Sonic Explorations in Divergent Landscapes

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Abstract

This document presents a portfolio of ten composition projects produced between September 2010 and June 2014 created by composer Jon Hughes working in collaboration with a number of artists and researchers. Each individual chapter deals with a separate project, and is accompanied by a Data Drive presented alongside the text as an integral part of the submission. This contains audio, video and other supplementary material. There is also an introductory essay, Chapter 1: *Footprints and Philosophy: Sonic Explorations in Divergent Landscapes*, designed to set the composition portfolio in context.

Although contrasting in terms of content and media, the ten works presented here share a number of common conceptual threads. They all involve the use of sound to reveal, uncover, communicate, and to map hidden aspects of the subject matter explored with each individual project, whether that be mathematical principles (*Phase Revival*), the shared experience of landscape (*Terrarium, Hydrology, Another Place*), principles from evolutionary biology (*Transmission*), or the rich complexity of shared acoustic space (*A Dip in the Lake*).

A further related common thread is the use of large-scale ambisonic speaker arrays (*Terrarium*, *A Dip in the Lake*, *Phase Revival*, *Sonic Horizons*, *Hydrology*). This gave production teams the ability to create fully immersive audio/visual environments in which hidden themes and concepts referred to above could be better communicated. Working together with fellow collaborators, it thus became possible to create cultural interventions in the form of portable, immersive public spaces.

Other themes explored in the portfolio include the use of found sound, and the exploration of landscape narrative. Found sound is used extensively, in combination with instrumental and vocal material.

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Guide to the Data Drive

Each individual chapter presented here deals with a separate project, and contains a detailed contents page, a list of figures, and a Data Drive contents page. The Data Drive contents page refers to what I have called the 'Data Drive', a USB flash drive that accompanies the text, found in a plastic wallet at the back of the document. The Data Drive is an integral part of the submission, containing of a number of different types of files.

The Data Drive contents page in each project write up gives a detailed outline of what the drive contains, laid out visually in a way that corresponds to the way the files are organised on the drive. Items in bold type are folders, which always contain documents, and items in italics are actual documents. I have also put the 'address' of each document in the text in the form of a footnote towards the beginning of each project write up. For example, an audio file such as the stereo mix of Act 1 of *Terrarium* would be given a footnote like this[1], corresponding to its location on the Data Drive. The reader then needs only to plug the USB Data Drive into a computer and open it to find the file. The Data Drive also contains an electronic PDF version of this entire document.

The Data Drive contains a number of different file types:

1**. Audio Files:**

I have provided stereo files of all pieces, including the ambisonic pieces. These can be found on the DataDrive.

I have also included Bformat mixes of all the ambisonic pieces, in addition to stereo mixes. Bformat mixes can be decoded to any playback speaker set up available to the listener: one of the major advantages with Bformat is that it can be decoded to the available speaker configuration. I would suggest using Reaper[2] for playback of Bformat files. This can be used in conjunction with Bruce Wiggins'[3] decoder to suit the speaker setup available.

[1] See: /DataDrive/Terrarium Media/Terrarium Audio files/Terrarium 2012 Act 1 (Stereo).
[2] Available online: http://www.reaper.fm/
[3] Available online: http://www.brucewiggins.co.uk/?page_id=78

2. Video Files:

There are a number of video files included on the Data Drive. *Transmission* and *Ash Dome* both have complete videos of the dance performances. Unfortunately the complete *Terrarium* video is not available. There are a few video fragments however that can be found on the Data Drive. There are also short professionally made promotional films of *Terrarium*, *Transmission* and *Phase Revival*.

3. Other Files.

There are a good deal of supplementary files on the Data Drive, including for example programme notes, flyers, published research papers and scientific conference posters. There are also a number of folders of supplementary visual media, such as photographs. There is also an electronic PDF version of this entire document.

Acknowledgements

Thanks to my supervisor Bill Brooks, whose guidance, continued belief and encouragement throughout have made a difference in so many different ways. Simon Birch, without whom at least half of these projects wouldn't exist, and whose influence on my life and work has been so important - the work we've done together and our friendship is a continual source of inspiration. The unique and always entertaining force that is Stef Conner, who has been a rock solid, reliable friend for such a long time now. Becs Andrews for friendship and for the inception of so many great projects. Ben Elliot for friendship, and the great conversations and ideas that have opened up an exciting new field of interest and creativity. John Jacobs for being such a good friend and for the creative partnership that was so important in the early stages. Charlotte Pugh for all the help and support. Ben Eyes for the help over the years, and putting up with all my interminable late equipment returns. Ollie Larkin and Dave Malham for important technical assistance at key moments. Mike Brockhurst and everyone in the *Transmission* team for good times and inspiration. Debbie Purtill for the brilliant dancing. Sarah Shead at Spin Arts for all the help and for making *Terrarium* possible. Richard Rowland for the faith and interest that made a big impact in the early stages, and which led to getting PhD funding in many ways. Anna Goldbeck-Wood for continued friendship and inspiration. Alex Harker for good laughs and the foundational Hes Lane years. Rosie Calton-Willis for the friendship in the early stages. Robin and Graham Bier for the vocal adventures: singing in caves, singing in China, and singing everywhere else. Hannah Gibbs for friendship and lots of interesting conversations along the way. India Bourne for being a good friend throughout, despite the long distances involved. John Brigg for lots of interesting chats, notwithstanding the complexity of the situation at times. Lizzie Marshal for her beautiful voice, and for help and good times in the early stages. All the staff at the University of York Department of Music, especially Tim Howell for his support at some key moments, Ambrose Field for encouraging and supportive interventions throughout, Neil Sorrell for gamelan related adventures, and Jenny Doctor for conversations several years ago that proved to be very important. Judith Buchanan and all at the Humanities Research Centre for the investment and help. Frances Jones for fun times, support and good friendship in the closing stages. My brother Rich, and sisters Bridget and Bec for putting up with me being a bit mad over the years. And finally my parents Phil and Liz Hughes, without whose help and support nothing would have happened, and who are a continual source of inspiration to me.

Author's Declaration

I declare that, except where explicit reference is made to the contribution of others, that this doctoral thesis is the result of my own work and has not been submitted for any other degree at the University of York or any other institution.

Preface

The following document presents a portfolio of ten composition projects produced between September 2010 and June 2014. This body of work was created by the composer Jon Hughes working in collaboration with a number of artists and researchers. Each individual chapter deals with a separate project, and contains a detailed contents page, a list of figures, and a Data Drive contents page. The Data Drive contents page refers to what I have called the 'Data Drive', a USB flash drive that accompanies the text, found in a plastic wallet at the back of the document. The Data Drive is an integral part of the submission, containing a number of different types of files. It is explained in detail in the Guide to the Data Drive, page ix. There is also an introductory essay, *Footprints and Philosophy: Sonic Explorations in Divergent Landscapes*, intended to set the composition portfolio in context. Following this initial introductory essay, the composition projects are presented in chronological order, as set out below:

- Chapter 1: *Footprints and Philosophy: Sonic Explorations in Divergent Landscape*, an essay serving as an introduction to the composition portfolio.
- Chapter 2: *Snow Cradle*, a solo album of electronic music derived from samples of Central Javanese gamelan and techniques drawn from Karawitan.
- Chapter 3: *Ice Pictures*, an album of improvised and electronically generated music made in response to specific pieces of artwork, created in collaboration with gamelan musicians John Jacobs and Charlotte Pugh.
- Chapter 4: *Ash Dome*, a dance piece based on the work of British sculpture David Nash, created with choreographer Simon Birch and 26 dancers from the Northern School of Contemporary Dance, Leeds.
- Chapter 5: *Another Place*, a performance piece for solo recorders and fixed media based on a coastal walk in North Yorkshire, created with recorder player Charlotte Pugh.
- Chapter 6: *Terrarium*, a dance piece based on the experience of the specific landscape of the North York Moors, created with choreographer Simon Birch.

- Chapter 7: *A Dip in the Lake*, an outdoor ambisonic sound installation about the shared acoustic space of an urban landscape.
- Chapter 8: *Phase Revival*, a kinetic ambisonic sound sculpture based on the physics of spectroscopy, created with chemical physicists Dr Mike Nix and Professor Ben Whittaker from the University of Leeds.
- Chapter 9: *Star Carr: Sonic Horizons of the Mesolithic*, a research project and outdoor ambisonic soundscape and installation charting the sonic experience of people populating the ancient archaeological site of Star Carr.
- Chapter 10: *Hydrology*, an ambisonic dance piece about water and our relationship to it in the landscape, created with choreographer Simon Birch and 13 dancers from the Academy of Music and Theatre Arts, Falmouth University.
- Chapter 11: *Transmission*, a dance piece and interactive installation concerned with the transmission of disease and its relationship to social networks, created with biologist Professor Mike Brockhurst from the University of York, artist and producer Becs Andrews, video artist Phil Tew, composer and sound programmer Dr Tom Mitchell, and electrical engineer Seb Magwick, and choreographer Simon Birch.

Although contrasting in terms of content and media, the ten works here share a number of common conceptual threads: they all involve the use of sound to reveal, uncover and communicate, and to map hidden aspects of the subject matter. For example, with *Phase Revival* (see Chapter 8) visual artists, composer and scientists collaborate to construct a kinetic sound sculpture based on the physics of spectroscopy: an ambisonic sound fabric, constructed from the oscillations of the installation itself, helps to create a meditative public space. In this space, previously hidden mathematical principles are made manifest, re-presented sonically and in physical form. With *Sonic Horizons of the Mesolithic* (see Chapter 9), the focus shifts from science to archaeology, using sound to examine the hidden biography of an ancient landscape: composer and archaeologist develop a methodology to explore landscape narrative through sound, creating a 34 minute long soundscape working with archaeological data from the world famous Star Carr site in North Yorkshire. Here, ancient objects reclaimed from the landscape are animated sonically; the narratives of hidden lives are revealed and layers of previously silent historical strata are made audible. With *Terrarium* (see Chapter 6), the

shared experience of a specific landscape and geographical region is uncovered: *Terrarium* is an outdoor dance installation, with the dancers housed in a transparent bubble set in the center of a 30 meter diameter ambisonic circle of speakers. Composer and choreographer sought to distil and re- present their shared experience of the North York Moors in this piece, developing a language using found sound, instrumental composition and physical movement as modes of expression.

A further related common thread that many projects in the portfolio share (*Terrarium*, *A Dip in the Lake*, *Phase Revival*, *Sonic Horizons*, *Hydrology*) is the use of large-scale ambisonic speaker arrays. This gave production teams the ability to create fully immersive audio/visual environments in which hidden themes and concepts could be better communicated. Sound is particularly effective in this context, as large-scale sound fields have a unifying effect, helping to define a work's boundaries: sound acts as a kind of sonic glue, drawing people in and establishing acoustic territory. Working together with fellow collaborators, it thus became possible to create cultural interventions in the form of portable, immersive public spaces. This enabled the work to be more effectively communicated and to reach a more diverse demographic. For example, *Terrarium* was experienced by over 10 000 people, being performed outdoors across the North York Moors, central locations in the cities of London, Hull, Leeds and Sheffield, and overlooking the ocean from the cliff tops of Cornwall: as a result, *Terrarium* reached beyond the range of those who regularly attend the concert hall or theatre.

Other themes explored in the portfolio include the use of found sound, and the exploration of landscape narrative. Found sound is used extensively, in combination with instrumental and vocal material.

1. Footprints and Philosophy:

Sonic Explorations in Divergent Landscapes

Footprints and Philosophy: Sonic Explorations in Divergent Landscapes

What this essay is for?

This essay functions as an introduction to the composition portfolio as a whole. It is not intended to give the reader a description of the creative process involved in making each piece; that is something I do in detail in the project write ups themselves, Chapters 2 through to 11. My intention here is more to give a sense of the overarching themes and ideas that emerge from this body of work and from my creative practice.

In much the same way as music is granted the freedom to abandon linear narrative and to be flexible in terms of its form and construction, so I claim the right to use text and language in a comparable way here: as a freely employed creative and expressive tool. Language and text has the facility to communicate in different ways, and below I'm using it in a way that I consider to be most appropriate for the task at hand. I would define that task as follows: to communicate what I think and feel to be the essence of the composition portfolio and of the processes employed to make the work. The reason I am taking this approach with the text is because I think it's the most effective strategy: I don't feel that I can fall back on more regular and formulaic ways of using text and language if my interest and priority is in communicating to you, the reader, something meaningful about my work. The heart of the point I'm making is this: I don't want to use text here to 'rationalise' the creative process, because the creative process as I experience it is not something I would describe as rational.

It seems evident to me that our experience of life doesn't happen in logically coherent sentences or fall into neat and tidy paragraphs, and I do not accept that artistic creative practice is a rational, 'balanced' process. In my experience, human consciousness is not, in general, a rational place in which to be, and this is the location from which art works arise and coalesce. The experience of consciousness can perhaps better be described as a fragile, ephemeral and multi faceted *construction*: habitual ways of seeing and thinking make it easier for us to forget that

it is something we *construct*. Furthermore, that construction process involves a lot of filtering out of information: I would suggest that what are generally considered to be 'rational' and 'stable' ways of thinking, 'well adjusted' modes of thought and action, are brought about more through a reduction, not an increase, of consciousness and awareness. I would argue that what passes as sanity in our culture often comes about through a narrowing, not a widening, of the aperture of awareness: we often filter out aspects of ourselves and the reality of the world around us in order to function and survive.

Although at a superficial level of self reflection it might appear that we experience consciousness and time as a continuous unbroken stream, if we stop for a minute and think, it's clear that our experience isn't really like that. We live day to day in what I would better describe as a 'flux' state: an ever changing, fluctuating 'now'. That 'now' itself contains a complex mosaic of past, present and future. To quote William James:

> Consciousness is in constant change. I do not mean by this to say that no one state of mind has any duration – even if true, that would be hard to establish. What I wish to lay stress on is this, that *no state once gone can recur and be identical with what it was before*. Now we are seeing, now hearing; now reasoning, now willing; now recollecting, now expecting; now loving, now hating; and in a hundred other ways we know our minds to be alternately engaged. [1]

So according to this way of seeing things, consciousness is a stream of perceptions in the present moment intermingled with reflections on these perceptions. The 'now' is constantly folded back into itself and reflected upon in the 'now' that follows. And then this new 'now' is compared with memories of a more distant 'now', and imaginings of a future 'now'. The conception is of a multi-layered collage of experiential phenomena in a state of constant flux and change.

So, to return to the earlier point, if text is used to describe life and experience, and if it seeks to create an effective analogue of our conscious experience with shining black ink on the page, then it may well need to operate in a similar way. Rather than try and fit life into tidy sentences and paragraphs, perhaps language should be at the service of life's description; used *creatively* in an attempt to describe conscious experience. And this composition portfolio is essentially a record of life lived: it is about life and experience, not something called 'composition' that is abstracted and sealed off from life, from living and being. So it follows that I should be more creative with my use of language when attempting to describe the work and my lived experience that created it.

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[1] **JAMES** 1984, page 141.

I've come to realise whilst writing this essay that consciousness – human consciousness and experience – is a primary interest and concern that underscores my composition practice: it is a central theme. My work is a reflexive process through which I explore my own and other peoples' consciousness and experience. Through this enmeshed process of composition and living, what I'm looking at and returning to again and again is the following question: how can I better relate to others, to myself and to the world around me? This suggests that my work is primarily about communication, because consciousness and communication are inseparable. Our shared consciousness can be imagined as a shared collective experiential space that we inhabit together: the platform or stage onto which the information brought to us by the five senses is projected, experienced, analysed and 'played out'. As such, contact and communication with one another depends on the permeability of the borders of our conscious awareness. The degree to which we are aware of others, and are able to empathise with and connect with others is bound up with borders and boundaries, awareness and sensitivity to alternative ways of seeing. So, at the heart of my work in an interest in exploring ways in which I might be able to effect consciousness, our shared experience, and to change it, both for myself and for others. Thinking in this way, perhaps artwork creates a kind of 'no mans land' between individual psyche's: an external point of reference and meeting place that enables us to cross borders between minds and so to share our experience.

This is not something I am always aware of, this central theme in my work. I can't always see it myself. But I can see it now, and I am trying to capture that perception in *this* text, in *this* moment: the act of writing itself brings about a change in awareness. The transductive process of manifesting internal emotional and psycho-physiological 'states' in the medium of language *itself* creates new levels and degrees of understanding. And right now I am trying to capture the essence of these ideas somehow in the present moment that I am experiencing here at my writing desk, on my laptop. Because I *am* writing this in the moment. I am constructing *narrative* in the present that will become a part of *your* present, the reader, whoever you are, and whenever and wherever your present moment might be.

It is important, if one is to understand the nature of this text, to understand that I hold the following view: *there is only the present moment*. That is my view: that there has only ever been and only ever will be the eternal present moment. The rest is narrative: it is a narrative construction, a constructed story. I am not denying that there is an external world out there; it's just that gaining concrete knowledge regarding the nature of it is a difficult thing to do. The sense many people have of a concrete, fixed idea of events that happened in the past and of what might happen in the future is frequently an illusion based on little real evidence. It is, in my view, extremely important to be aware of this, as constructed narratives have the habit of fooling people: if not checked and carefully questioned and examined, they can often appear as

incontrovertible 'truths' about the past, present and future: 'common sense' facts that are beyond dispute. So what you are reading here, the words on this page, is another narrative construction about imagined futures, memories, ideas of the self and one's relation to the world. Woven into this text are my own hopes and fears, traces of my own misconceptions and fragments of unconscious narratives. Such narratives have been absorbed from the culture in which I live and are embedded here, along with everything else. For me it seems absurd to think that this text, or any other, may be objectively 'true'. Rather it is an imagined construction and trace of a lost present moment for the author, which is then reconstructed by the reader: reimagined and re-remembered in the reader's conscious experience, in their new 'now' that is itself constantly becoming and changing. I will return again and again to these ideas and themes in this essay. For now I am just introducing them into the discussion; beginning to map out the territory.

To recap, let the points stand that conscious experience is complex and multi-layered, and that text can be used in creative ways to reflect that on the page. Moreover, my opinion is that it *should* reflect that complexity, as that will encourage the writer and reader both to be more consciously aware of the inherent limitations of text as an analogue for experience. Furthermore, I put forward the view there is nothing but the present moment, and the rest – our memories of the past, our knowledge of what we think is history, and our imaginings of possible futures for example – are constructed narratives that exist only in our mind. There may or may not be correlations with our thought processes and actual events in the external world, but this is always extremely difficult to establish, and so caution is advised. What I'm emphasising here is an awareness of the habit in academic writing of using text in a way that professes to gain mastery over the complexity of experience. We might feel we are achieving something when we make up stories and construct narratives on paper, but we must be wary of the tendency to 'edit out' the complexity of our individual and shared experience of the world and the complexity of events that happen in order to make it fit textual norms: in order to write a 'paper'.

Navigating between different worlds.

For me, bound up with my interest in conscious experience and its representation is a deep fascination with the process of navigating between different states of being and experience: navigating between what I might call different experiential 'modes'. And by this I mean the process of building bridges between different worlds: building bridges between different ways of experiencing, and different ways of seeing and feeling. This process I am trying to describe and articulate, of navigating between different modes of being and ways of seeing the world and feeling about the world, is an essential part of my work. So at its heart this composition portfolio is about feeling and value – about how I *feel* about living, about being alive, and about states and modes of *being*.

And as I said earlier, I am using language creatively here to evoke a sense of what it is I mean. There is no direct correlation between these words and 'theories' about art, or specific philosophies. I am using language creatively in an attempt to express *my* experience of the world. This essay is a composition: think of it sitting somewhere between prose, poetry and music.

For me, music is a kind of existential prophecy – it is in part about creating possible new feeling and being *states*. Divorced from the constraints of the material world, it can move faster in developing, organising and formulating analogues of new social relationships and ways of seeing.[2] It is, as such, a bit like an experimental laboratory for experience, except that it is not hermetically sealed off from the world and from life like a laboratory, but a part of it. Music 'folds back' into our experience and itself becomes a part of it and the world in which we live. We all know that music listened to at a certain time of life can remind you of that time when heard years later: it can bring back the emotions, sensations, the 'feeling tone' or 'experiential cloud' of a period of our lives. But also music *made* at a certain time of life as a composer reminds you yourself of that time; the time in which you wrote it. So, when you are reminded about the experiential cloud of a period of your life in the past because of music made by *another* person, you are connecting with *their* stored experiences through the music, and that 'folds back' into your experience. It is an intermingling that is happening in the shared cultural space; an entangling of experiences, experiential clouds, feeling tones, and ways of being and seeing the world.

I will return also to this theme again throughout this essay. For now this is just an introduction, a beginning, an exposition of some of the ideas that I will return to, go on to explore and examine. However, as I've alluded to, I don't intend to do this in a particularly rational way, whatever that means.

Some questions.

Some of the central questions examined in my life and through my work are, I think, as follows:

[2]Attali says something similar in *Noise* (**ATTALI** 2006, page 11), although I am emphasizing the experiential nature of music and it's ability to create new ways of seeing and feeling in the world, which is different to Attali's notion as music as prophetic harbinger of different social organizations.

Why is it that sometimes life is illuminated, numinous, a joyful experience, but then sometimes life doesn't feel that way, but is drained of meaning? How can we navigate away from a state without meaning, towards a more effective and positive way of seeing the world? In my work I am trying to create *navigating strategies*, designed to move between these different worlds and ways of feeling and seeing. I am convinced that through the creation of artwork we can create positive change in society by making interventions that help to build bridges between different ways of seeing what is here before us in the eternal present.

I believe we desperately need such bridges in our culture in the West, one that is fixated with what I consider to be a materialistic view of life that is dampening the vitality of a potentially more rich and vibrant experience. I think that is the message of art: to unlock human potential for experiencing, feeling, thinking and seeing.

As William James says in *The Varieties of Religious Experience*, we sometimes encounter states of mind in which:

> […]we read in common matters superior expression of meaning. The deadness with which custom invests the familiar vanishes, and existence as a whole appears transfigured.[3]

My life is full of such moments, and I have them every day. My work is about trying to communicate them and give them form, manifest them and encourage others to see the world in the same way. It's about manifesting spirit, making ephemeral experience more concrete, and, as I said earlier, about building bridges. It's also about finding ways of affirming that *I* exist – that the way I experience the world has a place and some value; as such it is about a search for identity.

These points, and everything I'm saying, is of course to do with my own subjective feeling and experience. It is one possible narrative that I am constructing here using metaphor and symbol. Language is not a photograph; words are only symbols, and this particular sentence is referring to itself, like a dog biting its own tail.

Rather than seek to explain in a linear narrative what my work is about, I am trying here to create a text that will make the reader connect with what the work is about in a different way. You will come away from the text having been presented with a collage of interrelated ideas, thoughts, images, philosophical concepts and feelings. I will use repetition, looping and other ways of telling a story, like I do in music. The text is designed to change the way you feel and

[3] **JAMES** 1982, page 476.

see things, just for a moment perhaps. I am trying to draw you into my way of thinking, viewing and experiencing the world. It is not meant to present a well-constructed argument, but rather it is supposed to draw you into the orbit of my way of thinking, and through that to leave a feeling and thinking *residue*. So it will jump about from one nexus of ideas to another, and make no apology for doing so, because that is what my life and experience is like, which is where the work comes from. As a consequence, like a piece of music, this text has an emotional form, as well as containing multiple sequences and groups of ideas. It has crescendos in it, and fluctuations of intensity. For me, every day of experience contains fluctuations of intensity: days are like experiential compositions; they have a timeline, form and meaning, moments of elation perhaps, and moments of tension and relaxation. There are moments where consciousness becomes dislocated, moments that are passionate, and there are some periods that are less coherent than others. In life, sometimes an idea will seem real and clear to me; I jump on it as being true. But then I look back at the statements I've made when I'm in another qualitively different emotional state, and the exact same statements don't seem to have the ring of truth they once did. But then I see the same statements again another time and they seem dead right, pinpoint accurate once again. And likewise so is this text sometimes less coherent than at other times. That's because it is an attempt to create an analogue, a transduction. Some passages are more logical and restrained than others. This is deliberate, because this text is about my life and living, the art I've created as distillation, residue and product of living over the last four years and what it has meant and still means to me. I am shaping the text to suit me as an expressive medium, not the other way round. As I said before, I am not shoe horning my experience of the world into the pre-existing formal constraint of an academic style. What would be the point of that? It doesn't fit.

The real point is, that to abstract narratives *about* experience *from* experience and present them on the page in sentences is not to accurately *present* those experiences. You cannot take the life out of living and represent it with printed symbols without loosing a great deal. At best you can draw some kind of loose analogue between life and the text. And I'd suggest that at least we should always be aware of that process when writing or reading about living. We should consciously acknowledge it, rather than pretend that it isn't true and then get confused about the limitations of text, about the differences between the text on the one hand, and being on the other. For example in this essay, I am asking myself some questions: why did I do the work? What's the work for? Neat and tidy rational answers to these questions would surely in themselves be constructions of a lie.

So can I ask you to bear with me and go with the flow? Don't feel the need always to extract specific packets of data or information from the text; this is the humanities, not the sciences, and as such it is feeling and experience that I am interested in exploring here. The objects of our enquiry in the arts – the art works we look at, experience or create – are themselves distillations:

transductions of feeling and experience melded into rich modes of expression in different media and into different forms and shapes. They are singularities of experience, being and time. Such objects are the manifestation of our inner world, of our private joys and sorrows, into sonic, literary, embodied or visual art works. They are *spiritual manifestations* and as such they can be viewed as *sacred objects*. Please read through the text with attention, be in the present, and see how it makes you feel and what thoughts it fires in your mind. It is sincere, not cynical; I am trying to communicate honestly with you, as best I can, whoever you are. Of course text can be used in many different ways, and for many different purposes, and they are perhaps all valid. I'm trying to make it clear what the function and purpose of *this* text is, and counter any arguments regarding the validity of the approach I'm taking.

Before moving on, I just want to clear up the use of the word 'spiritual' in this essay. When I use the word spiritual, I don't mean to talk of something pertaining to a specific religious dogma or mystical belief system. I mean more 'concerned with the spirit' rather than with matter or material objects. As a yoga teacher and practitioner, I have a daily commitment to a spiritual practice, and I will use a quote to back up my way of thinking on this subject from yoga literature:

> We make a clear distinction between mystical (the claim to the perception of a supernatural reality experienced by some extrasensory means) and spiritual (from the Latin *spiritus*, meaning breath, the animating, sensitive, or vital principle of the individual).[4]

I am using spiritual in this way: to refer to the animating or vital principle of the individual personality, and to refer to the realm of experience as independent from matter. To me the idea of the spiritual is very important in terms of talking and writing in the humanities, because what we do and experience happens in what I would call an ephemeral, spiritual realm. This is the realm of consciousness that I am talking about here in this essay and that is referred to in the quote above. Our conscious, imaginative and emotional shared *experience* is not a physical thing, and does not take place in the physical world as such. It may well be the emergent property of physical and biological processes, but *experientially* it is non-material. So we need in the humanities to develop a better language for talking about this place in which we work, think and imagine, and in which works of art are made. We need a word to talk about this realm of experience, which is at one and the same time outside and inside the material. 'Spiritual' itself is loaded with other connotation, so is perhaps admittedly not ideal.

[4] **KAMINOFF, MATTHEWS** 2012, page x.

William James identified this distinction very clearly in *The Varieties of Religious Experience*[5] back in 1901. For James the value of religion and religious practice was not about 'truth': not about whether religious belief systems present historically accurate facts or are accurate as descriptions of physical reality and the way the physical universe works. In contrast, religion is valuable for James as a force in our culture due to how it has a significant effect on consciousness and the personality: how religious practices in many different cultures around the world *changes* the nature of conscious experience. The parallel question to ask in terms of music and the arts is this: 'in what way does a piece of music or art work make us *feel differently* about life? What is its function and what does it *do*?'

Ten different pieces and what they are about.

Although contrasting in terms of content and media, the ten works presented here share a number of common conceptual threads: they all involve the use of sound to reveal, uncover and communicate, and to map hidden aspects of the subject matter. This statement leaves two questions to answer with each of the ten pieces under discussion: firstly, what is the subject matter in each? Secondly, what is revealed and communicated in each? So let's start by looking at each piece individually and at least try to answer these two questions if we can.

With *Snow Cradle*[6] there is first of all what I might call an interest in creating imaginary sonic landscapes: imaginary worlds of feeling, being and experience encoded in sound. The album is made from fragmented isolates gleaned from deconstructed Kariwitan.[7] I discuss the creative process at length in Chapter 2. However, in my view what the music is really about, beyond a description of what I did to make it (the form and harmonic/melodic content and that sort of thing) is the creation of imagined ways of feeling and being in the world: imagined ways of experiencing living. The same can be said for *Ice Pictures*[8]: both *Snow Cradle* and *Ice Pictures* were designed to be listened to on headphones or at home, or perhaps in the car, and as such they are ways of feeling and experiencing that can be transported around in the listener's own present moment and evoked at will. So the subject matter being uncovered and revealed is a way of seeing and experiencing, of feeling about living and being alive. I am also *looking* for this way of seeing and experiencing *within myself* through the creative process: I am trying to find it and present it. In *Snow Cradle* I am mining myself to find this alternative way of seeing and feeling. In *Ice Pictures*, it is a collaborative effort. But in both projects, and in all the projects in the portfolio, I am trying to find and manifest this 'spiritual' reality somehow – this different way of seeing,

[5] **JAMES** 1982.
[6] See Chapter 2.
[7] Traditional Central Javanese gamelan music.
[8] See Chapter 3.

experiencing and feeling. I am doing this by coding it in acoustic media: by coding experience in sound.

With *Ash Dome*[9] these same ideas apply. With this piece I am searching for a way of manifesting feeling and experience in sound. But this time, I am working directly and collaboratively with specific outside influences: the work of British sculptor David Nash, along with the choreographer Simon Birch and 26 dance students. Here the interest is in uncovering and manifesting responses to David Nash's work: the finished product and performance is our collective response to his output. Nash's work itself is an attempt to manifest his interior world: his inner life and experiential world. The chosen media in Nash's case is found wood: the media Nash uses to present this personal alternative vision of experience is found wood and fallen trees. David Nash uses found wood to create objects and shapes that stand freely in the world and in life. In our piece, these shapes resonate with composer, choreographer, lighting designer and performers to create new work. This work itself is a new manifestation of being and experience.

With *Ash Dome*, I also started to work with natural, environmental found sound: field recordings gathered throughout the composition process. For me fragments of recorded sound are fragments of time and experience. In *Ash Dome* I used these found sound fragment to construct music and sonic textures, and to inspire musicians to create new material. For example in the 'Bird Cello' section[10] I used bird song recordings from the Yorkshire Sculpture Park[11] and then worked with Min Song in the studio to create cello phrases in response to these found sounds. I was then able to use these phrases freely on my canvas: the phrases themselves could then be thought of and treated as brushstrokes of sound, emotion and experience: I could shape them and combine them with other sounds in the work, making the composite whole into something that had and still has meaning for myself and for others. So in this piece, and in other areas of my creative practice, I am dealing with fragments of time, emotion and experience, and reconstituting them into new collages. In this sense the performance space and the moment of performance becomes a reconstruction of and exploration of consciousness. It becomes a new possible way of being in a specific, designed space; a shared experience with audience and performer and a way of being together. I am emphasising here and through this compositional process the idea expressed earlier: that art is essentially about communication.

[9] See Chapter 4.
[10] See Chapter 4 for details.
[11] As a starting point for this piece the dancer, choreographer and myself visited David Nash's major retrospective exhibition at the Yorkshire Sculpture Park. The creative process is covered in detail in Chapter 4.

Another Place[12] is a collaborative work created with recorder player Charlotte Pugh. Here, I was searching *in* the landscape for inspiration and for meaning. Found sound recordings taken whilst on a costal walk from Whitby to Robin Hood's Bay were used as a starting point. The journey, the walk, had a *contour* and a *form* of its own. There was a moment when I moved from the sunlit cliff path down into the woods and the shadow of the trees, as the path led into a shallow valley and across a woodland stream. The stones were green with moss in the shade, and sunlight came through the spaces in the natural canopy above, playing on the water's surface. It is *this* experience that I try to capture and distil in the piece; this is the experience I try to make manifest. The subject matter here is, again, life and experience. I am seeking to reveal hidden aspects of life and experience: hidden moments of emotional and psychological shift and change as I move from cliff top to stream and back out into the light. As we live we pass through periods of tension and relaxation, periods of expansion and contraction. There is the blocking of our spirit and periods of spiritual growth. Musical forms of course reflect this: that is because they are formal analogues of the living process and life cycle: they are the bridges we build between experiential worlds.

With *Terrarium*[13] the shared experience of a specific landscape and geographical region is examined and explored. Composer and choreographer here sought to distil and re-present their shared experience of the North York Moors, developing a language using found sound, instrumental composition and physical movement as modes of expression. Again, here it is the shared experience that is the hidden aspect of the subject matter. The subject matter is consciousness and life lived as it was experienced for the choreographer and composer in the landscape. The choreographer and I spent many days exploring the North York Moors, and it is the peak moments of that experience of landscape that we seek to distil and capture in the music and dance, the text, the sound and the movement of bodies in space. With Terrarium, I developed my working methods and creative process considerably.

With *A Dip in the Lake*[14] I sought to uncover the inherent beauty contained within the everyday and apparently mundane. Or rather, that is what happened: I didn't realise it would happen when I started it, but that is the nature of Cage's piece. *A Dip in the Lake* is a realisation of a text composition by John Cage. The piece is about seeing one's everyday surroundings and life being lived for what it really is: astonishing and beautiful. It is a process that leads to a way of seeing, using chance procedures applied to a specific urban landscape. For me this piece was a discovery of the remarkable complexity and variety found in the city streets; in what can so easily be considered mundane and everyday. When the process of the piece is 'performed' and

[12] See Chapter 5.
[13] See Chapter 6.
[14] See Chapter 7.

carried out,[15] participants with imagination will find that the world *looks* different: everything that appeared so mundane before will seem fresh and new. So Cage's piece is about changing the way we see the world, and so he was also interested in building bridges between worlds, between different ways of seeing and being, and between different levels of consciousness and awareness.

With *Sonic Horizons of the Mesolithic*[16] the focus shifts from a present day urban landscape (as with *A Dip in the Lake*) to a present day that happened in the long distant past; in 'deep time'. In this project, we used sound to examine the hidden biography of an *ancient* landscape. Composer and archaeologist develop a methodology to explore an ancient landscape narrative through sound, creating a 34 minute long soundscape working with archaeological data from the world famous Star Carr site in North Yorkshire. Here, ancient objects reclaimed from beneath the ground, from inside the landscape, are animated sonically. Through this process, narratives of hidden lives are revealed and layers of previously silent historical strata are made audible.

With *Phase Revival*[17] visual artist, composer and scientist collaborate to construct a kinetic sound sculpture based on the physics of spectroscopy. An ambisonic sound fabric, based on the oscillations of the installation itself, helps to create a meditative public space. In this space, previously hidden mathematical principles are made manifest, re-presented sonically and in physical form.

With *Hydrology*[18] choreographer, composer and dancers are searching again for the beauty in the everyday. Related in terms of process to *A Dip in the Lake*, this piece involves the mapping of a specific modern landscape. But this time, there is a theme and the rules of the game are different: all sounds used are found sound recordings of water. So what is examined here is our complex relationship to water in the landscape. This complex relationship is brought to the surface; made manifest through the use of sound and the body in space.

Finally *Transmission*[19] again returns to scientific themes, as this project was created in collaboration with evolutionary biologist Professor Mike Brockhurst. The hidden subject matter in this case is disease and it's transmission in the human population. In *Transmission*, we are making manifest the underlying scientific forces that exist below the surface, outside of our day-to-day conscious awareness. Throughout this work the fragility of our consciousness and its balance against the backdrop of the natural world is a prominent theme. As human beings we

[15] The process involves identifying 467 points on the map of a city selected using chance procedures, and then recording sound at each location. Then the sounds are organized using chance procedures and played map using multiple sound systems.
[16] See Chapter 8.
[17] See Chapter 9.
[18] See Chapter 10.
[19] See Chapter 11.

stand between heaven and earth: in this piece, the dance floor is this human plane and the ground on which we stand. On this terra firma we are balanced between the extreme polarities of two invisible worlds: one is visible only when we extend our senses with the help of the electron microscope: the other, the reality of the wider cosmos, can be perceived only through the telescopic lens. Science tells us that our body is a battleground: viruses and our own cells fight against one another to evolve and counter evolve, and bacteria evolve resistance to the antibiotics we use to fight them. From a scientific perspective, our own consciousness can be seen as little more than an emergent property of these forces; the emergent property of the need for DNA to proliferate, regenerate and replicate. At the opposite pole, through the telescope rather than the microscope, we learn from the science journal *Nature* that a black hole has been discovered with a 12 Billion solar mass: SDSS J0100+2802 is a quasar that compresses the mass of 12 000 000 000 suns into the space of a single atom.[20] We now have access to this bewildering scientific knowledge: images from the electron microscope and the hubble space telescope alike fill our computer screens. Human consciousness in the early 21st century must somehow hold a position between these polarities, whilst new narratives take the place of old mythologies.

What can we see emerging from this overview?

So that is my overview. We can see themes emerging here: themes of landscape, of process, the use of found sound, and a pronounced interest in consciousness and experience.

The theme of landscape features heavily, and this is because landscape is where we live: it is the world, the stage, the playground of human consciousness and experience. It is the platform on which the *being* of our life plays out and the dome of experience in which the five senses operate. The landscape also has multiple layers; maps are perhaps so fascinating to us because they express the multiple layers that are present within the landscape narrative. It is interesting to see an old map of an area in which you live for example, because you can see old lost narratives and stories overlaid onto the present. It makes one aware of multiple narratives and stories that have been lived within the landscape, right under our feet. The spirit of men and women, of lives lived and the experience of love and of intimate moments, of betrayal and hate: all this is stored somehow in the bricks, the earth, the rock and the stone. And also such maps make one aware that in one sense the past still exists in the present moment, if we are sensitive and allow it to filter into our consciousness. To do so adds an extra dimension to our being, our consciousness, and through that process our experience of living in the present can be enriched and enhanced. I believe that the function of my work is bound up with a desire to create immersive public spaces designed to bring about such a *raising* of consciousness. Through this process I am encouraged to be aware of more elements of the present than I regularly encounter when engaged in a more 'everyday' or 'habitual' way of thinking and experiencing the world.

[20] **WU** et al 2015.

My hope is that through the creation of the work I can communicate this way of seeing and create it for others. This is part of what I talked about earlier regarding bridges, and also what I mean by revealing hidden aspects of subject matter. I see my work as the process of creating cultural interventions designed to foster and encourage this kind of approach to life and way of seeing the world, both for myself and for the audience.

Like the maps mentioned above, living contains many hidden dimensions that can easily be overlooked: for example, the world of feeling. My work is often about making other people and myself more aware of feeling: about manifesting feeling through sounds, imagery and the use of the body in space.

Related to the idea of maps and landscape is the use of found sound and field recordings throughout the portfolio. Such material features heavily in *Ash Dome*, *Another Place*, *Terrarium*, *A Dip in the Lake*, *Sonic Horizons* and *Hydrology*. This tendency is related to my own perception of sound recordings as recordings of time and experience. As such recordings have a numinous, magical quality: the recording and manipulation of sound enables me to take threads of lived life and experience and weave them back together again in new configurations and constructions. I find recorded sound an inspiring starting point and powerful tool in creative work because of this inherent power and energy.

Looking over the works contained in this portfolio I can see an attention to and an interest in *process*. Process is important, and in my work I often seek to use process to uncover and communicate. I design creative processes that will enable feelings and experiences to be found and revealed in the present. This requires a balance between plans and no plans, and also the willingness to abandon plans if necessary. The processes themselves are designed to enable meaningful things to be discovered and uncovered, but they do not however have a *specific* target in mind: the target, if there is one, is to find something that is not yet known or seen, but relevant to the present moment; to *uncover* and *reveal*. As such, the process is about trying to be in the moment: to be mindful of the present, and to step outside of habitual thought patterns and ways of seeing that reduce rather than increase awareness.

That's the end of the introductory part of the text: now we are going somewhere else. That was the exposition, and we move now to the development section.

Plans are good for some things, but not for others.

Plans are good for some things, but not for others. Sometimes they need to be flexible, to adapt to circumstance and specific context. I had no idea what my PhD was going to be about

when I started it: I thought I knew, but I didn't. I had a plan and it made for a good application back in 2010, but that plan turned out to be completely different to what I actually did. It seems to me, now, in retrospect, to be clear what it was I was doing, and what happened in the end seems, in a mysterious way, to be inevitable. Now, with a little temporal distance, I can see the links, the threads, a number of themes and ideas emerging more clearly through the body of work. But I didn't *know* that in the beginning, and neither did I know quite what I was doing at the time. I was aware of some things: some elements of the jigsaw, some parts of the puzzle. But I couldn't see them as clearly as I can see them now.

This suggests that perhaps there's a lot more going on and influencing my thinking at any given moment than I'm directly conscious of: things I don't quite know about, until after they happen; only then can I see them better. Or rather, only then can I detect their presence through looking at the traces left behind. This PhD submission is a record of the traces left behind: the projects and pieces are not well executed plans brought to fruition, but the traces left behind by the making of themselves: footprints.

Right now, writing this, I'm asking myself some questions; there's lots of questions spinning round, whirring round in my head as I look at my fingers resting on the keyboard. My visual attention is moving, from the keyboard back to the screen, then out of the window to a band of sky over the slate rooftops. I can hear the hum of a central heating system, a car passing on the street below. I'm on the 3rd floor, 17 Wenlock Terrace, York, UK. It's a sunny day in late Autumn, November 2014. I was up till 5 am writing last night. I'm tired, but happy: it's all coming together. Next week, I'm handing this in, and the next day I'm going to India to study Yoga for seven weeks. All this information, this sensory and perceptual data and detail about my life as it's happening right now is becoming part of the text, and that's because I chose to include it here and to write it down. It was already there; it was already part of what I was thinking, seeing and feeling; the change came when I decided not to edit it out of the story I'm telling. For me, this decision regarding the editing of text – what to leave in and what to leave out – raises some interesting questions. For example, where does my life end, and the text begin? Where should I draw the line concerning what's part of the text and what isn't? Is this text supposed to be a representation of something real, or just a neat and tidy, noiseless white lie about the process of making things, of creating things? The dominant question rattling round inside my head, the one making more noise than all the rest, is:

What is the point of what I'm writing? What's it *for*?

I'm not asking this question in a cynical way – I'm not implying that this introductory text is a pointless exercise and has no function. It's more that the question itself is an exercise, a process: a way of helping me to clarify things which in turn might help me to write something

that has meaning. A way of trying to get to the heart of what this introductory body of text might be able to offer, so that I can focus better on writing something that communicates, that might have value. I don't want to just go through the motions; construct a neat and tidy document that ticks the right boxes. I don't want to strip out the complexity, to simplify life beyond all recognition, drain out the colour, the feelings, the perceptual detail, water it down to a monochrome description, no more than a detailed list of events on a timeline. I try and ask the same question when I make music: what's it *for*?

When I was about 19, I suffered a sort of breakdown, kind of. Perhaps it could be better described as the shock of an *awakening*. Whatever it was that happened, I changed. I started getting interested in the visual arts, literature, music, everything really: I woke up to it all. It felt as if I'd been asleep since I was about seven years old. I wanted desperately to transform myself, to become something else, something better. And I didn't like what I was, what I had become as a result of where I'd come from. I decided I needed to understand more about my relationship to myself, to others, to my family, to nature and to history. And so I decided to go into therapy, and became obsessed with psychoanalysis and psychology: with the ideas of Carl Jung, Eric Berne, Eric Fromm, Albert Ellis. I also became interested in the psychophysical, specifically through yoga, and also the Alexander Technique. My Alexander teacher in London, where I was living at the time, a wonderful woman called Anne Battye, said something to me once in a lesson that has stuck in my memory: that Alexander Technique is about building bridges, developing ways of getting from one psychological state to another through physical means. It is a tool that allows one to create the physical conditions – through muscle relaxation, the management of our experience of energy and the release of unconscious tension – that can build bridges between psychological states, or modes. I've had the same experience throughout my life with art, literature and music. They have been signposts for me, bridges to better worlds, better ways of being and feeling.

I remember around that same time I was first encountering abstract art. I remember thinking – 'what is it *for*?'. It had a powerful effect on me, suggesting a different way of seeing the world. The question was: in what world do people decide that creating such vibrant, dynamic images that don't have any obvious 'use value', or monetary value, is something worth doing? I wanted to know more about that world from which these objects came. I spent time alone staring at Holbein's portraits in the National Gallery: 'A Lady with a Squirrel and a Starling', 'The Ambassadors' and the portrait 'Christine of Denmark, Duchess of Milan'. I would also often visit the British Musuem. Looking at the human faces, and gazing at the objects and sculputres on display, I realised I was exposed here not to 'facts' about history, but more to traces left behind; traces of the psyche of a particular historical period, or way of seeing, captured somehow in the brush strokes or the stonework. I wondered how that could be so? What was this intangible realm that I was encountering in these works and others? How could that sort of

information be coded aesthetically, in the strokes of a brush, in marks left by oil on canvas, or the shape of a pot of statue?

According to Deleuze and Guattarri, 'Like all painting, abstract painting is sensation, nothing but sensation'.[21] And that makes sense to me now, reflecting back. It was neither in the painting, or the object, or in me, this essential quality I was seeing. The value of the work resided in my perception and the analysis and processing of my sensations. The painting or object is in this reading a dynamic, active agent: the physical catalyst for an *event*, more than an object. Brian Massumi, in his book *Semblance and Event*, suggests that:

> [A]rt claims the right to have no manifest utility, no use-value, and in many cases no exchange-value. At its best, it has *event-value*.'[22] It is something that happens. A painting, a piece of music, a novel, a myth, a poem: they are *active agents* operating in our culture.

I find a similar point being articulated in the writings of Wassily Kandinsky. Writing in 1910 in *On the Spiritual in Art*, Kandinsky is trying to articulate his own artistic metaphysics, introducing the concept of 'spirit' into the discussion:

> In an obscure and puzzling way, the artist develops a work of art. As it gains a life of its own, it becomes an entity, an independent spiritual life, which, as a being, leads the life of material realism. It is, therefore, not simply a phenomenon created casually and inconsequentially indifferent to spiritual life. Instead as a living being, it possesses creative active forces. It lives, has power, and actively forms the above-mentioned spiritual atmosphere. [23]

Kandinsky, in this wide ranging text, speaks of what he calls a 'spiritual principle' at work across the arts.

To me this is a key area for which I feel that I need to develop a better language. To be able to talk more fluently about this other world: the world of the imagination, of spirit, of feeling and experience. This, for me, is where the real action is, where things happen. To get beyond the idea that poems, music, archaeological artefacts and buildings are just things: objects to be examined, put together in lists and taxonomies. I want to develop new language and concepts

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[21] **DELEUZE**, and **GUATTARI**, 1994, page 183.
[22] **MUSSAMI** 2011, page 53.
[23] **KANDINSKY** 1946, page 91.

for myself that enable me to talk more effectively about them. I feel that there is a language deficit when it comes to talking about the spiritual, emotional and imaginative in our culture.

Art objects are distillations. They have cultural mass.

I'm suggesting that art objects are catalysts, connected in a complex web, a *rhizome*.[24] And that they are also *distillations*. I am talking about artwork, in any media, as *distillations* of time, memory and experience: distallations of life lived. Objects that are art are perhaps objects with unusual amounts of time and meaning packed into them: they are distilled, time-dense objects. If a composer spends 400 hours working to create a sonic image that is four minutes long, there is a lot of time invested and packed in to that object, a lot of experience. What's created is an unusually dense object in the cultural cosmos; and as such it has a correspondingly strong gravitational pull. Looked at from this perspective, art is a kind singularity, or a neutron star: those small squares of fabric and paint in the National Gallery I referred to earlier have been pulling people into their obit for centuries, demanding attention, fixing the gaze. If judged according to the amount of physical space they occupy, these objects punch far above their weight. That's because they have high levels of what I call 'cultural mass'.

I need a way of measuring cultural mass. Can we perhaps define cultural mass as a measure of some quantity or another? Of 'potential'?

For Brian Massumi, all objects possess 'potential'. Speaking about form in conceptual art in *Semblance and Event*, he uses an example from the visual world, the world of visual experience. He suggests that looking at a three-dimensional object, for example a hollow wooden box, we don't just see the object as if abstracted as a shape from a two dimensional plain. We also see lots of other qualities in it. He suggests that perception is an active and collaborative process between the viewer and the object. We see it's volume, we know it has a back and a front, and takes up space, we get a sense of its weight, and if, for example, it is made of stone or wood. All of these perceptions are part of the *seeing* of the object. In themselves they are *potentials* of action and of activity, and they are bound up with our *imagined interactions* with the object in time and space. We might, for example, lift the object at some time in the future, or we might walk around it.[25]

Massumi suggests that, furthermore, this type of multi-layered perception is a perception of 'form', and that form has very real content that has the quality of being both there and not there:

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[24] **DELEUZE** and **GUATTARI** 1987, page 1-28. I will discuss the Rhizome concept in detail below (page 13/14).
[25] **MASSUMI** 2011, page 42.

> Voluminousness and weightiness are not in themselves visible. But we can't not see them when we see an object. In fact, we see them *in the form of* the object. Form is full of all sorts of things that it actually isn't – and that actually aren't visible. Basically, it's full of potential. When we see an object's shape we are not seeing around to the other side, but what we are seeing, in a real way, is our *capacity* to see the other side. We're seeing, in the form of the object, the *potential* our body holds to walk around, take another look, extend a hand and touch. The form of the object is the way a whole set of active, embodied potentials appear in present experience: how vision can relay into kinaesthesia or the sense of movement, how kinaesthesia can relay into touch. The potential we see in the object is a way our body has of being able to relate to the part of the world it happens to find itself in at this particular life's moment. What we abstractly see when we directly and immediately see an object is *lived relation* – a life dynamic.[26]

So Massumi is suggesting that there is a kind of 'aura' of form in the mind of the perceiver, that, together with the physical object itself, constitutes the totality of the object: potential is *part of* the object. The object impacts into the rhizome-like web of human perceptions and relationships we call culture: it causes ripples in the pond. Or, to switch to my own metaphor, cultural spacetime bends and curves around its mass, its gravitational force: the object has cultural mass.

The quote from Kandinsky above, and his writing elsewhere, reaches out toward this same sense of the double modality of an artwork; it's existence in both the material and 'spiritual' realm. It seems to me from the quotes above that Massami, following Deleuze, is forging his own language to describe comparable experiences and ways of seeing. To return to my own work and the composition portfolio for a moment, I feel that I was reaching out for the same thing, attempting to articulate it in 'Mutation Tides' (see page 313), the final movement of the dance piece *Transmission* (see Chapter 11). In the music here I was trying to find something to express in addition to the scientific, rational themes of the piece of evolution and the transmission of disease. I was trying articulate in the music something of how those ideas effect the way I feel about living and being alive; how they impact on feeling, being, on the human experiential realm: the realm of the spirit, of experience.

[26] **MASSUMI** 2011, page 42.

The human body and it's potential to 'be'.

What happens if we consider the human body on stage through the conceptual lens of Mussami's 'potential'? Look at the human body in the same way as Mussami considered the wooden box in the earlier quote. The human body placed in the performance space exudes the potential to 'be', abstracted from life. In everyday life, all human beings we see are full of potential action, potential 'humanness'. They are poised, ready, about to act in unpredictable ways that we can imagine: they are not static. The choreographer works with bodies loaded with these layers of potential meaning. And they also work with people, not just bodies: individual dancers carry their own movement styles, ways of being and their own personalities. When developing material and creating a piece with dancers, the work is embodied, always. The medium is human: the body in space.

Recent research in psychology tells us that the movement of faces and bodies is of considerable interest to social primates,[27] and that our visual perception system has evolved extremely high levels of sensitivity to the moving human body.[28] It is interesting to note, expecially in relation to the Deleuzian concept of 'potential' as discussed by Mussami, that we also have a striking sensitivity to the potential *implied* dynamic information in still images as depicted in paintings and photographs of the human form.[29] We are transfixed by them, and for good reason: non verbal communication is an important part of our lexicon,[30] and so the body on stage is an articulate visual presence: with the body in the performance space we have an object loaded with the potential for all human action, of life being lived. Such bodies have force: they have cultural mass.

With the dance piece *Terrarium* (see Chapter 6), we set out to encapsulate this potential, this cultural mass, in a transparent globe in the landscape. This globe was then surrounded by a sound fabric constructed through the cutting and splicing of found sound, of memory and experience. The sound was mixed carefully to immerse the audience in the outdoor ambisonic speaker circle, and the complete assemblage was placed in the landscape. A terrarium is a special kind of transparent tank or jar, designed to protect living specimens, plant or animal, whilst retaining the ability to subject them to examination. With this piece, we were playing not only with the borderlines between sound, noise and music, but also with the division between the human and the non-human. In *Terrarium*, animals and nature become a part of the work. As well as the use of bird-song in the sound fabric, the costumes were animal-like: they made the dancers look like birdmen. Through sound, costume and choreography, the dancers are woven together into the fabric of nature.

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[27] **PUCE** and **PERRET** 2003.
[28] **JOHANSSON** 1973.
[29] **KOURTZI** 2003.
[30] **BULL** 2001.

> Every territory, every habitat, joins up not only its spatiotemporal but its qualitative planes or sections[…]and every territory encompasses or cuts across the territories of other species, or intercepts the trajectories of animals without territories, forming interspecies junction points[…] the territory does not merely isolate and join but opens onto cosmic forces that arise from within or come from outside, and renders their effect on the inhabitant perceptible.[31]

Working with dancers is like being able to create living, moving paintings. The oil is the human body and its potential, and the canvas is living time, space and experience.

The significance of the senses.

There is a lot of references in this essay to sensation and our analysis and processing of sensations: both in this work and in the portfolio as a whole there is an interest in the examination of the sensorium. It has been suggested that all art is about sensations. Deleuze talked about 'blocs of sensation' as a way of referring to the means-whereby an artwork wields its power:

> Whether through words, colors, sounds, or stone, art is the language of sensations. Art does not have opinions. Art undoes the triple organization of perceptions, affections, and opinions in order to substitute a monument composed of percepts, affects, and blocs of sensations that take the place of language.[32]

An awareness of the historical significance of the senses is something that has developed significantly in recent decades, a trajectory that Alain Corbin suggests begun to emerge five decades ago with Lucian Febvre's call for a history of the sensibilities.[33] The recent emergence of the sound studies field can be seen of part of this process. Sound studies involves research across a range of disciplines, where sound, both ambient and specific, is recognized as crucial for our understanding of the environments that people inhabit.[34] While some of this research has had a clear historical dimension and focus,[35] some of the most innovative works on 'acoustic

[31] **DELEUZE**, Gilles, **GUATTARI**, Felix 1994, page 185-186.
[32] **DELEUZE**, Gilles, **GUATTARI**, Felix 1994, page 176.
[33] **CORBIN** 2005, page 128.
[34] **BULL** and **BACK**, 2003; **STERNE** 2012.
[35] **CORBIN** 1999; **HENDY** 2013; **SMITH** 1999.

ecologies', and on the complexity of soundscapes, has taken the contemporary world as its focus.[36]

Looked at as a cultural phenomena, the emergence of the sound studies field is indicative of an emergent interest in *experience itself* as a legitimate field of enquiry, as independent from objective lists of things and events and the construction of descriptive taxonomies. There are numerous successful attempts to chart the sonic history of a specific landscape, place, or historical moment in the sound studies literature. Richard Cullen Rath's fascinating look at the acoustic world of the early American pioneers is a good example[37], as is Bruce Smith's treatment of Shakespeare's England.[38] Alain Corbin's Village Bells takes us through a detailed study of the importance of church bells in rural France, and how their sonic presence was an integral part of the political, imaginative and physical landscape at the time of the French Revolution.[39] These works suggest a developing interest in sensory experience itself, and I see in my work a fascination with feeling, sensation and experience that corresponds with this cultural tendency. I see my use of immersive ambisonic speaker systems, in *Terrarium*, *Phase Revival* (see Chapter 8), *Star Carr: Sonic Horizons of the Mesolithic* (see Chapter 9) and *Hydrology* (see Chapter 10) for example, as an experiment with, and in, the sensorium.[40] An interest in the cutting and splicing of experience: a desire to distil it down, then re-present experience in a new way, reconfigured, rearranged. As I said before, my work is about *distillation*: about playing with time, experience and memory.

The concept of the unconscious.

There is another line of thought here, lurking behind this text, and so running through my work. It's something that I have touched on, but not yet examined in any detail: that is the concept of the unconscious. The concept that there are forces outside conscious awareness that influence thinking goes back many centuries and across many cultures. There are different networks of stories and narratives regarding the derivation of terms and words and philosophical concepts related to the idea of the unconscious. For example, looking simply at modern Western intellectual history, Eduard Von Hartmann's 1884 publication, *Philosophy of the Unconscious*, has a lengthy chapter entitled 'Predecessors in Respect to the Conception of the

[36] **AUGOYARD** and **TORQUE** 2005; **LA BELLE** 2010; **SCHAFER** 1977; Also see the World Forum for Acoustic Ecology (WFAE), which was founded in 1993. *Soundscape*, the journal for the WFAE, is available online in 12 volumes – see **SOUNDSCAPE** 2000-2012 in the Resource List for details.
[37] **CULLEN-RATH** 2003.
[38] **SMITH** 1999.
[39] **CORBIN** 2005.
[40] I'm using this word in the sense used by Marshal McCluhan, See **McCLUHAN** 2005. Also for an elucidation regarding this term, see **HOWES**, 2005, section 11 'The Shifting Sensorium', page 53-139.

Unconscious'.[41] In this particular chapter, he traces what he considers the earliest clear elucidation of the term 'unconscious' back to Fredreich Schelling. Hartmann comments that '[…] we find in Schelling the conception of the Unconscious in its full purity, clearness, and depth'.[42] He is referring to Schellings work *System of Transcendental Idealism,* published in 1800.[43]

And that is just one academic story, one strand of narrative, used to illustrate a point.[44] I don't know if it's true. All I think I know is that someone thought it was true enough to write in a book once one hundred and thirty years ago. What does seem to be indisputable however is that for a very long time, people have been thinking about forces acting on decision making processes and the personality that are beyond conscious awareness, outside mind if you like, or outside what we experience as the 'self'. Our storybooks, movies and myths are crammed full of tales of gods, daemons and mysterious forces intervening in human affairs. It seems sensible to state that the search for effective conceptual tools for talking about and describing such experiences, the feeling that we are not conscious of the full measure of our own selves, has a long and rich history.

So I'm not talking here about a Jungian 'collective unconscious', or a Freudian 'subconscious', or William James' 'subliminal consciousness', or anything specific, although I'm sure what I have read by these particular writers has influenced my own thinking.[45] What I'm trying to do in the text above is to demonstrate that the concept goes beyond the parameters of one particular accepted narrative, or one individual philosopher or psychologist. I am also stating that, along with a lot of people who have lived, I can relate to the experience of the totality of my sense of self being something greater than I am able to hold simultaneously in my consciousness at any one moment: something greater than the narrow aperture of my own conscious moment to moment experience of reality. Writing back in 1902, William James referred to the 'subconscious self' as '[…] nowadays a well-accredited psychological entity'. James went on to state that '[…]there is actually and literally more life in our total soul than we are at any time aware of'.[46] In a later passage he quotes the pioneering poet, essayist and researcher Frederich Myers' 1892 paper 'The Subliminal Consciousness':[47]

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[41] **HARTMANN** 1884.
[42] **HARTMANN** 1884, page 24.
[43] **SCHELLING** 1997.
[44] For a detailed overview of the intellectual history of the concept of the unconscious, see **DEVIANCE** 2014 in the Resource List. This fascinating website provides a comprehensive selection of essays from a diverse range of contributors that precede Freud's conception of the subconscious, from John Stuart Mill to Franz Brentano and Schelling.
[45] **FREUD** 2002; **JUNG** 1980; **JUNG** 1968; **JUNG** 1989; **JAMES** 1982.
[46] **JAMES** 1982, page 511.
[47] Born in 1843, Frederic Myers was an English poet, essayist and psychic researcher who was one of the early leading members (and founding) of the Society for Psychical Research, established in 1882 'The Subliminal Consciousness' appeared in the Proceedings of the Society for Psychical Research in 1892. Information retrieved from **DEVIANCE** 2014.

> Each of us is in reality an abiding psychical entity far more extensive than he knows – an individuality which can never express itself completely through any corporeal manifestation. The Self manifest through the organism; but there is always some part of the self unmanifested; and always, as it seems, some power of organic expression in abeyance or reserve.[48]

The aperture.

What I'm getting at has to do with this idea of the 'aperture'. For me there is some kind of mechanism that comes into play in the creative process, and it has something to do with the adjustment of this aperture; the control of the border between different worlds. In everyday life, the size of the aperture changes all the time, depending on the situation, or the particular conditions you are in: a lot depends what you need to focus on at any given moment. For example, when you are driving a car, it pays only to perceive a general category of 'tree', the vaguely green shapes that occupy a particular portion of your peripheral vision. You're aware of them to some extent, but not aware at the same time. It's not economical in terms of cognitive load to increase your awareness, to take in each tree individually. But conversely, when you're out on a walk in the countryside on a sunny Autumn day, you might take the trees in one at a time, allow their beauty to flow unimpeded into your conscious awareness. You might be aware of the species of each tree, and even the shape of one specific, individual leaf. So clearly there are different states of mind appropriate for different tasks and pastimes: these different states are different ways of being.

I'm suggesting that art can disrupt these ways of being, interfere with the categories we use to process the world around us. In art we can create objects that break through the categories, and through this process we can shift the gearing that controls the quality of our perception.

Creating the conditions as opposed to planning.

In the work I do, the projects presented here and the creative process I use, I'm interested in the operation of this mechanism, this aperture. When making pieces, I find myself thinking more about 'creating the conditions' in which something will happen, something will be found, as opposed to planning what the thing will be. If there is planning, it is about planning to create the conditions in which I can work effectively: planning to create the conditions in which I can find

[48] **JAMES** 1982, page 512.

out what it is I'm trying to say. The aim is to get access to what I don't know yet, to what lies somehow below the threshold of consciousness. When practising Alexander Technique, this same aim is achieved through the inhibition of the psychophysical habit Alexander called 'end-gaining': going exclusively for the end result, and disregarding the process. When 'end-gaining' is inhibited, the focus shifts to the 'means-whereby': the method by which the goal can be achieved.[49] This is the approach I try and make ever present in my work: creating the conditions that might allow something interesting to happen. I try to design processes that in themselves are the 'means-whereby' something can be discovered, rather than going for the end result.

With *Terrarium* and *Hydrology*, the conditions were created through the design of the process: the identification of a specific landscape, and the discipline of building archives of sound, image and text: archives of experience. I have grown to trust that once a system is laid down, something special can happen: and it often does. With *Terrarium*, something happened at Boulby Cliffs, and Hummersea Beach (see page 166-170). I try to make something happen in this same way whenever I go into the studio to work collaboratively with a musician. I try to make the technology invisible, get it out of the way, and to clear the channels for the artistic subject matter to emerge. For example I tried, and I think succeeded, with cellist Min Song when working on *Ash Dome* (see Chapter 4), on the material that became the Bird-Cello section (see page 129). And also with violinist Val Pearson working on what became Hummersea Beach (see page 166-170). I try first to establish the right feeling in the session, in the studio. It is important for me to make it a priority get rid of tension, and friendship and personal relationship is important: the way the session feels is important. To use the studio as a composition tool, you need to create the right conditions, so that you might be lucky and capture a moment of time, a moment of expression. To capture such a moment is to capture something valuable: real human feeling and experience coded in sound.

Building bridges between the conscious and the unconscious.

To relate back to the earlier part of the discussion, I would say that I try in my creative process to create conditions in which I can build bridges between what is conscious and what is unconscious. I'm not claiming to know what I'm talking about here – claiming to know what I mean exactly, as if I have an accurate clear definition or model at my disposal of something called 'an unconscious'. As I said above, I'm not talking about a specific theory of the unconscious: there are many theories about what the unconscious might be, and of course many people question if there is any empirical evidence that it exists at all. But from time to time I find it a useful concept to explain the way my psyche seems to work. And it's in that spirit that I'm

[49] **ALEXANDER** 1932, page 69.

using the language now: as a practical tool that can help to explain my experience. Language and thought isn't the thing in itself, but always removed from it: there are a lot of spaces and gaps between language, thought, our perception, and the source of our perception.

Ideas and concepts are not photographs.

It depends on what you think ideas and concepts are, or what they are for. We can see philosophical concepts for example as being more valuable as 'thought machines', rather than 'truth machines'. What I'm saying here is that ideas and concepts are 'creative machines'. The gap is too big between language and the thing in itself for philosophy to be 'true'. Colebrook, unpacking Deleuze, suggests that:

> Concepts are not correct pictures of the world; […] [c]oncepts are philosophical precisely because they create possibilities for thinking beyond what is already known or assumed.[50]

In this way of thinking, the concept is imbedded in language. It's something we create in the domain of language, not something that actually exists independent of language. Whilst it might refer to a phenomenon of experience that we encounter internally, in some psychological state, it is not that thing in itself. From this perspective, all language is seen as metaphor. The problem comes for us when we mistake that metaphor, that linguistic symbol, for being an actual thing. What I'm saying here is antithetical to the idea of Plato and his forms. Or rather, it is antithetical to the ideas that Plato's concepts are actually 'true'. It seems much more likely that there are no such Platonic 'forms' out there in the cosmos that form a sort of metaphysical template for the reality we see around us. Scientific evidence suggests that his attempt at an explanatory metaphysics wasn't accurate as a description of reality. But the point is that, disregarding it's accuracy as a metaphysical hypothesis, it has had real utility and power as a creative tool in thought and language for many thousands of years.

A key idea in relation to this discussion is that concepts that are not questions, but conversely are *imbedded in our language as assumed facts*, can foster *habits of thought* and action, and lead to a kind of sterility. Our task is to challenge concepts, find new ways of developing thinking styles that enable us to question habitual ways of seeing. If we do that, perhaps we can avoid getting lost in a web of static metaphors, mistaking intellectual categories for reality itself. We are now returning in this discussion to the subject of the function of the art object.

[50] **COLEBROOK** 2002, page 19.

What am I writing this for?

To return to a question posed earlier ('what am I writing this *for*?'), this text does have a function: to provide an appropriate introduction to my PhD, and to provide some kind of context for the work presented in the next 300 pages or so, and the 57.59 GB of accompanying data. So the function is to clarify, and to elucidate. But this still leaves a lot of options, a lot of decisions to be made: what information should I include, and how should that information be presented in order to provide a meaningful context for the work? There's not a straightforward easily identifiable body of information that I *need* to communicate. In truth, there's no clearly identifiable purpose to this document at all. I've made all the practical lists, the contents pages, the lists of figures, and I've written the introductory blurb. The reader should be able to navigate the text without too much trouble.

If I were writing a science paper, the function would be clear. There would be an experiment to describe, a table of results to analyse and explain, and some conclusions to draw. There would be information to be communicated in a straightforward manner. And this makes sense, as the scientific method predicates the careful externalisation of what *isn't* relevant to the experiment. The more effective the experimental design, the more noise it will filter out of the results, and so the better it will test the hypothesis. So the scientific paper has a clear function: it wants to differentiate, as clearly as possible, the events that took place during 'the experiment' from the surrounding, messy paraphernalia of life being lived. That's the idea of a laboratory; it is an extreme alternative to the mess and chaos of everyday life. And it's an effective and appropriate approach, because the purpose of the whole enterprise is to isolate packets of information, molecules of data, discreet particles of knowledge. But in this field, in music and the arts, in the humanities, the nature of the task at hand is less clear, and the use of a laboratory is not appropriate for the task at hand. The question is, if the function of this text is to understand, to communicate, to clarify, then what should be externalised? What is deemed to be irrelevant to the description?

The concept of the rhizome.

In *A Thousand Plateaus*, Deleuze and Guatarri put forward the concept of the rhizome.[51] The Rhizome abandons the idea of a beginning: the concept of the initial cause in the cause and effect chain. Instead, the emphasis is on a multiplicity of connections. The rhizome concept rejects the 'common sense' notion of a linear timeline, with a clear beginning, middle and end. It rejects the imposition of hierarchical patterns of thought on complex networks: all things are

[51] **DELEUZE** and **GUATTARI** 1987, page 1-28.

connected with equal status. The rhizome model favours a complex network of connections, and is designed to supersede the tree/root bifurcated structure, which the authors suggest has dominated Western thought. With the rhizome, Deleuze and Guatarri offer a coherent conceptual tool for thinking more effectively about our experience and how we communicate it, about how things are connected, about sharing information.[52]

And of course, this text you're reading now wasn't all written at the same time. The bit about the cars passing outside and looking out of the window of the flat at the start was written just now, (and that's my now, not yours) but I inserted it there about an hour after the text that precedes it. But what am I saying? All that was days ago. The general form and meaning of the paragraph has transformed now, developed over time. I've realised what it's about now, after having written a whole load of other things, many of which will appear in the final document, but many of which won't: right now, it's still open to question. What I'm trying to illustrate is that this paragraph is a compression of a lot of time and thinking. It is a distillation of a complex network, of time passing and life being lived. It's 15:17 now, and I probably wrote the first line at 12:00. I'm editing it now, and it's 12:39 the next day! Right now it's May 2015 and I'm finishing off my corrections.[53] It's a complicated illusion this writing process! I'm shaping time for you, the reader: you experience this as a continuous stream, but for me, the time is fractured up, broken into fragments. And that's just this paragraph! What I'm *trying* to do here is to collect together the fractured parts of four years of work, life and experience: to arrange it into some kind of coherent, believable stream of text. It like trying to stick a smashed mirror back together! It's an impossibly complicated jigsaw. It's a Rhizome, not a tidy root and tree diagram with discreet events connected along an imaginary chain of cause and effect.

So, to return again to the question, what is deemed to be relevant to the discussion? How do I decide on the parameters of the document? How should I set my aperture? I could go wide, go all Proustian on you, covering an extremely small amount of ground in an extremely large amount of detail. Tell you everything that's happening. Or narrow: construct a tidy narrative connecting events across a wide span of time: explain how this body of work, these ten projects, are strung like pearls on a golden thread, a sparkling timeline that cuts triumphantly through the past four years.

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[52] It is interesting to note that Deleuze and Guattari's work predates the internet. Could it be that the web is perhaps the perfect expression of the concept of Rhizome? See Ian Buchanan for a discussion regarding Deleuze and the internet in relation to the concept of Rhizome: **BUCHANAN** 2009, page 152.

[53] Incase you're interested, the viva went well – I got minor corrections! And the trip to India was incredible.

Is all text a lie?

My real caution though, part of the reason I'm going on about this, is that I think it's dishonest: there is a serious point behind what I'm saying. So many of the friends I have that are practising artists go through hell in the creative process. (And that's just them: I'll tell you about me later). They are unstable, have periods of deep and painful depression: they seem to have no idea sometimes if they are any good at all. They oscillate between feeling OK and positive about their work, and feeling terrible about it. And the thing is, the people that have those experiences are usually the most prolific and creative artists. Maybe that tells you more about my friends than anything else, but it's the only experience I have to go on. It's knowledge by acquaintance. All the rest is just knowledge by description.[54]

Surely if we keep presenting neat and tidy descriptions of things, and edit out our more complex, individual, actual experience of reality – relegate that to the side lines with formulaic approaches to the presentation of text – then we're in danger of loosing something. We need to tell people that it's OK to have these experiences: they're not external to the world of the arts, but on the contrary they are central to it. In my experience, creating things often involves a difficult and frightening struggle, and a lot of self doubt and fear. It's not a neat and tidy process, and it *costs* something.

Sometimes I feel like I do things the wrong way round, upside down. It's never a 'top down' process for me. I have to make the thing, whether that be an essay or a piece or whatever, by the 'doing' of it. Only then do I know what it is that I'm making. And this involves a process of struggling with the media, whether that be text, sound, or visual media. It's not like there's ever a fully formed idea that I then use a particular material to articulate, as if there's a clear and transparent transduction process from something formed in the mind that is then manifest. It's more that the articulation of the thing through a specific medium, and my emotional and intellectual experiences whilst making it, all of this becomes an inextricable tangle. There is the sense of something that needs to be got outside and externalised, to be expressed and 'materialised' in order for it to be communicated. That 'thing', whatever it is, is given form by the medium, made manifest, but also shaped by it. The work made through this process is tangled up with experience, with life being lived. Experience is imprinted on it and through it. It is usually a sort of feverish, unstable process for me.

[54] For an exposition of the philosophical concepts of knowledge by description and knowledge by acquaintance, see **RUSSELL** 2009 pages 32-41.

The creative process is a 'struggling to become'.

For me any creative process is a 'struggling to become' of something that lies partly in awareness and partly outside of it. And then when I create something, I have the sense that the thing made at the end is bound up with that 'time', that part of my narrative, my story, that part of my life. My experience has shaped the object: it has rubbed off on the object, become a part of it, is manifest by it and through it.

I recently came across an interesting concept reading an essay by Bruno Latour, 'Reflections on Etienne Souriau's Les differents modes d'existence'.[55] In it he's breaking down Souriau's thinking, and explains the term 'instauration', used here as representative of a focus on process, rather than product. Or rather, on the idea that the notion of fully formed, fixed ideas being 'realised' in the compositional process is just not very useful. He offers the illustrative concept of the sculpture with a rough block of clay. This imagined craftsman works on the clay, and gradually the piece is fashioned. Latour criticises the idea that the work 'emerges', as if the form was pre ordained. Rather, Latour, following Souriau, argues that the making of the thing is more tangled up with what the thing turns out to be: the creative process is inseparable from the completed created object. There is not such a clear dividing line between the subject (the maker) and the object (the sculpture). The becoming, the making, the fashioning, are all aspects of the final thing that is made.

> But this growing existence is made, we can see, of a double modality that finally comes together, in the unity of a sole being progressively invented in the labouring process. Often there is no warning: up to a certain point the finished work is always a novelty, discovery, or surprise. So that's what I was looking for! That's what I was meant to make![56]

But who knows? Who really knows what Latour is talking about? Sometimes these continental philosophers just seem to be posturing, writing unnecessarily complicated sentences that ultimately mean nothing: It's often difficult to tell. After reading Sokal and Bricmont's book *Intellectual Impostures*,[57] I have to admit I've become more cautious. And who ever really knows how another human being thinks and sees the world? Surely language is just not that precise: it's not like mathematics. I can't be certain about what I mean, or what I think anyone else might mean. But on the other hand, what I can do with something approaching certainty is say that some things I read seem to connect with my experience, and I can try to articulate that

[55] **LATOUR** 2011.
[56] **LATOUR** 2011, page 310.
[57] **SOKAL** and **BRICMONT** 2003.

observation, try to share those thoughts with people and communicate. And I do that because it makes me feel good to be connected with other people, rather than isolated, and to celebrate being alive.

It's no more, or less, than that.

So for me, this is important: this sense of struggling to articulate, to delve into, to find, to make. It is as if there is something hidden, something inside, within the volume or the totality, that might, once found, be uncovered and revealed. I recognised recently here a common concern in my work: the interest in revealing something. This sense of something to be revealed in the world that is hidden has always been important to me.

Noise, truth and lies.

I must return to the task: that is, to write an introduction to the PhD. As we have established, committing thoughts to paper is of course reductionary. Representing life in all its complexity with symbolic marks on the page is a tricky and problematic thing to do. You have to construct a quite brutal aperture, and decide on your settings: should they be narrow or wide? One has to decide what is appropriate in that particular context. The task here is to select a believable, acceptable narrative line from the process of making these ten works I am submitting. From a kaleidoscopic, bewildering mass of images and feelings stored in my memory, I need to construct a narrative that sounds plausible, that neatly links a series of events along a timeline of causation, pretending that life works like that. Except that it doesn't. That's just making up stories to fit the specific requirements of the medium, to fit the brief. This is a rhizome: it won't fit without being distorted: it can't fit the medium of text without it misrepresenting itself: without telling white lies. It happens in journalism all the time of course; a journalist's job is to reduce rhizomes to neat and tidy narratives. A journalists role on the whole, contrary to popular belief regarding the adversarial nature of the press, isn't to tell the 'truth', as noble custodians of the Fourth Estate, but to manufacture narratives that provide appropriate 'content' designed to daisy chain adverts together. At least that's the norm in the commercial journalistic model. Tidy narratives are constructed that filter out unpleasant 'noise': uncomfortable information that might not be pleasing to corporate sponsors. At least that's the view of the great linguist, philosopher and activist Noam Chomsky, as laid out in *Manufacturing Consent*[58], *Necessary Illusions*[59] and elsewhere. And it's one that I find convincing.[60] It strikes me that an unconscious

[58] **CHOMSKY** and **HERMAN** 1994.
[59] **CHOMSKY** 1989.
[60] See **CHOMSKY** and **HERMAN** 1994 for a detailed study of this topic, particularly 'A Propaganda Model', page 1-35.

filtering process is in operation in many other contexts. It happens in the academic world surely, but just in a different way, according to a different set of criteria. Narratives are controlled and set in the academic sphere by a different set of needs and vested interests, a different set of emotional and intellectual parameters, dependent on individual department, staff, and supervisors for example. Personalities regulate one another: they dictate and control: they territorialise. But ultimately, there is only the present moment: all these narratives are constructions.

In one sense, it's all about noise; what one considers noise, and what one doesn't. The history of music in the 20th century has been described as the shifting of parameters regarding the introduction and acceptance of noise: the shifting border between 'music and its others'. The invention of the tape recorder, and music technology in general, has played an important role, giving composers and musicians access to what John Cage called 'the entire field of sound'.[61] *A Dip in the Lake* (see Chapter 7), a realisation of Cage's piece, is a clear example of this tendency alive in the work presented in this PhD. Furthermore, I'd say that the boundary between noise and music is a theme that runs through all ten projects. From the use of environmental sounds in *Ash Dome*, *Another Place* (see Chapter 5), *Terrarium* and *Hydrology*, to *Sonic Horizons of the Mesolithic*, where we tried to recreate the everyday sound world of people living 9000 years ago at Star Carr, on the banks of Lake Flixton.

My basic position with noise is that I like to leave a lot of it in: I don't want things to sound too clean. I have never been particularly attracted to clean, sparse synth sounds for example. For me they are redolent of excessive control and discipline: of atomisation and exclusion. *Ice Pictures* (see Chapter 3) plays a lot with the boundary between noise and recorded sound. Sounds from improvisations recorded roughly in a gamelan rehearsal room are juxtaposed with clean, studio recordings of the same instruments.

A little anecdote about Brian Eno.

A long while ago, in my early 20s, I worked as a tape op in the Matrix studio group in London. Brian Eno came in for a session, working with the Senegalese singer Baaba Maal, at the mix room we had in Kilburn. I didn't get to do the session, which was a bit of a blow, because at the time they were both musical heroes of mine. Afterwards I chatted to the tape op who was selected for the session, and he told me a story. He told me that Eno came in when he was lining up the tape machine, and told him to stop, not to do it. Then, when he was asked to set up the mics, he asked Eno where he wanted them, and Eno just said 'anywhere you feel like

[61] **COX** and **WARNER** 2008, page 5.

in the room'. He really didn't care; he was more interested in mistakes happening, because in the mistakes, in the noise, something might happen that you don't expect, a sonic idea that you would never have imagined. Eno's use of the recording studio as a musical instrument and compositional tool has been a significant influence on me since I was discovering electronic music in my late teens and early 20s.[62] The control and liberation of noise. The acceptance of error, mistake. The mindset of creating conditions. The openess to allow things to happen, rather than rigidly controlling the outcome. These are all important.

Attali identified that the control of sound is related to power:

> Everywhere codes analyse, mark, restrain, train, repress, and channel the primitive sounds of language, of the body, of tools, of objects, of the relations to self and others{…} All music, any organization of sounds is then a tool for the creation or consolidation of a community, of a totality. It is what links a power centre to its subjects, and thus, more generally, it is an attribute of power in all of its forms.[63]

If the control of noise relates to power, then the desire to clean, to neaten, to sanitise, is a powerful one. It is the compulsion to eradicate imperfection, to marginalise, to edit and control.

What noise should be eradicated?

So, what should be edited out of the concert hall? What should be externalised? For *Terrarium*, we decided to bypass this problem by abandoning the concert hall altogether, and move out into the landscape. Taking a 30 meter diameter circle of speakers, and a giant transparent globe housing a pair of dancers, we created a work inspired by rivers, birds, landscapes, beaches, monks, insects and flowers. The music was full of noise: it was actually created from it. The sounds of birds, flowing waters of the River Esk, the gong-like reverberant clonk of a disused water outlet pipe, the whining of a broadcast aerial. This find of found sound managery was combined with cello, violin, percussion and vocal sounds. In the landscape, outdoors in performance, you couldn't really tell which sounds were part of the environment and which sounds were part of the piece: it all bled together. Rather than seek to subjugate nature, to shut it out, we wanted nature it to get involved. During one memorable performance, we even invited the weather: at Danby in the North York Moors, we could see and hear a thunderstorm approaching in the far distance, across the valley of Danby Dale, for almost the

[62] **SCOATES** 2013, page 293, and **ENO** 1983.
[63] **ATTALI** 2006, page 6.

entire piece. It finally hit us in the last five minutes. It was one of the most exciting performances we did.

In 17th Century America, Richard Cullen Rath tells us that thunder was considered to be the angry voice of a vengeful god.[64] But with *Terrarium*, we abandoned such projections onto the sonic emanations of nature: we made our peace with that particular manifestation of the divine. Actually, we went further than that: we let God in to join the party, to get involved. No longer personified as the emotionally distant father figure, the psycho-parent, threatening punishment and discipline with his deep booming voice, we welcomed the weather in as an instrument, as part of the piece: we had a jam with the thunder! Our attitudes toward nature seem to have changed since the time of the pilgrim fathers.

This network of metaphors reminds me of the story of Transcendentalist Henry David Thoreau on his death bed. When his Calvinistic aunt felt obliged to ask "Henry, have you made your peace with God?" the apparently unruffled Thoreau mildly replied, "I did not know we had ever quarrelled, Aunt".[65]

The ebb and flow of experience.

A lot of things have happened to me over the past four years. A lot of things have gone into the creation of this body of work. There are a number of narratives threads I could pick up and run with. I could tell the story of a research plan that I hatched in 2010 that I have effectively carried out, and that I am here presenting the results of that plan. It would be a made up story, but I could easily construct it in a way that would be believable: you would never know. I could on the other hand tell the story of my constant struggle with depression, periods of time in which I was convinced that my work was a complete embarrassment. Maybe in that story the work is a struggle for identity, to find meaning: this is getting closer to the truth, but it's a bit 'messy', and maybe a bit embarrassing to talk about. I don't really want to dwell on the three months I spent lying in my bedroom in a state of terror, frequently in tears, convinced that I had failed in every way imaginable. Maybe it's best not to talk about the therapy, the course of anti depressants, consultations with a psychiatrist convinced I had manic depression. I didn't by the way: I've learnt through that experience that the internet is not always a good thing when it comes to making a diagnosis. Much better to tell a calm, measured story of moderate success: much better to talk about results, thus avoiding the messy details and instability of the process, with its oscillations from terror to ecstasy, and not enough time spent in between. But perhaps I

[64] **CULLEN RATH** 2003, page 20.
[65] **HODDER** 2001, page 302.

should talk about it. As Kahlil Gibran so beautifully puts it in his meditation on joy and sorrow, these kind of experiences, this dynamic range, has value:

> Your joy is your sorrow unmasked. And the self same well from which your laughter rises was oftentimes filled with your tears.
> And how else can it be?
> The deeper that sorrow carves into your being, the more joy you can contain.
> Is not the lute that soothes your spirit, the very wood that was hollowed with knives? [66]

And then there is the unmasking: periods of intense excitement and creative revelry. The amazing feeling of creating a piece and seeing it operating in the landscape, making a contribution to the culture, having an effect. The joy of creating something new, something that people tell you they think is beautiful and that makes their day better. And the friendships, relationships and experiences. And there is also love woven into the fabric of it all. The colour, the landscape, the smell of the sea, the celebratory meals after a show, and the red wine. The excited, slightly unhinged conversations through which all the good ideas always seem to come about. The trampoline on a drunken summer night in a Cornish garden with dancers Debbie and James. The bowl of soup and a cappuccino in a cafe with the choreographer Simon at the Yorkshire Sculpture Park, a meeting that started one project, and led to so many more. The sounds and memories of life being lived: the ebb and flow of experience.

Feelings, experiences: this is exactly what the work is about. It's always part of the work, part of the way I talk about the work with collaborators and with friends, but it's rarely part of the discussion in the academic environment. It's as if, perversely, information detached from feeling is considered to have *more* value. Antonio Damasio set out some convincing arguments to the contrary some time ago, but the view still persists.[67] Research tells us that emotions are central to human decision making processes, and link us in a web of shared understanding and concern. 'Indeed, the 'socio-moral emotions such as compassion, love, remorse, empathy, and guilt have been seen as the key qualities making us human'.[68]

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[66] **GIBRAN** 1996, page 30.
[67] Antonio Damasio's Book, *Decartes' Error*, examines the relationship between emotion, reason, and the human nervous system, showing how thinking and feeling are closely interrelated. See **DAMASIO** 1994.
[68] **SPIKINS, RUTHERFORD** and **NEEDHAM** 2010.

Tears are useful: they give spirit form.

Tears are useful: they externalise our inner world. They make it something that can be seen, and so reflected upon, acted upon. They are a form of 'emotional leakage', to borrow a particularly unpoetic phrase from the psychological literature.[69] And as such they make our feelings something real that we can see and touch. This I think is part of the role of music and the arts in our culture: to make emotions and feelings and other important subject matter hidden from view in everyday life more apparent; to get it out, into the culture. The manifestation of feeling, emotion and the best of what we feel inside. To make what is otherwise invisible visible, so that it exists: to give spirit form.

Theories such as Durkheim's collective effervescence support this notion: this suggests that ritual is a mechanism with profound social function, '[…]serving to promote social cohesion, in particular with respect to the genesis of values and the affective charging of symbols representing the group.'[70] And Steven Feld has written on how song is used to insert emotional values into the culture of the Kaluli people of Bosavi. Perhaps ritualised[71] behaviour such as a concert enables us to reflect on hidden or forgotten aspects of ourselves?

This isn't science: the humanities isn't about neat and tidy results, it's about life and feelings. It's about experience, being in the world. It's a spiritual enterprise: concerned with the development and emancipation of the human spirit. Surely discussing and better understanding emotion and subjective experience should be at the top of the agenda? It's as if people look across campus from the humanities departments and see the physicists and biologist writing complicated equations and being proper scientists producing real 'facts' and then think that they need to do the same: to say sensible, sober things, and to regulate their emotions like proper grown ups. But I'd argue that we are not in the same game: music, I think, is all about feelings. It's all about sensation, about life being lived. The emotions, contours of experience and being, colour of life lived and the context of relationship and friendship. All these should be included, as this is what the work is really about, and this is the content that fills the form of an artwork. Form is not simply a shape to be identified in a taxonomical exercise, but a vessel, a container for a code, for the drama of distilled experience, for the manifestation of our inner world, our emotional, imaginative life. To give this immaterial dimension form, to make it visible. Art gives spirit form: it makes visible the intangible: 'Behind matter, within matter, the creative spirit is hidden.'[72]

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[69] **EKMAN** and **FRIESEN** 1982.
[70] **SCHEVE** 2012.
[71] **FELD** 1990.
[72] **KANDINSKY** 2006.

Culture is the categorical garden.

People are living like they are driving. That makes sense, because they're busy: it's necessary to create categories in order to function: you can't reassess the world anew every time you leave the house, you'd never get anything done. So clearly it's necessary for consciousness to function selectively, to edit. But how it edits depends on what categories have been laid down.

Culture is the categorical garden.

The function of artwork for me is to create objects that break through categorical habits, and make people see the world in a new way: To 'MAKE IT NEW. Day by day make it new''. This aphorism is better known now as one of Ezra Pound's mottos, and the title of his book published in 1932. It is interesting to know that it was translated from an inscription on a Shang emperor's bathtub.[73]

I think Art can slow down time, or at least the perception of it, and through that can insert ideas, elevate to prominence concepts and ways of seeing that are important, but forgotten. Aspects of our shared humanity that get unnoticed and overlooked, in the business of everyday life. I'd say, when society is organised such that people don't have time to think or feel, aren't encouraged to be fully human, why not throw a spanner in the works?

The value of feelings can get lost. Part of the artist's job is to reinstate authentic feeling into the culture, to protect feelings. I think public outcry to the war in Iraq might now be more visceral if the feelings and emotional experience of the estimated 601,027 post invasion violent deaths that took place from 2002 to 2006 had been effectively communicated through the mass media.[74] Isn't that what happens, when you hear a great piece of music? You think 'that's what life's really about. What have I been doing with my time? Those are the values that matter, that are worth defending, worth disseminating'. At least that's what I do. Art can function as an antidote to violent impulses. It's worth noting that of course it can also act as a panacea.

> When power wants to make people *forget*, music is ritual *sacrifice*, the scapegoat; when it wants them to *believe*, music is enactments, *representation*; when it wants to *silence* them, it is reproduced, normalized, *repetition*. [75]

[73] **ALEXANDER** 1992, page 19.
[74] For a major study on the death toll post invasion in Iraq 2002-2006, see **BURNHAM** et al 2006.
[75] **ATTALI** 2006, page 20.

Emotions and feelings are important, and they need to be respected, and the regulation and control of emotion is significant. Emotions have been an important part of our shared culture and modes of expression throughout human history. Recent research into the archaeology of compassion for example tells us how important the care of others was for archaic humans, with the earliest evidence of compassionate behaviour being some 1.5 million years old.[76]

I think that there is a responsibility to insert content into our culture that has integrity. Of course what I'm talking about is my subjective opinion of what has integrity, and what is important. But that is indeed exactly what I'm talking about. We have a responsibility to be true to creating output that we believe in, subjectively: that we believe has integrity. What more can we do than be true to ourselves?

We live in a time in which we are constantly exposed to deliberately false information. Lies. Whether it's the avalanche of manipulative messages designed to foster a desire for environmentally destructive consumption and needless 'growth', or the dangerous lies of the media propaganda model.[77] We have to navigate through a confusing miasma, a consistent stream from the nonsense factory: a devastating and destructive blizzard of misinformation concerning what has value in our culture. I think a major motivation for my work is a struggle for identity despite the confusion. A struggle to contribute in a meaningful way, to insert content that I believe has value: to elevate to prominence values that I believe in. And this isn't a neat and tidy struggle, a rational decision I have made. Right now I'm looking back at what I've done, and trying to make sense of it, and this explanation makes sense to me.

Trying to escape from habitual ways of thinking and feeling about the world.

It also makes sense to me, looking back, that throughout my PhD, I have been searching, looking for a method to see more clearly, to escape from habitual ways of thinking and experiencing the world: this a definite line or theme that emerges from the body of work I'm presenting here. It started with *Ash Dome* I think. But it was also present in the work before that: *Snow Cradle* (see Chapter 2) and *Ice Pictures*. These two piece were in part a continuation of work done previously, a kind of 'over hang' from a different period. *Snow Cradle* was in part a response to my long term work with the gamelan[78], and in part the antithesis to *The Women of Trachis*, the

[76] **SPIKINS, RUTHERFORD** and **NEEDHAM** 2010.
[77] **CHOMSKY** and **HERMAN** 1994; **CHOMSKY** 1989.
[78] I've played and sung in the gamelan since 2006, and composed a number of works for gamelan, including *Three Moments on a Journey* (2006) for gamelan and choir, *Antigone* (2008), an opera scored for gamelan and string ensemble, and *The Women of Trachis* (2010), a music drama scored for gamelan and electronics.

project I had done immediately preceding the start of my Phd.[79] I used live gamelan and electronics for the project, and I took on a lot of work as director and composer. I enjoyed it, but the experience also exhausted me, burnt me out. Following the performances, I wanted to scale things down completely for the next project. I wanted to make something that didn't involve having to organise large groups of people; players, actors, costume designers and technicians. Just to work alone, only with sound. But I was also interested by gamelan musical structures, and how they might be utilised in the creation of electronic music: I could see a lot of parallels between the two genres. This is part of the reason why it is relevant to the body of work, the entire PhD, as use of cyclic structures and the gamelan sound world permeates through the ten projects I'm presenting. I was also interested in the ideas of Brian Eno, in his electronic music. And I was inspired by the concept of creating 'imaginary landscapes'. Originally the title of a number of pieces by John Cage, imaginary landscapes is a phrase I've always liked. The idea of realms, places, which are also psychological spaces, internal imagined possible ways of being. Imaginary places and possible futures: potential ways of seeing, of feeling. There is a connection between our ability to imagine a better future for ourselves, and the ability to imagine works of art. Music is prophecy:

> If we want to know what something (such as art, science or philosophy) is, then we can ask how it serves life. The problem, today, is that when we ask what art or philosophy are for we tend to feel they should serve some everyday function: making us better managers or communicators. We fail to see the purpose or force of art and philosophy goes beyond what life is to what it might become. [80]

Searching for a better way of being.

So for me, the pieces I'm presenting here are about searching for a better way of being. A better way of feeling, communicating and interacting. Music offers alternative emotional landscapes, or feeling landscapes: sensescapes. Music offers alternative ways of seeing and feeling about the world: different ways of communicating and different things to communicate. I remember when I was in my early 20s seeing a string quartet for the first time. It seemed to me to be an extraodinarily civilized way of being in the world and of communicating. I'd never seen people *being* like that before. For me it was an encounter with a new communication style, a new way of being to aspire to and the indication of a direction to head in psychologically and spiritually.

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[79] *The Women of Trachis* was a full length Ancient Greek drama I put on in July 2010 at the Guildhall, York; a setting of Sophocles' text in a new translation by Dr Richard Rowland.
[80] **COLEBROOK** 2002, page 13-14.

So, after the two initial projects, *Ice Pictures* and *Snow Cradle*, *Ash Dome* came around in the spring of 2011. This piece was pivotal for me: *Ash Dome* got me into working with found sound taken from the landscape, and with the landscape itself. In preparation I read a good deal of research on land art, as the piece was based on the work of the sculptor land art sculptor David Nash. This research, and the exposure to his work, got me thinking about art, nature and landscape, and on the relationships between them. It made me think more about the borderlines between the these different concepts and aspect of my experience, and about different ways of listening. The next piece chronologically was *Another Place*, inspired by reading about land artists such as Richard Long and Andy Goldsworthy. With *Another Place* I focussed on a specific stretch of coastline in North Yorkshire, and based the piece on found sounds collected on a walk from Whitby to Robin Hoods Bay. But it was also based on the experience of the walk itself: the route, the movement from light to dark, from the bright light to the shade. It was about looking out from the cliff tops across the distance, across an infinite volume of water into the depth of the North Sea. I'm not saying I was successful in articulating that in the piece, but I tried to.

The most significant single work in the PhD is *Terrarium*, the next on the timeline. It enabled me to develop a process initiated in *Ash Dome*, and explored a little more with *Another Place*. I became more seriously engaged in the idea of working with landscape, with a fixed, identified geographical area: working with a map. *Terrarium* enabled me to develop more fully a process and a way of working that I was starting to feel could produce successful results. To make something I believed in and thought had value.

Following *Terrarium* I had the chance to work on a new project, a realisation of *A Dip in the Lake*, as part of *Getting Nowhere*, a conference and festival celebrating the life and work of John Cage run by my PhD supervisor, Professor William Brooks. I learnt a lot making *A Dip in the Lake*, and working on that festival as a whole. It's not really my piece, but I included it here anyway because it was very important for me: it's John Cage's piece. The score essentially consists of a couple of lines of text, asking you to record sounds from 467 selected locations in a city using chance procedures, and then to play them back. What I learnt from that, from actually doing it, was that Cage's piece is a thought process. It's a powerful thought machine that is designed to change your perception. As such, it's essentially about *awareness*.

To go hypothetical for a moment, if someone was to ask you to choose 467 locations in a city and record sounds, the chances are you would immediately think of all the 'best' places to go, the place with the best sounds. Or alternatively you might select locations that would give you the most diverse range of sounds. Whatever you decided to do, your decisions would inescapably be based on your own habits, knowledge and experience. Even if you were deliberately to attempt to subvert your choices, and go against habit, that would still bear a

relationship to your own experience: it would be a sort of negative imprint of it. The selected locations are also likely to be contingent on the most convenient routes offered by the public transport system, or road system if you have access to a car. Things would change though were you to get involved with chance procedures: then you would cut through habit, and you'd be forced to go to all sorts of places that you never knew existed, that you would never have noticed on the map. It's only through the discipline of making a detailed grid, rolling the dice, or using whatever scheme you devise to make the procedures genuinely chance orientated, that you would begin to really *look* at a map. Then you would have to find the locations, write down the exact address, and get there.

Cage's process for *A Dip in the Lake* is a tool to encourage the artist to look, to see, to analyse. And then, what you find when you get there, when you go to all these places and record sound, is an astonishing variety. The amount going on in any city at any given moment surpasses what one individual can imagine: one simply can't imagine it all alone, in isololation: there are too many variables. The people you meet, the stories you have to tell, the sounds you hear – the variety is extraordinary. What's more, because of the random nature of time and place selection, you cut through categories such as social class, economic habit, profession and lifestyle. *A Dip in the Lake* is about the variety found in the shared acoustic space: the variety of life lived in the urban landscape, and its acoustic footprint. Cage's piece is an algorithm, a process that wakes you up to what is really there: life in all it's profusion and abundance. And, if you have some imagination and are prepared to listen, it makes you aware of how beautiful a thing that is.

So *A Dip in the Lake* is about shifting our attention: the message is that the beauty is there all the time; it's our way of seeing, of listening that needs to change. Cage is calling on us to shift our awareness, to see what's staring us in the face: to try actually looking. This reminds me of Laurie Anderson's quote, the opening lines from 'Language is a Virus":[81] 'Paradise is exactly like where you are right now, only much, much better'.[82]

My antidote to nihilism.

Art tries to open the aperture, and so to make visible what previously remained hidden from view. It's connected with speeds: thinking speeds and being speeds. It's also connected with awareness and categories:

> For the purposes of life, everyday thinking has to work by a kind of shorthand. From a highly complex flow of perceptions I tend to

[81] Laurie Anderson 'Language is a Virus' from *Home of the Brave*. Warner Bros 1986.
[82] Anderson was in turn quoting Willaim S Burrough. See: BARDINI 2008, page 149.

> perceive recognisable and repeatable objects. I do not perceive all the minute differences that make up the flow of time. I see this as an extended object that is the same. I regard myself, not as a flow of perceptions, but as a person with an identity. So when I experience data – such as colour, sound or texture – I subordinate it to an everyday concept. Art works in the other direction. It disengages the ordered flow of experience into its singularities. [83]

This has been my life over the past four years creating these works, although I didn't realise it at the time: attempting to disengage the ordered flow of experience into singularities.

There are moments. It is a searching for moments – a searching for freedom from a state in which the world ceases to be beautiful. That is the core motivation in all my work and activity: Searching for freedom from a state in which it isn't beautiful to live anymore. It is bound up with the depression I have experienced for two decades. I am trying to navigate between states, between ways of seeing the world.

Because I know that it should be beautiful: it has to be.

I'm motivated, in part, by fear; fear of being forced to live in a way that cuts me off from living in accordance with music's prophecy, and a fear of being cut off from seeing the world as it really is, or as it could be. Bound up with this is a desire to create prophecies and imaginary landscapes of my own. If the economic system we live in pushes me into a way of being that doesn't involve thinking and feeling and seeing the world for what it is, or what it could be, I might stop being able to perceive its beauty, and it will become devoid of meaning. In my 20s I spent years working in restaurants, waiting tables, whilst I did my A levels at night school, and learnt to read music and play the piano in a bedsit in London. I'm scared to go back there, to that place where I don't have any options, and where I'm cut off from creativity and the search for true identity and authenticity.

The root of the fascination with maps, with landscapes, with archives, is a searching for what I know is there: a searching for the beautiful in the everyday. I'm not searching for the beautiful in the extraordinary, elite, special or 'other worldly': not searching for beauty and meaning in the transcendent, but searching for the way of thinking, the awareness in which the ordinary world has not fallen from grace.

It is my answer to Nietzsche, my antidote to Nihilism.

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[83] **COLEBROOK** 2002, page 24.

2. Snow Cradle

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Introduction

Snow Cradle is an album of electronic music composed and produced from Autumn 2010 to Spring 2011, with final mixes completed in January 2012. The finished album can be found on the Data Drive.[1] Below I will first give an overview of the project, describing the creative process involved, followed by a more detailed description of each individual composition. The emphasis throughout will be not only on the 'micro' level (examining each piece in isolation) but also on the 'macro' level (examining the relationship of each piece in the context of the work as a whole). As such this text is an attempt to map the creative process involved and, through that, to reveal relationships between pieces.

Creative Process: Aims and Strategies

Snow Cradle seeks to find a creative synthesis between two different musical genres: Central Javanese gamelan and electronica[2]. This general aim has been pursued through the application of two main strategies:

- The use of a restricted sound palette: source sounds used are taken exclusively from either recordings of Central Javanese gamelan made by the composer or electronically generated drum sounds.

- Compositional strategies drawn from both genres have been integrated and used throughout: strategies borrowed from karawitan include the use of bentuk (cyclic forms) as modular building blocks to create large-scale musical structures and the use of changes in irama (tempo) to generate form, variety and new musical material. A number of other concepts drawn from karawitan have also been applied, including selar notes (destination notes), and the practice of garap. Strategies drawn from the electronica genre include the use of a DAW (Digital Audio Workstation) environment to develop

[1] See: /DataDrive/Snow Cradle Media/Snow Cradle Bandcamp release

[2] The term electronica has been used here as defined by the OED:
'Any of various kinds of electronically generated music; electronic music in general.' and
'Any of various popular styles of electronic music deriving from techno and rave music, esp. those having a more ambient, esoteric, or cerebral quality.' **OED** 2014b.

structure and also more complex timbres and textures through the application of electronic processing and production techniques.

From the perspective outlined above, the album as a whole can be viewed as a network of fragments originating from a common source; the finished work has grown from the seed of a common collection of sound sources and related musical and compositional ideas.

Sound Sources

Sounds used are drawn from three sources:

- a sound library of gamelan Sekar Petak, a Central Javanese gamelan orchestra housed at the University of York.[3] This sound library was recorded in 2010 by the composer and gamelan musician John Jacobs.[4]
- a number of sound recordings of gamelan instruments in performance made by the composer. These recordings can be further subdivided into two groups: material taken from recording sessions conducted specifically for the project (such as the rebab solo section in 'Thought 4'), and recording sessions conducted as part of a separate project, *Ice Pictures* (such as a bonang recording used for 'Black Trees, Slow Mist').
- a suite of electronic drum samples taken from Battery 3, a software drum machine made by Native Instruments.

Bentuk

Compositional methods and musical concepts drawn from traditional Central Javanese gamelan are an integral part of the work as a whole, both in the genesis of each individual composition and in the use of certain seed compositions to create other tracks on the album. Bentuk is a key concept in relation to this. Pieces in the traditional repertoire of karawitan conform to one or another of the fixed forms (bentuk), each of which is characterised by a particular pattern or cycle of strokes on the colotomic instruments.[5] Longer and more complex types of pieces in the repertoire, such as a gendhing, will thread together a number of bentuk to

[3] For information regarding gamelan Sekar Petak, see: http://www.york.ac.uk/music/about/ensembles/gamelan/.

[4] Recorded in April 2010 at the Trevor Jones recording studio at the University of York's Music Research Centre using Newuman U87 microphones. The library is a near complete collection of recordings of every instrument in Gamelan Sekar Petak. Numerous examples of recordings can be round on Soundcloud here: https://soundcloud.com/gamelan-sekar-petak.

[5] PICKVANCE 2005, page 63.

create a large-scale structure. There are also shorter forms, sometimes referred to as 'editable forms' (for example srepegan or sampak), that are used frequently in wayang kullit[6] performances, threaded together in different ways to create flexible incidental music.[7]

The key idea here in relation to *Snow Cradle* is that bentuk are used in karawitan as building blocks and can be thought of as 'seed structures' used to create larger modular forms. The structure and form of each piece in *Snow Cradle* uses this modular approach, each being derived from an original bentuk created by the composer. *Figure 1* below shows an example of a bentuk created for the track 'Thought 4':

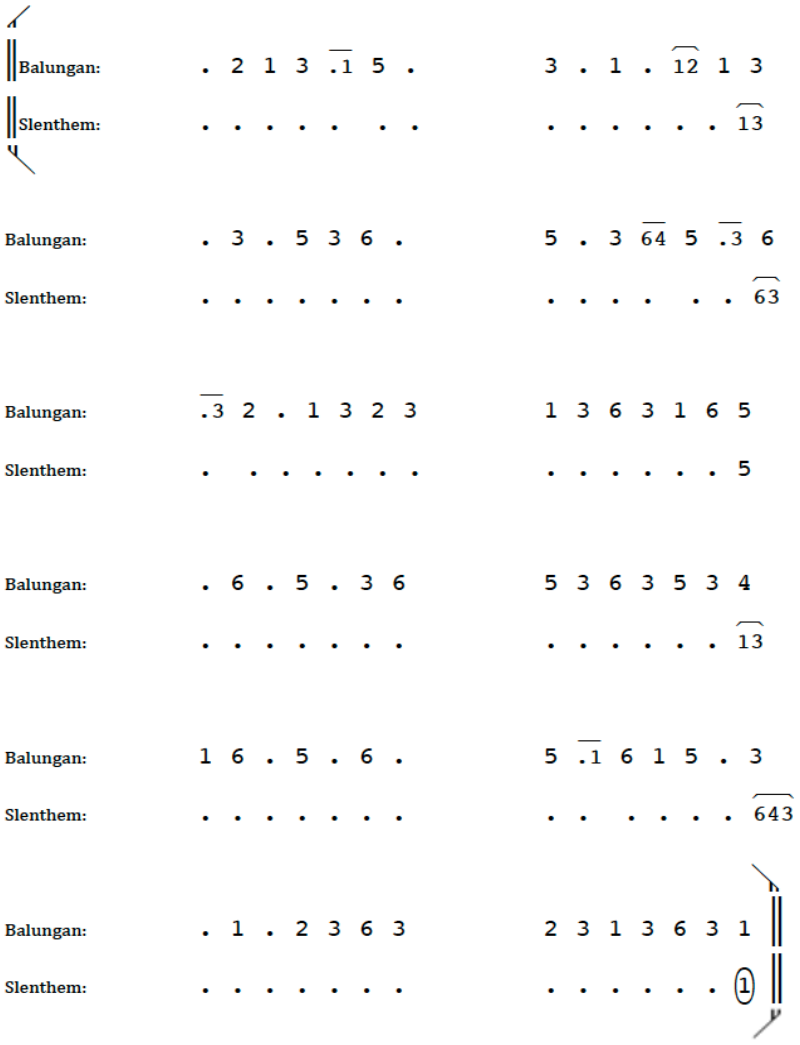


Figure 1. 'Thought 4' bentuk.

The notation used in *figure 1* is based on a system known as kepatihan, the standard system used for karawitan. As is typical with kepatihan notation, it contains a minimal amount of information: only the basic skeleton or outline of the bentuk. This information includes the number of beats present in each cycle, (the dots), the balungan melody, (the numbers) and the

[6] Javanese shadow puppet theatre.
[7] PICKVANCE 2005, page 96.

position of colotomic instruments that mark important points in the structure (for example the circle around the final 1 pitch). So *figure 1* represents a structure of six lines, each containing two gåtrås of seven beats. At the end of each line, there are harmonising notes written below the main balungan line. These function as colotomic instruments in this instance, although they are played by the slenthem, which is not usually used as a colotomic instrument in karawitan. These notes create chords that ring at the end of each line and are sustained through the following line, sounding a pedal. At the end of the final line, the circle represents the striking of the gong ageng, and a return to the beginning of the cycle.[8]

Once an initial version of the composition in *figure 1* was complete, the next step in the creative process was to program this framework into a suitable DAW environment using samples taken from the composer's gamelan sound library. For the entire *Snow Cradle* project, I used the DAW Reaper.[9] The framework was input first in a very sparse and simple version, containing only raw sound samples appropriately positioned in Reaper, without any of the more complex sonic textures found in the finished mixes. From this point on in the process, the material was worked on directly in Reaper, either in the recording studio or on a laptop, and the notation no longer used. Harmonic, timbral, melodic, textural and structural elements of the music were developed in this way, fashioned from this initial seed structure using the recording studio and DAW as a compositional tool.

Using Bentuk to Create Larger Structures

Snow Cradle contains nine individual tracks that fall loosely into two main groups in terms of structure: tracks that are rigidly structured and adhere to a predefined framework, and tracks that are more free flowing in quality. Tracks in the first group include 'Snow Cradle', 'Thought 4', 'Extreme Thought', 'Music Box', 'Mountain Collision' and 'Slow Mountain'. These tend to have a more clearly defined pulse and more explicit use of rhythm. The structures of individual

[8] Kepatihan is a type of cypher notation. Pitches are represented by numbers, each of which refer to a pitch in one of two gamelan scales: slendro or pelog. 'Thought 4' is in pelog, which uses pitches numbered 1 to 7. Each dot or number in figure 1 represents a 'beat', and could be written in Western notation with, for example, a single crotchet or quaver. Each group of dots or numbers forms a structural unit called a gåtrå, which is roughly equivalent to a bar in Western notation. So what is represented above is a cyclic form of 6 lines, each containing 2 gåtrås of 7 beats. The music plays from the first beat of the first line (top left of *figure 1*) straight though to the final beat of the final line (bottom right in *figure 1*). Upon reaching this note, it returns to the top left starting point. Different symbols employed refer to different instruments.

The numbers represent notes in the balungan melody. In gamelan music, the notation only ever forms a basic outline of the piece, a structural skeleton. This will most commonly involve the use of numbers on the lines that represent the balungan melody. Symbols and numbers above the lines represent colotomic instruments, marking important structural points in the form.

The circle at end of the final line refers to the striking of the gong ageng, a large low frequency gong, and the only colotomic instrumental symbol used here. For a detailed description of this notation system, see PICKVANCE 2005, page 38.

[9] See here for more info regarding Reaper http://www.reaper.fm/.

pieces in this group were developed according to principles outlined above, with bentuk treated as modules and arranged to create larger scale forms. In the case of 'Thought 4', for example, after an initial opening section, the main cycle is repeated 5 times before the final gong leads to a brief outro. (See *figure 2* below.)

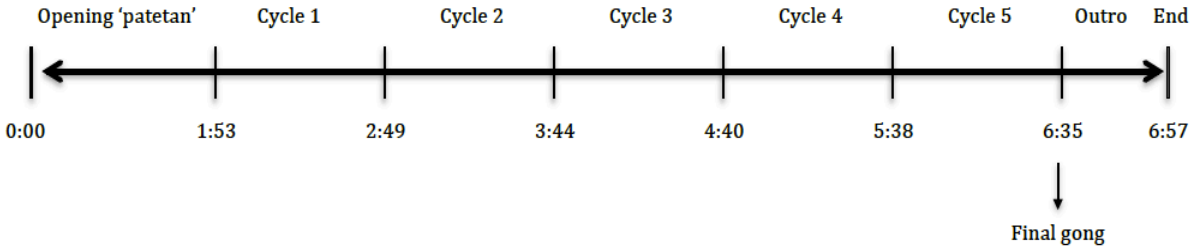


Figure 2. 'Thought 4', complete form.

Tracks in the second group include 'Open', 'Rebabst', and 'Black Trees, Slow Mist'. These tracks differ from the first group in lacking a clear metric pulse. Some, however, do contain an underlying colotomic structure.

Irama as a Compositional Strategy

Irama in karawitan can loosely be translated as 'tempo' and is used extensively in performance of traditional Javanese gamelan music. Forms are played in different iramas, and each irama relates to the next in terms of playing speed: there is roughly a halving or doubling of playing speed for the balungan and colotomic instruments when moving from one irama to the next. For example, irama Lancaran is a fast tempo, with the next fastest irama, irama tangung, being roughly half the speed of Lancaran. The next irama, slowing the speed further, is irama dados, which is roughly half the speed of tangung.

This Javanese approach to the use of speed change is a concept that runs through the album as a whole, and it was frequently used as a method by which new material was generated. For example, 'Music Box' is derived from interlaced versions of the basic Snow Cradle bentuk at double and quadruple speed.

Initially, both 'Snow Cradle' (track 1) and 'Thought 4' (track 7) were planned as two individual longer pieces which would move freely though different tempo changes, from one irama to another. Early drafts included, for example, a 17-minute version of 'Thought 4'. This began with a longer section, using material generated from quarter and half speed playback of

the original bentuk, before moving into the full speed bentuk. The track then moved into a faster tempo section formed from double and quadruple speed playback of the bentuk. In the final version of the album, this idea was abandoned; I decided that a larger number of discrete short pieces was better, as each individual track and the ideas contained within it would be more readily accessible on playback for the listener. The sections developed for the draft mentioned above were used in different ways in the finished work: material generated from working with the piece at reduced playback speed was used to create new textures that play throughout the final mix. This same material was also used as the basis for the intro section, which runs from 0:00 to 1:52. The sections of the piece based on material at a faster tempo were eventually developed into track 8, 'Extreme Thought'.

Furthermore, the feel of the slowed-down material, used as intro and textural material in both 'Thought 4' and 'Snow Cradle', provided a creative impetus that led to the development of rhythmically free, ambient pieces such as 'Open', 'Rebabst', and 'Black Trees, Slow Mist'. In these pieces, the sense of pace is greatly reduced, and as such they reflect the sense of changing pace that is an important part of karawitan.

The Concept of Patetan

As mentioned above, the first 1 minute and 52 seconds of 'Thought 4' is a non-cyclic, introductory section that lacks any clear regular pulse. It is a free-form, loose collection of fragments, a mosaic that is in a state of flux. With the striking of the gong ageng at 1:53, the first cycle of the full-speed bentuk begins, and these elements are pulled into alignment. In the free-form opening section, elements of the music are gradually revealed, and the listener is introduced to the sound world of the piece. As such, it performs a function comparable to patetan in karawitan. Patetan is a rhythmically free, expressive musical form that often provides an introductory section before certain types of pieces in traditional Central Javanese Gamelan.[10] A Patetan has strong modal associations, and so functions as a way of establishing the mode of a piece.[11] It is short and non-cyclical,[12] and it is one of a small family of traditional gamelan pieces that have no common pulse and thus no irama or set rhythmic relationship between the simultaneously sounding parts.[13] Other forms in this family include Ada Ada, Båwå and Sendhon.

[10] PICKVANCE 2005 page 78
[11] BRINNER 1995 page 245
[12] BRINNER 1995 page 209
[13] BRINNER 1995 page 245

Garap as a Compositional Strategy

At this point it will be useful to explore the concept of 'garap', an integral part of karawitan performance practice, as a means of developing language and concepts that will be helpful to better understand the creative process employed. Garap is used throughout *Snow Cradle* and is integrated into the compositional strategy in a number of different ways.

In krawitan, the only elements of the music commonly notated are those found in the basic seed structure of the bentuk, as presented in *figure 1*. The music, however, contains a much higher degree of detail and sophistication in performance. It is common for many other instruments to play in a gamelan ensemble, using this structural framework as a starting point, either in notated form or committed to memory. So from this initial seed, many other instrumental parts are derived live in performance. This concept is comparable to the use of notation in jazz, where a head composition presents only the harmonic structure and melody to be realised more fully by an ensemble of improvising musicians.

The term garap refers to the system or process by which players of elaborating instruments, such as gender, suling or rebab, will derive their part. This process has been described by Pickvance as "a way of working or fashioning; specifically the way in which an instrumental part realises the balungan or the 'inner melody'.[14] "

According to the Javanese musician Rahayu Suppangah, the concept of garap is used more widely in Indonesia to apply to any kind of creative process, being a part of everyday Javanese discourse. For example in Indonesian to 'menggarap sawah', means to 'garap' or cultivate the rice fields. The concept covers the entire process carried out by a person or group of people (the farmer and his employees in this example) that leads to the production of an agricultural product, from the preparation of the land and planting of the seeds to the final harvest.[15] In this wider context then, the concept of 'garap' refers to a 'system' or a series of activities of a person and/or several people, consisting of several different stages that work together towards a particular aim or goal.[16]

[14] PICKVANCE 2005, Glossary, page 13
[15] For a detailed book-length study of the concept of garap and its application in Kariwitan, see SUPANGGAH 2011.
[16] SUPANGGAH 2011 page 133.

‘Garaping’ Texture and Timbre

Once the initial framework shown in *figure 1* had been entered into Reaper in its most basic form, this material could then be worked on and developed. An important part of this development was the creation of a specific sound world for the album. This was done by using skills and techniques developed through many years of experience working with production software. These were applied to the sound samples: individual sounds might, for example, be filtered and processed in a number of ways to create a sound fabric. This process led to new elements being added to the cycle, such as new textures, pitch material, and percussive sounds. Processes used include EQ, compression, and the utilisation of effects such as artificial reverb. The initial framework was embellished in this way, building up a wider sound fabric that, while extending beyond the timbral horizons of the original structure, has nevertheless grown from it. This process reflects the way in which, for example, a gender player adds an important layer to the sound fabric of a gamelan composition by extrapolating from the original balungan line and colotomic structure of a bentuk. This new layer adds to the harmonic, textural and melodic content of the composition; it expands the sonic horizons of the piece on multiple levels, working out from and into the original framework provided.

Description of Individual Tracks

Snow Cradle

Two separate bentuk are used to create 'Snow Cradle'. Bentuk A (see *figure 3* below) consists of four lines containing four individual gåtrå of five beats each. Each line contains a high kemanak 6 on the first and third beats of the second gåtrå, a muted gong komadhong on the second beat of the third[e] gåtrå, a kenong 7 on the fourth note of the third[rd] gåtrå, a gender 5 on the first note of the fourth gåtrå, and ends with a gong ageng on the final note.

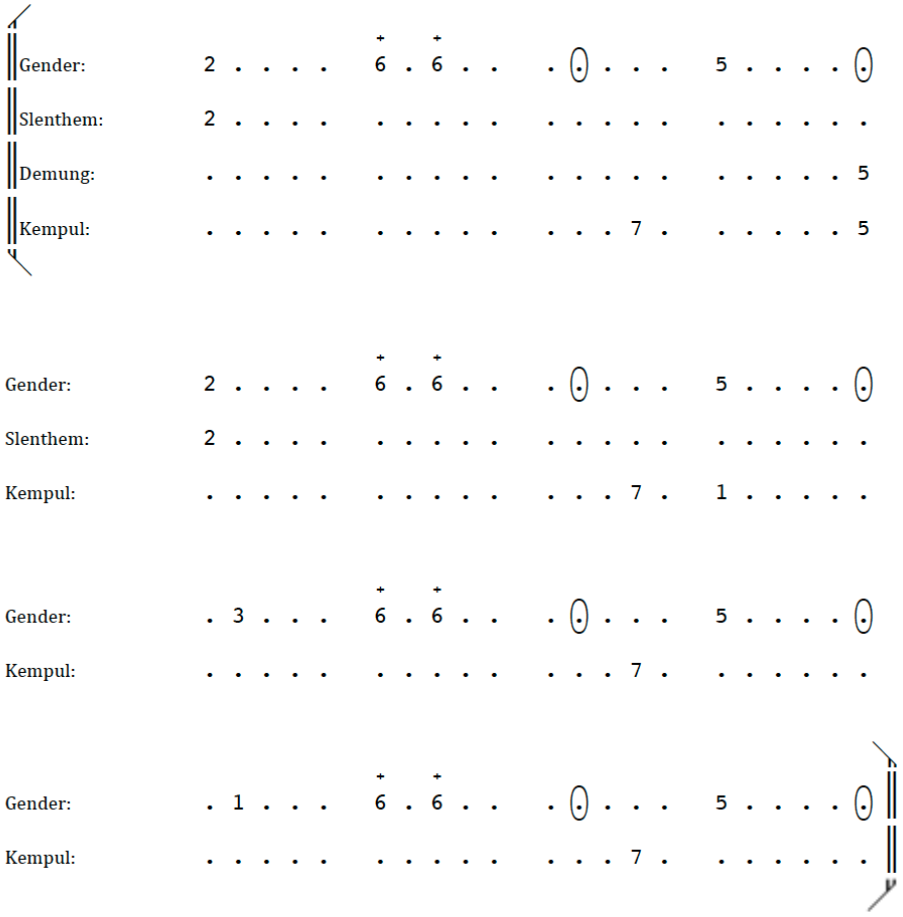


Figure 3. 'Snow Cradle', section A, bentuk.

The final gong note is actually a complex composite of a number of pitches: the recording used is of an instrument called the gong komadhong, which, following the initial percussive attack, carries two strong tones. The strongest is a flat pelog 4, a note that falls outside of the pelog scale. (A normal pelog 4 in gamelan Sekar Petak is at a frequency of 101 Hz. The gong komadhong tone is at 96 Hz, which is approximately a semitone flatter.) This forms a dissonant pedal over which the entire harmony of the bentuk rests. The other prominent notes in this complex tone are two pelog 5 notes, from a kempul at 106 Hz and a demung at 216 Hz. The flat

4 and 5 together form a sustained interval that act as a pedal. Against this pedal, the kamanak 6, kenong 7 and gender 5 common to each line form a static harmonic block.

The piece is almost exclusively in pelog, but the flat 4 gong komadhong note strays outside the scale. There is an interesting precedent here, as certain types of pieces in karawitan use notes outside of the scale: such notes are called miring notes and are most commonly used as expressive ornaments in the performance of vocal and rebab melodic passages.[17] Employing miring notes in a vocal line imbues a piece with a particular colour and expressive quality. In a way, the same thing happens here: although the piece is exclusively in pelog, this pedal note from outside the scale twists the harmony in a particular way, putting the notes above it in an unfamiliar and expressive harmonic context.[18]

While the A section is quite static harmonically, the small amount of harmonic and melodic activity that does take place is important, creating a sense of forward movement. This happens most prominently at the start of each line, where a note is sounded in the first gåtrå. In the first line, this is a 2 from both a gender and slenthem. The 2 is repeated in the second line, with the addition of a kempul 1 together with the 5 on the first beat of the final gåtrå. With the kempul 7 that precedes it on beat 4 of the fourth gåtrå, this forms part of a melody. In line 3, there is a clear shift when a gender 3 is sounded on the second beat instead of a 2 as in the previous two lines. The final line replaces this note with a gender 1.

The harmonically static nature of the A section is useful compositionally, providing a resting place or 'home' territory that can be departed from and returned to throughout the piece by moving through the B section (see figure 4 below). This sense of movement or travelling through related bentuk will be familiar to gamelan players who have performed certain types of gendhing: for example the movement from mérong to ngelik frequently involves a change to a higher tessitura throughout the gamelan orchestra, before returning to a lower tessitura in the umpak.

[17] SUPANGGAH 2011 page 80.
[18] For a detailed description of miring in karawitan, see SUPANGGAH 2011 page 80-88.

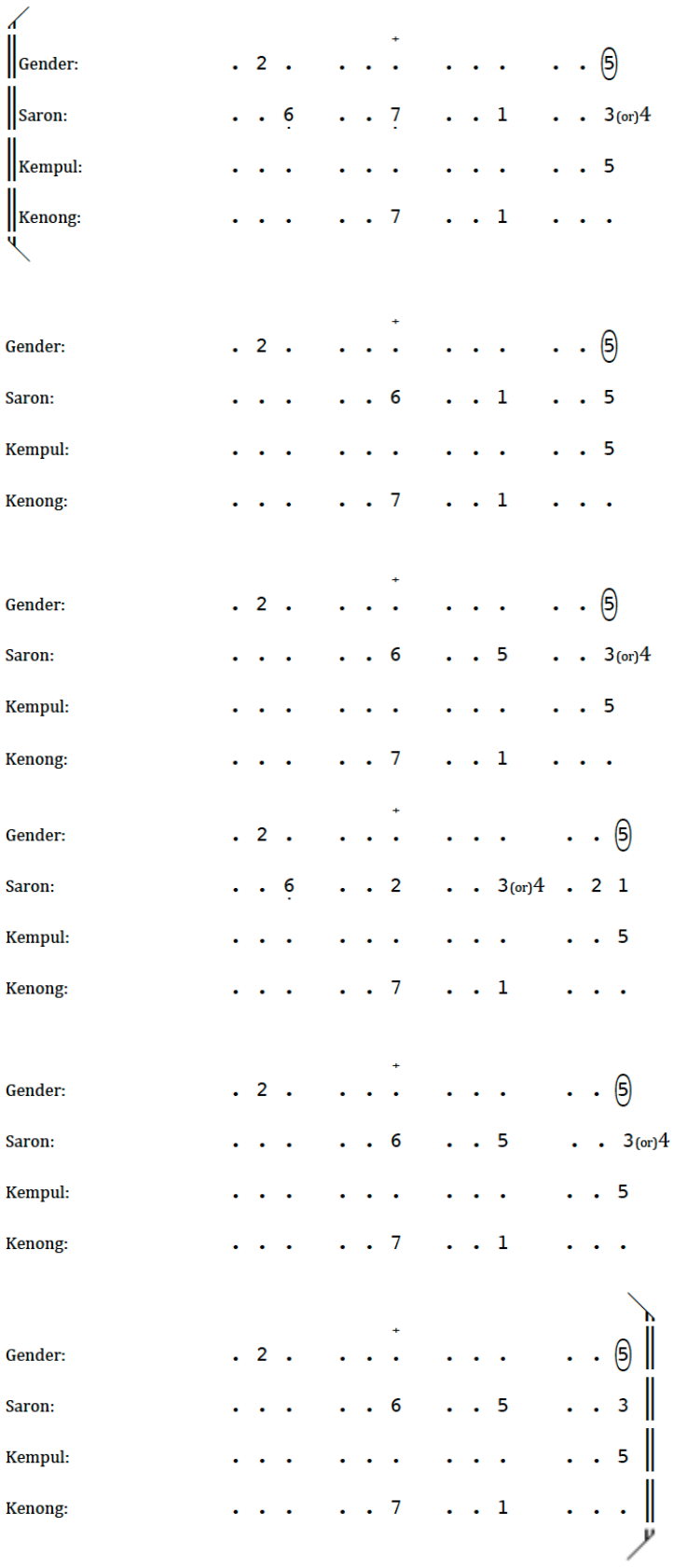


Figure 4. 'Snow Cradle', section B, bentuk.

Section B is constructed from 6 lines with identical colotomic structures, each containing four individual three beat gåtrå. A gender 2 is sounded in the second beat of the first gåtrå. A

high 6 kemanak is sounded on the final beat of the 2nd gåtrå, along with a kenong 7. Another kemanak 6 comes on the second beat of the 3rd gåtrå, followed on the 3rd beat by a kenong 1. Each of the 6 lines end with a composite tone consisting of a gong komodhong along with a gender 5 and kempul 5. This basic structure is repeated six times, but with a melody line moving over the top, as can be seen from the score in figure 4. The melody notes are placed on the selar notes for each gåtrå, with the odd exception (2nd and 4th gåtrå of the 4th line). The B section is played twice in the finished piece; the second time, pitch 3 in the melody is replaced by pitch 4, giving it a more dissonant, minor key quality.

Using the sections A and B described above, the complete form of the piece is set out in *figure 5* below:

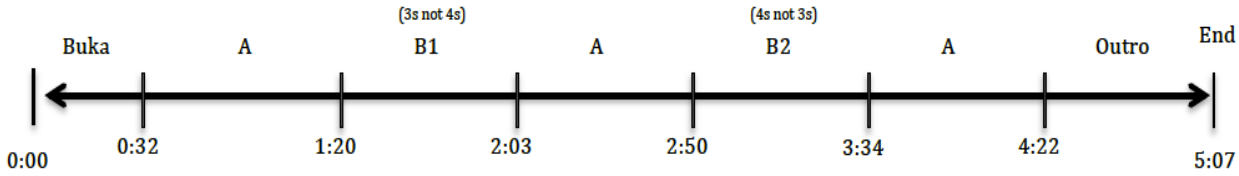


Figure 5. 'Snow Cradle', complete form.

As can be seen, after the initial opening intro section, from 0:00 to 0:32, we have the first exposition of the A section (0:32-1:20). Then the B section appears for the first time, using the first melody, with 3s instead of 4s. This finishes at 2:03, and the A section appears again. Another B section—this time with 4s instead of 3s in the melody—begins at 2:50 and runs until 3:34. The A section then recurs (3:34-4:22). At the end of this, at 4:22, there is no colotomic structure, just a continuation of the rhythmic material from the A section. Over this, elements from the sound fabric are used to create variety until the piece ends at 5:07.

Black Trees, Slow Mist

'Black Trees, Slow Mist' is constructed from fragments of source material taken from two other tracks: a rhythmic track derived from material taken from 'Thought 4', and a recording of an improvisation by 3 bonang players that later became Bonang Triangle Three in *Ice Pictures*. In 'Black Trees, Slow Mist', these two sound sources are slowed down and shifted down in pitch before being remixed and meshed together. The form of the track was developed in an intuitive way through experimenting with the juxtaposition of blocks of the different groups of material.

Mountain Collision

'Mountain Collision' grew out of a central rhythmic pattern around which hangs a very slow balungan melody, acting as a kind of colotomic structure. This slow melody consists of the simple movement from a high pelog *7* to a low pelog 3. This forms plays out as shown in *figure 6* below.

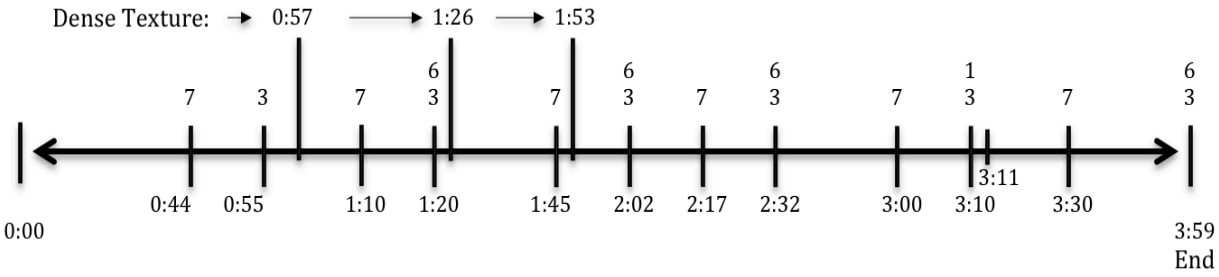


Figure 6. 'Mountain Collision', complete form.

The low 3 is harmonised slightly differently at different points in the track with a more distant sounding low note. The first example of the low 3 at 0:55 is played without a harmonising note, but then it is harmonised with a low note closest to a 6 (a slightly flattened 6, at 109 Hz, rather than 115 Hz) at 1:20, 2:02, 2:32 and 3:59. At 3:11, it is harmonised with a low pelog 1. Across this basic structural framework, dense textural material comes and goes, frequently alternating with the notes of the 7-3 melody (the first time at 0:57, then again at 1:26, 1:43 1:53 and 2:11). We can see here how this piece as a whole is still reducible to gamelan notation, and its structure is entirely gamelan orientated.

Open

'Open' is derived from three main sound sources: slowed down fragments of rhythmic elements from 'Thought 4', and with two sets of instrumental recordings. These instrumental recordings comprise freely improvised passages on rebab and suling, played by Charlotte Pugh. As we can see in *figure 7* below, the processed rebab recordings are first heard at 0:24. The suling recordings are first heard at 1:48 (an organ or reed-like texture) and then heard most clearly from 3:08 to 3:30, when the rhythmic material drops away. These recordings have been time stretched, slowed down, pitch shifted and heavily processed in various ways to create the texture heard throughout the piece.

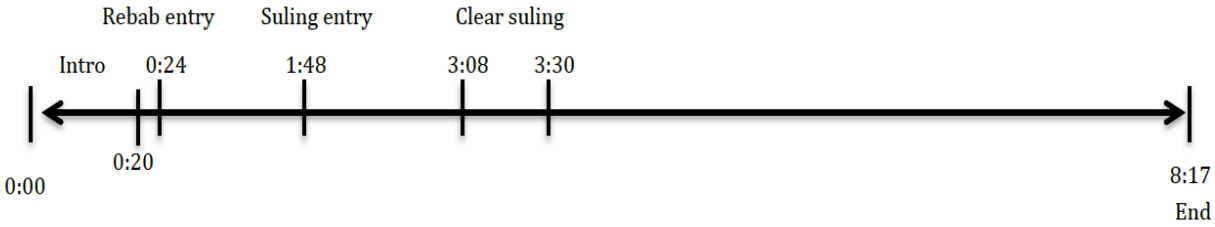


Figure 7. 'Open', complete form.

This is a long, free-form track, not anchored in a clear colotomic structure. However, there is a repeated use of the rhythmic cadential material derived from 'Thought 4'. This is used to create a short Buka-like opening, from 0:00 to the large gong strike at 0:20. Shortly after this the processed rebab sound comes in at 0:24. The track gains momentum and is running more fully at 1:48 where the distorted suling makes its first appearance.

Music Box

'Music Box' is derived directly for the bentuk used to make 'Snow Cradle'. The exact form of 'Snow Cradle' is used, but played back at double and quadruple speed.

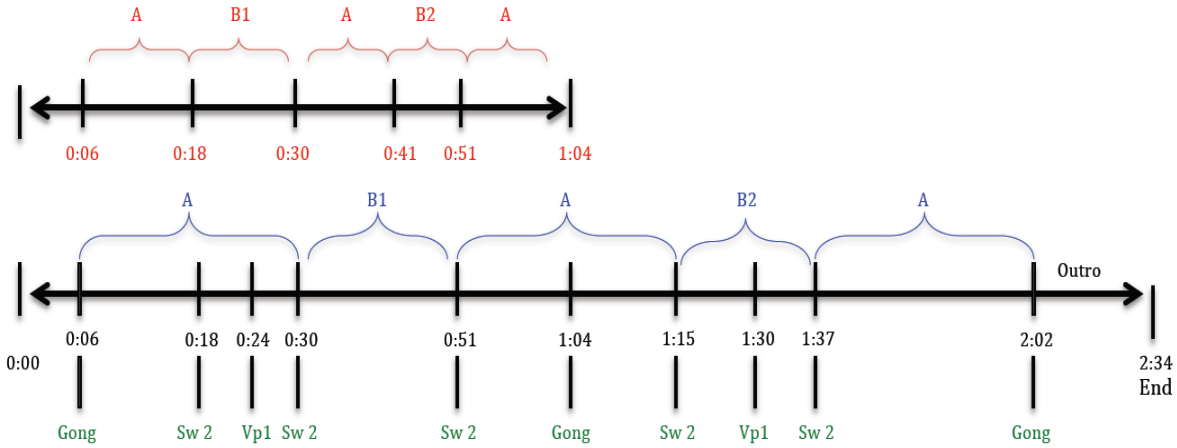


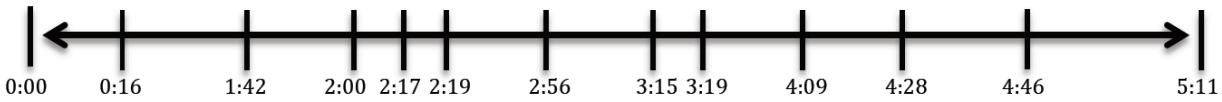
Figure 8. 'Music Box', complete form.

As we can see from *figure 8*, the main structural framework for the track is a double-speed version of the 'Snow Cradle' form, marked by the blue brackets. The 'Snow Cradle' A and B bentuk are repeated in the same form as in 'Snow Cradle', but at twice the speed. Layered on top of this for the first half of the track is a quadruple-speed version of the same form, as illustrated by the upper timeline in *figure 8*, marked in red. Finally, the combination of these two bentuk of different speeds is over-layered with a new colotomic structure articulated using sound samples taken from the gamelan Sekar Petak sound library, marked in green in *figure 8*.

Rebabst

'Rebabst' was created using material derived from 'Mountain Collision', 'Thought 4' and 'Snow Cradle'. This material was slowed down and mixed to create a completely open, rhythmically free texture and sonic landscape. The composer then worked with gamelan musician Charlotte Pugh in the recording studio, asking her to improvise freely over the material with both suling and rebab. The recorded material was then edited and mixed into the sound fabric.

The opening section features a clear, sustained pitch, which is closest in pitch to a pelog 1 but somewhat distant from the gamelan tuning used in the rest of the track. It creates a kind of state, or 'place,' that begins the track and is returned to at the end. Another structural feature is a number of gong-like markers designating points of reference, which are universally pitched at pelog 3, as illustrated by *figure 9* below:



Kenong and gong-like tone positions. All pitched at pelog 3

Figure 9. 'Rebabst', complete form.

These tones are provided by either kenongs (0:16, 2:17, 3:19) or gong-like processed sounds derived from kempuls and other gamelan samples (1:42, 2:19, 4:28). The pelog 3 pitch is picked up frequently by the improvising instruments: for example the rebab responds to the clear gong- and kenong-like pelog 3 in the texture at 0:28 by echoing with a high 3 (first at 0:30) before alternating this with a low 1 (first at 0:35). The low 1, in turn, is a response to the juxtaposition of the 3 and the sustained pitch from the start, which is closest to a 1. Then, as the low, sustained tone fades out (from around 0:40), the suling begins to respond to the changing pitch material, playing with different notes, moving from the same high 3 but to a low 6 rather than a low 1. The suling is no longer tied to the dominant low 1 or influenced by the sustained 'alien' tone, as that has faded. The suling repeats the oscillation between pitches 3 and 6 throughout the piece, starting at 0:52 with a low 6 and moving to a high 3 for the first time at 0:56. The other rebab and suling lines are built freely upon this pitch material by the player in the recording session. The sustained 'alien' note (low pelog 1) returns at 3:44.

Thought 4

The bentuk used for 'Thought 4' has six lines, each containing two gåtrå of seven beats, as illustrated by *figure 10* below:

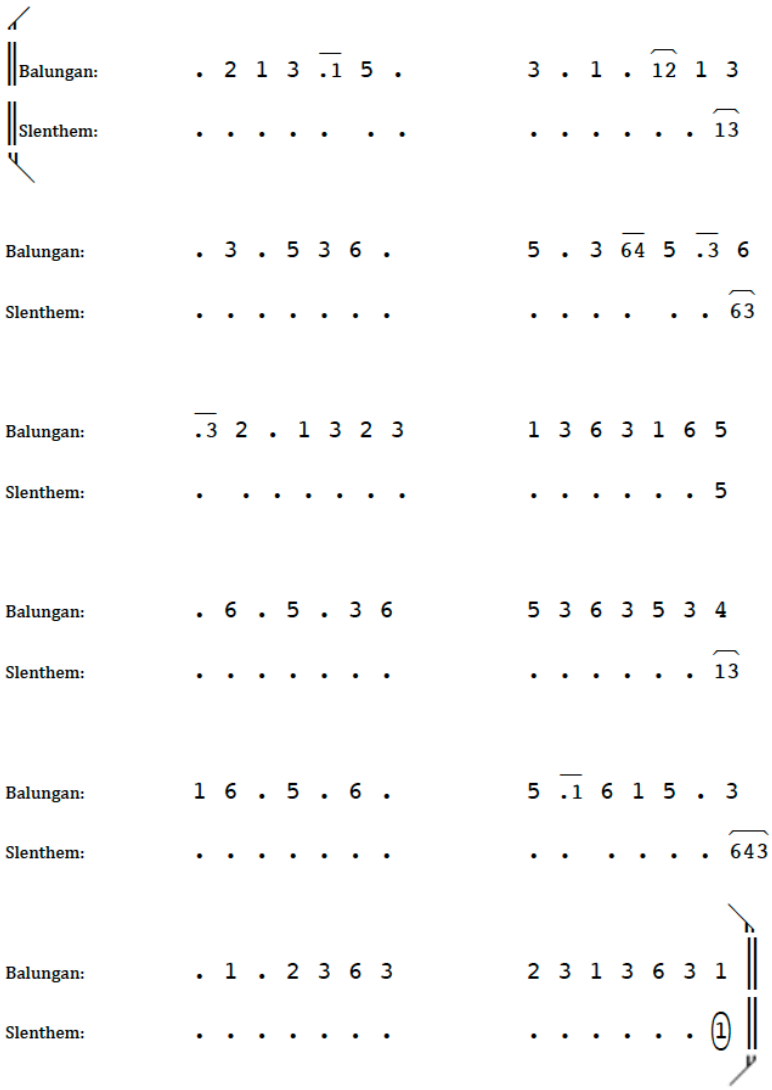


Figure 10. 'Thought 4', bentuk.

Each line has the same simple colotomic structure, ending with a different combination of sustained slenthem notes. The first line, for example, ends with a 1 and 3, and the second line ends with a 6 and 3. The melodic material that appears first on the recording at 2:49 winds through this harmonic backdrop. The overall basic form of the piece is thus as can be seen in *figure 11* below:

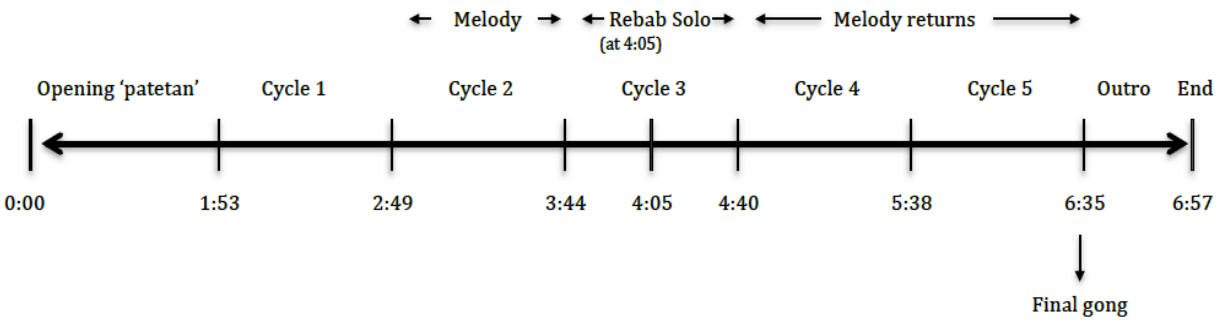


Figure 11. 'Thought 4', complete form.

The opening intro section lasts from 0:00 to 1:53 and is followed by five repeats of the full cycle of the bentuk.

The rhythmic track, created from a combination of gamelan drum samples and drum machine sounds, is an important part of the texture, containing a melodic element suggested by the bass drum tones and a number of significant colotomic elements. A kecér sample is also used throughout, for example at 0:12, and again at 0:51 slowed down and pitch shifted from its original frequency. A heavily filtered version of this sound can also be heard in the distance at 0:57-1:02, no longer recognisable as a metallic percussive sound. The full speed and correct pitched version of the kecér can be heard at 1:20 and again at 1:32.

With the striking of the gong ageng at 1:53, the full-speed form is established. The texture also changes here, becoming thinner and more sparse. The first articulation of the cycle lasts from 1:53 until 2:49. A second cycle then plays, and the balungan melody is heard for the first time, ending at 3:44. Then another cycle incorporates a general increase in the density of the surrounding texture and a solo rebab line that starts at 4:05 and runs until the end of the cycle at 4:40. A new cycle then begins, and with it a return to the sparse texture found in the first section (1:53-2:49), allowing space for the melodic material. This is repeated a second time (5:38-) before the melody gradually fades and becomes less distinct, starting at 6:10, heading towards the gong ageng at 6:35. A short outro then leads to the end of the piece.

Extreme Thought

'Extreme Thought' uses sped-up fragments derived from 'Thought 4', with gongs and kempuls marking points of structural significance. The basic structure, illustrated in *figure 12* below, contains an introductory section, followed by 4 cycles, each containing a pelog 7 followed by a pelog 6 kempul. After a buka-like introductory texture from 0:00 to 0:16, an initial gong marks the first of 4 cycles, from 0:16 until 1:00. A high kempul comes at 0:28, with a heavier rhythm starting shortly at 0:31. A second kempul sounds at 0:42, with the cycle closing with a

gong at 1:00. There are three more repeats of the cycle before the final gong at 3:06, signalling the end of the track, and a small outro section.

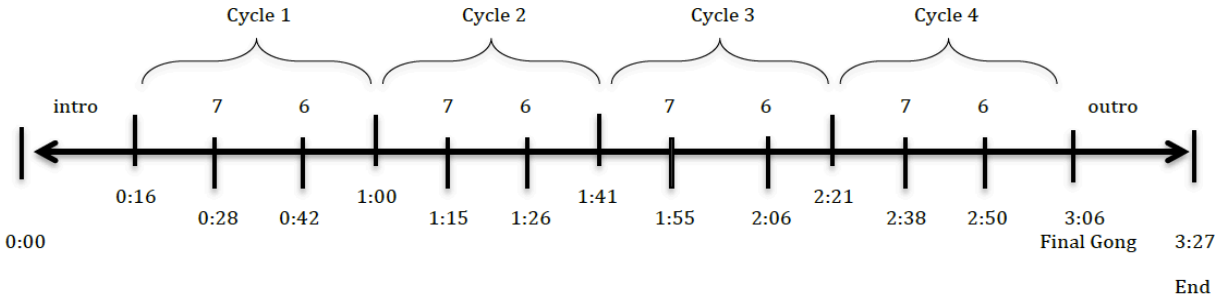
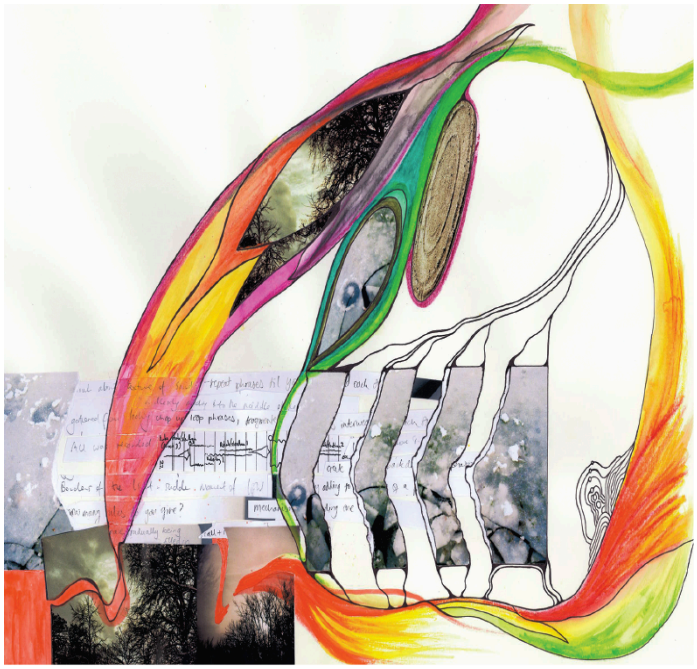


Figure 12. 'Extreme Thought', complete form.

Slow Mountain

Track 9, 'Slow Mountain', is a short track derived from the material used in 'Mountain Collision'. I experimented with slowing this material down considerably and then remixing it to suit the new tempo, with more emphasis on the rhythmic track. I would also acknowledge that there is a conscious dubstep influence at play here.



3. Ice Pictures

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Cover Image: Ice Pictures artwork by Jon Hughes and Charlotte Pugh.

Introduction

Ice Pictures is an album created collaboratively by John Jacobs, Charlotte Pugh and myself. It consists of twelve individual tracks made between October 2010 and August 2011. Below I will discuss the sound sources used, followed by an overview of the creative process. I will then provide a brief individual description of each track. The complete album can be found on the Data Drive.[1]

Sound Sources

Everything you hear on *Ice Pictures* has been derived from three distinct sound sources, and the contrasting nature of these three sources was an important aspect of the project:

- **Source 1 (S1)**: improvisation sessions conducted in the gamelan rehearsal room at the University of York.
- **Source 2 (S2)**: recording sessions using gamelan instruments in the Trevor Jones recording studio at the University of York.
- **Source 3 (S3):** Electronically generated sounds created through digital processing techniques applied to S1 and S2 recordings.

The two recording locations produced substantially different results. For example S1 Sessions were recorded in a 'rough and ready' way, with two stereo microphones positioned almost arbitrarily. As a result, they reveal the characteristic sound of the gamelan rehearsal room itself, with its specific acoustic identity. This includes occasional noise from outside the room, and frequent interjections from ambient sounds within; the central heating system became a bit of a sonic feature of the project! Such noise has value, as it contains information relating to the context of the creative process; recorded sound is also recorded time, a recording of a particular period of lived life and shared experience, and so these recordings are imprinted with a specific passage of time in a specific place.

[1] See:/DataDrive/Ice Pictures Media/Ice Pictures Bandcamp release/

In contrast the second set of recordings were made in a technically 'superior', soundproofed recording environment. Furthermore, higher quality microphones and preamps[2] were used throughout. This led to both a reduction of noise and interference, and a lack of a 'room' sound. Whilst a clear identity in terms of time and place is an integral part of the S1 material, S2 recordings are free from these characteristics, and so it is possible to capture 'cleaner' sounds devoid of an overt time/place specific context.

Electronic processing applied to S1 and S2 material constitutes the S3 family. This allows for a third sonic layer that can serve to blur boundaries between the two primary sound sources. The interplay and juxtaposition of the two contrasting recording styles and three different sound-worlds became an important part of the finished work.

Overview of Creative Process

The conceptual starting point for *Ice Pictures* was to create a body of work inspired by visual art. The three musicians involved (Charlotte Pugh, Jon Hughes and John Jacobs) met regularly (roughly once every two weeks) over a two-month period. At each meeting selected images were discussed and used as a starting point for a recorded improvisation session. *Figure 1* and *3* show examples of notes taken in these sessions. Below I will refer to these initial sessions as S1 recording sessions.

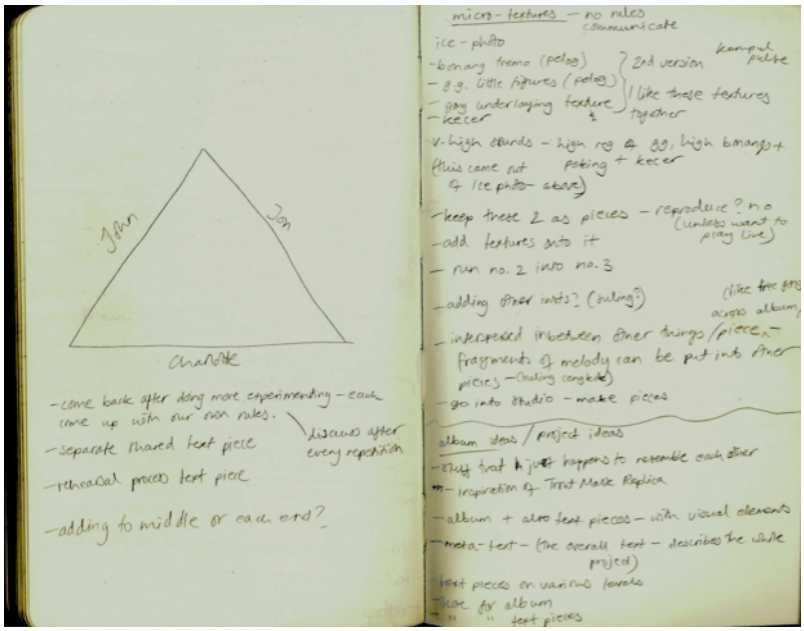


Figure 1: Notes from the improvisation session.

After several meetings, the material generated in the S1 sessions was then reviewed. Notes were taken, and promising ideas selected for further development.

[2] Neumann U87 and AKG 414 microphones together with Focusrite and Grace preamps.

The next part of the process involved a number of recording sessions conducted in the Trevor Jones recording studio at the University of York Music Research Centre. This second set of recordings served one of two main purposes: either to recreate musical ideas captured in the earlier improvisation sessions, but this time using the sonically higher quality studio recording environment, or to add and create layers of new musical material to be used together with the original S1 recordings. Below I will refer to these sessions as S2 (Source 2) recording sessions. *Figure 2* shows an image of one of these S2 sessions.

Once this material had been recorded, we then worked together as a group in the studio over several sessions in order to develop the work further. I then took the tracks away and worked on them in isolation, adding layers in terms of timbre and some new musical ideas, working with the digital audio workstation Reaper and employing various production techniques. Additional material generated by myself in the production process is referred to below as S3 (Source 3) material.

Figure 2: Charlotte Pugh Playing Rebab in a Trevor Jones Studio recording session.

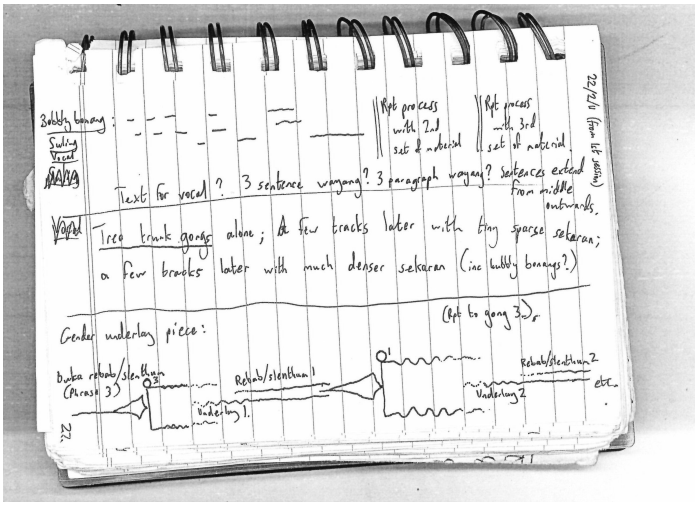


Figure 3: Notes from the review sessions.

Description of Individual Pieces

Ice Picture 1

'Ice Picture 1' was developed from improvisations based on the image shown in *figure 1* below:

Figure 4: Photograph of ice by Charlotte Pugh.

The complete form of 'Ice Picture 1' can be seen in *figure 5* below:

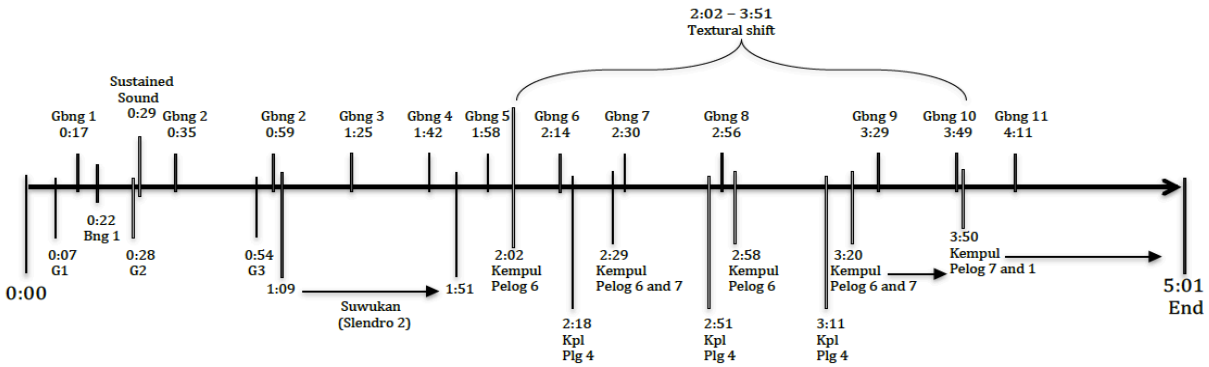


Figure 5: ' Ice Picture 1,' complete form.

The track opens with a texture constructed from an S1 recording, filtered to bring out the characteristic ambient sound of the room. At 0:07 (G1 in *figure 5*), a gong sounds, accompanied by S3 sounds designed to emphasis and sustain the gong's pitch. This gong tone is constructed from recordings of a pelog 4 kempul and higher pitch slendro 1 kempul. These tones combine to create the interval of a fourth, acting as a pedal. At 0:17, the gambang gonso sounds for the first time (Gbng 1 in *figure 5*). Interjections from the gambang are a prominent feature throughout

the piece, for example at 1:42, 2:56 and 4:11 (Gbng 4, 8 and 11 in *figure 5*). A bonang sounds at 0:22 (marked Bng 1 in *figure 5*), a sound that returns later in the track. A second gong is struck at 0:28 (G2), immediately followed by the emergence of a sustained S3 sound pitched at pelog 4, generated from a suwukan sample. Following the third gong at 0:54 (G3) a new pitch centre is introduced with a slendro 2 suwukan struck six times from 1:09 to 1:51. The gambang responds to this with interjections at 1:25 and 1:42.

At 2:02 there is an important textural shift, with the new pedal note introduced by a kempul pelog 6, accompanied by S3 sounds generated from the same kempul recording. For the following section, from 2:02 to 3:20, the kempul pelog 6 alternates with a lower pitched kempul pelog 4, first heard at 2:18. At 2:29, the kempul pelog 6 returns, this time with an added kempul pelog 7 one note above. The pelog 4 is back at 2:51, before we return to the pelog 6 once more at 2:58. The kempul pelog 4 comes back for the final time at 3:11 before the kempul 6 and 7 return at 3:20. At 3:50, there is the introduction of a higher pitched kempul 1 together with a kempul 7, which dominates the texture from here. Towards the end of the track, the ambient S1 texture first heard in the opening section returns to prominence.

Personnel: Gambang gonso: John Jacobs; bonang: Jon Hughes; gongs and kempuls: Charlotte Pugh Other sounds: Jon Hughes, John Jacobs, Charlotte Pugh. All production, electronics, recording and mixing: Jon Hughes. Composition: Jon Hughes, John Jacobs and Charlotte Pugh.

Figure 6: Charlotte Pugh playing Rebab in a Trevor Jones recording session.

Ice Picture 2

'Ice Picture 2' was derived from improvisations based on the picture shown in *figure 1* above.

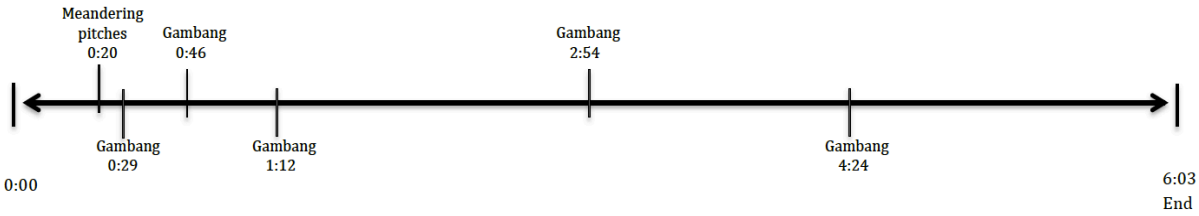


Figure 7: 'Ice Picture 2,' complete form.

'Ice Picture 2' is a combination of S1 and S2 recordings and S3 textural material. In contrast to 'Ice Picture 1', there is an overt use of electronically generated rhythmic sound throughout. The rhythm starts from the beginning of the track, embedded in a backdrop texture constructed from a number of different S1 recordings. Meandering low frequency pitch material is introduced at 0:20, which remain as background texture for the duration of the track. The main source of variation in the foreground is the gambang gonso, for example at 0:29, 0:46, 1:12, 2:54, 4:24 (as marked on *figure 7* above). 'Ice Picture 2' seeks to establish an atmosphere and stay there: there is not much in the way of linear narrative development. A static sound-world is established, then propelled forward by the driving force of the rhythm.

Personnel: Gambang gonso: John Jacobs; bonang: Jon Hughes; gongs and kempuls: Charlotte Pugh. Other sounds: Jon Hughes, John Jacobs, Charlotte Pugh. All production, electronics, recording and mixing: Jon Hughes. Composition: Jon Hughes, John Jacobs and Charlotte Pugh.

Ice Picture 3

'Ice Picture 3' was derived from improvisations based on the picture shown in *figure 1* above. *Figure 8* below shows the complete form:

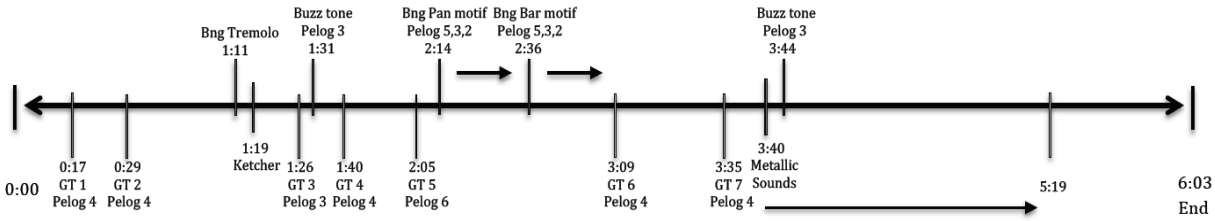


Figure 8: 'Ice Picture 3,' complete form.

'Ice Picture 3' predominantly uses a single S1 recording, which runs continuously from the beginning to the end of the track. It has been mastered using EQ and compression. Some of the

tremolo gongs have been added from S2 recordings, in order to clarify material present in the original S1 material. Also, gambang gonso has been added from S2 recordings in a number of places.

The track opens using a filtered version of the original S1 track only, with an ostinato figure in the gambang gonso together with accompanying bonang in the foreground. At 0:17 a tremolo gong is sounded pitched at pelog 4, (GT 1 in *figure 8*) which is repeated at 0:29. A tremolo figure on the bonang becomes more prominent at 1:11, and there is a clear 'clap' sound from the ketcher at 1:19, the first example of a sound that features throughout the track. At 1:26, the gong tremolos appears again, but this time pitched at pelog 3. This is followed by the introduction of a pelog 3 'buzz' tone from the gambang at 1:31. At 1:40 the pelog 4 gong tremolo returns once more. At 2:05, the gong tremolo changes pitch again, this time pitched at pelog 6. This is closely followed by a melodic motif from the bonang panerus, setting up an improvised dialogue from 2:14 and 3:35. It begins with a pelog 3 from the bonang panerus, which repeats until a pelog 2 is introduced at 2:24. These two notes are repeated until a 5 is added above the 3 and 2 at 2:35. This motif is picked up by the bonang barung player at 2:36, who begins by playing a repeated pelog 5, followed by a 5 and 3 at 2:42, before adding an addition low pelog 2 at 2:53. This motif is then repeated further until 3:35. This exchange serves as a good example of the kind of improvised dialogue that occurs in many tracks on the album.

At 3:09 there is another tremolo gong, pitched at pelog 4. This returns again at 3:35 (GT 7 in *figure 8*) where the tremolo is sustained until 5:19. Over this pedal, metallic sounds dominate, first heard at 3:40. In addition, the pelog 3 'buzz' tone returns at 3:44 and becomes a feature. The texture thins out once the tremolo gong fades away at 5:19. For the final minute we are left with only the original S1 recording.

Personnel: Gambang gonso, bonang barung: John Jacobs; bonang panerus, ketcher: Jon Hughes; gongs and kempuls: Charlotte Pugh. Other sounds: Jon Hughes, John Jacobs, Charlotte Pugh. All production, electronics, recording and mixing: Jon Hughes. Composition: Jon Hughes, John Jacobs and Charlotte Pugh.

Bonang Triangle 1 and 2

'Bonang Triangle 1' and 'Bonang Triangle 2' were created in response to the drawing shown in *figure 9* below:

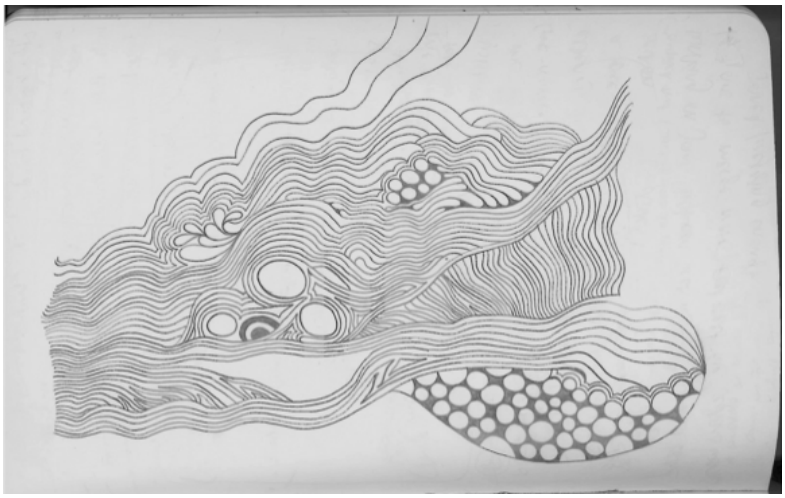


Figure 9: Drawing by Charlotte Pugh.

In our discussions regarding the drawing and how it was made, Charlotte talked about her creative process. This involved starting with a single line or image on the page, and then allowing a form to grow naturally out from that point of initiation in an unplanned way. The emphasis is on her drawing process being intuitive; the finished image is not pre-planned, beyond initial decisions regarding materials and style. For example, she might decide to do a line drawing on white paper using a particular sized black ink pen. In this way, the parameters are set at the start, but the image itself is not planned: that arises naturally once the selected pen is put to paper. Following these discussions, we began as a group to think about ways in which we might replicate this approach in our music making.

We decided to set our parameters by selecting a specific bonang instrument each, and to arrange the bonangs in a triangle, in which the three players would face one another. We found this arrangement to be preferable for improvisation as compared to the usual bonang set up, which is a square, in which players sit with their backs to one another. This triangular configuration can be seen in the notes from the studio review session (see *figure* 1 above).

We focussed on the idea that the final form would develop intuitively, in an unplanned way, outwards from an initial starting point. In the original S1 session, we devised a number of different improvisational frameworks, or sets of rules, each relating to this concept. After reviewing the recorded S1 material at a later date, we decided to record three different improvisations following three different sets of rules in the subsequent S2 studio recording sessions. Of these three, two made it onto the final album. Only these recorded S2 improvisations were used in the final pieces, mixed and mastered with some artificial reverb.

Bonang Triangle 1

The rule for 'Bonang Triangle 1' was as follows:

Create a short phrase. Repeat, adding to the phrase from the centre.

Each player was asked to follow this rule while listening and responding to the other two players. The form that resulted can be seen in *figure 10* below:

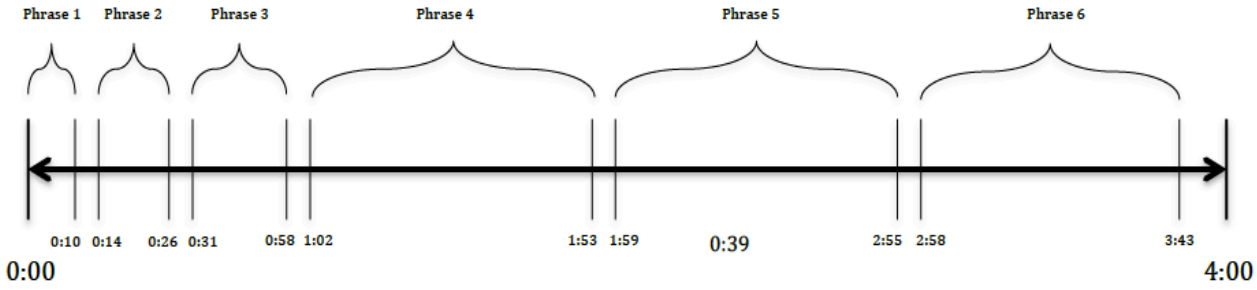


Figure 10: 'Bonang Triangle 1,' complete form.

Phrase 1 develops into phrase 2 by the procedure of repeating phrase 1, but inserting a small amount of new improvised material into the centre; so phrase 2 has the same beginning and end as phrase 1. This process was repeated to create the final six phrases.

Bonang Triangle 2

The rule for 'Bonang Triangle 2' was as follows:

Play a note. Repeat, adding something. Build a phrase in this way, adding a portion at each repetition.

Our realisation of the piece resulted in the form illustrated in *figure 11* below:

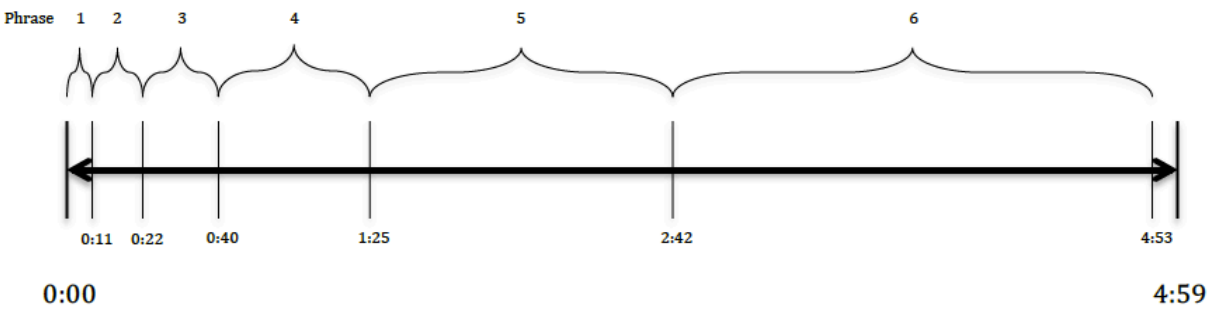


Figure 11: 'Bonang Triangle 2,' complete form.

Personnel: Bonang slendro barung: John Jacobs; bonang slendro panerus: Jon Hughes; bonang pelog barung: Charlotte Pugh. Other sounds: Jon Hughes, John Jacobs, Charlotte Pugh. All production, electronics, recording and mixing: Jon Hughes. Composition: Jon Hughes, John Jacobs and Charlotte Pugh.

Dark to Light Picture

'Dark to Light Picture' was created in response to the photograph in *figure 12* below:

Figure 12: Photograph by Charlotte Pugh.

One method we employed to find ways of using the pictures creatively was to write lists of attributes, feelings or observations relating to each image. One such attribute identified regarding the picture in *figure 12* was 'light emerging from darkness'. This was translated into the musical idea of a piece in which there is a clear sense of contrast between two different sections, one light and one dark. Furthermore, the second, lighter section would emerge out of the first, darker section. Initial experiments in the S1 session proved fruitful, and were supplemented by S2 studio recordings in the final piece. *Figure 13* below shows the complete form of the finished piece:

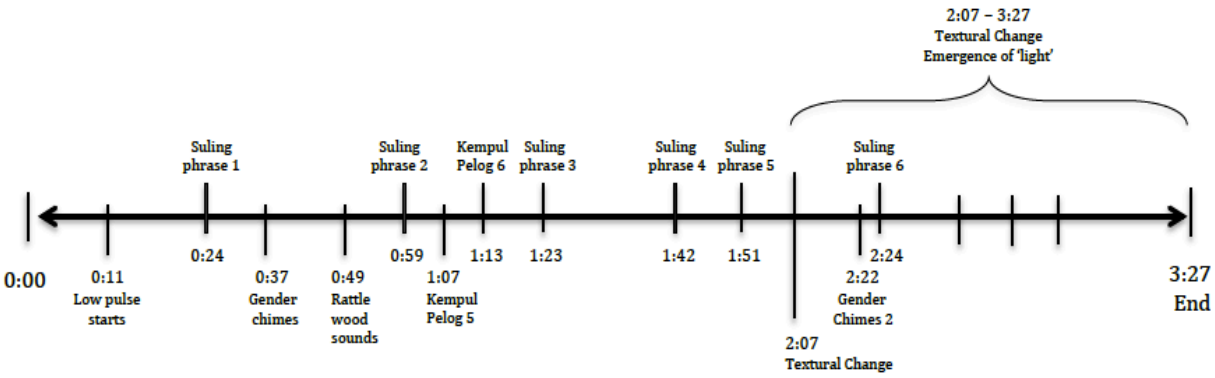


Figure 13: 'Dark to Light Picture,' complete form.

The track opens with a five-second long loop of S1 material which repeats until 0:24. At 0:11, an S3 pulse is introduced, made from processed S2 sounds. This pulse continues throughout the piece, and anchors it to a slendro 3 drone for the first two minutes and seven seconds. The first of several S2 suling phrases appears at 0:24. At 0:37, S2 recordings of a 'chiming' sound are introduced, made by playing the gender without pads on the mallets which results in a more 'metallic' sound. Other sounds that feature in the piece include a 'clattering' S1 sound, first heard at 0:49, created by using wooden mallets on the wooden bonang frame combined with some digital delay. At 0:59 a second entry of the suling is shortly followed by two kempul strikes: a kempul pelog 5 at 1:07, and a pelog 6 at 1:13.

A more significant change begins at 2:07, intended to be the contrasting, emerging 'light' texture: the drone shifts from slendro 3 to pelog 5, new material appears from the suling at 2:10 in a lower tessitura, whilst a second suling plays phrases starting at 2:24 (S2), moving to a higher tessitura. Another important element in this second section of the track is the clear emergence of a gender 'chiming' sound: first heard at 0:37 at a lower pitch (pelog 7 and 6), the gender chime returns at 2:22, with pitches pivoting around slendro 1, pelog 5 and pelog 4, decorated using other pitches that fall outside of the gamelan due to transposition caused by pitch shifting in Reaper. In Western notation, the phrase can be rendered as follows:

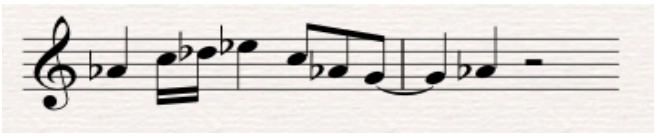


Figure 14: Gender chime phrase.

The A ♭ in *figure 14* is roughly equivalent to a pelog 5, the G to a pelog 4, the C to a slendro 1, and the D ♭ and E ♭ fall outside the pitches of the gamelan. At the end of the piece, from 3:07, we hear a clear return to the ambient rehearsal room loop first heard in the initial 24 seconds of the opening.

Personnel: Gender: John Jacobs; gongs and kempuls: Jon Hughes; suling: Charlotte Pugh. Other sounds: Jon Hughes, John Jacobs, Charlotte Pugh. All production, electronics, recording and mixing: Jon Hughes. Composition: Jon Hughes, John Jacobs and Charlotte Pugh.

Three Short Textures

'Three Short Textures' was created predominantly using S1 recordings. The idea for this piece did not relate directly from any one picture, but emerged from the improvisation process. The concept was to develop 'micro textures': short, free standing textures that might provide new material that could be developed into more extended pieces. The three micro-textures chosen to complete 'Three Short Textures' were particularly successful examples of this process edited together into a single track. Some processing was used on the third micro-texture: a little reverb on the rebab line. The complete form can be seen in *figure 15* below:

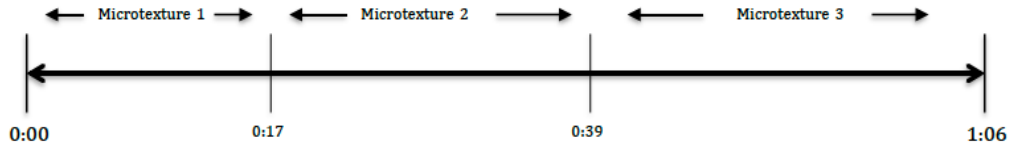


Figure 15: 'Three Short Textures,' complete form.

The first texture (0:00–0:17) consists of improvised gender, bonang and gamelan gonso. The second texture (0:17–0:39) consists of kempuls, bonang and gender. The third texture (0:39–1:06) consists of kempuls, rebab (with some reverb and processing added) and gender.

Personnel:

Texture 1: Gender: John Jacobs; bonang: Jon Hughes; gambang gonso: Charlotte Pugh.
Texture 2: Gender: John Jacobs; bonang: Jon Hughes; gongs and kempuls: Charlotte Pugh.
Texture 3: Gender: John Jacobs; gongs and kempuls: Jon Hughes; rebab: Charlotte Pugh.
Other sounds: Jon Hughes, John Jacobs, Charlotte Pugh. All production, electronics, recording and mixing: Jon Hughes. Composition: Jon Hughes, John Jacobs and Charlotte Pugh.

Atlas

'Atlas' was derived directly from a short 'micro-texture' (see 'Three Short Textures' above), used as the basis for a more extended track.

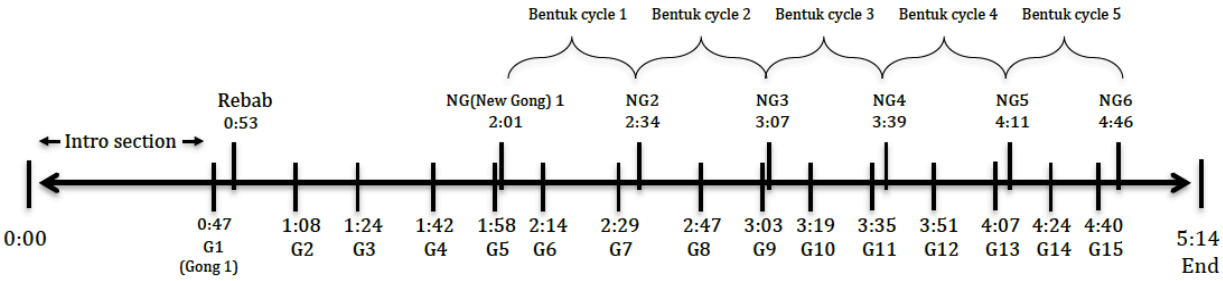


Figure 16: 'Atlas' complete form.

'Atlas' begins with an initial opening section that uses S2 recordings (0:00–0:47), consisting of a gender ostinato, rebab, and a gong tremolo. Following this, the gong at 0:47 signals the introduction of the original S1 recording of the micro-texture, which is looped and used as the basis for the track. The slendro 2 gong at 0:47 is repeated a further fifteen times through to the end of the track. From 0:47, the S1 micro-texture is combined with a dense fabric of S2 recordings, including a new gender ostinato and repeating rebab phrase, both of which remain for the duration of the track. A separate, slow-moving melodic rebab line, time-stretched and heavily processed using reverb and EQ, is introduced at 0:53, becoming more apparent from 1:04, and rising in tessitura considerably from 2:10. From 2:01, a new slendro 5 gong tone appears (marked NG1 in *figure 16*) articulating a bentuk marked by three gongs. *Figure 16* above shows the complete form, with the cycles of bentuk indicated using brackets. A long fade out, beginning at 4:40, brings the track to a close.

Personnel: Gender: John Jacobs; gongs and kempuls: Jon Hughes; rebab: Charlotte Pugh. Other sounds: Jon Hughes, John Jacobs, Charlotte Pugh. All production, electronics, recording and mixing: Jon Hughes. Composition: Jon Hughes, John Jacobs and Charlotte Pugh.

Year Zero

'Year Zero' was created in response to the drawing in *figure 2* above, more specifically the detail of *figure 2* shown in *figure 17* below:

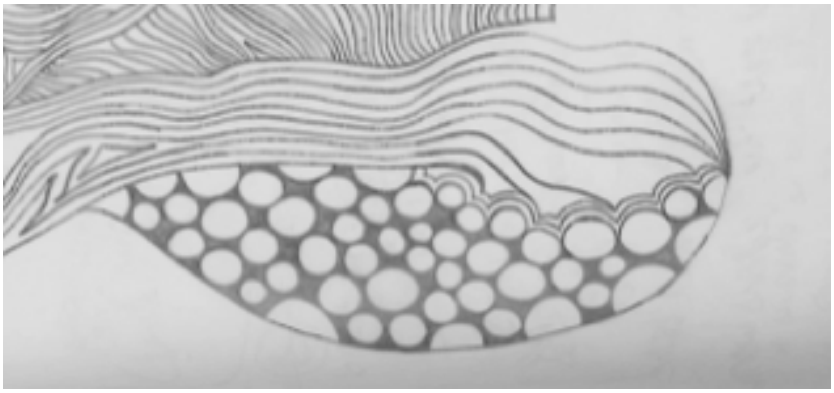


Figure 17: Detail from drawing by Charlotte Pugh (original drawing in *figure 2*).

In the second improvisation session, John Jacobs had the idea of using the bonang slendro barung to create phrases inspired by the 'bobbly' quality shown in the image above. Charlotte Pugh then improvised responses to these phrases on the suling.

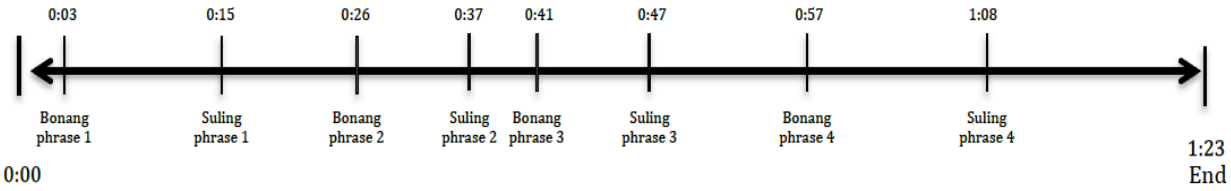


Figure 18: 'Year Zero' complete form.

The basic bonang phrase moves from a low slendro 3 up to a high slendro 1 via slendro 5 and 6, and then back down to the slendro 3, before returning once again to the high slendro 1 to finish. Four variations of this phrase are played, each followed by a response from the suling. At the end of the fourth phrase, the suling cadences on a slendro 3.

Once the material described above had been developed in the S1 session, it was rerecorded in the S2 studio session before being edited, mixed and mastered with a little artificial reverb. 'Year Zero' uses an edited version of the S2 recording: in the original recording a lot more phrases were generated. These additional phrases did not go to waste however: they were used in 'One or Several Wolves?'.

Personnel: Gender: John Jacobs; suling: Charlotte Pugh. Recording and mixing: Jon Hughes. Composition: Jon Hughes, John Jacobs and Charlotte Pugh.

One or Several Wolves?

In 'One or Several Wolves?' the original S2 material used in 'Year Zero' is developed in a different way using electronic processing and production techniques. The original S2 material (as presented in 'Year Zero') was entirely the work of John Jacobs and Charlotte Pugh, whereas 'One or Several Wolves?' is entirely the work of Jon Hughes, using 'Year Zero' as source material, combined with some other gamelan recordings such as the alternating kamarnak pitches first heard at 0:16 and the reversed saron at 0:13. *Figure 19* below shows the complete form:

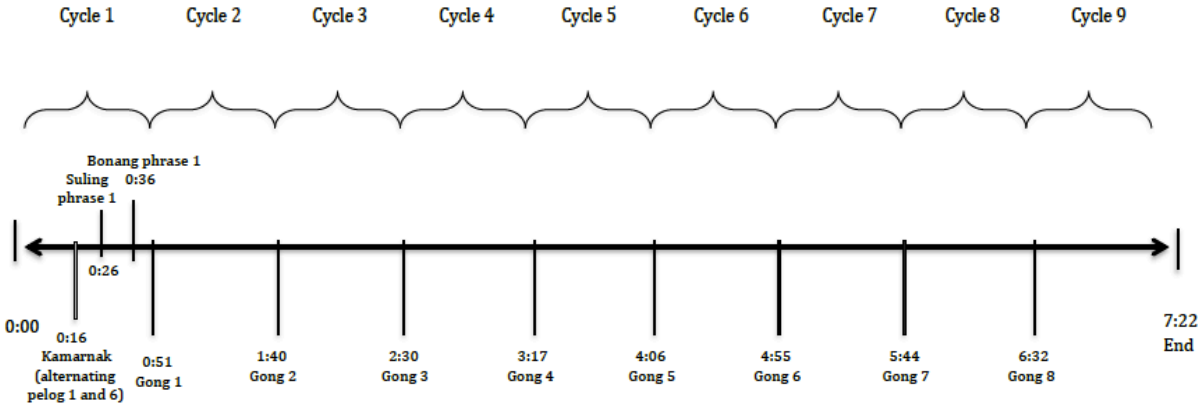


Figure 19: 'One or Several Wolves?' complete form.

The S3 rhythm first heard at the opening of the track and subsequently played throughout was generated using S2 recordings of a bonang rhythm filtered to bring out lower frequencies. This was then looped, and processed using Native Instruments' Absynth. At 0:16 a pair of alternating karmarnak pitches are introduced, starting with a slendro 1 at 0:16, and a slendro 6 at 0:19. This is followed by the first suling phrase at 0:26. From then on the form of the suling and bonang phrases follows the sequence laid out in *figure 13* ('Year Zero' complete form), up until 1:24. From then on, additional phrases are used that are not heard in 'Year Zero.'

The structure of the track is constructed from nine repeats of a bentuk, marked using brackets in *figure 19*, and indicated sonically by the repeated periodic gong strikes (for example at 0:51, 1:40 and 2:30). *Figure 20* below shows this bentuk in more detail:

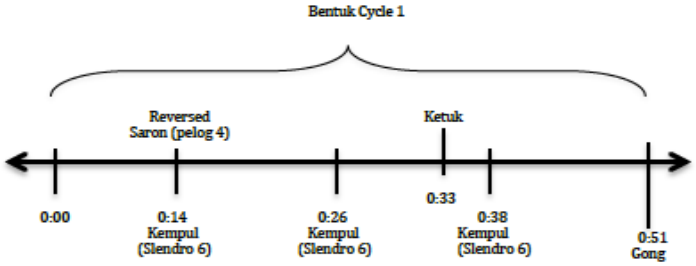


Figure 20: 'One or Several Wolves?' bentuk.

The bentuk is marked by three kempuls pitched at slendro 6, and a terminating gong ageng. The first kempul is also accompanied by a reverse saron sound pitched at pelog 4 (0:14 in figure 20). Shortly before the third kempul, a ketuk is sounded (0:33 in *figure 20*).

Personnel: Gender: John Jacobs; Suling: Charlotte Pugh; Other sounds: Jon Hughes, John Jacobs, Charlotte Pugh. All production, electronics, recording and mixing: Jon Hughes Composition: Jon Hughes, John Jacobs and Charlotte Pugh

Sand Circles

'Sand Circles' was inspired by the photograph displayed in *figure 21* below:

Figure 21: picture taken by Charlotte Pugh.

In one of the S1 improvisation sessions, I developed a technique in an attempt to capture something of the quality of the sand circles in the image above. It involved playing upturned bonang gongs using a wooden mallet, moving it around the rim of the instrument in a circular motion. The other two players responded to this initial idea in the improvisation. The original S1 improvisation that emerged is used as the basis for the finished piece. The complete form of 'Sand Circles' is shown in *figure 22* below:

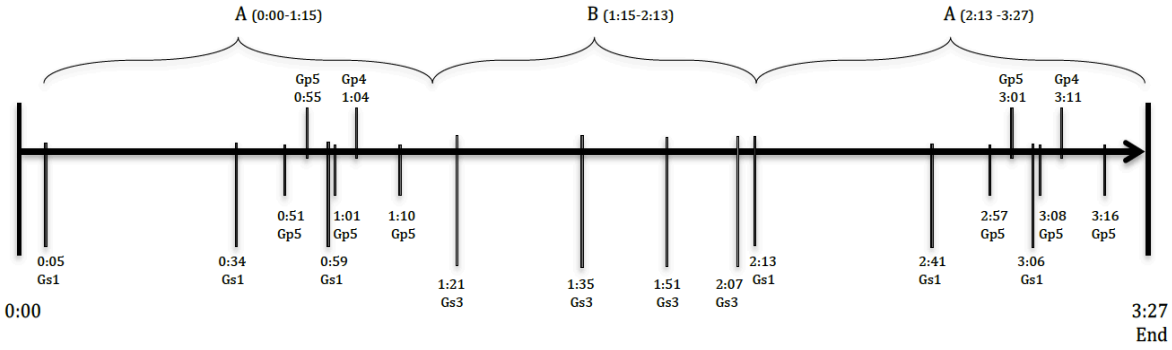


Figure 22: 'Sand Circles' complete form.

As shown in *figure 22* above, the piece can be divided into three sections, labelled A, B, A. In the two A sections, the rebab plays melodic phrases in the foreground, punctuated by gong strokes, embedded within a background comprising of S1 recordings. In the B section, the S1 material moves into the foreground, with some shorter introjections from the rebab. Elements from the S1 recordings can be heard clearly at the start, with the high frequency scraping sound in the background. This then becomes more prominent in the B section, moving into the foreground, and is joined by other percussive S1 sounds.

The S1 recordings are used continuously, from 0:00 to 2:13, before the initial A section is repeated from 2:13 to 3:27. S2 sounds added to the S1 backdrop include: gambang gonso, first heard at 0:06, rebab, first heard at 0:09, and numerous gong-like tones heard throughout, for example at 0:05 and 0:34. The gong tones are important harmonically, moving in pitch from slendro 1 at 0:05 to 0:34 (marked Gs1 in *figure 22*) to pelog 5 at 0:51 (Gp5), back to a high slendro 1 at 0:59, pelog 5 at 1:01, then to pelog 4 at 1:04, before returning to pelog 5 at 1:10. The B section is dominated by the low slendro 3 (Gs3 at 1:21, 1:35, 1:51 and 2:07), before returning the slendro 1 at 2:13 for the repeat of the A section.

Personnel: Gambang gonso: John Jacobs; bonang: Jon Hughes; rebab: Charlotte Pugh. Other sounds: Jon Hughes, John Jacobs, Charlotte Pugh. All production, electronics, recording and mixing: Jon Hughes. Composition: Jon Hughes, John Jacobs and Charlotte Pugh.

Gunderlay

'Gunderlay' was created from an idea first developed in the experimental S1 sessions. It came from a concept of John Jacob's involving the creation of two gender ostinatos, one in each of two contrasting laras, slendro and pelog. Each ostinato consists of two interlocking parts played simultaneously by gender barung and panerus.

The final piece can be divided into three clear sections: the introduction, the slendro section and the pelog section.Divisions between sections are marked by a reversed gong leading towards the destination point of a gong strike, at 0:34, 3:20 and 5:56 shown in *figure 23* below:

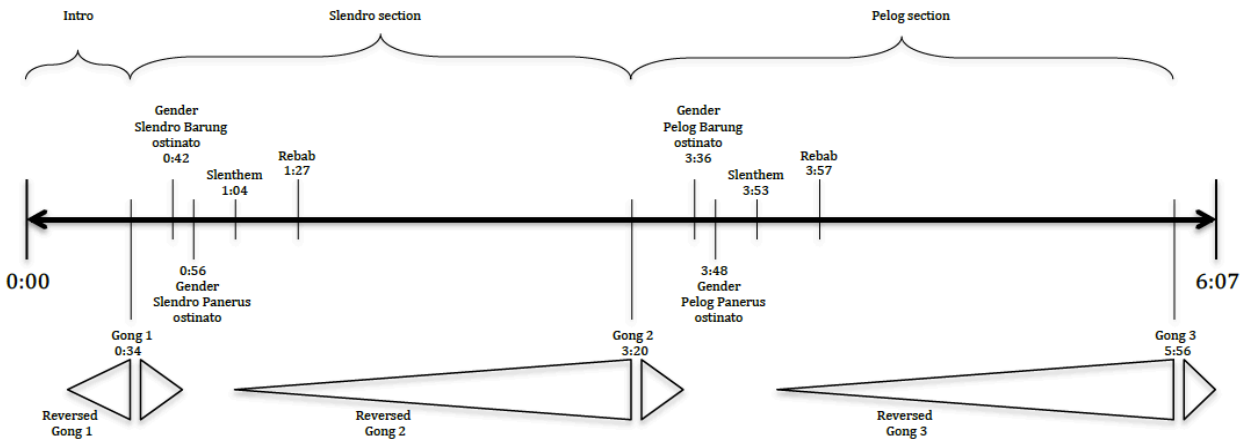


Figure 23: 'Gunderlay,' complete form.

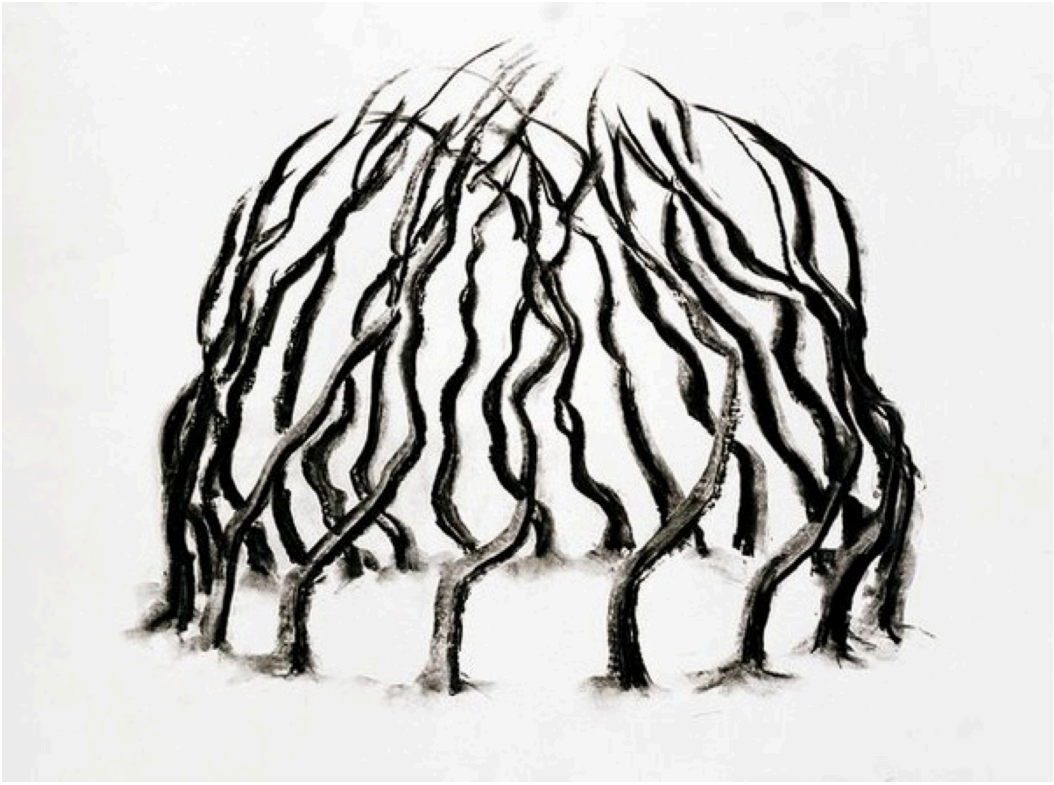
The initial introductory section runs from 0:00 to the first gong strike at 0:34. Sounds from the gambang gonso are introduced here, along with the rebab. The tail of the reversed gong can be heard emerging at 0:22. After the gong strike at 0:34, the gender barung ostinato emerges at 0:42, and the interlocking gender panerus ostinato emerges at 0:56. The slenthem enters at 1:04, and the rebab at 1:27. The texture then gradually thickens and builds towards the second gong strike at 3:20. The pelog gender barung ostinato then begins at 3:36, with the panerus joining it at 3:48, and the slenthem at 3:53. The rebab enters at 3:57, but this time there are multiple rebab tracks. The track builds towards the final gong at 5:56 at which point it fades to a close.

In terms of source material used, the ostinatos were developed by John Jacobs and Charlotte Pugh in the intial experimental rehearsal sessions. Jon Hughes then developed the slenthem line by improvising alongside this material. The basic ideas for the piece were developed in this way, and then everything was rerecorded in the S2 recording sessions. The gender ostinatos were processed using EQ and compression to create additional rhythmic and textural S3 material. S2

gambang gonso sounds were also recorded to add interesting textural elements, and S2 rebab was also used throughout.

Personnel: Gender slendro and pelog barung: John Jacobs; slenthem: Jon Hughes; gender slendro and pelog panerus: Charlotte Pugh. Other sounds: Jon Hughes, John Jacobs, Charlotte Pugh. All production, electronics, recording and mixing: Jon Hughes. Composition: Jon Hughes, John Jacobs and Charlotte Pugh.

Figure 24: Artwork made for *Ice Pictures* CD cover by Jon Hughes and Charlotte Pugh.



4. Ash Dome

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Cover image: *Ash Dome*. Charcoal on paper David Nash (2009). (Reproduced with the permission of David Nash.)

Photographs of Nash's Work by Jonty Wilde are reproduced with the permission of YSP Publishing.

Introduction

Ash Dome is a dance work made as a collaboration between myself as composer and choreographer Simon Birch, created as a response to the work of English sculpture David Nash. Devised together with twenty-six first-year undergraduate dance students at the Northern School of Contemporary Dance (NSCD) in Leeds, it was performed at the Riley Theatre, Leeds, on the 22nd and 23rd of March 2011. The music was composed using a combination of found sound, cello, guitar and recorded samples, played back using fixed media. I have provided a video of the complete piece on the Data Drive. I have also included a separate audio only sound file of the complete piece.[1]

Figure 1: Red Dome. David Nash (2009). Photographer Jonty Wilde.

Process

I was commissioned as composer by choreographer Simon Birch in April 2011. This was the second piece created with Simon, having made *Timeliners* together at the NSCD in 2010.[2] *Ash Dome* was devised over a period of one month, with Simon working five days a week with the

[1] See:/DataDrive/Ash Dome Media/
[2] A *Timeliners* video is available to watch online here: http://www.youtube.com/watch?v=szwabK9cy_o.

dancers. I visited once or twice a week, and also kept in regular contact throughout via email and phone.

The starting point was a visit by myself, Simon and the dancers to an exhibition of David Nash's visual art at the Yorkshire Sculpture Park. This was a major retrospective exhibition, which Nash himself has described as 'unique' and 'a full statement of my life's work'.[3] The initial exposure to Nash's work, combined with subsequent research and discussions between choreographer, composer and dancers, provided the foundations from which the piece developed. Specific sculptural forms and conceptual ideas found in Nash's work were of particular significance to the final piece and the creative process, as I will discuss in more detail below.

Sound Sources

Ash Dome is a continuous piece of music, but it can be subdivided into a number of smaller sections that dovetail into one another, as shown in *figure 4* below. Each subdivision illustrated in *figure 4* was made using a different sound palette. These sounds were drawn from three main sources: environmental field recordings; instrumental recordings made by the composer; samples taken from the composer's own gamelan sample library.

Figure 2: *Black Sphere*. David Nash (2004).
Photographed at the Yorkshire Sculpture Park 2011. Photographer Jonty Wilde.

[3] NASH 2009, page 19.

Environmental field recordings include, for example, the sounds of cracking wood used for 'Tree Percussion' (1:15–4:39), birdsong recordings used in 'Bird Cello' (14:44–20:19), and water sounds in the 'Ash Dome' section (5:49–9:31). Environmental sound sources, in addition to being used in a recognisable form, have frequently been manipulated and processed to create other less immediately recognisable textures. All field recordings used in *Ash Dome* were made by the composer during the compositional process. For example, the water sounds, bird song, and sounds of cracking wood were taken from the Yorkshire Sculpture Park, recorded when attending the David Nash exhibition in 2011. Other sounds were collected from locations near the composer's home in York.

Instrumental recordings include the guitar sound used throughout, such as in 'Guitar Spheres' (9:31–10:49). This guitar sound was recorded and played by the composer and then used as source material to make other sounds: for example the looped pulse figure that first appears at 5:49 and continues through the 'Ash Dome' section and the low frequency pulse that joins it at 6:00. Cello is used prominently in the piece, and can be found for example in 'The Tower' (0:00–1:15), 'Cello Pyramid' (13:49–14:44), and 'Bird Cello' (14:44–20:09). All cello recordings used were recorded by the composer and played by Min Song.

Gamelan samples are used frequently in *Ash Dome*. All such samples are taken from the composers own gamelan sound library.[4] They can be heard throughout the piece in the form of a range of metallic pitches sounds, for example in 'Bronze Spheres' from 10:49 or in 'Tree Percussion' at 2:33.

Figure 3: *Red Column*. David Nash (2010). Photographer Jonty Wilde.

[4] Jon Hughes and John Jacobs created a gamelan sound library in April 2010 using recordings of Gamelan Sekar Petak, a central Javanese Gamelan housed at the University of York.

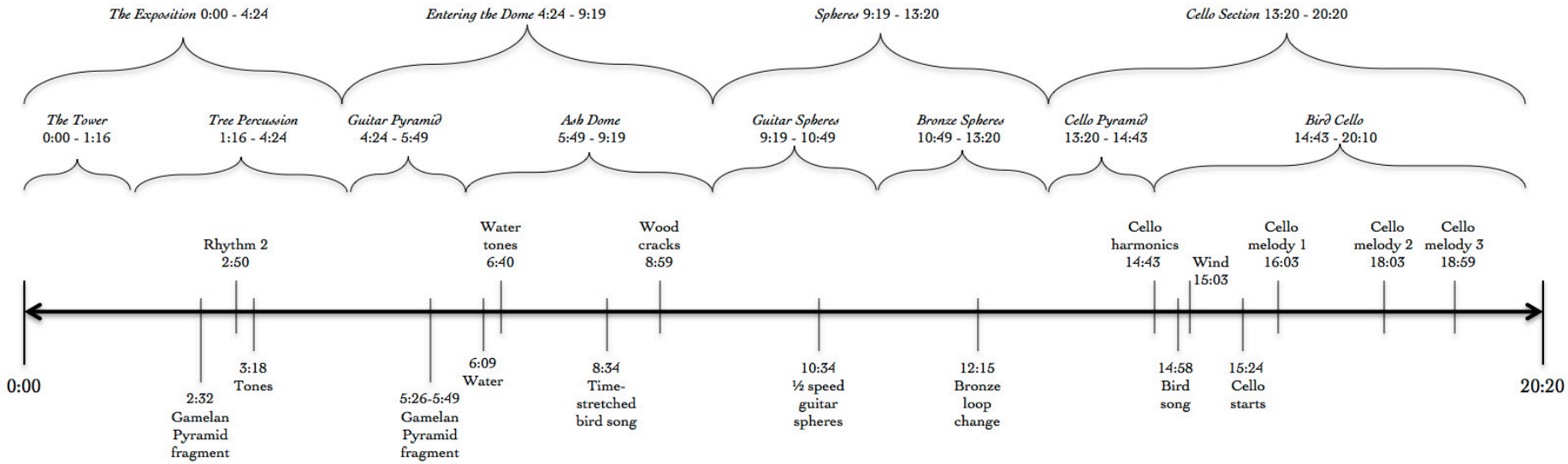

Figure 4: *Ash Dome* complete form.

Form

Ash Dome lasts 20 minutes and 10 seconds. As mentioned above, it can be subdivided into a number of smaller sections that dovetail into one another. These sections can be organised further and put together into a number of larger subgroups: 'The Exposition,' 'Entering the Dome,' 'Spheres' and 'Cello Section.'

The Exposition

The first two sections, leading up to 'Guitar Pyramid' at 4:24 form 'The Exposition.' This begins with 'The Tower,' which is a vertically stacked sound collage constructed using most of the sonic elements that will be heard subsequently in the piece, including gamelan, guitar and cello. This then dissolves into 'Tree Percussion,' in which various field recording sounds of wood and trees are used to make percussive loops. These loops are overlaid with tones generated from gamelan samples—for example, the rising figure that starts at 2:32. The rhythmic material changes to a second loop at 2:50, and this is joined by a sustained pedal note at 3:18, made from time-stretched gamelan fragments.

Figure 5: *Ash Dome*. Drawing by David Nash.

Entering The Dome

From 4:18, as the rhythm fades, 'Tree Percussion' starts to transform into 'Guitar Pyramid,' which itself functions as a transition into the change of pace found in the following 'Ash Dome' section. The 'Ash Dome' section, which begins properly with the sound of a rhythmic pulse at 5:49, is made from a combination of guitar sounds, gamelan sounds and the sounds of water. The rhythmic loops starting at 5:49 are made from processed and filtered guitar recordings. Water sounds (recorded at the Yorkshire Sculpture Park) first appear at 6:09 and continue

throughout the section. These sounds are joined by a melody constructed from pitched material which begins at 6:40. This pitched material has been made by filtering the underlying water sound recordings, boosting the level at specific frequencies with a narrow Q factor, and suppressing all other frequencies (using Reaper's versatile FFT EQ). At 8:34 time-stretched bird song recordings are heard, along with figures derived from gamelan samples from 8:46. The sounds of cracking wood first appear clearly at 8:59.

Spheres

A guitar sound first heard at 9:19 marks the beginning of 'Guitar Spheres.' Here, a rhythmic guitar loop is overlaid with gamelan-derived material and time-stretched recordings of bird song. This guitar loop then slows down, fading into a time-stretched, half-speed version of itself at 10:34. 'Guitar Spheres' gives way to 'Bronze Spheres' at 10:49, which is constructed from loops and figures derived exclusively from gamelan samples. At 12:15 there is a clear change in the loops used. 'Bronze Spheres' run to 13:20.

Cello Section

Cello sounds are first heard at 12:52 in the form of cello harmonics, signalling the immanent change into the 'Cello Section.' This begins properly at 13:20, allowing the 'Bronze Spheres' loops to fade out. 'Cello Pyramid' is constructed exclusively from processed and unprocessed cello sounds. As with 'Guitar Pyramid,' 'Cello Pyramid' can be seen as part of a transition, preparing the ground for 'Bird Cello,' which begins with the harmonics at 14:43. This is joined by bird song (14:58) and a gentle wind sound (15:03). A more prominent cello part begins at 15:24, which develops through to the close of the piece, accompanied by occasional fragments of environmental sound material. A clear cello melody enters at 16:03, which is repeated six times. At 18:03 a new melody appears, repeated three times, and at 18:59, a third melody appears, repeated four times.

Figure 6: Inside Capel Rhiw, David Nash's home and studio in Blaenau Ffestiniog, North Wales. Photographer Jonty Wilde.

Emotional and Structural Correlates

The sections, as described in the diagram above (f*igure 1*), also have an emotional correlate: a map of psychological or emotional states intended to be communicated through each section of the piece. Whereas f*igure 1* is an expression of the underlying structural framework alone, it is also possible to map a less tangible surface layer, which can perhaps be described as the work's emotional form, and is generated from the sum total of the constituent parts (movement, sound, lighting, projections) working together.

A Description of the Form of *Ash Dome* using words

The feeling of 'The Exposition' is intended to be one of exuberance and freedom of expression. This is achieved following an initial gathering and distillation of forces, both in terms of sound, movement and lighting. At the beginning, a single dancer on stage emerges from the darkness and is spotlit. She is joined gradually by all the dancers from the piece, and together they construct a physical tower. The light level slowly increases throughout this construction process. The idea of construction is reflected in the music with the building of a sonic tower that is intended to be a representation of multiple musical elements of the piece; a distillation of the sound-fabric of the piece as a whole compressed into the same short period of time. The tower of dancers then explodes and deconstructs, with the dancers spreading across the stage, using expansive and exuberant gestures and movement. Lighting levels on stage also increase to emphasise these feelings. An element of tension is added at 3:21 with the emergence of a sustained pedal tone. The feel of the movement becomes gradually less expansive, and the number of bodies on stage slowly begins to reduce at around 3:50.

The overall shape of the opening as described above is quite deliberate, moving through the stages of construction, explosion, and gradual increased tension to a more focussed aesthetic. The construction of the tower builds energy, which is then released. This stored energy, once released, remains on the stage, transmitted through the exuberant movement of the dancers in the following rhythmic 'Tree Percussion' section. But rather than being expended, or 'burnt off', the intention is for the energy to be transformed and focussed as the audience are led into 'Guitar Pyramid' and the 'Ash Dome' section.

As we reach 'Guitar Pyramid,' the transformation process continues. This is reflected in the changing pace of the music; the steady rhythmic pulse disappears and instead we have a more static texture, without a clear metric pulse. We are left with only four dancers on stage huddled

into a tight shape, and there is a change of lighting state, with a focussed spotlight. With the end of 'Guitar Pyramid,' beginning at around 5:29, a projection begins to emerge on the back wall, and a little more light is added to take us into the 'Ash Dome' section proper. We are now in a completely different place; more intimate, meditative, reflective and gentle. Movement is slower and more controlled, more considered. As the 'Ash Dome' section then progresses, the numbers of bodies on stage increases as various dancers are reintroduced, and lighting levels also gradually increase.

The 'Guitar Spheres' section continues a similar feel emotionally, being quite gentle and atmospheric in tone. It is a transition again from the focussed, perhaps slightly melancholic and serious feel of the 'Ash Dome' section into a more static transition phase. There is a sense that what was said in the 'Ash Dome' section is nearing completion. The lighting gradually increases until the stage is fully lit by time 'Bronze Spheres' is reached. 'Bronze Spheres' is more bright and open in feel.

With 'Cello Pyramid,' a new place is reached. All the dancers reassemble on stage for this transition, creating a communal form that builds along with the developing and building sonic texture. This construction dissolves as the bird cello section is established, and a single dancer is left on stage. The lighting moves through a change of level and colour to mark the change of feeling. 'Bird Cello' is a new place psychologically and emotionally. The movement becomes about lifting, lightness. The emphasis for the rest of the piece is on a sense of contact, communication and relationship.

Figure 7: *Oculus Block*. David Nash (2010). Photographer Jonty Wilde.

David Nash's Work and its Relationship to *Ash Dome*

David Nash at the Yorkshire Sculpture Park was a thorough retrospective of the artist's career, containing over 200 works made since 1967 and was his most ambitious project to date at the time.[5] As such it gave composer, choreographer and dancers a complete overview of the artist's work and the variety of forms he has produced over a forty-year career. Since the late 1960s Nash has worked exclusively in wood, treating wind-fallen, dead or dying trees as 'wood quarries' from which to draw the material for sculptures ranging from table forms, abstract shapes, pyramids, cubes and spheres, anthropomorphic frames and standing structures.

Figure 8: David Nash working on new pieces. Photographer Jonty Wilde.

Typically, Nash has worked in the landscape, alongside the source of his material, responding not just to the wood available, but also to the local cultural conditions where he is working.[6] Although best known for his free-standing sculptures in wood, he has also since the mid-1970s produced a series of planted projects, which he calls 'growing works'. Whilst a number of these have been realised in sculpture gardens,[7] most have been carried out close to his home, on a hillside in Cae'n-y-Coed in the Vale of Ffestiniog, Wales. There are over twenty works here, of which the best known is the *Ash Dome*, a ring of ash trees planted in 1977 (see cover image, and *figure 5* and *9*).

[5] PHEBY 2009, page 4.
[6] TUFNELL 2006, page 88.
[7] For example *Divided Oaks*, in 1985 at the Kroller-Muller Museum in Otterlo, Holland; see TUFNELL 2006, page 90.

Ash Dome as a meditative public space

Ben Tuffnel, in his book *Land Art*, describes David Nash's *Ash Dome* as follows:

> *Ash Dome* is a ring of twenty-two ash trees, guided and fletched using traditional husbandry techniques, so as to grow into a sculptural form that symbolises the interaction of nature and culture as well as creating a meditative chamber.[8]

This work had an important influence on the dance piece *Ash Dome*. We were interested in this idea of a public meditative space, and set out to create such a space for the audience through our work. For the *Ash Dome* section (5:49 – 9:31), the reduced lighting, the projections, the slowing down of musical pace, and the increased level of intimacy conveyed by the smaller number of dancers all contribute in an attempt to achieve this.

Figure 9: *Ash Dome* photographed in woodland, near Cae'n-y-Coed in the Vale of Ffestiniog, Wales. David Nash. Photographer reproduced with the permission of David Nash.

In terms of form, the work contains two main focal points for composer and choreographer: the 'Ash Dome' section, from 5:49 to 9:31, and 'Bird Cello,' from 14:44 to 20:09. Other sections can be seen as transitional to some extent, either leading up to or linking these two focal points. The 'Ash Dome' section itself is where we enter the dome, the meditative space. The 'Bird Cello' section is where we step out of this meditative space, into the light. The feeling here is of breathing fresh air, of rebirth and psychological transformation. Emerging from a meditative and reflective space, engaging with Nash's work, we are rejuvenated. This is a basic contour of the form and, on reflection, the meaning of the piece as a whole for composer and choreographer; the rush of energy in 'The Exposition' is focussed down to a meditative and

[8] TUFNELL 2006, page 90.

contemplative place in the 'Ash Dome' section and then transformed into a lighter, more expansive state in the closing 'Bird Cello' section.

Family Tree and the Primary Forms

Family Tree

Family Tree is a large painting that was on display at the YSP exhibition. The piece was begun in 1997 and represents David Nash's artistic development over the span of his entire career. He keeps the image up to date: it has been added to and expanded numerous times, most recently in 2008.[9] It now consists of five frames, which can be seen in *figure 2*. The piece is an attempt by Nash to represent his own development as an artist, to show a range of what he considers to be his most important pieces and how they interrelate. It also shows the chronological development of his work. The full image can be seen in *figure 12* below. Figure 10 however shows a close up detail.

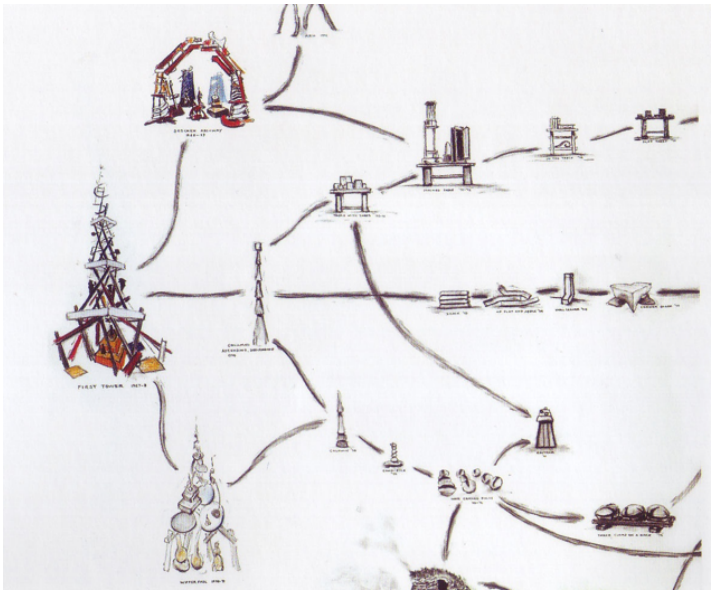

Figure 10: Detail of David Nash's *Family Tree*. (Reproduced with permission of YSP Publishing)

This work influenced *Ash Dome* in a number of ways. The initial starting piece in *Family Tree* is a work he considers to be extremely important: *First Tower*, constructed at Blaenau Ffestiniog in 1967[10] (seen at the extreme left of the image in *figure 10* and *12*). *Ash Dome* and *Wooden Boulder* can be seen spanning the entire picture, as these pieces have been developing continuously throughout the period represented, being long term 'growing pieces'. *First Tower* is the starting

[9] See video documentary *Updating Family Tree* by David Nash (Nash 2009).
[10] TUFNELL 2009, page 124.

piece however, and as such clearly very important. We can see from his own writing that David Nash considers this work to be the first piece of real importance for him, one from which all his other work has grown. It is as if *First Tower* was a composite containing all his future work in embryonic form.

Family Tree serves a twofold process. One the one hand it presents a diverse body of work to an audience and reveals the relationship between them, but on the other it reveals a private process, in which the artist struggles to understand how he has arrived at the present state of his work.[11] We set out to replicate the form of this piece though *Ash Dome*, starting with a tower of our own in *The Exposition*, which contained all the sonic elements used in the rest of the piece. This tower is then fragmented and split apart, with individual ideas being focussed on, displayed more clearly and in different configurations and combinations.

The forms and shapes created by the dancers were also based on elements of Nash's work. Choreographer and dancers worked collaboratively to developed forms based on particular sculptures by David Nash, and these became the building blocks or basic elements in creating the movement vocabulary of the piece. Our exposure as a group to the mass of forms and images in the exhibition, together with a sense of these forms being interrelated and growing out of one another gained from *Family Tree*, together formed the core bedrock of the creative stimulus for the work as a whole.

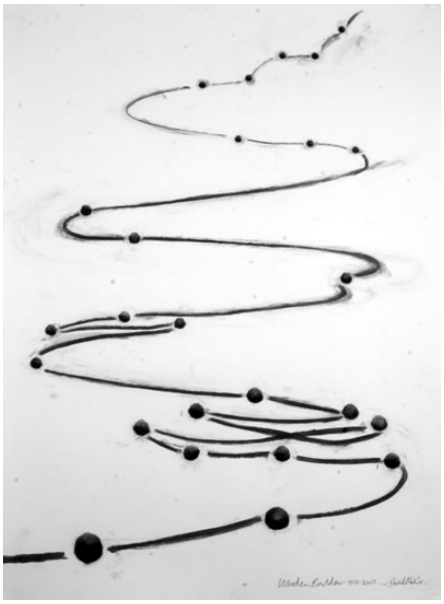

Figure 11: *Wooden Boulder*. Drawing by David Nash. (Reproduced with permission of YSP Publishing)

[11] TUFNELL 2009, page 124.

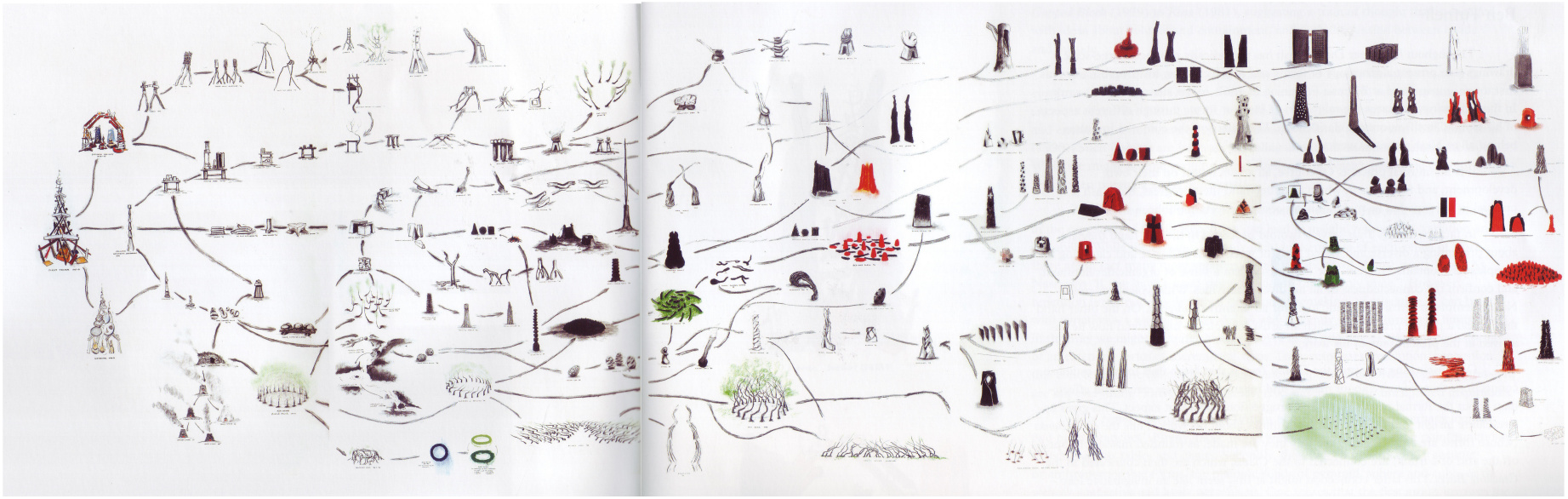

Figure 12: *Family Tree*. David Nash (2008). Reproduced with permission of YSP Publishing)

Primary Forms

An interesting idea clearly presented in *Family Tree* is the concept of primary forms. Throughout his career, Nash has worked extensively with three primary forms: Pyramid, Sphere and Cube (see *figure 13* and *14*). They first appear singly in Nash's early work, before coming together for the first time in a piece made in Japan, *Nature to Nature: Into Water* (1984). He has returned to these essential forms again and again throughout his career.[12] In Nash's own words:

> [T]here are various things I've learnt from Cezanne. He has an idea of observation and applied his idea using the sphere, cone and cylinder[...] These forms have an inherent clarity and authority, even when appropriated their integrity is undiminished. Ancient culture revered geometry as a living force active in all things […] [M]aking these forms over many years I find the cube is static, fixed, compared to the potential movement rolling, orbiting of the sphere. The pyramid has a rising gesture, it's awake, dynamic.[13]

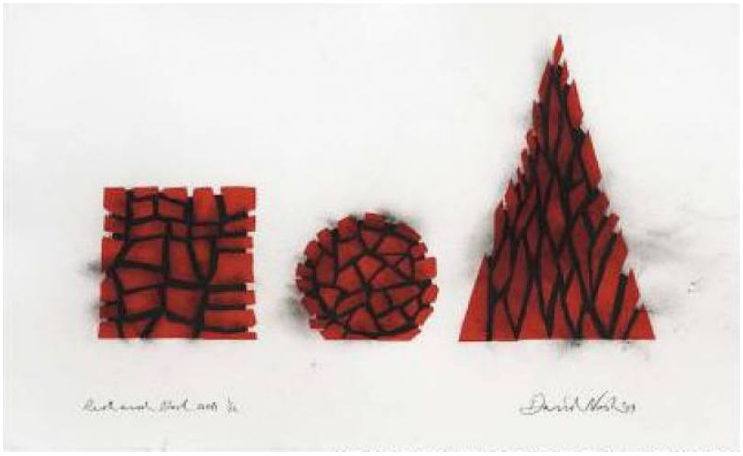

Figure 13: Primary Forms drawing. David Nash. (Reproduced with permission of David Nash.)

Adapting *Family Tree* and the Concept of Primary Forms to Music

The influence of *Family Tree* and the concept of primary forms manifested in my composition work in two key ways: the creation of sonic pyramids, spheres and cubes as fundamental building blocks in the piece, and the form of the piece as a proliferations of multiple forms from a starting point.

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[12] TUFNELL 2009, page 126
[13] PHEBY 2010, page 21

One of the starting points creatively when composing *Ash Dome* was the idea of making sonic pyramids, spheres and cubes. For example, one of the first things I did was to create a bronze pyramid. This was achieved by making a sound collage of samples of bronze instruments (drawn from gamelan recordings) that gradually rises in pitch from low to high frequency. The lowest frequency sound is also the longest, and forms the pyramid base. Higher frequency samples enter one by one, until the highest at the tip appear for just a moment. Sounds used were pitch-shifted by slowing down or speeding up the original source recordings in order to create as wide a sound frequency spectrum as possible. Once made, I then started to cut up the pyramid, and so out of this initial pyramid structure, I would create other material. I experimented with isolating different elements of the pyramid to create different harmonic structures. I then looped sections to create rhythmic looped material, which became the *Bronze Spheres* section. I experimented with this material for some time until I had a range of different elements carved out from the original bronze pyramid that are scattered across the piece.

After receiving positive feedback from the choreographer and dancers, I repeated the same process using other sound sources: for example, with guitar and cello. The second pyramid, using the guitar, was cut up and used as a 'sound quarry', eventually forming the main musical ideas for the 'Ash Dome' section, 'Guitar Pyramid,' and 'Guitar Spheres.' A cello pyramid was then created with cellist Min Song in the studio. I got Min to create a cello pyramid by gradually building layer upon layer while listening to the bronze and guitar pyramids I had already made on headphones.

Figure 14: *Pyramid Sphere Cube*. David Nash 1997. Photographer Jonty Wilde.

So from this initial material, combined with the field recording sound sources already mentioned in detail above, the piece developed as a complex proliferation of interrelated forms unfolding throughout the duration of the work, all of which are contained in 'The Tower' in the opening exposition section.

Creating 'Bird Cello'

'Bird Cello,' which follows the transitional 'Cello Pyramid,' stands alone in some way, independent from the rest of the music in the piece. It was created in a different way, neither growing out of the instrumental pyramid material described above nor from the manipulation of field recordings. It was created in collaboration with cellist Min Song in the studio. I worked with Min, asking him to improvise some cello lines in imitation of birdsong I had recorded from the Yorkshire Sculpture Park. I asked him to reflect the feel of the birdsong in some way. I later experimented with this material, editing it extensively and layering it in order to create the final 'Bird Cello' section. For example, the initial two-note figure that is introduced at 15:24, shown in *figure 15* below is actually the beginning of a single sound file, which is an edited section of a take:

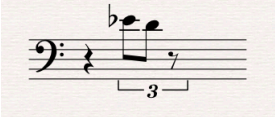


Figure 15: Two-note figure.

The full sound file, which I will call Sound File 1, can be seen notated below in *figure 16*:

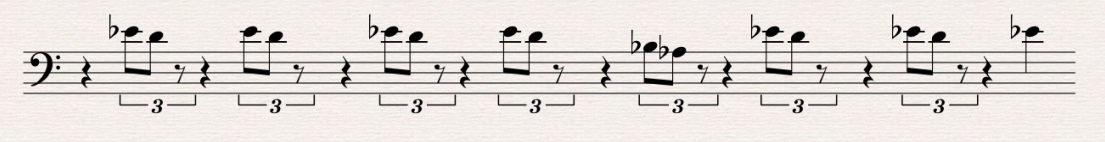


Figure 16: Sound File 1.

As can be seen from *figure 5*, the cello repeats the two note figure, moving from Eb down a semitone to D three times before moving down to a lower pair of notes (Bb and Ab), then returning to the upper two for two further repeats, and ending on a single Eb. I looped this sound file to create a backdrop, embedded in the environmental sounds. The entire file runs from 15:23 to 15:37, before starting again at 15:44 and running to 15:58. The repeat is accompanied by the gentle, slow-moving melodic material shown in *figure 17* below, which is a separate sound file played simultaneously, which I will call Sound File 2:

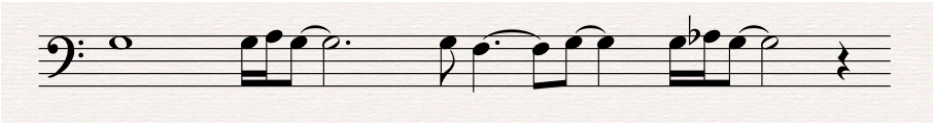


Figure 17: Slow-moving melody (Sound File 2).

Following this, on the third repeat of Sound File 1, from 16:06 to 16:20, the two files (Sound File 1 and 2) are joined by a third, Sound File 3, which contains the melody shown below in *figure 18*:

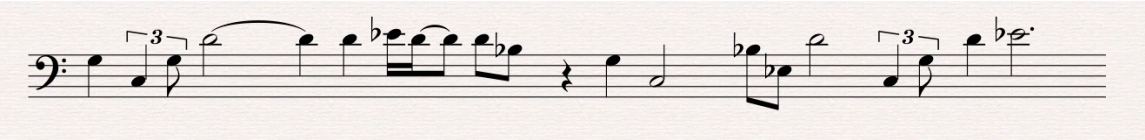


Figure 18: Main melody (Sound File 3)

Subsequently these three files are repeated a further five times, played simultaneously. On each repeat however, the balance of sonic elements is presented in a slightly different way: I duplicated the files and filtered them in different ways, so that, for example, in the second repeat of the melody (16:23–16:40) there is a stronger emphasis on low frequencies; the cello sounds like it is accompanied by a double bass if you listen closely, and the tone is generally darker, because it is joined by a version of itself pitch-shifted down an octave, with a slightly different type of EQ to bring out lower frequencies.

The full structure of 'Bird Cello' was developed in this way, to come up with the final form as shown in *figure 19* below:

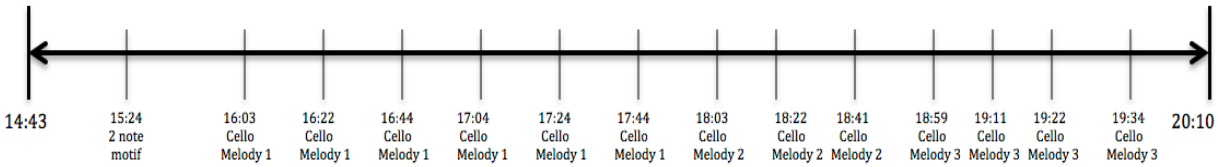
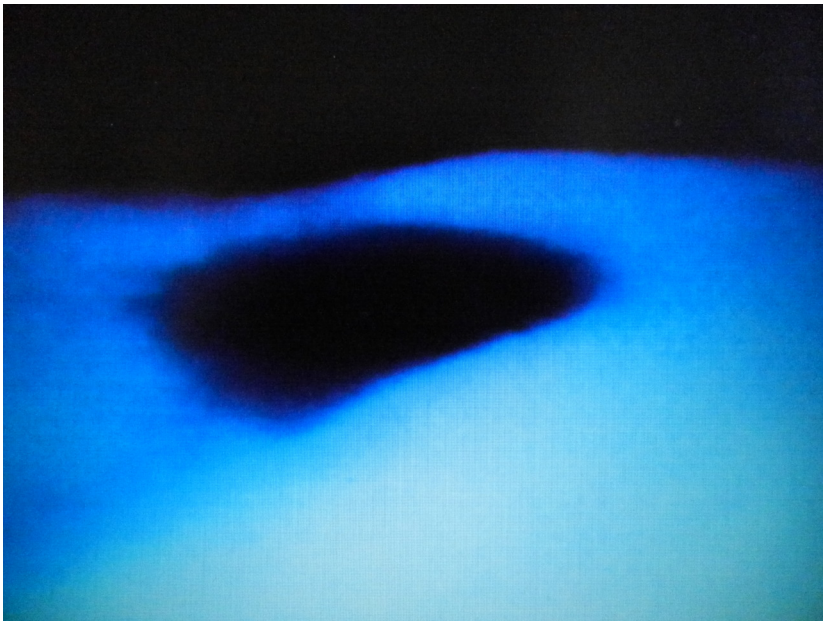


Figure 19: *Bird Cello* complete form.

There are three melodies, each of which is repeated a number of times, and varied using the methods outlined above. Cello melody 1 is repeated six times, Cello melody 2 is repeated three times, and Cello melody 3 is repeated four times.



5. Another Place

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Cover Image: Processed photograph from *Another Place* field trip by Charlotte Pugh.

All photographs by Jon Hughes unless otherwise stated.

Introduction

Another Place is a piece for live musician and electronics, made in collaboration with recorder player Charlotte Pugh. It was created in the summer of 2011, and first performed at the University of York's Spring Festival of New Music, 13 May 2011, paired with a new realisation of Steve Reich's *Vermont Counterpoint*. The starting point for the piece was a coastal walk from Whitby to Robin Hood's Bay in July 2011, in which primary visual and audio source material for the project was gathered. Sounds used are drawn exclusively from two sources: Field recordings taken from North Yorkshire Moors during a walk along the coastal path from Whitby to Robin Hood's Bay; Studio recordings of recorder played by Charlotte Pugh. The Data Drive contains Reaper performance files and a stereo audio file of a final mix of Another Place, along with peformance and stereo playback files for the companion piece (see below).[1]

Companion Piece

Another Place was created as a companion piece to be played alongside a new recorder realisation of Steve Reich's *Vermont Counterpoint*, and it is designed to use the same technical set up of amplified solo live instrument and stereo fixed media. *Vermont Counterpoint* was commissioned in 1982 by flutist Ransom Wilson and is scored for three alto flutes, three flutes, three piccolos and one solo part, all pre-recorded on tape, plus a live solo part. The live soloist plays alto flute, flute and piccolo and participates in the ongoing counterpoint as well as playing more extended melodies. The piece can be performed by eleven flautists but is intended primarily as a solo with tape.[2] We followed this basic framework for *Another Place*, with the use of fixed media (in place of the 'tape' part originally used) and also with the use of a range of different recorders, including bass, alto, soprano and sopranino. It was decided that the new realisation of *Vermont Counterpoint* would be tackled first, before moving on to create *Another*

[1] For Another Place performance Reaper files, see: /DataDrive/Another Place Media/Another Place performance files. For stereo audio playback of finished mix, see:/DataDrive/Another Place Media/Sound files.

[2] Boosey and Hawkes website: http://www.boosey.com/cr/music/Steve-Reich-Vermont-Counterpoint/5292. Accessed 12th October 2014 13:15.

Place. The finished realisation and performance files of *Vermont Counterpoint* can be found on the Data Drive.[3]

Inspiration and Context

From the start my plan was to base the new companion piece on a walk in the landscape. This was inspired by ideas and practices first explored and researched whilst creating *Ash Dome* (see Chapter 4). Researching *Ash Dome*, I read a good deal regarding the work of David Nash and its context within the wider field of late 20th-century art and sculpture, specifically regarding artistic practices, such as Land Art, that engage directly with landscape and blur the distinction between artwork and environment. Excellent examples of such work are Nash's *Wooden Boulder*,[4] or Andy Goldsworthy's *Thin Ice*[5], both of which can perhaps best be understood as *interventions* in the landscape, rather than being entirely separate from it. Such site-specific work takes art out of the white cube of the gallery and into a different kind of performance situation. These kinds of pieces interested me, perhaps because I was becoming aware of my tendency to use field recordings in my work.

The phrase Land Art has been traced back to a German television film of the same name, broadcast in April 1969.[6] The term can be used to denote artistic works *in* and *with* the landscape. Lailach traces this form of art back to a group of American and European artists working in the late 1960s, who 'began to develop new and unconventional techniques and materials, and think differently about locations and dimensions.'[7] Such artists began to think about landscape differently, no longer just describing it in texts or depicting it in paintings: landscape itself began to be used as an artistic material.[8] Such artists produced their works on location, working directly with the landscape itself. One artist featured in Schum's film was Richard Long, who contributed a piece called *Walking a Straight 10 Mile Line Forward and Back Shooting Every Half Mile.*[9] As the title suggests, this involved Long following a preordained journey in the landscape and methodically photographing it. The walk in the landscape, and its documentation, becomes the work itself. Long produced many such 'walking pieces,' including *A Line Made By Walking England* (1967), *A Hundred Mile Walk* (1971–2),[10] and *10 Days Walking and*

[3] For performance Reaper files, see: /DataDrive/Another Place Media/Vermont Counterpoint performance files. For stereo audio playback of finished mix, see:/DataDrive/Another Place Media/Sound files.
[4] See http://www.culturecolony.com/news?id=13746 and COULSON et al 2011, page 144.
[5] See LAILACH 2007, page 48.
[6] Land Art directed and produced by Gerry Schum; LAILACH 2007, p. 6.
[7] LAILACH 2007, page 7.
[8] Also see TUFNELL 2006 and ALFREY et al 2013.
[9] LAILACH 2007, page 16.
[10] http://www.tate.org.uk/art/artworks/long-a-hundred-mile-walk-t01720

Sleeping on Natural Ground (1986).[12] *Figure 1* below shows the map produced by Long as part of *A Ten Mile Walk England* (1968), with his route drawn across it using graphite:

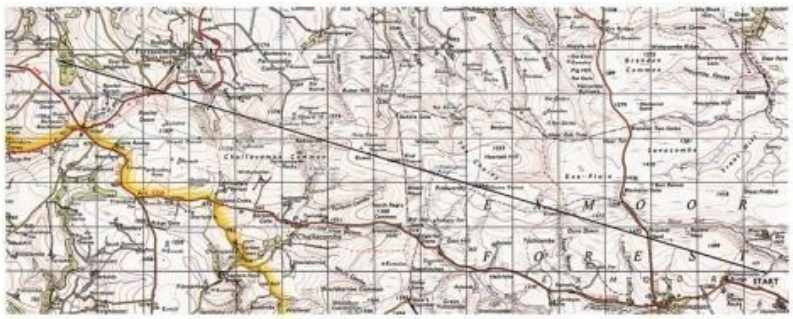

Figure 1: *A Ten Mile Walk England (*1968). Map and Graphite. Richard Long. (Reproduced with permission of the Tate Modern)

In his essay 'Ten Miles on Exmoor,' Nicholas Alfrey focuses on this specific piece, describing Long's creative process and setting it in the context of his work as a whole:

> In November 1968 Richard Long made a work on Exmoor by walking for ten miles in a straight line on a compass bearing of 290 degrees. The work was documented by the relevant section of the one-inch Ordnance Survey map on which the line of the walk was drawn in pencil, with the inscription below: 'A Ten Mile Walk England 1968'. It is a significant work in Long's career because of its unprecedented scale (a ten mile invisible 'sculpture') and also on account of the unique environment in which he chose to make it.[13]

Another influence on my creative process when making *Another Place* was the idea of the Sound Walk, a listening process practiced by Hildegard Westerkamp, amoung others, defined by her as 'any excursion whose main purpose is listening to the environment.'[14]

Figure 2: Image from the clifftop on *Another Place* field recording walk.

[12] http://www.tate.org.uk/art/artworks/long-ten-days-walking-and-sleeping-on-natural-ground-t05033
[13] ALFREY 2012
[14] WESTERKAMP 2007

My response to the ideas encountered through my research was, perhaps unsurprisingly, to go for a walk! The walk I chose was from Whitby to Robin Hood's Bay, on the coast of the North Yorkshire Moors, as shown by the red line in *figure 3* below:

Figure 3: Route taken for Another Place walk. (Reproduced with permission from Ordnance Survey)

This six and a half mile coastal walk covers a small section of the Cleveland Way, and predominantly consists of a high, cliff-top trail overlooking the North Sea. Sounds were recorded throughout the walk, and pictures taken. These together formed an audio-visual record of the experience, as well as the raw audio subject matter for the piece. *Figures 2*, *4* and 5 show pictures taken from the walk. Sounds gathered were then used to develop an initial family of textures and ideas from which I constructed a basic first-draft form for the piece. This initial work was by me working alone. The next stage was to work in the studio with Charlotte Pugh in order to develop recorder parts. This was achieved through a process of live improvisation in the studio: Charlotte would improvise to develop melodic material and ideas in response whilst listening to the early draft of the composition on headphones. These improvised responses were recorded before being reviewed by composer and performer. Certain ideas were isolated to be developed further, and others were discarded. Charlotte would then return to the recording booth and the process was repeated. After the initial recording session, I went away and worked

alone to shape the material further, before a second recording session took place. This process was repeated until we were satisfied with the piece. Once the final state of the piece had been fully developed and established, a live part was extracted from the recorded material. This was then transcribed by Charlotte and practiced for performance.

Figure 4: Field trip image from the North York Moors costal path

In performance, Charlotte memorised the recorder part and navigated the form by responding to learned cues in the music. A significant amount of flexibility was possible regarding live performance of the solo recorder part. The emphasis was not on playing the 'correct' notes, but on playing something live that retained the same *feel* as the finished work. There was also some variation possible in adhering to this principle. For example, in the initial *Intro* section, the prominent solo alto recorder parts (at 0:26, 1:07 and 1:26) were played almost exactly as heard in the recorded example provided on the Data Drive**.** However, the melodic material running from 5:53 to 9:30 was improvised differently each time.

Figure 5: Image from *Another Place* field trip
on the North York Moors costal path.

My intention throughout was for the piece to be an equal collaboration. I provided the basic idea and framework for the piece: the creative starting point of beginning with a walk and collecting sounds to use as raw material, the construction process using the studio as a compositional tool, and the structure and form of the piece as a whole. But Charlotte provided the melodic material and raw recorder sounds. The distinction between our roles is not always clear or easy to grasp. For example, in the initial recording sessions, I asked Charlotte to provide me with individual tones from each of the recorders. I then used these to construct chords and loops used throughout the piece (for example, the recorder loop that becomes prominent at 2:05). Other material, such as the tapestry of interwoven melodies found in the final 'Sopranino Melody Section,' are Charlotte's own improvised lines, although organised and mixed by me. Throughout, clear and unequivacle decisions regarding whose work is whose are hard to make; and that, in my opinion, is how it should be. The intention was to create a platform on which the performer could express something that was meaningful to them at that particular moment. Furthermore, the platform itself was constructed from experiences shared between performer and composer (the raw material of the field recordings and the experience of the walk), combined with responses to this material once it had been transformed and transfigured in the recording studio environment.

Form

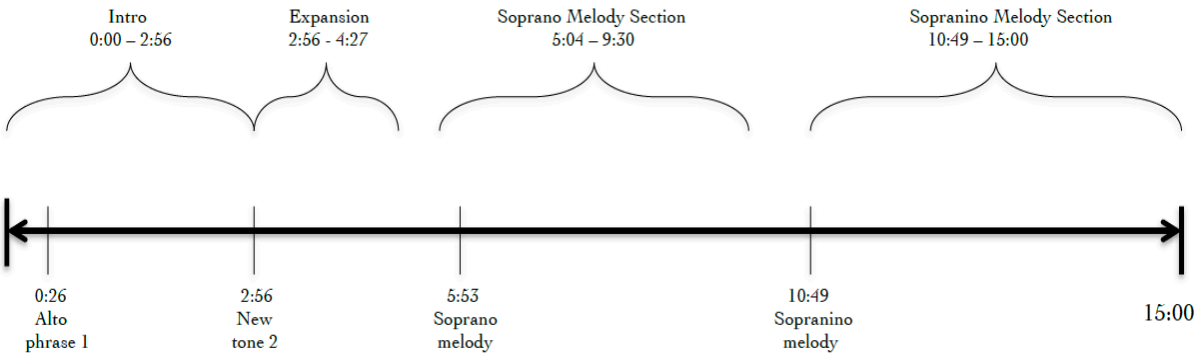

Figure 6: *Another Place* complete form.

Figure 6 above shows the complete form of the piece, which can be divided into four sections: 'Intro,' 'Expansion,' 'Soprano Melody Section' and 'Sopranino Melody Section.' 'Intro' begins with a two-note repeated figure from alto recorder. This is joined by background textural material made from field recordings. At 0:15 breath sounds from the alto recorder are added. At 0:26, the solo recorder part first appears with an initial short phrase (played live in performance). This is joined by a soprano recorder from the fixed media track at 0:46. The live solo recorder part appears again at 1:07 and 1:26, before a build up begins at 1:49, with an increase in density in recorder phrases from both the solo part and fixed media track. At 1:59 a looped recorder part first appears, building the density of the texture further. At 2:56, a clear low frequency tone, made from processed recorder sounds, signals the start of the 'Expansion.' Here the texture broadens, and the tension builds still further. By 4:27, 'Expansion' has finished, and the texture has thinned out, consisting mainly of background field recording loops and the solo alto recorder, the final phrase from which is sounded at 4:32. A new field-recording loop begins at 5:04, signalling a change in texture and the entry into the 'Soprano Melody Section.' The soprano melody itself begins at 5:53, playing through numerous improvised phrases until 9:30. This soprano melody was played live in performance. A low frequency tone appearing first at 9:55 signals a change into the 'Sopranino Melody Section,' with the sopranino recorder playing improvised phrases, beginning at 10:49. This sopranino recorder part was played live in performance, accompanied by numerous layers of countermelody from the fixed media track. All sounds in this final section are from the recorder, and employ the use of sopranino, soprano, alto and bass recorders. There are also some low frequency sounds outside the range of the recorders used, created by pitch shifting using Reaper.

6. Terrarium

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Cover Image: the Helford Passage from *Hydrology* field recording trip.

All photographs by Jon Hughes.

Introduction

Terrarium is a dance piece created by the Simon Birch Dance Company in 2012, commissioned for the sixtieth anniversary of the North Yorkshire Moors Park Authority and supported by a grant from the Arts Council. I was the composer for the project, in collaboration with lead artist and choreographer Simon Birch, costume designer Becs Andrews, and dancers Debb Purtill, Ricardo Meneghini, Daniel Conner and James Southward. Created from February through to August 2012, *Terrarium* was performed as an outdoor dance work in various locations across the North Yorkshire Moors. Following this initial performance, *Terrarium* has resurfaced in a range of different formats and configurations: a shorter version was performed in a number of outdoor urban locations in 2012; in 2013 a third version was created, which toured in London and Cornwall; an album of stereo mixes was produced in 2013, available for purchase on the website Bandcamp[1]; a 13-minute version of one of the sections, *Esk Path*, has been used as a freestanding ambisonic concert piece, first performed in York, June 2013.

Figure 1: *Terrarium* in performance at Daymer Bay, Cornwall, August 2013.

These different outputs originate from the same pool of choreographic and musical resources, and as such *Terrarium* can be thought of as a network of related outputs derived from a common

[1] For the Bandcamp site see here: https://imaginarylandscape.bandcamp.com/album/terrarium and also here: /DataDrive/Terrarium Media/Terrarium Bandcamp release/

source. The original source itself was created in response to the stimulus of a specific landscape: the North York Moors National Park. As such, it is an attempt to manifest the composer and choreographer's experience of the landscape in sound and movement; to distil experience and give it an external form though the creation of an immersive audio-visual work. Below I will focus first on the original source material generated in 2012; I will then discuss subsequent outputs and look at each individual section in more detail. Accompanying this document are a number of files found on the Data Drive, including: Bformat and stereo mixes of the 2012 and 2013 performance versions;[2] *Terrarium* Bandcamp release album;[3] a promotional video of *Terrarium*;[4] a folder of supplementary media, including photographs and smartphone video of excerpts from performances.[5]

Sound Sources

With a small number of exceptions,[6] all sounds in *Terrarium* are drawn from two primary sources:

- Field recordings taken form the North Yorkshire Moors (frequently processed electronically)
- Instrumental and vocal recordings.

Figure 2: *Terrarium* in performance, Devonshire Square, London, July 2013.

[2] See: /DataDrive/Terrarium Media/Terrarium Audio Files.
[3] See: /DataDrive/Terrarium Media/Terrarium Bandcamp Release.
[4] See: /DataDrive/Terrarium Media/Terrarium Video.
[5] See: /DataDrive/Terrarium Media/Terrarium Supplementary Media Archive.
[6] The 'Ash Dome' section, gamelan sounds in 'Esk Path', and percussion sounds in 'Jig'.

Process

The real starting point for *Terrarium*, both conceptually and musically, was the earlier piece *Ash Dome* (see Chapter Four). The two pieces are closely related, and music from *Ash Dome* was used in *Terrarium*[7]. *Ash Dome* was based on the work of the sculptor David Nash, and involved the use of field recordings. The initial creative stimulus for the piece was a visit to a major retrospective exhibition of Nash's work in 2011. Nash's work is intimately connected with the natural world, almost exclusively using material drawn from the natural environment, such as wood from fallen trees. The title *Ash Dome* comes from a well-known 'growing work' by Nash of the same name, which comprises of a ring of twenty-two ash trees planted in woodland near Cae'n-y-Coed in the Vale of Ffestiniog, Wales in 1977. These trees have been guided and fletched using traditional husbandry techniques over the past 35 years, so as to grow into a sculptural form that 'symbolizes the interaction of nature and culture as well as creating a meditative chamber'[8]. When making *Ash Dome* choreographer Simon Birch and I were drawn to this idea: our aim was in part to create a 'meditative chamber' in the theatre; to draw people in to a focused, meditative space through the use of movement, music, lighting and stagecraft. With *Terrarium*, however, we reversed the process; rather than bringing a reflection of our sensory impressions of the natural world into a theatre space, our intention was to take the theatre space out into the natural environment.

Figure 3: *Terrarium* at Danby, North York Moors, August 2012.

[7] A composite of the 'Ash Dome' and 'Bird Cello' sections from *Ash Dome* were dovetailed together and remixed ambisonically to form an 8 minute, 20 second section of *Terrarium* (See *figure 16* below).This section is unique in *Terrarium* in not being derived from field recordings made in the North Yorkshire Moors.

[8] TUFNELL 2006, page 90

In order to achieve this aim choreographer Simon Birch had the idea of using a large transparent sphere in which to house two dance performers. One significant aspect of this approach was the importance of protecting dancers from the elements,[9] but beyond this, the sphere creates a focal point for an audience, a kind of 'stage' that elevates the dancers to prominence; the transparent sphere creates a strong visual intervention in the landscape, while at the same time blending in and being in some way a part of it. Furthermore, the sphere is a powerful symbol, a signifier bringing with it a complex network of associations: the sphere of the earth; the sphere of the celestial dome; the sphere as a shape with no edge, no beginning or end, and so a signifier of time and the life cycle: of regeneration, of birth and death, growth and decay. A transparent sphere both reflects light from its surface and allows light to travel through it from the surrounding landscape; there is a sense of the sphere as a transient object, a temporary focal point, a momentary point of distillation. The sphere creates a singularity, a lens through which not only light is focused, but also the narrative, history and biography of the surrounding landscape. The transparent sphere is a clear membrane that one can see through; its transience, lack of substance, ability to yield to the surrounding environment and blend in to it, becomes an important aspect of the nature of its presence; it is both there and not there.

Figure 4: *Terrarium* in performance at Daymer Day, August 2013.

The prospect of taking this symbolic object and its contents out into the world interested us as a company; we welcomed the opportunity to take the work to unusual spaces and bring it before new audiences. We wanted to be able to drop the piece anywhere and into any kind of landscape, and so to be able to communicate with people who would not ordinarily experience contemporary dance. To do this it became necessary to develop a portable immersive public

[9] One of the problems with outdoor choreography is that dancers need a regulated temperature if they are going to attempt more complex movement: muscles have to be carefully warmed up and the conditions regulated and controlled to a significant degree.

performance space that was sufficiently flexible to be dropped into a wide range of possible performance locations; the use of sound was an important factor in the design and implementation of this project.

The Sound Sphere

As a composer, my task was to respond to the idea of the sphere and to use sound to help create a flexible, portable, public immersive space. My idea was to use a large-scale ambisonic circle of speakers to create a larger, outer 'sound sphere' in which both the audience and the globe containing the dancers could be housed.

Once funding had been secured, we were able to purchase a suitable sound system in order to achieve this, which I designed, specified and purchased: an eight-speaker ambisonic system.[10] With sufficient cabling, I was able to create an array thirty meters in diameter and in an octagonal configuration. The system was run alongside my own Apple MacBook Pro and the appropriate software.[11] Final mixes, once mixed ambisonically using Reaper, were rendered to Bformat. The final performance file was created using Reaper, with Bformat renders decoded by a Wigware decoder.[12] Sound was then distributed through eight discreet analogue outputs to the eight amplifier channels and then to the eight speakers. The dance sphere was then positioned inside this sonic sphere, to create the configuration shown in *figure 5*.

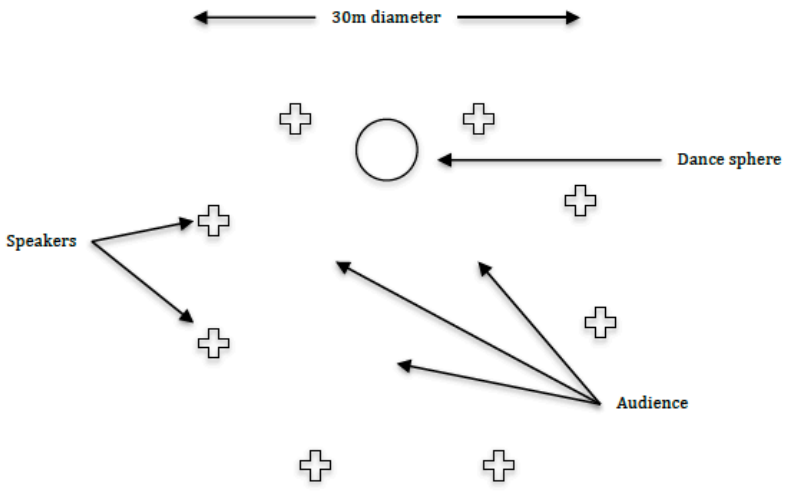


Figure 5: Octagonal speaker configuration.

[10] 8 x Electro Voice ZX4 passive speakers
8 x acoustically transparent fully weatherproof speaker covers.
4 x QVC 2500 stereo amplifiers (providing 8 independent channels of amplification)
Moto Ultralite Mk III soundcard

[11] The software used included: Reaper DAW; MRC 1st order B-Format Ambisonic Panner v0.1 (Music Research Centre, University of York); Wigware Regular Shape 1st Order Ambisonic Decoder (Bruce Wiggins, University of Derby). See /DataDrive/Software/ambisonic plugs

[12] The Performance Reaper files can be found here: /DataDrive/Terrarium Media/Terrarium Performance files.

All speaker cables were covered with strips of rubber matting to prevent a trip hazard, and the cable joins were taped with plastic (using strips of black bin liner and gaffer tape) to make them waterproof. Weatherproof covers were used for the speakers.[13] All items of equipment sensitive to the elements[14] were housed in a small tent a short distance from the speaker circle. Weatherproof cables were used to connect the electrical equipment in the tent to either a mains supply or generator, depending on the availability of power at the performance site. This system was fully weatherproof, and could travel to almost any performance site we could think of, as explained in more detail below.

Figure 6: Terrarium set up at Wykeham Abbey, August 2012.

Making the Piece

Once the concept was developed, we started to create the piece. Choreographer and composer met numerous times over a period of three months from February to April 2012 to conduct daylong field trips in the North York Moors. (I have provided a map of the region in Appendix 1). For example, one day was spent following the path of the River Esk, from its source in Westerdale to where it flows into the North Sea at Whitby (see *figures 26* and *28*), another at William Smith's Geological Museum in Scarborough, and a third at Sutton Bank, retracing Turner's footsteps (see *figure 8*).[15] During these field trips we recorded sound, took

[13] Custom made by the New York based company Under Cover. I highly recommend them! http://www.undercovernyc.com/

[14] Which includes amplifiers, plug boards, Apple laptop and Motu soundcard.

[15] Turner is well known to have visited Sutton bank in 1816, and left numerous sketches of the landscape. see http://www.tate.org.uk/art/artworks/turner-from-sutton-bank-looking-north-to-whitestone-cliff-d11892 (accessed 20th October 2014)

photos, talked and wrote text. The aim was to build an archive of sounds, images and written responses to the environment—a store of sensory experience derived from each unique location. This work was conducted alongside research into the biography of the landscape and geographical region.[16] A record of this process was kept online as a blog, a page of which I have produced in figure *7* below. The complete blog can be found on the Data Drive,[17] or online.[18]

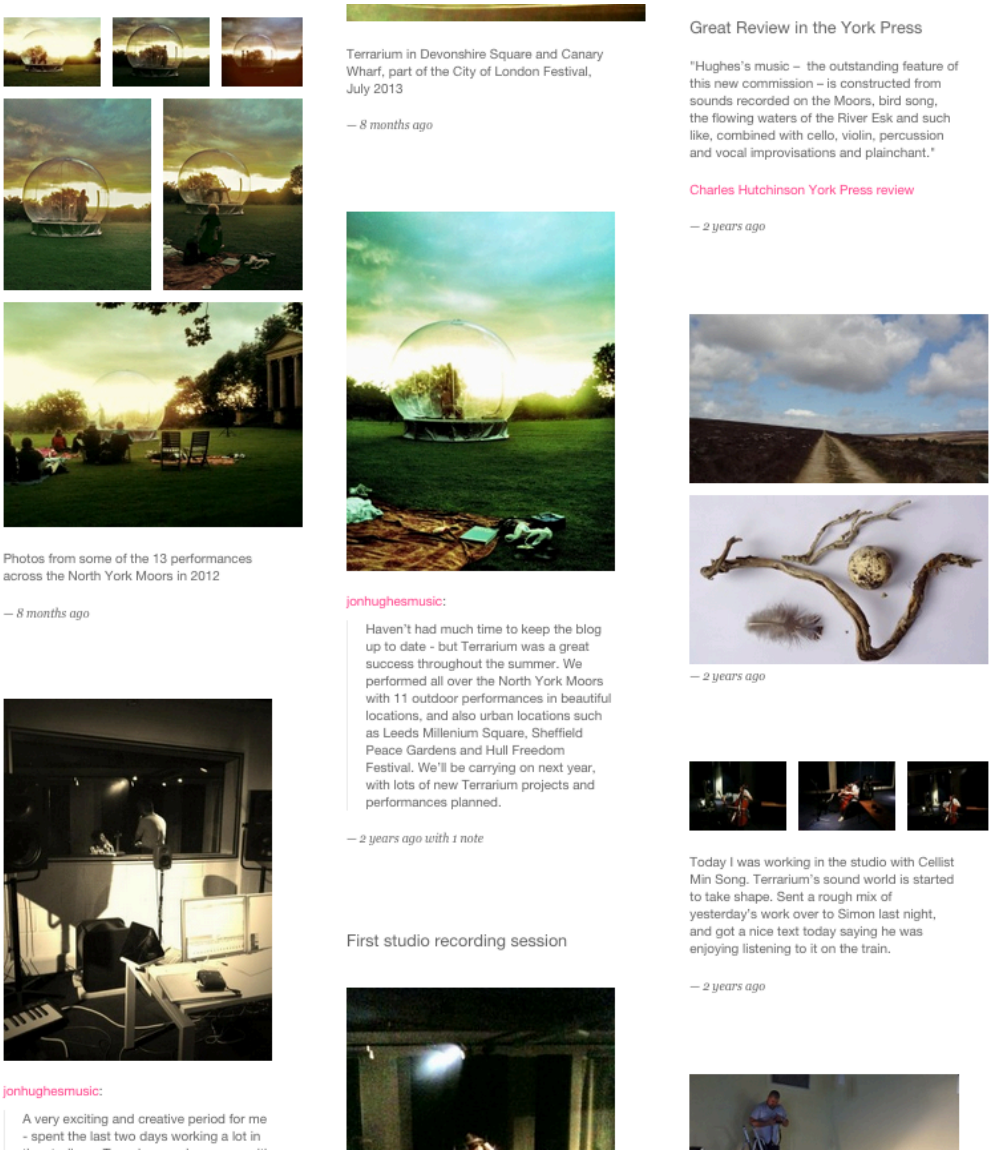


Figure 7: Page from the *Terrarium* blog.

This material was then drawn on to create a corresponding musical counterpart for each field trip. The first stage of this process involved creating a found sound collage. The second stage involved working with instrumental players or vocalists to develop the final pieces, using the initial found sound collage as a creative stimulus. I will give the example of 'Hummersea Beach' below as a typical description of the creative process employed.

[16] See for example RHEA 1985, MEAD 1978, SPRATT and HARRISON 1989, POTTER 2006, OSBORNE 2007, FORTEY 2000, WINCHESTER 2009.
[17] See: /DataDrive/Terrarium Media/Terrarium Blog pages.
[18] The *Terrarium* blog can be found online: http://terrariumblog2.tumblr.com/.

Figure 8: *Transmission* field trip. Choreographer Simon Birch on Sutton Bank, February 2012.

'Hummersea Beach'

The day we spent at Hummersea, March 6th 2012, became a very important part of the project, and illustrates well how the music for *Terrarium* was composed. The initial focal point of the field trip was the cliffs at Boulby, which are among the highest in the UK. Previous to this we visited the fishing village of Staithes. I recorded various sounds in Staithes as we explored the village. One key sound, for example, that would feature in the later found sound collage was a low-pitched resonant tone from a large, reverberant water outlet pipe found next to Staithes Beck, a small river that runs through the village. Following our exploration of Staithes, we then visited the cliffs at Boulby, where I recorded ambient sound from the landscape: the buzzing sound of a police aerial, and the sound of scraping stones for example. On the cliff edge, I managed to capture a recording of a small flock of jackdaws flying beneath us from left to right. We then returned to the car, and noticed a man standing with a pair of binoculars and looking intently north, up the line of the coast. We chatted for a while and found that he was checking how far he could see; apparently on a good day it is possible to see up as far as Teeside and Hartlepool. It was a clear day, and indeed we could see some signs of industry in the far distance. We talked, telling him a little about what we were up to. He then told us about a nearby beach called Hummersea, so called because the humming sound the sea makes. We had not heard of it before, which was surprising to us considering our particular interest in sound; Hummersea does not appear in any guidebooks I have found before or since. Excited by this new discovery, we headed down towards Hummersea. We found our way down a track called Hummersea Lane, cutting through a green valley marked with wild flowers, to a single

farmhouse, through the grounds of which we were able to gain access to the Cleveland Way behind, a well known coastal walking path.

Figure 9: *Terrarium* field trip. Wooden steps leading down to Hummersea Beach

A second footpath led off down towards the cliff edge and then after a little while down several flights of steep wooden steps (see *figure 9*) and onto a large deserted pebble beach. The beach formed a natural amphitheater, and the sound of the sea was very clear. There were also traces of some kind of disused, ancient industry on the cliff edge above us. It turned out to be the remains of Hummersea alum house, which was part of the Loftus Alum Works, and operated from 1655 to 1863.[19] There is a long history of alum mining in the North York Moors stretching back to the sixteenth century.[20] We spent a long while in this location—a good couple of hours recording sound, writing text and taking pictures (see *figure 10*).

It seemed to me that the curve of the high cliffs created a natural acoustic space reflecting the sound of the sea. It was a very simple, uncluttered landscape: no people, just the towering Jurassic cliffs, an endless variety of differently shaped coloured pebbles, and this continuous, mesmerizing sound of the water. I do not think I have ever heard such a detailed and complex sea sound: transparent, multi-layered, with a wide range of clearly defined frequencies. It was as if the sea had been balanced, EQ'd, and mixed by a good sound engineer.

I have provided a fair amount of descriptive detail in the passage above, because the subject matter is at the heart of the project—the composer and choreographer's shared subjective experience of the landscape. This moment of discovery was charged or numinous in some way for us. It was an experience that generated a reservoir of energy and meaning that would power and sustain the next two years of work.

[19] According to an internet source: http://www.teeswildlife.org/nature-reserve/hummersea/ (accessed 15th October 2014, 20:35)
[20] See MEAD 1978, page 54 – 59, and SPRATT and HARRISON 1989, page 170 – 174

Figure 10: Choreographer Simon Birch on Hummersea Beach. 6th March 2012.

When thinking about the day in retrospect, one thing that particularly interests me is that the discovery of Hummersea only happened because we had a conversation with the man at Boubly who was looking north along the coast. It would have been very easy to pull away from that conversation, but I distinctly remember the moment we decided not to. There was every reason to pull away earlier, as it was at first somewhat awkward; he was a little shy and nervous to explain what we he was doing there, and I got the impression that he wasn't the sort of personality to easily enter into a conversation with strangers.

Figure 11: On the Cleveland Way, on cliffs above Hummersea Beach.

The purpose of our visit was not to get somewhere specific however, but to talk and explore: to experience the landscape in a more general sense. And so we persevered; we kept talking and chatting, despite the slight awkwardness. It was only after some fifteen minutes of sharing our experience of the day that our new aquaintance remembered Hummersea. It was an interesting exchange. Especially when one considers the impact it had on the way the piece would develop.

To return to the story, once I had returned home that evening, I edited the sounds recorded, and uploaded some information onto the blog relating our experiences. Once online, I found

that Simon had collected objects from the beach and arranged them as found object images, shown in *figure 2* below:

Figure 12: Hummersea Beach Found object collage by Simon Birch.

I found these images inspiring, and so created a found-sound collage in response, constructed exclusively from sounds collected during the day. This included the gong-like sound of the Staithes water outlet pipe, sounds of the sea itself, the sound of me walking on the pebble beach, the police aerial from Boulby (pitch shifted to make different intervals), and sounds from the rusty metal steps that formed part of the old alum works on Hummersea Beach. This was the first piece of sound work for *Terrarium*, the first example of found sound being organized musically in some way. It was used subsequently as the basis for 'Hummersea Beach', a key section in the finished piece.

The next stage in the creative process involved working with violinist Val Pearson in the studio, using the found sound collage as a creative stimulus (see *figure 13*). Val was given direction from me regarding the feel I wanted for the piece, but left free to improvise in an attempt to respond to my request and guidance. For example, at first, Val was trying out a lot of extended techniques and more abrasive textures. I pressed, however, for more simplicity, as I wanted a slow moving, raw melodic feel to the violin part. It took some time to find our way to something that I thought was going to work. Once I was happy with the pool of recordings generated, I continued to work alone in subsequent recording sessions to create the final piece.

Figure 13: Violinist Val Pearson in the studio.

The final mix was a composite of edited and treated violin recordings and the found sound collage material. This was mixed ambisonically into a 360° sound field in the finished piece. The choreographer started working on the dance material for this section once the initial mixes of the first violin session had been partially edited. There was a constant flow of mixes from me to the choreographer and dancers via electronic media, and video of rehearsals flowing back to me from the rehearsal studio. I also visited the dance studio in Leeds on a regular basis.

Figure 14: *Terrarium* rehearsals at Yorkshire Dance, Leeds, June 2012.

The Complete Piece[22]

Each of the *Terrarium*'s twelve sections were developed in a similar way to 'Hummersea Beach'. Once each section was created, the final form was established, working closely with the choreographer and dancers throughout. As illustrated in *figure 15* and *17* below, the piece was divided into 2 acts:

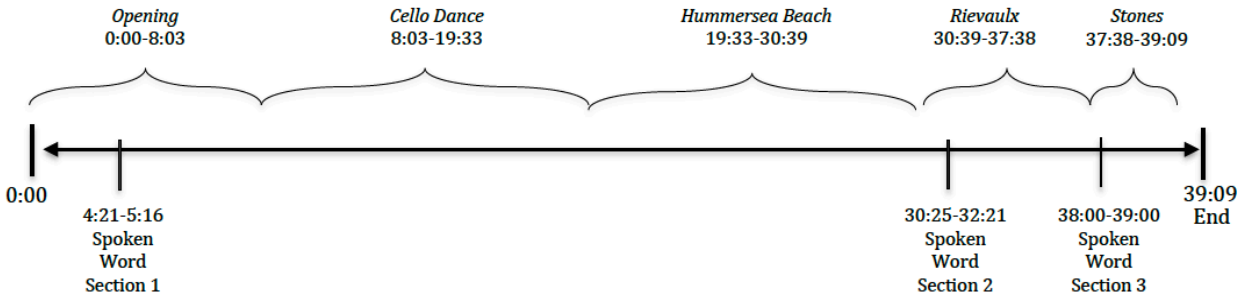


Figure 15: Terrarium 2012 Act 1 complete form.

Figure 16: *Terrarium* field trip to Sutton Bank, March 2012.

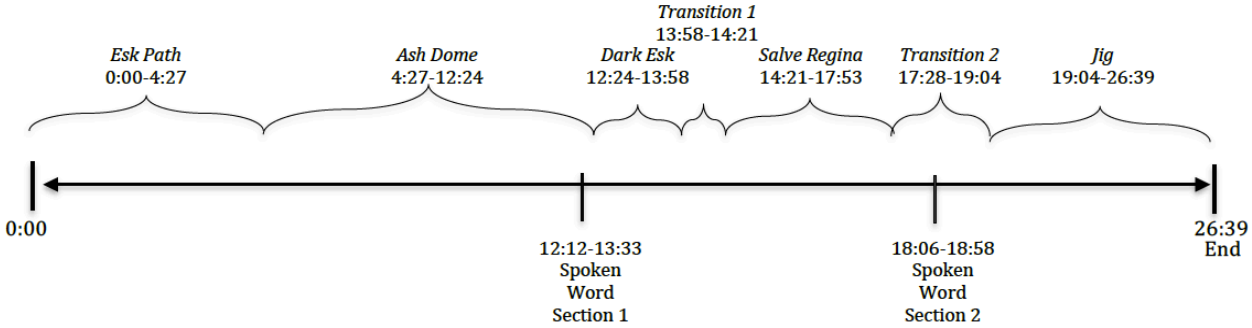


Figure 17: Terrarium 2012 Act 2 complete form

[22] For the audio files corresponding to figure 15 and 17, see: /DataDrive/Terrarium Media/Terrarium Audio Files.

Spoken Word Sections

Spoken word sections used fragments of text written by composer and choreographer during the field trips. Each section was spoken by Jon Hughes, recorded and added to specific sections of the music. Following the 2012 North York Moors tour, these spoken word sections were dropped, both for the 2013 tour and the *Terrarium* Bandcamp release. Below I have included a single example of the text that appeared in the 2012 version from 4:21 to 5:16. The text was written by Simon Birch on the summit of Roseberry Topping on a Terrarium field trip in late February 2012.

Suddenly you're on this high expanse,
Miles of Land,
But little to break the tremendous sense of openness.
No trees, only low growing heather.

The moor feels heavy, like a huge body sleeping,
Its surface a rough skin,
Encasing the skeletal rock structure beneath.

Walking through woodland, surrounded by conifers,
The tops are swaying in the wind.
I hear the call of gold crest flitting in the canopy above.
Comforted, safe, enclosed,
I follow the tracks made by animals and people.

Figure 18: *Terrarium* field trip – view from Roseberry Topping.

Performance

2012 version of Terrarium[23]

The first performance was a 20-minute extract in Millennium Square, Leeds, as part of the Big Dance festival July 15th 2012 (see *figure 19*). The first performance of the full version was August 1st at Wykeham Abbey in the North Yorkshire Moors (I have included a press review in Appendix 3 of this first performance). The full version then toured across the North Yorkshire Moors in August 2012,[24]. Following this tour, a shorter version, edited down to a 21-minute piece comprised mainly of parts of 'Cello Dance' and 'Hummersea Beach', was performed in a number of urban settings, such as the iMove festival in the Sheffield Peace Gardens, August 17th 2012, and the Hull Freedom Festival, September 8th 2012. At all times in 2012 *Terrarium* was performed with two dancers, but in two separate pairs. One pair was Debbi Purtil and Riccardo Maneghini, and the second pair was Daniel Connor and James Southward.

Figure 19: First ever *Terrarium* performance, Millenium Square, Leeds, July 2012.

[23] For the audio files: /DataDrive/Terrarium Media/Terrarium Sound Files.

[24] 1st August, 7.30pm Wykeham Abbey, near Scarborough; 2nd August, 7.30pm The Moors National Park Centre, Danby; 3rd August, 3.00pm & 7.30pm Sneaton Castle, Whitby; 4th August, 3.00pm & 7.30pm Kirkleatham Hall, Redcar; 5th August, 7.30pm The Moors National Park Centre, Danby; 8th August, 7.30pm Rievaulx Abbey Terrace; 9th &10th August, 7.30pm The Moors National Park Centre, Danby; 12 Aug, 7.30pm Rievaulx Abbey Terrace, near Helmsley.

2013 version of Terrarium[25]

The next wave of performances took place the following year, in London and Cornwall: July 24th at Devonshire Square (see *figure 2*) and on July 25th at Canary Wharf, both as part The City of London Festival. This was followed by a tour in Cornwall August 2013, as part of Salt, a festival celebrating landscape and dance[26] (see Appendix 2 for more details of the festival). For the 2013 version performed in Cornwall, we developed the piece, using three extra small spheres, together with a small group of dancers to supplement the two dancers in the globe (see *figure 20* below). Three separate portable sounds systems (small mono battery powered amps) were used to provide sound for small-scale dance pieces that took place in the landscape at the different performance locations. These used mono mixes of various sections of music from *Terrarium*, and acted as a prelude for the main piece in the transparent dome: a 22 minute version with some choreographic changes. The dancer used in the globe for the 2013 performances were Debbi Purtil and James Southward, and for the movement external to the main globe, dancers were selected from a pool of local professional movement artists and dance students. The form of the 2013 Terrarium is illustrated in *figure 21* below:

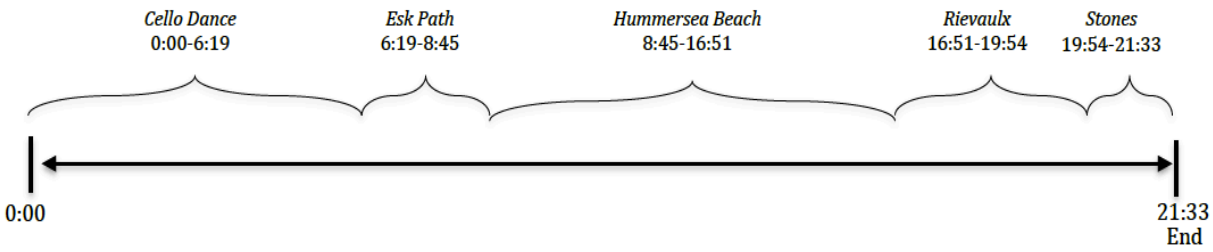


Figure 20: *Terrarium* 2013 complete form.

One key idea for the Cornwall tour was to think of *Terrarium* as an experience that could take over a specific performance site. So, for example, in the first performance at Trerice Manor, the system was set up early as a sound installation, with the ambisonic speaker circle playing extracts of the music from 11 am. The dance performance started at 12:00, beginning with the material using the three smaller spheres and the battery-powered portable amplifiers. This drew the audience towards the larger sphere and the ambisonic sound system for the performance of the main 24-minute piece. After this performance, the ambisonic circle would return to its function as a sound installation, playing various sections of the music until the second performance at 2:00 pm. There was also a third performance at 4 pm, following which the sound installation would kept on on until the venue closed at 6 pm.

[25] For audio files see: /DataDrive/Terrarium Media/Terrarium Audio files.

[26] 3rd August 2013 Trerice Manor; 5th August Bedruthan Steps; 6th August Daymer Bay; 7th August Daymer Bay.

Individual Pieces

Below I will examine individual sections of music in more detail. I will first refer to individual sections as they appear on the *Terrarium* Bandcamp release[27], before explaining how the same material appears in different performance contexts.

Figure 21: *Terrarium* in Performance in Daymer Bay, August 2013. Dancers using one of the smaller globes.

'Opening'

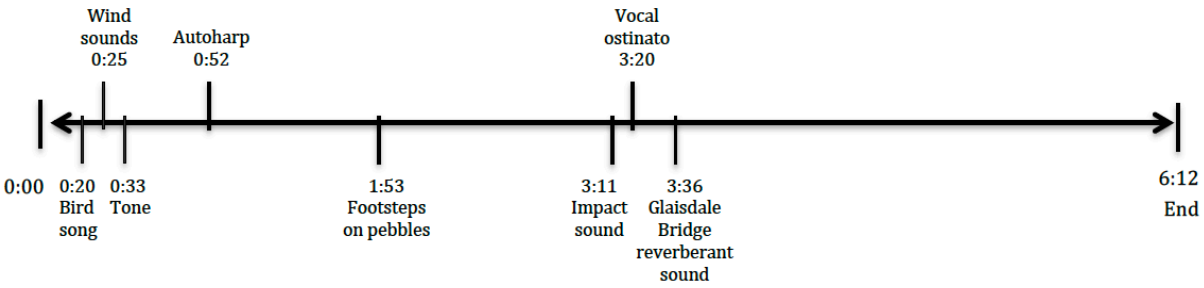


Figure 22: 'Opening' complete form (*Terrarium* Bandcamp release version).

Sounds used in 'Opening' are sourced from field recordings selected from a wide range of different field trips and can therefore be considered an exposition prefiguring elements that

[27] for full album see: /DataDrive/Terrarium Media/Terrarium Bandcamp Release.

surface in later sections in the piece. It begins using a loop made from field recordings from Roseberry Topping. Bird song from Danby first appears at 0:20, and the sound of wind from Sutton Bank at 0:25. A clear tone, made from processed vocal recordings made in Danby Church, appears at 0:33. At 0:48 the bird song recedes into the distance with the addition of processing and reverb, shortly followed at 0:52 by the first entry of an autoharp recording made by the composer in the studio, pitched shifted down an octave. This phrase is repeated an octave lower at 1:03, before phrases in the original recorded pitch first to appear at 1:06: the autoharp recordings becomes a feature of the piece from this point on. The density of vocal recordings increases around 1:24 before footsteps on pebbles (from the Hummersea recordings) are heard for the first time at 1:53. The texture thickens further from here, with sounds from many different field-recording sources making an appearance. For example, the strong low-frequency impact sounds at 3:11 come from recordings of a metal road bridge at Glaisdale, as do the clattering, reverberant sounds at 3:36. A hummed wordless vocal ostinato made by the composer appears for the first time at 3:20, becoming gradually more prominent. Other sounds fade away, leaving a thin texture dominated by the vocal ostinato by 5:00. The texture thins further from here to the end at 6:12.

In the 2012 version of *Terrarium*, 'Opening' is over-layered with the first section of spoken text, from 4:12 – 5:07. Then, at 6:15, a field recording of a rookery from the North York Moors is faded in, forming a link through to the beginning of the 'Cello Dance' sections at 7:56.

'Opening' was not used in the main dance performance in the sphere for any subsequent versions of *Terrarium*, such as the 2013 version. It was however used as material for the three smaller spheres in the 2013 version, mixed down to mono, and as part of the ambisonic sound installation in 2013, played without the dancers.

'Cello Dance'

In the 2012 and 2013 versions of Terrarium, what is called the 'Cello Dance' section was formed from a composite of what were originally two separate sections: 'Cello Prelude' and 'Cello Dance'. These two sections remain separate on the *Terrarium* Bandcamp release.

The material for both was developed working with cellist Min Song in the studio. While listening to the Hummersea Beach found-sound collage on headphones, Min improvised under my direction. The recorded material gathered was then mixed, processed and organised by me to create these final two pieces.

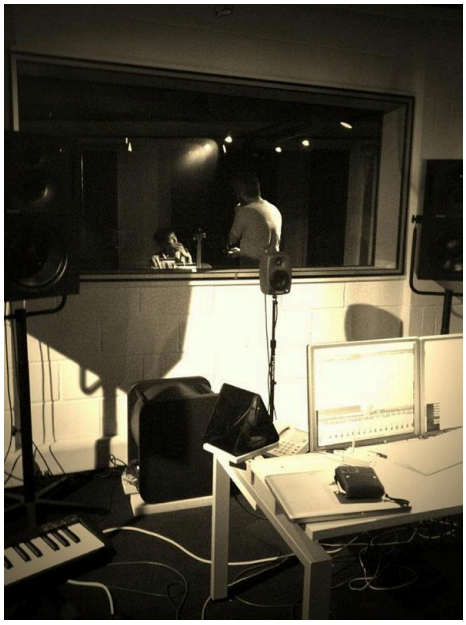


Figure 23: Min Song and Jon Hughes in the studio, May 2012.

'Cello Prelude' consists of three simultaneous multi-tracked melodic lines. What appears in the final piece was selected from a number of possible takes, edited and shaped to create the final form.

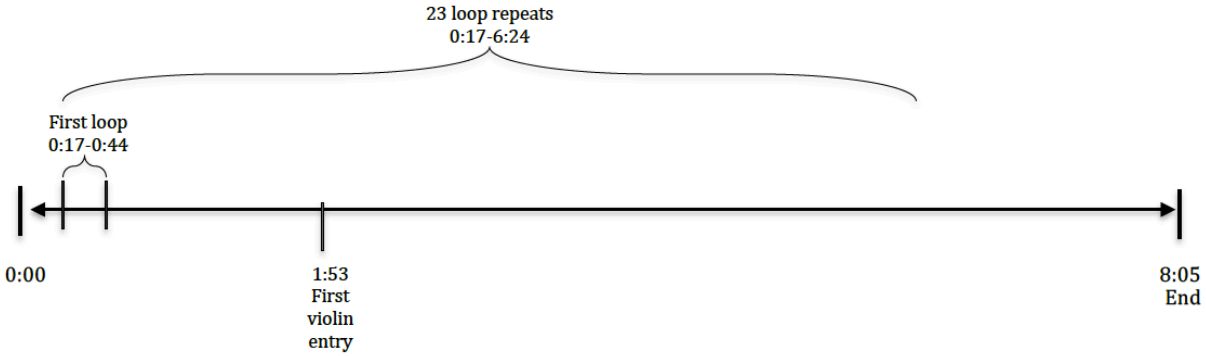


Figure 24: 'Cello Dance' complete form (*Terrarium* Bandcamp release version).

'Cello Dance' developed from a single loop found within the improvised three part material used to make 'Cello Prelude'. The loop is 17 seconds long, and can first be heard from 0:27 to 0:44 in 'Cello Dance'. This loop then repeats 23 times until 6:24. Over the course of these 23 repetitions, a range of other cello sounds, motifs, and phrases gradually appear to increase the textural density. The fragments of cello used here were not recorded with the intention that they would be employed in this particular way. Instead, the fragments were 'mined' by the composer from the pool of material generated by the recording session, once the concept for the piece had been developed later working alone in the studio.

The next stage in creating the piece was to work with violinist Val Pearson. Val improvised short phrases and introjections over the cello material, and this was edited and shaped in the

studio at a later date. The violin first appears at 1:52, with more prominent phrases starting at 2:14.

In the original 2012 version, the 'Cello Prelude' section was shortened and put together with 'Cello Dance' to create a composite track running from 7:55 to 19:25. In the 2013 version, a shortened version of the 'Cello Dance' section is combined with a further shortened 'Cello Prelude'. This material together formed the opening of the performance, with the prelude lasting from 0:00 to 0:30, and the looped cello section from 0:30 to 6:19.

'Hummersea Beach'

The underlying structure of 'Hummersea Beach' involves two repetitions of a found-sound collage made by the composer, followed by an outro section. The first repetition, which is shorter than the second, runs from 0:00 to 4:15, and the second from 4:15 to around 9:30. The outro runs from 9:30 to the end.

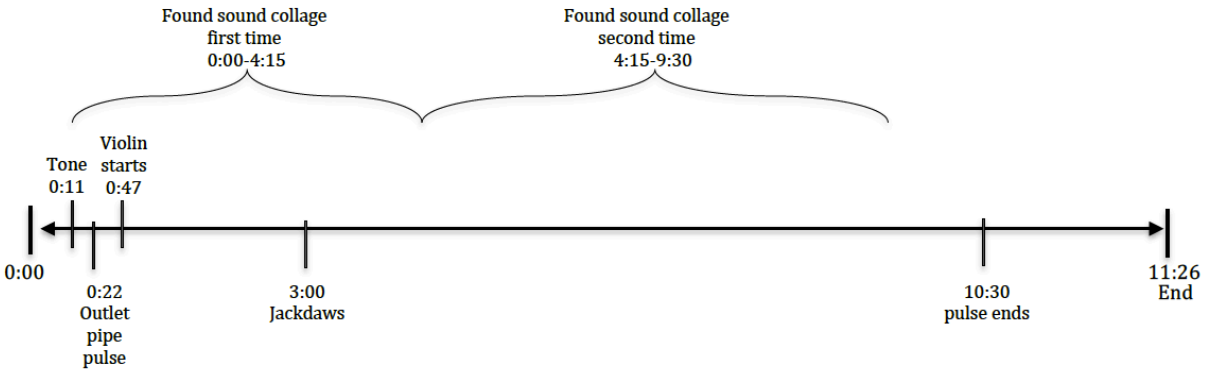


Figure 25: 'Hummersea Beach' complete form (*Terrarium* Bandcamp release version).

'Hummersea Beach' begins with the sound of sea in the distance and footsteps on pebbles at 0:03, both taken from Hummersea Beach field recordings. At 0:11 a tone can be heard, made from processed sound of metal steps from the old alum works at Hummersea. At 0:22, a gong-like pulse begins, playing consistently until 10:30, made from a recording of a water outlet pipe recorded in the small fishing village of Staithes. At 0:47, a clear violin tone can be heard. This is the first of several interjections from the violin: at 1:08, 1:29, 2:00, 2:17, 3:08 and 3:15. These were all positioned by the composer, selected from a pool of improvisatory fragments generated by Val Pearson in response to the Hummersea Beach found-sound collage. They are also processed in various ways, using pitch shifting to thicken the texture of the original violin. At 3:00, there is the clear sound of Jackdaws, recorded from the cliffs at Boulby. At 4:15, the cycle of the found-sound collage repeats. An unbroken violin texture then starts with a single violin at

4:47, joined by two other violins shortly after. These three lines, together with various transformations and transpositions of the raw recorded violin material created by the composer, build toward a climax of intensity at 8:15. The violin fades out by 9:49, and the gong-like pulse is gone by 10:30, leaving only the sound of the sea to the end.

The track was used in the 2012 version from 19:14 to 30:39 of Act 1. It was used again in the 2013 version in a slightly shortened version from 8:16 to 17:26.

'Rievaulx'

'Rievaulx' is constructed entirely from vocal sound sources. The vocal recordings used are of improvisations made based on the plainchant *Salve Regina*, the significance of which is discussed in more detail below.

Figure 26: Danby Church, North York Moors. The location for some of the vocal recordings used in 'Rievaulx' and elsewhere.

These improvisations come from two sources: improvisations by the composer made alone in the studio and a pool of recordings of improvisations by a group of singers made under the direction of the composer in Danby Church (see *figure 26* above). As part of the creative process, I took a group of eight singers to Danby Church in the North Yorkshire Moors and experimented with the *Salve Regina* plainchant in that specific acoustic.

'Stones'

'Stones ' was made using the sound of stones being scraped on Roseberry Topping. Roseberry Topping, a distinctive outlier in the North Yorkshire Moors,[28] has been an important presence throughout the history of the Moors, stretching back to the Anglo-Saxon and Viking period, when it was named Odin's Berg.[29] It also has a very interesting and long-standing custom; at the top, which affords a stunning 360° view of the surrounding landscape, the rocky surface is covered with a dense patchwork of messages and signatures, scratched into the stone. The earliest dates I found go back to 1850, and continue right up to the present day. I recorded the sound of scratching my name into the surface, and used this raw material to create 'Stones', together with Native Instruments Guitar Rig and various plugins from Reaper.

'Esk Path' and 'Dark Esk'

'Esk Path' was created using sound recording on a specific field trip: on March 22nd 2013, Simon and I decided to follow the path of the River Esk, from its source in Westerdale through its egress into the North Sea at Whitby. The River Esk is contained within the boundary of the North York Moors, winding on a 28-mile path through the valley of Eskdale (see the map in Appendix 1). We followed the river, recording at the source in Westerdale, where it is only a small trickling stream. The river then grows, gradually building in width, depth and intensity, fed by many contributory streams and becks from the surrounding hillsides, until by the time it reaches Whitby it is a wide fast flowing torrent. The piece I created is designed as a response to this sense of gradual, building energy.

Figure 27: Jon Hughes field recording on the River Esk at Danby, spring 2012.

[28] See OSBORNE 2007, page 14; also http://www.nationaltrust.org.uk/roseberry-topping/history/ (accessed 19th October 2014); also MEAD 1978, page 204-209.
[29] SPRATT and HARRISON 1989, page 71.

The piece was made using various sounds collected from the day as a starting point. For example the Curlews at 0:53 were recorded in woodland at the source in Westerdale, and the water sounds used come from various locations along the river: Westerdale, Glaisdale, Danby and Whitby for example. We also used hydrophones to capture sounds from below the river's surface. I made a found-sound collage from this material and then worked with Min Song in the studio, getting him to try and mimic the water sounds and respond to the atmosphere of the found-sound collage. The results of this recording session were edited and blended in with various field recordings. The next stage was a studio session with percussionist Martin Scheuregger to create a rhythm track, using the material generated so far as a guide. This was then processed and edited. I then added a layer of melodic material using gamelan recordings, which first appear at the opening of the track.

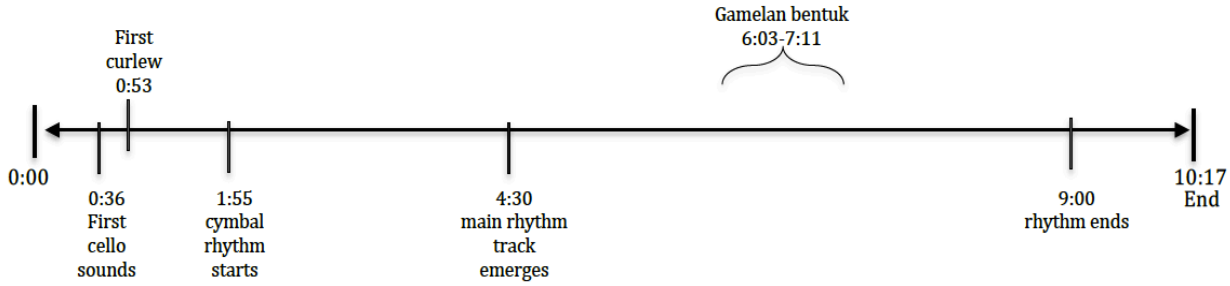


Figure 28: 'Esk Path' complete form (*Terrarium* Bandcamp version).

Tones from the composer's gamelan sound library open the piece, and are the only sounds until the cello sounds enter at 0:36. Curlew sounds can first be heard clearly at 0:53. A rhythmic cymbal track starts at 1:55, and the track then builds in intensity towards the emergence of a more explicit rhythmic track at 4:30. The gamelan tones gradually get more frequent amid the building density of texture. At 6:03, a complete gamelan bentuk[30] is articulated that is played only once, from 6:03 to 7:11. The explicit rhythmic pulse then disappears by 9:00, leaving only cello, water sounds, curlew and other bird samples and gamelan sounds that persist through to the end.

'Esk Path' has been used in a number of different ways: an excerpt from it was used as the opening for Act Two in 2012, from 0:00 to 4:27. In the 2013 version, it was used from 6:00 to 9:39, connecting 'Cello Dance' to 'Hummersea Beach'. The entire track was also used as incidental music in the installation that was presented between the main dance performances in the 2013 Cornwall tour.

[30] For a definition of bentuk, see *Snow Cradle*, Chapter 2, pages 32 to 38.

In June 2013, prior to the tour in July and August, the track was developed further and made into a freestanding ambisonic concert piece for a performance collaboration between myself and SPL/it, a York based electronic music collective. The ambisonic mix was for a venue with a full speaker sphere (the Rymer Auditorium, University of York), using elevation, and so was different to the mix used on the horizontal outdoor ambisonic speaker circle.[31]

The River Esk found sound collage also formed the basis for 'Dark Esk', which was used in the 2012 *Terrarium* from 12:12 to 13:58 of Act Two. This was mixed in performance with a spoken word section from 12:12 to 13:33, and a 'Transition' section, from 13:36 to 14:21, using sections of the Danby Church vocal recordings mixed with moorland soundscape.

Figure 29: Jon Hughes recording on Glaisdale Bridge, over the River Esk. *Terrarium* field recording spring 2012.

'Ash Dome'

Ash Dome uses sections of music from a previous project, *Ash Dome*, remixed for Terrarium. This music has been discussed at length elsewhere (see Chapter Four). The section used in Terrarium was a reedited and ambisonically remixed composite of the 'Ash Dome' section and the 'Bird Cello' section from *Ash Dome*.

[31] For audio files see: /DataDrive/Terrarium Media/Terrarium Audio files.

'Transition 1' and 'Transition 2'

This material does not appear on the *Terrarium* Bandcamp release, or the *Terrarium* 2013 performance. It was only used in *Terrarium* 2012. The first 'Transition', 13:36 to 14:21, and the second 'Transition', 17:28 to 18:45, both from Act Two, use fragments from the Danby Church recordings mentioned above, together with field recordings from the Moors.

'Salve Regina'

'*Salve Regina*' is an a cappella vocal track sung by Jon Hughes. The *Salve Regina* is a piece of plainchant that was important to the Cistercian monastic order. The relationship of this Marian hymn to *Terrarium* arises from the use of Rivaulx Abbey Terrace as one of our performance sites. Rivaulx Abbey was founded in 1131,[32] and went on to be the largest and most important Cicsterican house in England.[33] Sources tell us that the *Salve Regina* was sung after compline each night by Cistercian monks[34] and was adopted as a daily processional chant as early as 1218.[35] It would therefore have been sung at Rivaulx every day for several centuries. I used this chant to generate material appearing in 'Vocal Experiments', as explained above in more detail. This a cappella recording was used in the 2012 version of *Terrarium* only, from 14:21 to 17:53 of Act Two, and also made its way onto the *Terrarium* Bandcamp release.

'Jig'

The final 'Jig' section, from 19:04 to 26:39 of Act Two, was made using electronically generated drum sounds from Native Instruments Battery 3 drum sequencer. These percussion sounds were combined with violin recordings created working in the studio with Val Pearson. The aim throughout was to create an uplifting, playful feel for the end of the piece, so the audience didn't go home with too heavy a feeling following the darker, more intense sections of music. 'Jig' only appears in the 2012 version of *Terrarium*, and not in the 2013 version or the Bandcamp release.

[32] OSBORNE 2007, page 16.
[33] OSBORNE 2007, page 17.
[34] WAKEFIELD 1983, page 88.
[35] CIABATTONNI 2010, page 118.

Appendix 1:

Map of the North Yorkshire Moors

Map attribution: By Lencer [GFDL (http://www.gnu.org/copyleft/fdl.html)], via Wikimedia Commons

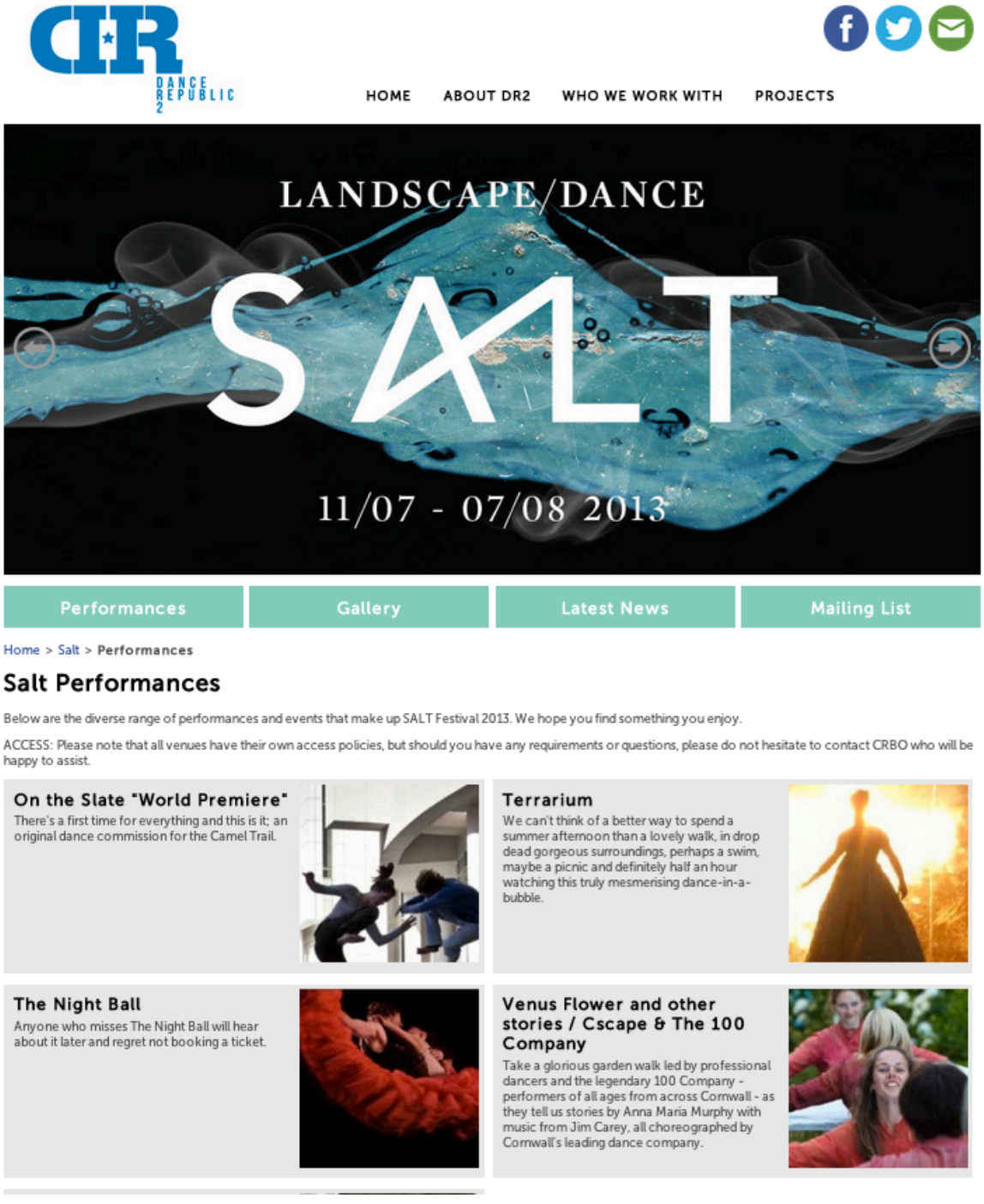
Source location:

http://upload.wikimedia.org/wikipedia/commons/0/0d/North_York_Moors_map_en.png

(Accessed 21st October 2014)

Appendix 2:

Salt website (http://www.dancerepublic2.com/project/salt.php)



Performances | Gallery | Latest News | Mailing List

Home > Salt > Performances > Terrarium

Event Details

Dates: Saturday 03 August 2013 - Saturday 03 August 2013

Venue: Trerice Manor, TR8 4PG

Time: 12 Noon, 2.00pm and 4.00pm

Price: £8.00 / £4.00 Conc. (U5's & NT Members Free

Dates: Monday 05 August 2013 - Monday 05 August 2013

Venue: Bedruthan Steps, PL27 7UW

Time: 12 Noon, 2.00pm and 4.00pm

Price: FREE

Dates: Tuesday 06 August 2013 - Tuesday 06 August 2013

Venue: Daymer Bay, PL27 6SA

Time: 8.00PM

Price: £8.00 (Price includes a complimentary drink)

Dates: Wednesday 07 August 2013 - Wednesday 07 August 2013

Venue: Daymer Bay, PL27 6SA

Time: 12 Noon, 2.00pm and 4.00pm

Price: FREE

Terrarium

What they say

Bring your friends, family - and a picnic - to celebrate the wild beauty of rural Cornwall.

Terrarium is dance in a giant transparent globe. Performers explore the ever present life-cycle of nature as they move, perform and play to the soundtrack of especially composed music, played through an ambisonic surround-sound speaker system that allows you to immerse yourself in the event and your surroundings.

Beautiful and mesmerising, Terrarium celebrates some of Cornwall's most stunning coastal locations.

What we say
We can't think of a better way to spend a summer afternoon than a lovely walk, in drop dead gorgeous surroundings, perhaps a swim, maybe a picnic and definitely half an hour watching this truly mesmerising dance-in-a-bubble.

Performers dance, music plays and we all keep fingers crossed about the weather!

What the audience say
Truly amazing - a beautiful story. Thank you for a great evening
An audience member from Terrarium 2012

6

Your Comments

Add a comment...

Also post on Facebook

Posting as Jon Hughes (Not you?) Comment

How To Book...

Whilst there is no need to book for performances during the day, we recommend you do for evening performances and in which case...

By calling: (01726) 879 500

Online: www.crbo.co.uk

In person: Tourist Information Centres in St Austell, St Ives, Looe, Truro, Launceston, Bodmin, St Mawes, Falmouth or Penzance, PLUS Bookends - Fowey, and Open Shed, Penzance.

.

You can also get tickets for the evening performance from Wadebridge Wines (Cash Only / Subject to Availability)

READ or DOWNLOAD THE PROGRAMME HERE!

Multimedia

Terrarium / NC Ritchie

Appendix 3:

Charles Hutchinson's York Press review of *Terrarium:*

(http://www.yorkpress.co.uk/leisure/theatre/9856430.Review__Terrarium_____Dance_In_A_Bubble__Simon_Birch_Dance_Company__Wykeham_Abbey__near_Scarborough/)

Terrarium – Dance In A Bubble,

First published Saturday 4 August 2012 in Theatre

by Charles Hutchinson

Follow 207 followers

A TERRARIUM is usually a vivarium for small land animals or a sealed transparent globe for growing plants – and you'll have to look up vivarium.

This Terrarium is much bigger, not the size of the Menwith Hill golf ball obviously, but large enough when inflated to house a very mobile man and woman (on the press night, and sometimes two men, which no doubt brings a whole new ball game to both the choreography and couture).

Courtesy of globe designers and fabricators JBL Leisure, Terrarium – Dance In A Bubble is performed by Debbi & Riccardo Meneghini or Daniel Connor & James Southward in a thick plastic, see-through orb with a zip for access, and a capacity for inflation and deflation that outdoes the Greek and Spanish governments.

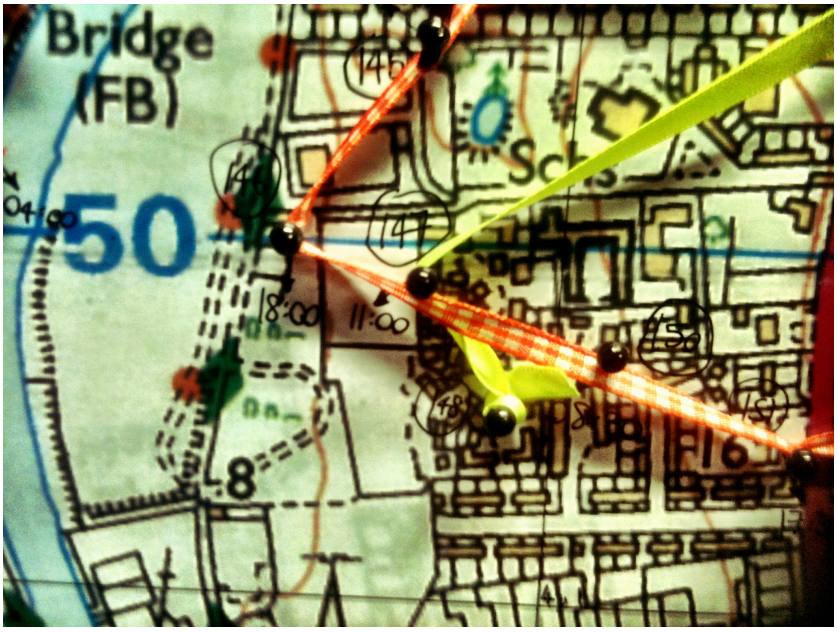
The reason for this global phenomenon is the 60th anniversary of the North York Moors National Park, whose rivers, birds, landscapes, beaches, monks, insects and flowers have inspired Leeds choreographer Simon Birch, composer and soundscape designer Jon Hughes and costume designer Becs Andrews.

Hughes's music – the outstanding feature of this new commission – is constructed from sounds recorded on the Moors, bird song, the flowing waters of the River Esk and such like, combined with cello, violin, percussion and vocal improvisations and plainchant.

A series of voiceovers also provides a poetic narrative context, complementing the extensive programme notes that explain the dancers' progress through the moorland seasons and countryside from autumn into winter and onwards to spring and a summertime represented by the flower-power suits and waistcoats at the finale.

The dancers become more entwined, more gymnastic, more daring and physically responsive to the globe's bouncy walls as the night progresses – and no, the bubble never bursts, only deflating around them at the exhausted finale.

Terrarium – Dance In A Bubble, Simon Birch Dance Company, Wykeham Abbey, near Scarborough, last Wednesday; now on tour until August 12. Box office: 0113 243 8765 or yorkshiredance.com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7. A Dip in the Lake

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A Dip in the Lake (Stereo)

A Dip in the Lake complete composite (Bformat) (Part 1)

A Dip in the Lake complete composite (Bformat) (Part 2)

A Dip in the Lake Blog

A Dip in the Lake Blog Files

A Dip in the Lake Blog

A Dip in the Lake material for visual display

A Dip in the Lake Credits

A Dip in the Lake Movement Order

A Dip in the Lake Photograph Archive

A Dip in the Lake Program Notes

A Dip in the Lake Score PDF

A Dip in the Lake recording location maps and information

A Dip in the Lake Field Recording Guidelines

A Dip in the Lake recording location chart (Excel)

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A Dip in the Lake high res map pins

A Dip in the Lake high res map ribbons

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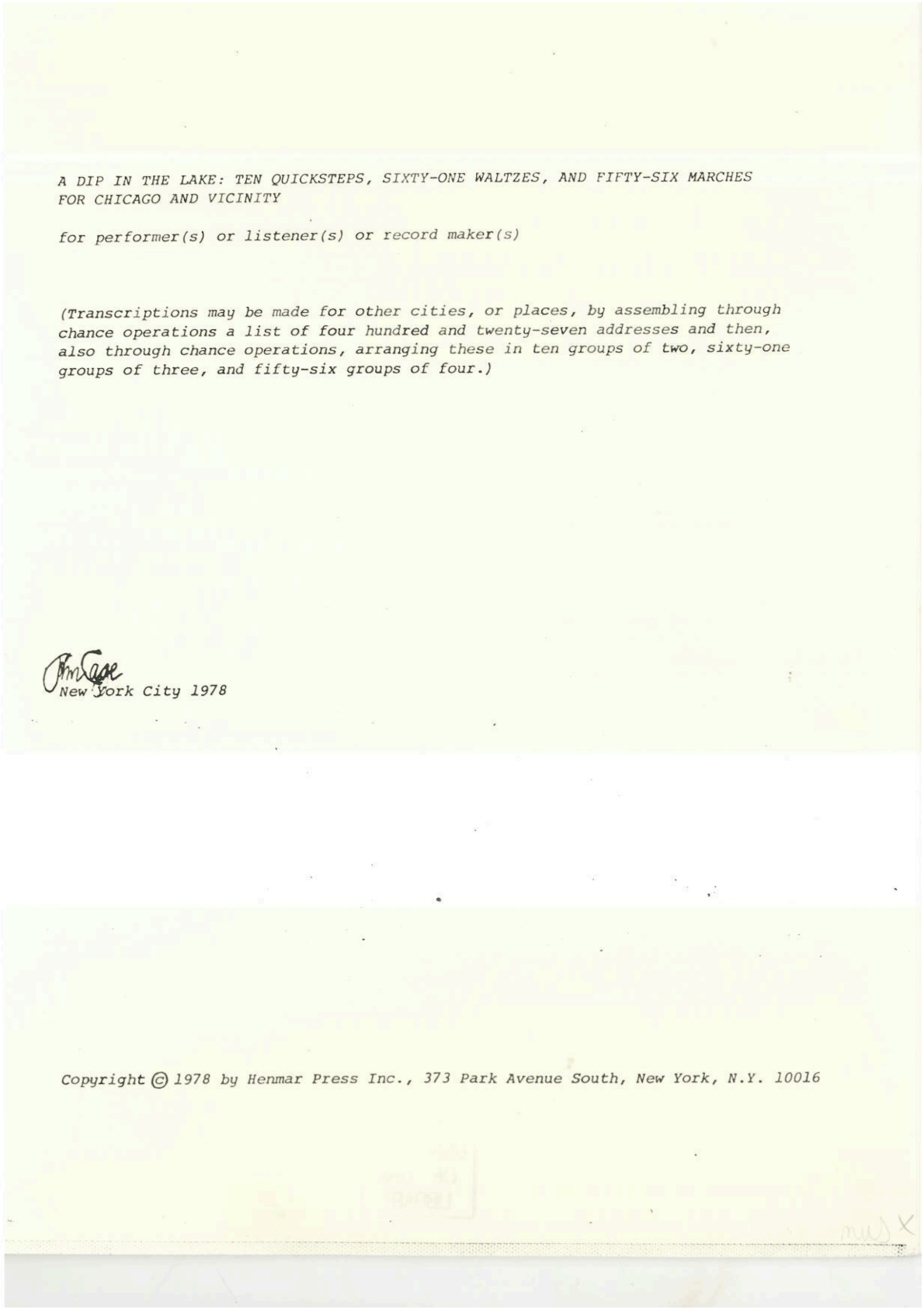
Cover Image: Close up of *A Dip in the Lake* locations map.

All photographs by Jon Hughes unless otherwise stated.


A DIP IN THE LAKE: TEN QUICKSTEPS, SIXTY-ONE WALTZES, AND FIFTY-SIX MARCHES FOR CHICAGO AND VICINITY

for performer(s) or listener(s) or record maker(s)

(Transcriptions may be made for other cities, or places, by assembling through chance operations a list of four hundred and twenty-seven addresses and then, also through chance operations, arranging these in ten groups of two, sixty-one groups of three, and fifty-six groups of four.)

John Cage
New York City 1978

Copyright © 1978 by Henmar Press Inc., 373 Park Avenue South, New York, N.Y. 10016

Figure 1: *A Dip in the Lake* text-score, published by Henmar Press, 1978.[1] (With permission of Edition Peters)

[1] See Data Drive for the PDF of the score: /DataDrive/A Dip in the Lake Media/A Dip in the Lake material for visual display/A Dip in the Lake Score PDF.

Introduction

A Dip in the Lake is an audio-visual installation created as part of *Getting Nowhere*, a festival and conference at the University of York in November 2012, celebrating the life and work of John Cage.[2] The installation was a realisation of the eponymous text-piece composed by John Cage: *Figure 1* shows Cage's text score.[3] The piece was a collaborative work, led by me and implemented by a small team of undergraduate music students at the University of York.[4]

According to online sources, the original piece was created in the city of Chicago in 1978. John Cage's composition initially came about in response to a 1976 request from *Chicago Magazine* and composer Raymond Wilding-White. The graphic score (a map of Chicago with superimposed coordinates) now resides in the permanent collection of the Chicago Museum of Contemporary Art.[5] The first performance took place inside the SS Clipper, docked at Navy Pier, Chicago, on July 7, 1982.[6] It was part of the opening reception for Chicago's week-long festival of new music: buffet guests were able to wander round the ship with twelve separate tape machines relaying the sound.[7] There have since been other realisations of the piece, for example by Robert Pleshar in 2003.[8]

The basic premise involves the selection of 427 locations on a city map using chance procedures. Sound recordings are then made at these locations. The sound material thus gathered is then organised for playback, again using chance procedures. As can be seen from figure 1, nothing is specified, so there is ample scope for invention as regards executing these instruction. For my realisation, I decided to use a large ambisonic outdoor speaker array for playback. I also restricted the number of locations to 157[9], (the same number Cage used for

[2] Details of the festival can be found here: http://www.york.ac.uk/music/undergraduate/practical-project/getting-nowhere/.
[3] See Data Drive for the PDF of the score: /DataDrive/A Dip in the Lake Media/A Dip in the Lake material for visual display/A Dip in the Lake Score PDF.
[4] The full team credits and list of personnel can be found on the Data Drive: /DataDrive/A Dip in the Lake material for visual display/A Dip in the Lake Credits.
[5] Website source: http://www.petergena.com/cagedip.html. Accessed 10th October 2014 08:53.
[6] Website source: http://www.petergena.com/cagedip.html. Accessed 10th October 2014 08:53.
[7] SILVERMANN 2012, page 321.
[8] For details see website: http://modisti.com/n10/?p=2718.
[9] A list of location can be found in documents on the Data Drive: /DataDrive/A Dip in the Lake Media/A Dip in the Lake recording location maps and information.

another similar piece called *49 Waltzes for the 5 Boroughs*, created in New York). The smaller number of locations was chosen due to practical considerations: we only had a few weeks to create the piece from scratch. As a group, we selected our locations using chance procedures applied to a map of York. Again, for practical considerations, we limited ourselves to an area of around 9Km² radiating out from the centre of York. *Figure 2* below shows the map used. The black dots are pins marking the selected points.[10]

Figure 2: detail of Ordinance Survey Explorer Map 290.
Area of approximately 9km² radiating out from the centre of York.
(Reproduced with the permission of Ordnance Survey)

[10] A high resolution image of the map can be found on the Data Drive: /DataDrive/A Dip in the Lake Media/A Dip in the Lake recording location maps and information.

Location Selection and Gathering Materials

157 locations were selected from an Ordinance Survey map of York by means of chance procedures. The map was made by enlarging an area of approximately 9km² from Ordinance Survey Explorer Map 290[12] (see *figure 2*), which was then printed on A1 paper. The locations were selected by means of a system using a grid and dice. The map was divided into a 5 x 8 grid of 40 squares, each one 10 x 10cm, and each was given a number 1–40. Each of these coarse resolution grids was further divided into four 5 x 5cm quarters, numbered 1–4. A 5 x 5cm grid of 100 0.5cm squares was then made using a cut-out section from an overhead projector transparency film, the grid being marked on the film with black pen. This grid enabled us to select locations at a much higher resolution, resulting in a grid over the entire map comprising 16,000 possible locations. Several gaming dice were then used to identify the precise location in the following way: a four- and a ten-sided dice were rolled to get the two digits of the first coordinate, giving a number from 1 to 40, and thus selecting the square for the coarse 5 x 8 grid. A four-sided die was rolled to select the quadrant of the square to be used. The 5 x 5 cm transparency was then placed over the quardrant, and two ten-sided dice were rolled in order to select the precise square on this grid. A pin was put through the centre of this square, marking the point. This pin was left in the map.

The process of marking the points took us about six hours as a group. It was filmed, and the film was played as part of the final piece. *Figure 3*, below, shows this work in progress.

Figure 3: Jon Hughes selecting recording location points on the map.

[12] Ordinance Survey Explorer Map 290. Scale 1:25 000 (4cm to 1km).

These points were then each allocated a time on a 24-hour clock, again using chance procedures, and the time was written onto the map.

We then worked out the route and time for a number of field-recording trips, which were marked with ribbons. *Figure 4*, below, shows the final map; each ribbon represents a field-recording trip undertaken by an individual or group of individuals to gather sounds.[13] Ten minutes of audio was recorded at each location; photos were also taken and text recorded.

Figure 4: Location map for *A Dip In the Lake* showing field trip ribbons.

[13] A high resolution photograph of this map can be found on the Data Drive: /DataDrive/A Dip in the Lake Media/A Dip in the Lake recording location maps and information.

Mixing

For the mixing process, four sound mixers were appointed: Jon Hughes, Desmond Fitzgerald, Will Mackie and Twm Dylan. We began by meeting in a pub and having a 'tape splicing party'. This was inspired by the reported method Cage used to select, edit and splice tape recorded in the original realisation of *A Dip in the Lake*.[14] According to online sources,[15] Cage used a method he had developed for an earlier piece, *Rozart Mix*.[16] This involved unspooling the tape once sounds had been collected, cutting it up and putting the fragments in a pile on the floor, then splicing it back together arbitrarily. In our version we created 157 coloured strips of paper and give each a number corresponding to a specific sound file. These bits of paper were then placed in a pile in the centre of a table, and the four sound mixers took it turns in selecting a strip at random. This procedure gave each sound mixer both a quarter of the total number of recordings and a playing order, both selected by chance. The results of our tape splicing party can be seen in *figure 5* below:

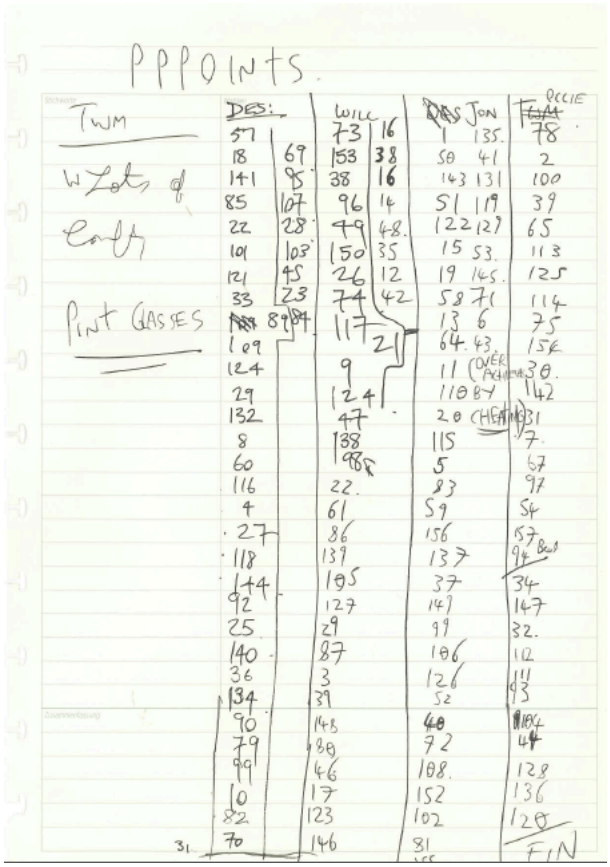


Figure 5: Tape splicing party results.

[14] Website source: http://www.petergena.com/cagedip.html. Accessed 10th October 2014 08:53.
[15] Website source: http://www.petergena.com/cagedip.html. Accessed 10th October 2014 08:53.
[16] *Rozart Mix*, Peters Edition, 1965.

The individual sound mixers then worked on their allocation of the recordings independently to create a continous track of sound. Each recording was played from beginning to end, with minimal use of processing: techniques such as EQ and compression were only used to enhance the clarity of a recording, while editing was only used to remove obviously intrusive handling noises. If a recording was missing for a location ten minutes of silence was inserted in its place. 36 of the 157 recording locations were missing in the final piece: due to the time limits we didn't get to complete our plan and recording every location. Once these four continous tracks were assembled, they were overlaid in a single project, using the DAW Reaper, and mixed ambisonically. This final mixing process was completed by Jon Hughes and Desmond Fitzgerald. Our guiding principle at this final stage was to mix in a musical and effective way. The material had been assembled according to chance procedures up to this point, but now the focus was on making the ambisonic mix as interesting as possible sonically, based on our subjective judgement. Both Bformat (in two parts) and stereo versions of the final mix can be found on the Data Drive.[17]

Figure 6: 'Surround' picture of *A Dip in the Lake* installation (Photograph: Chris Leedham)

[17] See: /DataDrive/A Dip in the Lake Media/A Dip in the Lake audio files.

The piece was performed outdoors using a 30-meter ambisonic speaker array at the University of York. Audience members were free to walk around in the circle. A gazebo was erected on the perimeter of the circle, in which visual material was housed, including photographs from recording locations and fragments of text captured through the recording process (either from writing down text observed in the field, from the field recordist's own reflections, or from conversations with members of the public)[18]. A video screen also played a video recording the process of creating the locations map, which was speeded up to approximately double speed to fit with the length of the audio track. *Figure 7* shows a photograph of the performance site:

Figure 7: *A Dip in the Lake* performance site, University of York, November 2012.

[18] This visual material can be found on the Data Drive: /DataDrive/A Dip in the Lake Media/A Dip in the Lake material for visual display.

Form of the Finished Work

The final piece was three hours and 12 minutes long and divided into five movements. A timeline was drawn up for the installation, which was also on display (see *figure 8*) and printed out to be distributed to visitors.[19] From *figure 8*, we can see that the timeline details moments of sonic interest, which have been given individual names and a time stamp.

Program notes were also on display and distributed to visitors. These were written by Jon Hughes and took the form of a concise description of the creative process, spliced together with fragments of text giving a description of the artistic aims (see *figure 9*). This style of text was inspired by Cage's *The Future of Music: Credo*.[20] A blog was also maintained through the creative process, which can be found online at http://adipinthelake.tumblr.com/, and also on the Data Drive.[21]

[19] See Data Drive: /DataDrive/A Dip in the Lake Media/A Dip in the Lake material for visual display.
[20] CAGE 2009, page 3.
[21] See:/DataDrive/A Dip in the Lake Media/A Dip in the Lake Blog.

Appendix 1:
A Dip in the Lake timeline.

A Dip in the Lake

Movement 1
Rolling in the Deep

0:00	Ear Cleaning
8:28	Rolling in the Deep
9:04	Bike Spokes
11:28	Unbent Screwdriver
17:26	Rain
19:00	Railway Workshop

Movement 2
Motorik

21:44	Silence
22:00	Night time Alleyway
44:55	Military Jet
47:17	Pirates
54:01	Bike Wizz Pan
1:04:29	Barrack Gates
1:07:01	Crying
1:09:18	Silence

Movement 3
Infrastructure

1:09:36	Crows
1:18:06	Chopper Playground
1:19:41	Train Station
1:32:58	York Minster
1:46:16	Siren
1:48:10	Propellers
1:51:15	Terry
1:55:49	Deeds

Movement 4
Andante

1:58:34	Andante
2:05:03	Primal Scream
2:16:05	Great Hall
2:30:53	Bus Chat Up
2:34:59	Firework Sweep
2:38:23	Jet Plane
2:39:43	Bonfire night

Movement 5
Dukebox

2:51:03	Pub
2:51:55	80s Synth Solo
2:53:32	Beth Orton
3:04:09	Strange Voices
3:05:04	Old man sweeping

Appendix 2:
A Dip in the Lake programme notes.

A Dip In the Lake

Sound is an important element of our shared experience, shared cultural and acoustic space.

We present here a realization of John Cage's text composition A Dip in the Lake.

The original piece was created in the city of Chicago in 1978. The graphic score (a map of Chicago with superimposed coordinates) now resides in the permanent collection of the Chicago Museum of Contemporary Art. The first performance took place inside the SS Clipper, docked at Navy Pier, Chicago, on July 7 1982.

Communication through sound: we experience one another's intention and movement through sound, and so it binds us, forms a shared community.

The basic idea for the piece is to select 427 locations using chance procedures applied to a city map, and then make sound recordings at each location. The recorded material is then organized for playback, again using chance procedures.

Think of the recordings not simply as recorded sound, but as recorded time, recorded experience.

The original score text reads as follows:

For performer(s) or listener(s) or record maker(s); transcriptions may be made for other cities, or places, by assembling though chance operations a list of 427 addresses and then, also through chance operations, arranging these in ten groups of 2, 61 groups of 3, and 56 groups of 4). John Cage, New York City 1978.

This is written on the title page, and then the rest of the score consists of a list of the selected addresses.

And as such you are listening here to a collage of captured time, space and experience.

For our version, we restricted ourselves to 157 locations due to practical considerations; we only had a few weeks to create the piece from scratch. 157 is the same number Cage used for a similar piece called 49 Waltzes for the 5 Boroughs, created in New York 1977.

A compression of experience.

There are 16 000 possible points on the map, each selected with a single throw of 5 dice.

We selected our locations using chance procedures applied to a map of York, limited to an area of approximately 9 Km^2 radiating out from the city center. We enlarged and printed a specific region of Ordnance Survey map #290, dividing it into a grid of 40 squares, each again divided into 4 quarters. A grid of 100 small squares (0.5 cm^2) was then drawn onto an acetate transparency, and used to locate each precise point position within the selected quarter.

Sound is a phenomena we experience when mechanisms in our inner ear respond to oscillations of pressure transmitted through a solid, liquid or gas.

5 different sized gaming dice were thrown simultaneously to select each point position. The first 2 (one 8 sided and one 10 sided), chose the coarse grid square on the X,Y axis of the map.

We feel it physically, on our skin, in our bodies. Usually, for us, sound is transmitted in the air.

Then a 4 sided pyramid die selected one of the 4 quarters of this square. Two further 10 sided dice chose the specific point from the X,Y axis of the finer transparency grid overlayed on this quarter square.

And this is the same air that we breath, that we share with one another and with other organic material in the environment

A pin was then put in the center of this selected fine transparency grid square. Each of these small squares equated to an area on the map equivalent to approximately 3 moderately sized terrace houses.

Our next step was to choose the time of day for each recording. We chose 25 locations by chance, and for these selected times between 12am and 6am by chance. We then selected times from 6am to 12am for the remaining 132 locations, again using chance procedures.

The boundary between one physical entity and another is not so distinct. We coexist in a complex field of energy that we sense in different ways – electromagnetic waves are sensed as light, energy through heat, through sound.

We were disciplined with our selection procedure. Just 2 alterations were made to chance procedures. We altered the time of the Minster and the National Railway museum locations – by chance they both fell in the middle of the night, and we reasoned that this was a waste of a good opportunity, and so offset the time of each by 12 hours, so they fell in the middle of the afternoon.

Here, we are attempting to capture a snapshot of that light, heat and acoustic energy, and of the community that is bound together by this sharing, this exchange.

We allowed ourselves this small deviation in order to add more colour and variation to the finished piece; our piece celebrates the diversity of life in York, and the use of chance procedures is designed to facilitate capturing something of this diversity.

If asked to select 157 locations on a map, the most likely response is to think of all the 'interesting' places, meaning places and situations that are already familiar in some way, and which you judge to be places that will elicit interesting recordings. Also, selection will be biased to fit with convenient road or bus systems for example, and be an expression of personal habits.

The colours, sights and sounds of each location are still with us.

Whilst this approach can of course be effective and fruitful, there is also something valuable and interesting to be discovered through the use of chance procedures. The selection of points and working out precise map locations is in itself a process of analysis regarding information contained in the map, but one independent of unconscious past experiences and practical concerns.

Each location can be viewed from multiple perspectives. Individual recording expeditions still exist in the memories of those involved.

One is opened to the possibility of entirely new experiences, distanced from the regular individual patterns of daily life and thought. We are all related to one another in this city, but our habits are different, and stop many of us ever meeting or finding out about one another. Also, the chance selection procedure imbues the location with a numinous quality; whatever happens at that particular time and place becomes special and significant.

Each location is a part of the life of anyone who inhabits or visits the city.

The result is a celebration of the environment as it is, as it is lived, rather than a reflection of the artists own tastes, habits, interest or concerns. The work is about the environment itself.

We are recording all the time.

Once the points were selected, we then organized them into routes, by finding points that were related by time and space. So a point at 17:00 might be linked to a point nearby at 17:30 for example, and then another one at 18:30. In this way, a number of routes were established, and then each one distributed to a field recording team. The routes are marked on the displayed map using coloured strips of material.

The boundary between sound, feeling, light, art, sensation and the body, the boundary between the external world and our internal experience of it, are not so distinct

We had a lot of fun recording these sounds. It was fun to hear stories coming back from field recording trips – anecdotes, snippets of conversation overheard, people met. We have gathered as much of this material together as we can, and it is on display here.

Sensing, synthesizing, transmitting; we are all transducers.

Our Aim: a Transparent recording process, to focus attention on the sounds themselves.

Following field recording, the next part of the process was to edit the material, removing recording mistakes and handling noise, or unwanted distortion caused by wind for example. Our target was the sound of the environment itself, and we were keen to make the technology as transparent as possible. Our ideal is for the audience to be drawn into the sound world of each individual location, and find interest in the juxtaposition of them; to be drawn into the work by the sounds themselves.

In a sense you are listening to a compression of experience. Think of the recordings not simply as recorded sound, but as recorded time. You are standing in a field of stored memories.

> Cage's original piece involved the use of tape machines. His recordings were made on tape, which was cut up, mixed together in a big pile at a tape spicing party, and then re-spliced. This meant that for playback, sounds were cut and spliced together by chance, frequently reversed, with no choice or judgment exercised regarding the organization of the sounds. These reconstituted reels of tape were then played back on 12 separate tape machines in numerous different rooms on a docked ship.
>
> Our realization is different for many reasons. For one, our playback is all from a single sound system, rather than in separate rooms. We are using a circle of 8 speakers, each with its own independent channel of amplification. The speakers work together as an ambisonic array, controlled by software that enables sounds to be positioned in a 3D ambisonic sound field.

Speech, language, music, vibration. Sound is carried in the medium we use to communicate. We share a common sound field.

> As a consequence, we decided to exercise more control over the balance of sound within our speaker array. We didn't want the piece to come across as a din, a cacophony. We wanted a way of playing with the way sounds interact, so that at times we could choose to hear a single sound clearly if we wanted to. We also decided against reversal of sounds, as it would distract from the sounds in themselves, and draw attention to the production process.
>
> We printed out a number of sheets containing 157 different coloured strips in total, with each strip containing a number. These were then cut up into individual ribbons. We then had our own tape splicing party, involving drawing the strips out of a hat in the Deramore Arms one Thursday evening, to make 4 continuous separate tracks of material.

Sound is an important element of our shared experience, shared cultural and acoustic space.

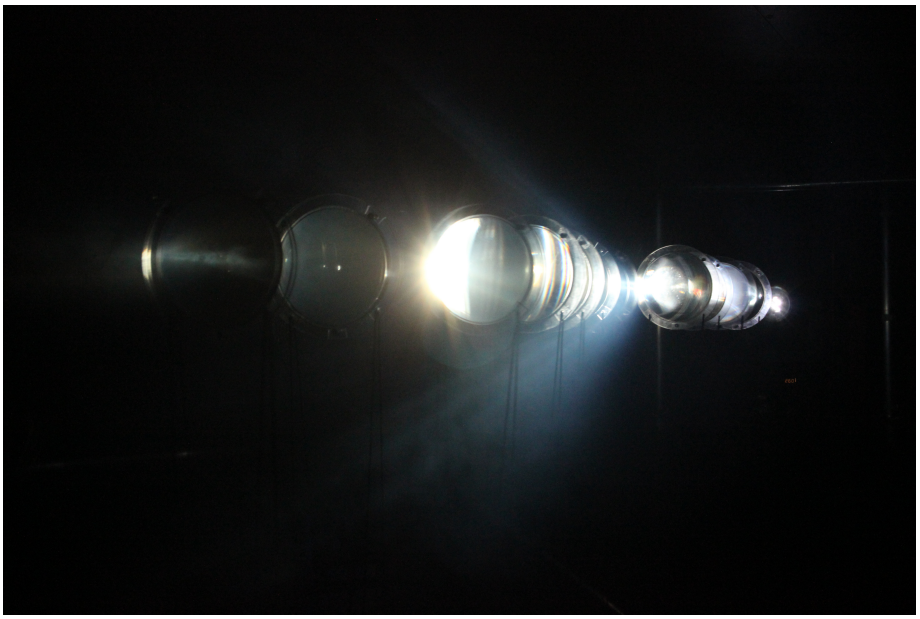
> Then each track, or 'stem' was mixed by a different person, (Jon Hughes, Des Fitzgerald, Will Mackie, and Twm Dylan) with levels being balanced, the stereo recording being positioned in the ambisonic circle, and any outstanding technical problems cleaned up. These 4 channels were then put together, played simultaneously, and decisions made concerning what we thought worked, and sounded effective in terms of the balance of the 4 stems.
>
> We are interested in the tension created between sounds. For example, a man quietly sweeping his front yard and chatting about his house means something different when played right after the sound of a helicopter flying overhead, or children playing football.

We experience one another's intention, movement and energy through sound, and so it binds us, forms a shared community.

> Different combinations of sounds elicit different meanings, connect with the listener in different ways emotionally, and relate to different aspects of their own personal memory and experience. Whilst the chance procedures utilized in the tape splicing party and the independently mixed stems ensured that we had no control over which sounds fell together, we made artistic decisions regarding how these sounds would interact.

We are attempting here to present a celebration of our shared acoustic space. We want to remember that we who live in this city are connected.

Jon Hughes



8. Phase Revival

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Cover Image: *Phase Revival* lenses in performance (photograph by Andrews and Lynch)

Introduction

Phase Revival: An Optical Harmonica is a kinetic sound sculpture based on the physics of spectroscopy (the study of the absorption and emission of light and other radiation by matter.)[1] It was created collaboratively by visual artist partnership Andrews and Lynch (Becs Andrews and Dave Lynch), composer Jon Hughes, and chemical physicists Professor Ben Whitaker and Dr Mike Nix from the University of Leeds.[2] A number of supporting files can be found on the Data Drive: A six minute promotional video of the installation;[3] two complete audio recordings of the score, one Bformat and one stereo; [4] a significant amount of supplementary media such as pictures and smartphone videos from different performances[5].

Process

The project was set up by lead artist Becs Andrews, who assembled the creative team with the open-ended aim of producing some sort of science and art collaboration. After a period of development and experimentation, the idea emerged to build a large-scale example of a piece of equipment known as 'Mach's wave machine'. Allegedly invented by the great nineteenth-century physicist Ernst Mach,[6] this is a set of pendulums,[7] each with carefully worked-out string lengths, hung from a single crossbar.

[1] CHU 2014.
[2] Biographical information regarding the production team can be found on the Data Drive, in the performance programme PDF. See here:/DataDrive/Phase Revival Media/Phase Revival performance programme.
[3] See: /DataDrive/Phase Revival Media/Phase Revival Video.
[4] See: /DataDrive/Phase Revival Media/Phase Revival Audio.
[5] See: /DataDrive/Phase Revival Media/Phase Revival Supplementary Visual Media Archive.
[6] BLACKMORE 1972 page 41, SEIFER 1998 page 19 and HARVARD 2014.
[7] I've opted for 'pendulums' rather than pendula, in accordance with the OED. See OED Online 2014.

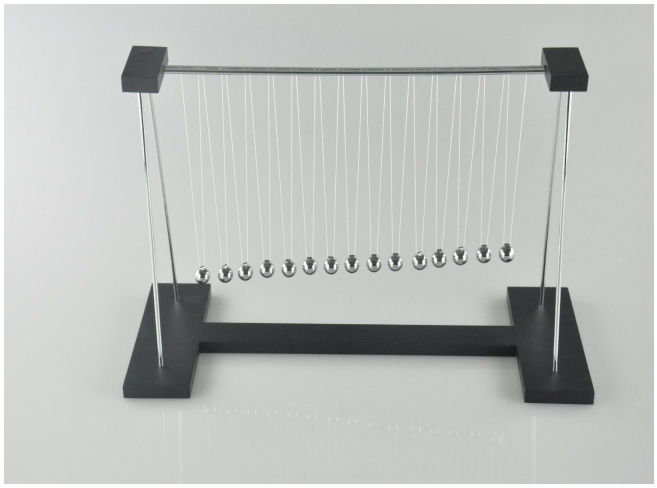

Figure 1: An example of Mach's wave machine.

Small-scale examples of Mach's wave machine, similar to the one shown above, are often found in university physics labs and used for demonstration purposes. The example in *figure 1* shows fifteen uncoupled pendulums of precisely calculated increasing lengths. When dropped together, they travel at different speeds, falling in and out of phase with one another, creating a visualisation of travelling waves, standing waves, beating, and random motion.[8] With *Phase Revival*, the mechanism shown above was scaled up considerably in size (see *figure 2*), with string lengths ranging from 2.4m to 1.7m, and a crossbar length of around 6m.

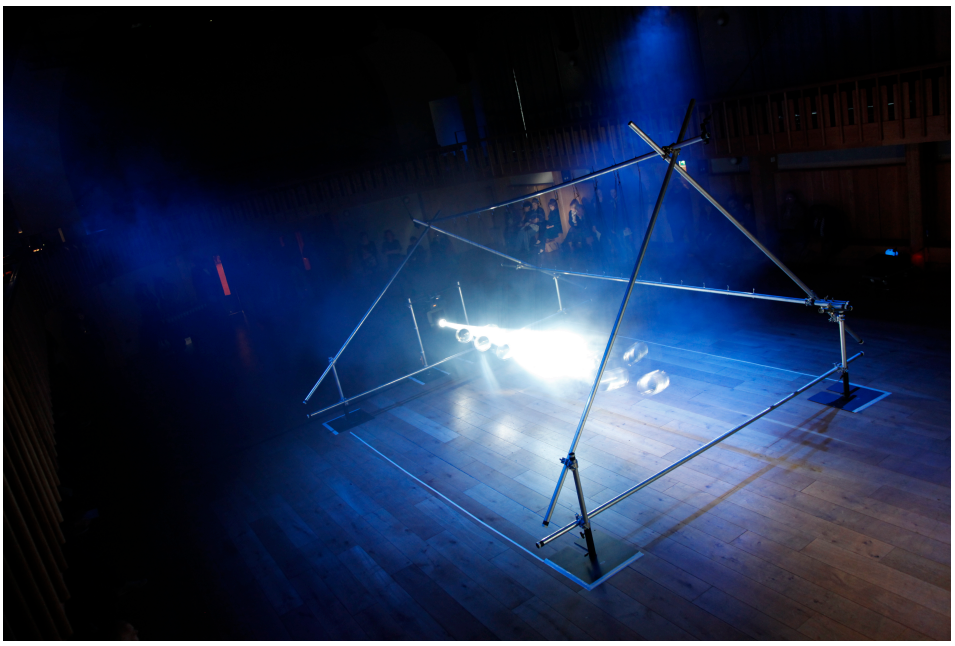

Figure 2: Phase Revival wave machine at the Howard Assembly Rooms, Opera North, Leeds.

The length of the longest pendulum is adjusted so that it executes 80 oscillations (full periods from extreme left back to extreme left) in a fixed period of a 240-second complete phase cycle. The length of each successive shorter pendulum string is carefully adjusted so that it executes

[8] HARVARD 2014.

one additional oscillation in the same time period. Thus, while the twelfth pendulum (the longest) executes 80 oscillations in 240 seconds, the first pendulum (the shortest) undergoes 91 oscillations in 240 seconds. When all 12 pendulums are started together, they quickly become unsynchronised: their relative phases continuously change because of their different periods of oscillation. However, after 240 seconds they will all have executed an integral number of oscillations and be synchronised again at that instant, ready to repeat the pendulum 'dance'[9] for another cycle.

The Use of Light and Sound

In *Phase Revival*, underlying mathematical relationships are manifested and made visible not only in physical space by the 'dance' of the pendulums themselves (the patterns they make as they work through the phase sequence) but also through the use of light and sound mapped onto these movements. Each pendulum is actually a lens, (see *figure 3, 4* and *5* below), and a powerful spotlight is placed at one end of the installation. As a result, the movement and phase relationships of the pendulums are expressed by the light that is focussed through the lenses and projected onto a screen at the opposite end of the installation to the spotlight; the screen captures movement of light analogous to the pendulum movement. Furthermore, smoke is used, generated by a smoke machine, so that beams of light can be seen clearly as they are intersected, focussed and refocused continuously by the swinging lenses.

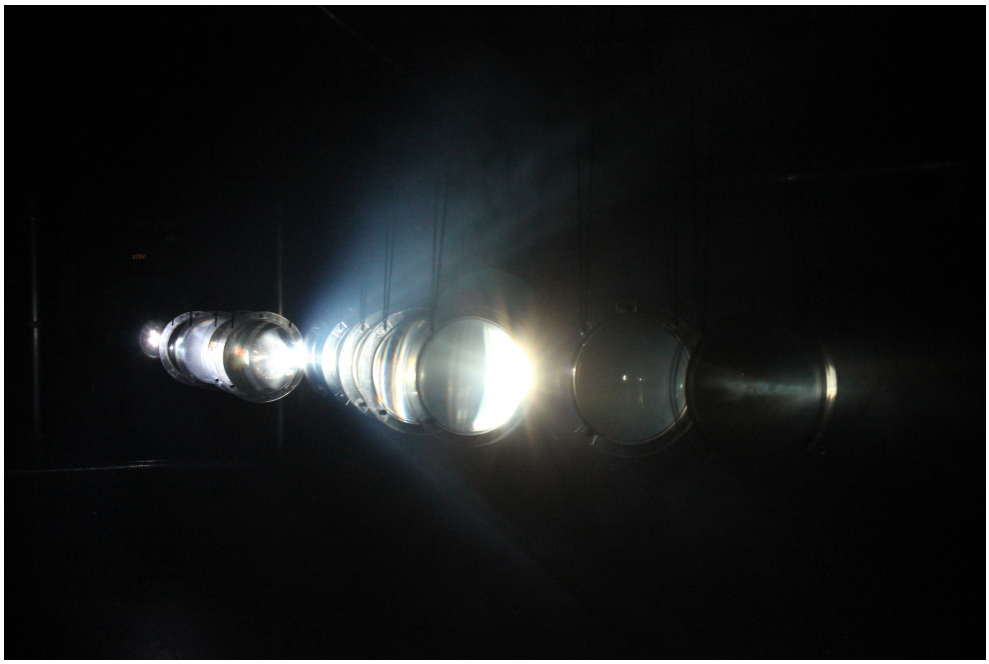

Figure 3: *Phase Revival* wave machine lenses illuminated.

[9] HARVARD 2014.

Sound used in *Phase Revival* serves to bind the whole together. An ambisonic array of speakers is placed around the performance space, so that the audience is immersed in a specific sound world from the moment they enter the space. The rhythmic framework and pitch material used in the piece is derived directly from the pendulum movement, as will be explained in more detail below.

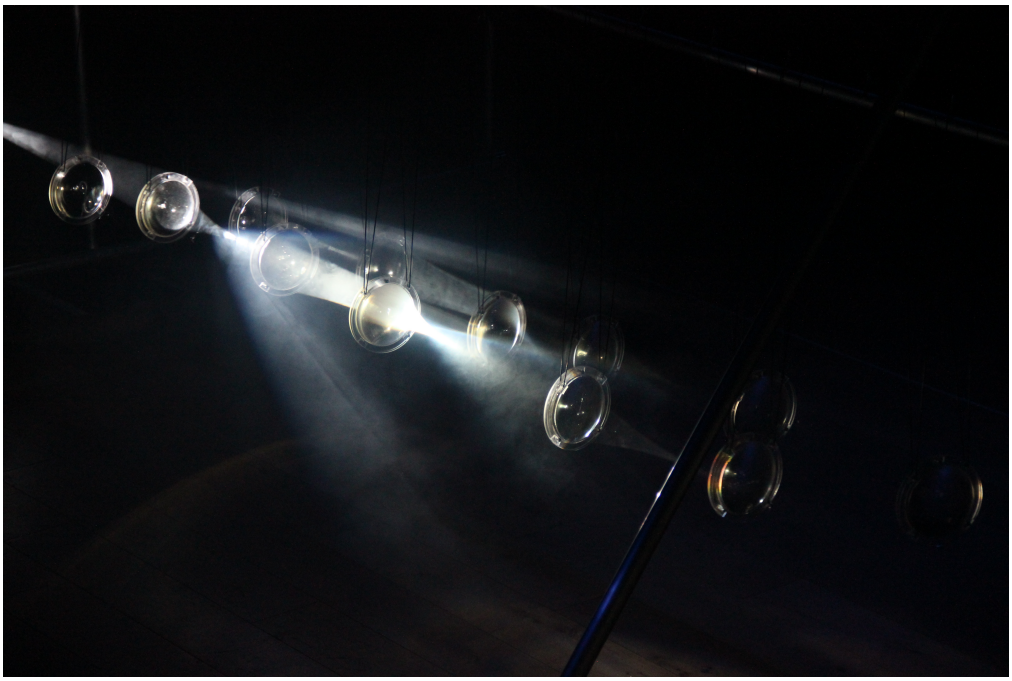

Figure 4: *Phase Revival* in performance at the Howard Assembly Rooms, Opera North.

Figure 5: *Phase Revival* in performance at the Howard Assembly Rooms, Opera North.

Creating the Sound

The music created for Phase Revival is predominantly generative; it was created through the design and implementation of a finite set of rules that play out to create the piece. I used data drawn from the installation to create both rhythmic and pitch content. However, the sound also contains non-generative elements. It order to explain how the piece was put together in more detail, I will need to first explain a little more regarding how the pendulums work.

Using The Excel Data Sheet

As mentioned above, the base pendulum in the installation executes a complete period 80 times in 240 seconds. The dimensions needed to create the installation were calculated by physicists Professor Ben Whittaker and Dr Mike Nix using Microsoft Excel (see *figure 6* below). The oscillation rate of the base pendulum is entered in the correct box (coloured pink in *figure 6*), and the rest of the boxes change automatically to give the information necessary to construct the wave machine: most significantly the length of the string needed for each pendulum. But there is also other information available: for example, in *figure 6*, one can see that our slowest pendulum, the base pendulum, (number 12) ran at a speed of exactly one period every three seconds, a frequency of 0.(3)[10] Hz; to accomplish this the required string length was 2.236412 m. The mathematics and science behind this sheet and the pendulum motions can be found in the poster included in Appendix 1. This poster was created by Dr Mike Nix and professor Ben Whittaker for a display at a Royal Society of Chemistry conference, Durham 2013. This poster can also be found on the Data Drive in PDF format,[11] so it can be looked at in closer detail: the original poster was A1 in size so it is necessary to be able to zoom into the image to see it more clearly. I have also included the original Excel data sheet on the Data Drive.[12]

Originally this Excel data sheet simply displayed string lengths, but I asked the physicists to add the supplementary information relating to pendulum frequency and speed. For example, the lower section of the sheet contains more detail regarding the movement of the pendulums, displaying the point in time at which each pendulum reaches key positions within the period: extreme left, centre, extreme right, and centre again on its way back to the extreme left. So for

[10] The brackets around the (3) are a standard way to denote a recurring decimal – used instead of 0.33333....
[11] See: /DataDrive/Phase Revival Media/Phase Revival Conference Poster (PDF).
[12] See:/DataDrive/Phase Revival Media/Phase Revival Data Sheet/.

example base pendulum 12 leaves the left extreme at 0, crosses the centre at 0.75, reaches the extreme right at 1.5, and crosses the centre again at 2.25 on its way back to the extreme left at 3.

Another important feature of this sheet, the relevance of which will become clear a little later, is that data for an *imaginary* installation can be generated. For example, *figure 7* below shows the data for a wave machine with a base pendulum rate of 1 period every 240 seconds. With string lengths ranging from 99m to 14 313 m (46 959 feet), this remarkable imaginary machine would rise up well above the height of commercial aircraft flight paths.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	Pendulum	1	2	3	4	5	6	7	8	9	10	11	12					
	String lengths	1.728419	1.767041	1.806973	1.848274	1.891007	1.93524	1.981043	2.028491	2.077665	2.128649	2.181533	2.236412					
	Frequency	0.379167	0.375	0.370833	0.366667	0.3625	0.358333	0.354167	0.35	0.345833	0.341667	0.3375	0.333333	Hz				
	Period	2.637363	2.666667	2.696629	2.727273	2.758621	2.790698	2.823529	2.857143	2.891566	2.926829	2.962963	3	secs	80	OSCILLATIONS in 240 seconds		
	START AT LEFT HAND Extreme - AT TIME ZERO																	
	After 240s (4 min) all pendulums are back at the left extreme (start position) together, but after different numbers of oscillations (80 for the longest pendulum, 91 for the shortest)																	
	Pendulum	1	2	3	4	5	6	7	8	9	10	11	12					
	Oscs in 240 s	91	90	89	88	87	86	85	84	83	82	81	80					
	Timings in seconds at left extreme, middle travelling right, right extreme and middle travelling left.																	
	0 Left Extreme	0	0	0	0	0	0	0	0	0	0	0	0					
	0 Middle (--> R)	0.659341	0.666667	0.674157	0.681818	0.689655	0.697674	0.705882	0.714286	0.722892	0.731707	0.740741	0.75					
	0 Right Extreme	1.318681	1.333333	1.348315	1.363636	1.37931	1.395349	1.411765	1.428571	1.445783	1.463415	1.481481	1.5					
	0 Middle (--> L)	1.978022	2	2.022472	2.045455	2.068966	2.093023	2.117647	2.142857	2.168675	2.195122	2.222222	2.25					
	1 Left Extreme	2.637363	2.666667	2.696629	2.727273	2.758621	2.790698	2.823529	2.857143	2.891566	2.926829	2.962963	3					
	1 Middle (--> R)	3.296703	3.333333	3.370787	3.409091	3.448276	3.488372	3.529412	3.571429	3.614458	3.658537	3.703704	3.75					
	1 Right Extreme	3.956044	4	4.044944	4.090909	4.137931	4.186047	4.235294	4.285714	4.337349	4.390244	4.444444	4.5					
	1 Middle (--> L)	4.615385	4.666667	4.719101	4.772727	4.827586	4.883721	4.941176	5	5.060241	5.121951	5.185185	5.25					
	2 Left Extreme	5.274725	5.333333	5.393258	5.454545	5.517241	5.581395	5.647059	5.714286	5.783133	5.853659	5.925926	6					
	2 Middle (--> R)	5.934066	6	6.067416	6.136364	6.206897	6.27907	6.352941	6.428571	6.506024	6.585366	6.666667	6.75					
	2 Right Extreme	6.593407	6.666667	6.741573	6.818182	6.896552	6.976744	7.058824	7.142857	7.228916	7.317073	7.407407	7.5					
	2 Middle (--> L)	7.252747	7.333333	7.41573	7.5	7.586207	7.674419	7.764706	7.857143	7.951807	8.04878	8.148148	8.25					
	3 Left Extreme	7.912088	8	8.089888	8.181818	8.275862	8.372093	8.470588	8.571429	8.674699	8.780488	8.888889	9					
	3 Middle (--> R)	8.571429	8.666667	8.764045	8.863636	8.965517	9.069767	9.176471	9.285714	9.39759	9.512195	9.62963	9.75					
	3 Right Extreme	9.230769	9.333333	9.438202	9.545455	9.655172	9.767442	9.882353	10	10.12048	10.2439	10.37037	10.5					
	3 Middle (--> L)	9.89011	10	10.11236	10.22727	10.34483	10.46512	10.58824	10.71429	10.84337	10.97561	11.11111	11.25					
	4 Left Extreme	10.54945	10.66667	10.78652	10.90909	11.03448	11.16279	11.29412	11.42857	11.56627	11.70732	11.85185	12					
	4 Middle (--> R)	11.20879	11.33333	11.46067	11.59091	11.72414	11.86047	12	12.14286	12.28916	12.43902	12.59259	12.75					
	4 Right Extreme	11.86813	12	12.13483	12.27273	12.41379	12.55814	12.70588	12.85714	13.01205	13.17073	13.33333	13.5					
	4 Middle (--> L)	12.52747	12.66667	12.80899	12.95455	13.10345	13.25581	13.41176	13.57143	13.73494	13.90244	14.07407	14.25					
	5 Left Extreme	13.18681	13.33333	13.48315	13.63636	13.7931	13.95349	14.11765	14.28571	14.45783	14.63415	14.81481	15					
	5 Middle (--> R)	13.84615	14	14.1573	14.31818	14.48276	14.65116	14.82353	15	15.18072	15.36585	15.55556	15.75					
	5 Right Extreme	14.50549	14.66667	14.83146	15	15.17241	15.34884	15.52941	15.71429	15.90361	16.09756	16.2963	16.5					
	5 Middle (--> L)	15.16484	15.33333	15.50562	15.68182	15.86207	16.04651	16.23529	16.42857	16.62651	16.82927	17.03704	17.25					
	6 Left Extreme	15.82418	16	16.17978	16.36364	16.55172	16.74419	16.94118	17.14286	17.3494	17.56098	17.77778	18					
	6 Middle (--> R)	16.48352	16.66667	16.85393	17.04545	17.24138	17.44186	17.64706	17.85714	18.07229	18.29268	18.51852	18.75					
	6 Right Extreme	17.14286	17.33333	17.52809	17.72727	17.93103	18.13953	18.35294	18.57143	18.79518	19.02439	19.25926	19.5					
	6 Middle (--> L)	17.8022	18	18.20225	18.40909	18.62069	18.83721	19.05882	19.28571	19.51807	19.7561	20	20.25					
	7 Left Extreme	18.46154	18.66667	18.8764	19.09091	19.31034	19.53488	19.76471	20	20.24096	20.4878	20.74074	21					
	7 Middle (--> R)	19.12088	19.33333	19.55056	19.77273	20	20.23256	20.47059	20.71429	20.96386	21.21951	21.48148	21.75					
	7 Right Extreme	19.78022	20	20.22472	20.45455	20.68966	20.93023	21.17647	21.42857	21.68675	21.95122	22.22222	22.5					
	7 Middle (--> L)	20.43956	20.66667	20.89888	21.13636	21.37931	21.62791	21.88235	22.14286	22.40964	22.68293	22.96296	23.25					
	8 Left Extreme	21.0989	21.33333	21.57303	21.81818	22.06897	22.32558	22.58824	22.85714	23.13253	23.41463	23.7037	24					
	8 Middle (--> R)	21.75824	22	22.24719	22.5	22.75862	23.02326	23.29412	23.57143	23.85542	24.14634	24.44444	24.75					
	8 Right Extreme	22.41758	22.66667	22.92135	23.18182	23.44828	23.72093	24	24.28571	24.57831	24.87805	25.18519	25.5					
	8 Middle (--> L)	23.07692	23.33333	23.59551	23.86364	24.13793	24.4186	24.70588	25	25.3012	25.60976	25.92593	26.25					
	9 Left Extreme	23.73626	24	24.26966	24.54545	24.82759	25.11628	25.41176	25.71429	26.0241	26.34146	26.66667	27					
	9 Middle (--> R)	24.3956	24.66667	24.94382	25.22727	25.51724	25.81395	26.11765	26.42857	26.74699	27.07317	27.40741	27.75					

Figure 6: Excel sheet showing data for the *Phase Revival* wave machine.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	Pendulum	1	2	3	4	5	6	7	8	9	10	11	12					
	String lengths	99.39608	118.2896	143.1304	176.7041	223.6412	292.1028	397.5843	572.5214	894.5647	1590.337	3578.259	14313.04					
	Frequency	0.05	0.045833	0.041667	0.0375	0.033333	0.029167	0.025	0.020833	0.016667	0.0125	0.008333	0.004167	Hz				
	Period	20	21.81818	24	26.66667	30	34.28571	40	48	60	80	120	240	secs	1	OSCILLATIONS in 240 seconds		
	START AT LEFT HAND Extreme - AT TIME ZERO																	
	After 240s (4 min) all pendulums are back at the left extreme (start position) together, but after different numbers of oscillations (80 for the longest pendulum, 91 for the shortest)																	
	Pendulum	1	2	3	4	5	6	7	8	9	10	11	12					
	Oscs in 240 s	12	11	10	9	8	7	6	5	4	3	2	1					
	Timings in seconds at left extreme, middle travelling right, right extreme and middle travelling left.																	
	0 Left Extreme	0	0	0	0	0	0	0	0	0	0	0	0					
	0 Middle (--> R)	5	5.454545	6	6.666667	7.5	8.571429	10	12	15	20	30	60					
	0 Right Extreme	10	10.90909	12	13.33333	15	17.14286	20	24	30	40	60	120					
	0 Middle (--> L)	15	16.36364	18	20	22.5	25.71429	30	36	45	60	90	180					
	1 Left Extreme	20	21.81818	24	26.66667	30	34.28571	40	48	60	80	120	240					
	1 Middle (--> R)	25	27.27273	30	33.33333	37.5	42.85714	50	60	75	100	150	300					
	1 Right Extreme	30	32.72727	36	40	45	51.42857	60	72	90	120	180	360					
	1 Middle (--> L)	35	38.18182	42	46.66667	52.5	60	70	84	105	140	210	420					
	2 Left Extreme	40	43.63636	48	53.33333	60	68.57143	80	96	120	160	240	480					
	2 Middle (--> R)	45	49.09091	54	60	67.5	77.14286	90	108	135	180	270	540					
	2 Right Extreme	50	54.54545	60	66.66667	75	85.71429	100	120	150	200	300	600					
	2 Middle (--> L)	55	60	66	73.33333	82.5	94.28571	110	132	165	220	330	660					
	3 Left Extreme	60	65.45455	72	80	90	102.8571	120	144	180	240	360	720					
	3 Middle (--> R)	65	70.90909	78	86.66667	97.5	111.4286	130	156	195	260	390	780					
	3 Right Extreme	70	76.36364	84	93.33333	105	120	140	168	210	280	420	840					
	3 Middle (--> L)	75	81.81818	90	100	112.5	128.5714	150	180	225	300	450	900					
	4 Left Extreme	80	87.27273	96	106.6667	120	137.1429	160	192	240	320	480	960					
	4 Middle (--> R)	85	92.72727	102	113.3333	127.5	145.7143	170	204	255	340	510	1020					
	4 Right Extreme	90	98.18182	108	120	135	154.2857	180	216	270	360	540	1080					
	4 Middle (--> L)	95	103.6364	114	126.6667	142.5	162.8571	190	228	285	380	570	1140					
	5 Left Extreme	100	109.0909	120	133.3333	150	171.4286	200	240	300	400	600	1200					
	5 Middle (--> R)	105	114.5455	126	140	157.5	180	210	252	315	420	630	1260					
	5 Right Extreme	110	120	132	146.6667	165	188.5714	220	264	330	440	660	1320					
	5 Middle (--> L)	115	125.4545	138	153.3333	172.5	197.1429	230	276	345	460	690	1380					
	6 Left Extreme	120	130.9091	144	160	180	205.7143	240	288	360	480	720	1440					
	6 Middle (--> R)	125	136.3636	150	166.6667	187.5	214.2857	250	300	375	500	750	1500					
	6 Right Extreme	130	141.8182	156	173.3333	195	222.8571	260	312	390	520	780	1560					
	6 Middle (--> L)	135	147.2727	162	180	202.5	231.4286	270	324	405	540	810	1620					
	7 Left Extreme	140	152.7273	168	186.6667	210	240	280	336	420	560	840	1680					
	7 Middle (--> R)	145	158.1818	174	193.3333	217.5	248.5714	290	348	435	580	870	1740					
	7 Right Extreme	150	163.6364	180	200	225	257.1429	300	360	450	600	900	1800					
	7 Middle (--> L)	155	169.0909	186	206.6667	232.5	265.7143	310	372	465	620	930	1860					
	8 Left Extreme	160	174.5455	192	213.3333	240	274.2857	320	384	480	640	960	1920					
	8 Middle (--> R)	165	180	198	220	247.5	282.8571	330	396	495	660	990	1980					
	8 Right Extreme	170	185.4545	204	226.6667	255	291.4286	340	408	510	680	1020	2040					
	8 Middle (--> L)	175	190.9091	210	233.3333	262.5	300	350	420	525	700	1050	2100					
	9 Left Extreme	180	196.3636	216	240	270	308.5714	360	432	540	720	1080	2160					
	9 Middle (--> R)	185	201.8182	222	246.6667	277.5	317.1429	370	444	555	740	1110	2220					

Figure 7: Excel sheet showing data for the imaginary giant wave machine.

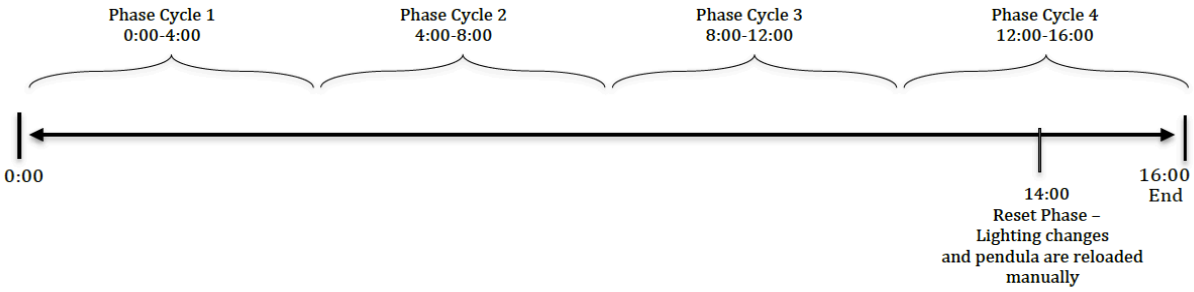

Figure 8: *Phase Revival* complete form.

Phase Revival is presented in a 16-minute cyclic form, as shown in *figure 8* above. This is comprised of four repeated 240-second cycles, each containing a fixed number of oscillations for each individual pendulum. At the beginning of the 16-minute cycle, the pendulums are dropped simultaneously using a manually operated release mechanism. The music and lighting cues then play through the duration of the four cycles more or less in sync with the pendulum movements (this level of synchronisation is sufficient, as will be explained in more detail below). The first cycle, phase cycle 1, is dominated by rhythm, in keeping with the high amplitude, and so explicit visual rhythm, of the pendulum swings. For phase cycle 2 (4:00-8:00) the rhythm becomes more subtle and less explicit. The rhythm breaks down more for phase cycle 3, with the introduction of musical texture free from any kind of clear pulse. By phase cycle 4, the rhythmic pulse has disintegrated entirely. This gradual disintegration of rhythm is analogous to the way the pendulums oscillate, becoming less emphatic in their movements as their amplitude decreases.

A gradually changing lighting state is also used in performance, programmed to change over time, becoming less bright and luminous as the 16-minute cycle progresses. The reason for this was that at the start, the high amplitude of the pendulums is quite spectacular and dramatic, and the lights are brighter so the pendulums can be seen more clearly. But as the amplitude of the pendulum movements gradually decreases, the rhythm of the swings is expressed more by the spotlight rather than the more obvious movement of the pendulums themselves, as its beam is focussed, cut up, and refocused through the lenses.

At 14:00, the lighting changes again as the piece enters the reset phase. This involved the manual resetting of the pendulums into position in preparation for their release at 16:00 for a new 16-minute cycle. Four clear pips are heard in the sound track in the last few seconds of the cycle; the pendulums must be released manually on the fourth pip in order to synchronise with the lights and audio.

Rhythm

To create the rhythmic element of the musical structure for *Phase Revival*, I created a Max patch with twelve different *metro* objects, one for each pendulum, each of which generated both a sine-wave tone and a MIDI-note trigger at the point that each pendulum crosses the centre line of the sculpture. *Figure 9* shows a screen shot of this Max patch. The Max patch itself can also be found on the Data Drive.[13] The centre line point for each pendulum swing is highlighted in green in *figure 6*.

We initially considered triggering the music using sensors, so that the movement of the pendulum would trigger the sound. We decided against this, however, for a number of reasons. Firstly, a sensor and trigger system would have been more expensive, both in terms of development time and money, and we did not have the resources to cover this. But more significantly, the rigid accuracy and precision of the musical track is an important part of the piece. This is because the wave machine we built is not accurate; it is only a effective approximation of what was intended. With smaller versions of Mach's wave machine, the phase patterns seen in the pendulum movements are very clear. This is because it is a lot easier to construct a wave machine on the smaller physical scale. With a large version, as we discovered, there is a lot of movement and flexibility in the structure that is difficult to account for mathematically. Most significantly, there is a lot of resonance in the top cross bar: it flexes a little in sympathy with the movement of the pendulums. This meant that an element of distortion was thrown into the system and the calculations were not realised as precisely as they would have been with a more rigid cross bar. We worked out a way of making the structure more rigid, but this would have involved using specially made triangulated scaffolding, and we did not have the budget to do it. A possible continuation of the project would entail finding funding to build the model to a higher specification. However, the music actually lends some assistance here, as it *is* mathematically precise: the exact figures (shown in green in *figure 6*) can be programmed into each of the twelve metronomes in the Max patch (*figure 9*). The precise rhythmic feel of the sound helped to make up for the lack of precision within the sculpture, as the eye is led by the ear, and visa versa. We tend to look for connections, and so we pick out the synchronous moments continually while watching, prioritising them perceptually over the asynchronous. With a system triggered by the pendulum movements, the lack of precision in the sculpture, which is an error, would have been amplified through sonification.

[13] /DataDrive/Phase Revival Media/Phase Revival synth.

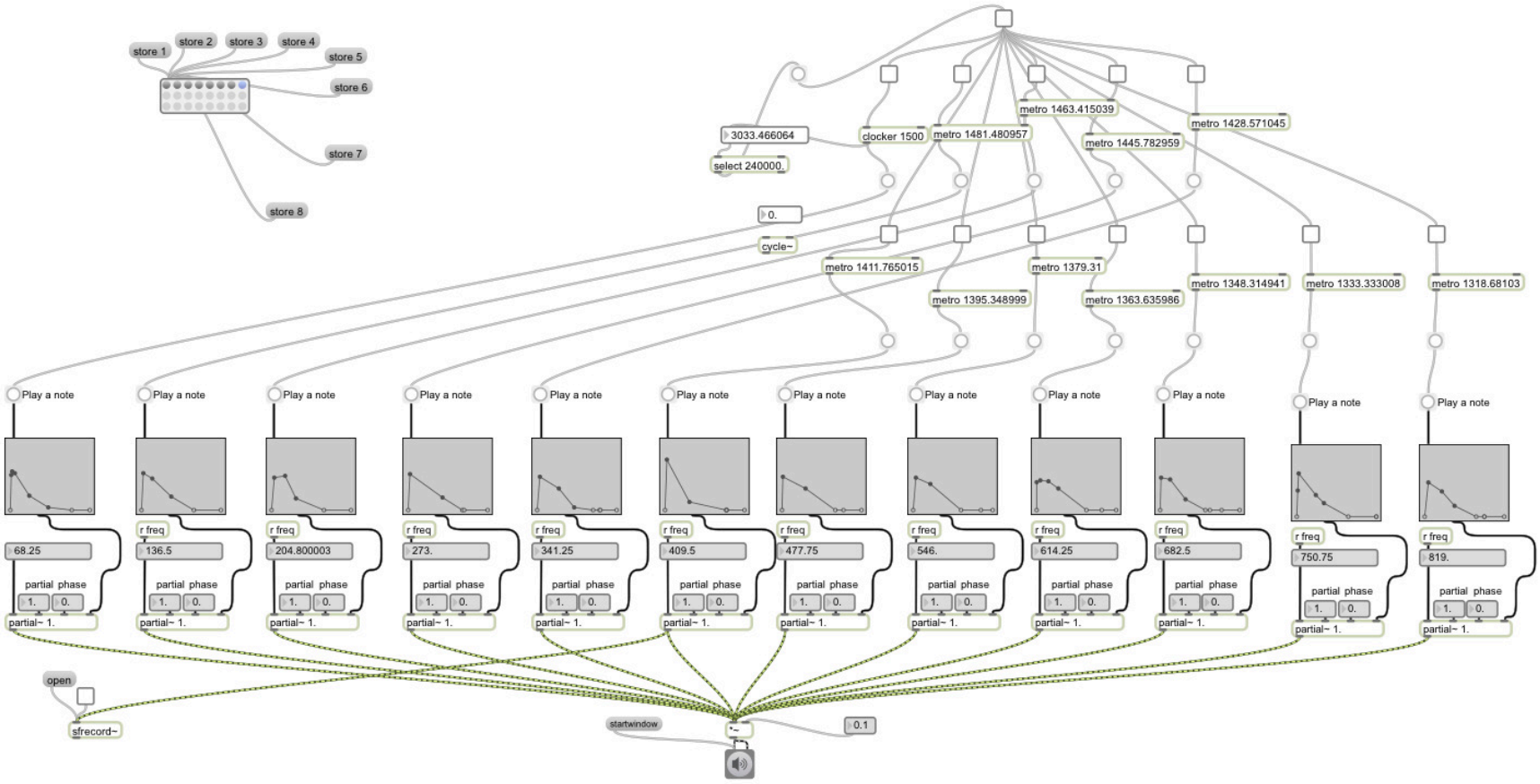

Figure 9: Max patch using 12 metro objects and oscillators.

Pitch

The pitch used throughout is also derived directly from the movement of the pendulums. This was done in two different ways. Firstly, pitch was derived from the data shown in *figure 6* (data relating to the installation we constructed) and secondly from data shown in *figure 7* (the imaginary giant version of the installation).

The background tones that become prominent towards the end of the piece were derived from the data in *figure 6*. I simply transposed the Hz values of each of the pendulums up into the audible frequency range by multiplying them by a factor of 2 ten times. This was done using a simple *cycle* object in Max. This gave me a fundamental pitch of 341.3 (0.(3) x 2^{10}) and a range of close pitches above. The Max patch I made to do this is shown in *figure 10*. The pitches were effectively a sonification of the relationships between the speeds of the different pendulums.

The next musical idea involved the use of data from the giant imaginary version of the installation (shown in *figure 7*). I realised that, once transposed into the audible frequency range, which involved 13 doublings of frequency values of the 12 pendulums, there resulted a harmonic series[14] on a fundamental of 68.27Hz[15] (0.004167 x 2^{13} = 68.27). The pitches that result are as follows: 68.27Hz; 136.5Hz; 204.8Hz; 273Hz; 341.25Hz; 409.5Hz; 477.75Hz; 546Hz; 614.25Hz; 682.5Hz; 750.75Hz; 819Hz. Notice that this is a mathematically perfect harmonic series: for example there are exact doublings of the octave on the first, second, fourth, and eighth harmonic (68.27Hz, 136.54Hz, 273.08Hz, 546.14Hz). *Figure 9* shows the Max patch used to create the core rhythmic and pitch base of the piece, with each *metro* object programmed to output one of the specific frequencies listed above along with a separate MIDI note trigger.

The next stage was to record the audio and MIDI output from Max. I used the sine waves generated by Max at the pitches outlined above as a basis for the piece, and the MIDI notes as triggers to build more interesting composite texture and timbre, using for example Native Instruments Absynth as a sound source alongside various other production techniques. This was mixed ambisonically and decoded in the appropriate way to suit specific performance venues. For example, it was decoded to quadrophonic for the initial performances in Leeds, as that was the audio set up available in the performance space. For performances at Howard Assembly Rooms in Leeds, and for Leeds Light Night (see below for details) a six speaker hexagonal configuration was used.

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[14] A harmonic series in music, in relation to the fundamental, results in the 2nd, 4th and 8th harmonic being octaves, the 3rd 6th and 12th harmonic a perfect fifth, the 5th and 10th harmonic a major third, the 7th harmonic a minor seventh, the 9th harmonic a major second and the 11th harmonic a tritone. LATHAM 2002, page 559.

[15] Which is a slightly flat C# incidentally (at A = 440hz). In equal temperament (at A = 440) a C is 65.41Hz and a C# is 69.3 Hz.

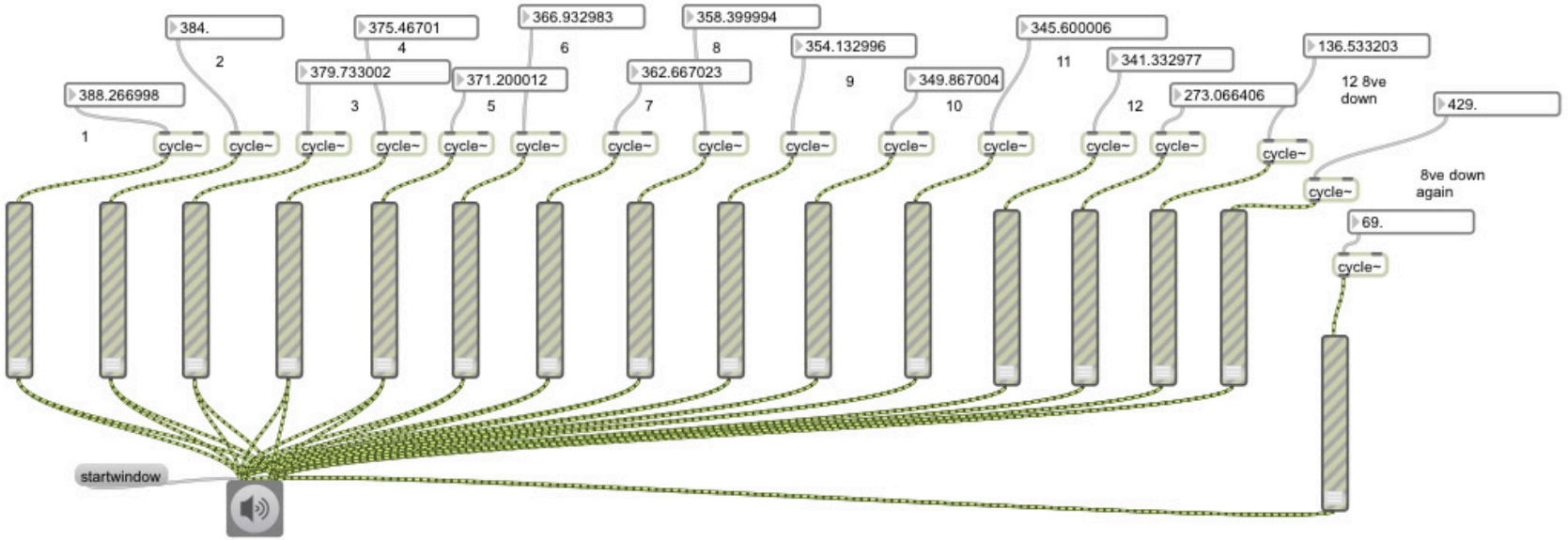

Figure 10: Max patch showing pitch generator synth.

In Performance

The piece was performed three times. The first performance was at Stage@Leeds, University of Leeds, in a 'black box' type theatre space (see *figure 11* and *12* below).

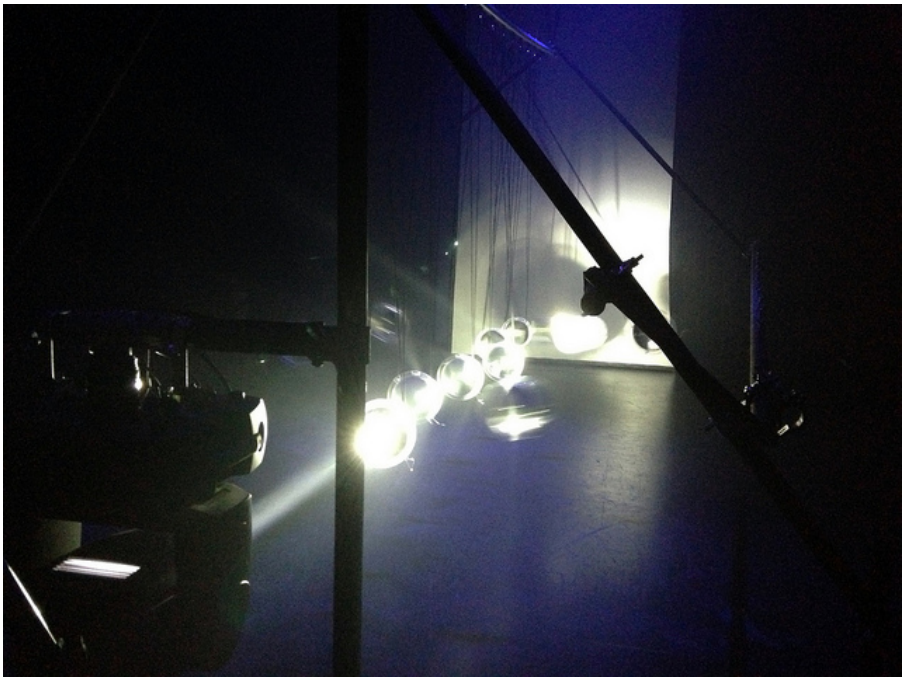

Figure 11: *Phase Revival* in performance at Stage@Leeds.

The installation was open all day, and people came in small groups and were given a leaflet to provide some context (see Appendix 2).

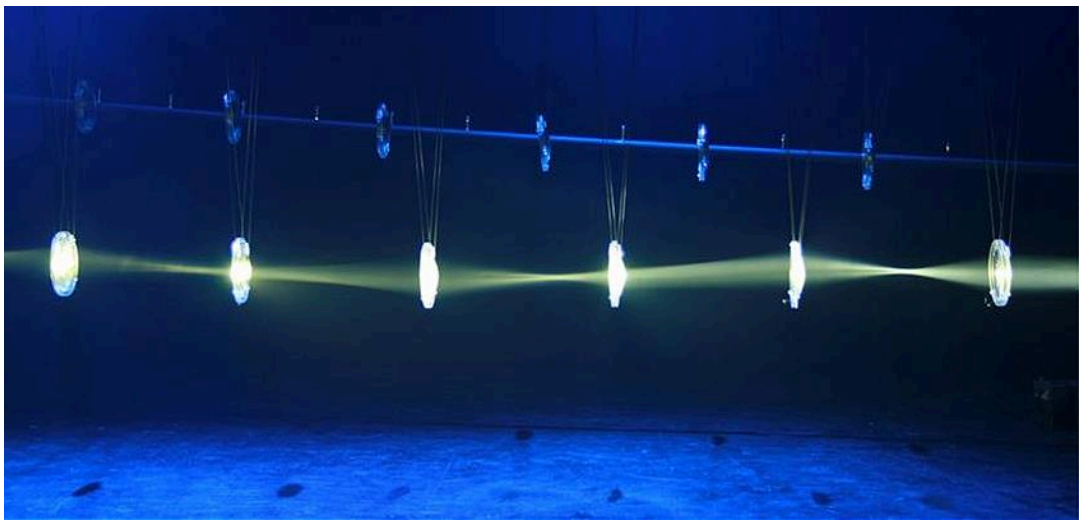

Figure 12: *Phase Revival* in performance at Stage@Leeds.

The second performance was at the Howard Assembly Rooms at Opera North, Leeds (see *figure 5*). This was for an organised 'private viewing,' with wine provided along with a talk by Becs Andrews and Mike Nix. The installation ran for a few hours in a room packed full of some 300 people. This performance used ambisonic sound decoded quadraphonically to four independent speakers.

The third performance was in Leeds City Museum, in Millennium Square, Leeds as part of *Leeds Light Night*, a large-scale free public event (see *figure 13* and *14*).

Figure 13: *Phase Revival* in perfomance at Leeds City Museum.

The performance space was a large, cylindrical-shaped room with a continuous throughput of visitors: over 5000 people saw the piece in a single evening at the Leeds City Museum. We used ambisonics, with six speakers surrounding the installation hexagonal configuration.

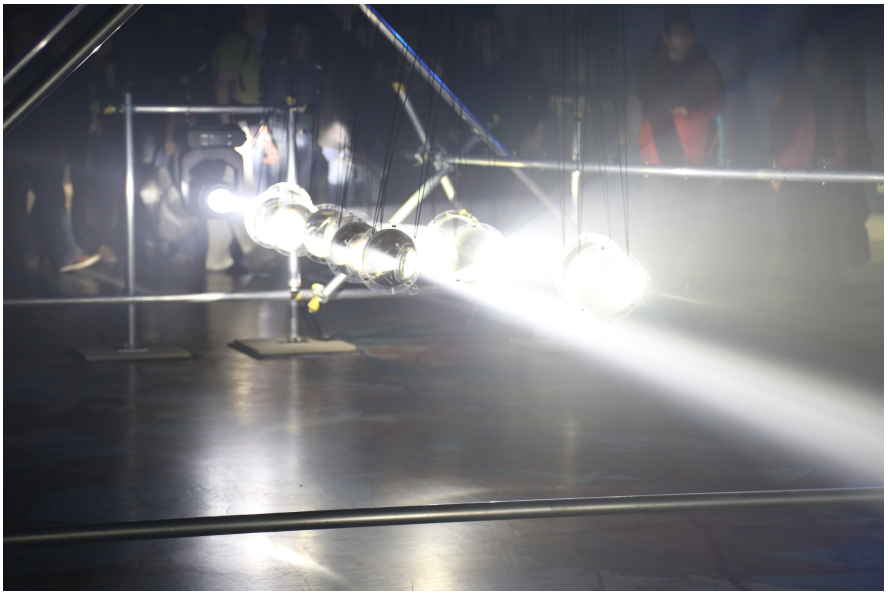

Figure 14: *Phase Revival* in performance at Leeds City Museum.

Extracts from Individual Interview with Members of the Production Team.

Extracts from Interview with Becs Andrews

"I was really delighted and quite surprised when we visited the chemical physics laboratory at the University of Leeds. I had no idea that we were going to see something that was made up of lasers and optics and apertures and mirrors; bending, stretching and bouncing light around – although obviously for scientific and not just visual research! These are things that we both have been really interested in and done experiments with for a while – we are both obsessed with early forms of cinema and moving image – camera obscuras, zoopraxiscopes, zoetropes (as well as more technologically advanced things!) Really this particular area of science and the things we do in our art and theatre practices weren't so far apart after all.

Straight after our first visit we booked a black theatre space and carted along all the mirrors, smoke machines, lenses and projectors we could lay our hands on and tried to do a large (and very approximate) visual version of what we had seen in the lab. The results were beautiful and we took some photographs of what we had done to show the scientists – Mike Nix and Ben Whitaker. They both thought they were fantastic (although we later found out that this was for scientific rather than aesthetic reasons – they thought we had captured an unusual phenomenon but we had unwittingly duped them with an optical illusion because of the projected footage we had used!). As a result Ben secured a little bit of funding from the Royal Society of Chemistry to research a 'spectroscopy outreach' project, which I supplemented with my DARE Fellowship project funding from the Opera North Future Fund, and the four of us began to meet up pretty regularly to discuss what form this might take. After almost a year, and the deadline to show the RSC looming, we suddenly hit on the idea for *Phase Revival: An Optical Harmonica* and I quickly contacted Jon Hughes, the composer, whom I had recently worked with and loved his work on *Terrarium* (a dance piece by Simon Birch) [see Chapter 6]. Jon was a great fit with the project and brilliantly translated the physics behind the sculpture into a sound composition, which many of our audience thought was triggered by movement of the lenses themselves. We did discuss the possibility or creating a triggered sound environment, but what I find interesting at this point is that your brain assumes the two are more linked than they actually are – your perception when watching the phase revival is that the sound and the motion are inherently linked – and they are through physical theory, but not actual physical motion. In fact the optical harmonica is a silent musical instrument of sorts – hence its name.

I am more widely interested in making work that communicates scientific theory in a visually seductive and non-verbal way. So much of science is incredibly interesting, but delivered in such a dry way that it turns off non-scientists, and I think that is a shame. There is a real case for people like us, skilled in drawing out visual metaphor, and communicating without words, but relatively unversed in scientific knowledge and theory, pairing up with scientists in different fields. Of course having found this interesting way in to physics we then read (and YouTubed) around the subject, and I hope this is what our audiences will do – that our work might inspire them to find out more about spectroscopy and wave-forms; but even if it does not I think there is another level on which the work can be appreciated as purely experiential, and that is fine too. I am also collaborating with biologists and physiologists for a few other installation projects…watch this space!"

Extract from an interview with Professor Benjamin Whitaker and Dr Mike Nix regarding the project

"*Phase Revival: An Optical Harmonica* is based on the physics that controls the motion of the molecules in almost everything we see. The work is inspired by the science of spectroscopy, the study of molecules with light. In our laboratory we observe the motion of molecules governed by quantum mechanics, the strange duality of waves and particles. We watch complex patterns emerging from simple physical objects and see miniature molecular phase revivals. Similar patterns exist in almost every scientific field imaginable, from astronomy to biology. The beauty of the installation reflects the mathematics and physical laws which help us to understand our universe."

Extract from an interview with composer Jon Hughes

"The aim when creating music for *Phase Revival* was to give the audience the sensation of being immersed in a sound fabric intimately connected with the movement of the pendulums, and so both the rhythm and pitch of the sounds you hear are derived directly from the mathematics that govern the pendulums' movements. Using a music program called Max/MSP, twelve individual metronomes were created, each programmed to tick in time with one of the twelve swinging lenses. Each of these twelve metronomes was connected to an oscillator, omitting a tone derived from the frequency of each pendulum, scaled up into the audible range. The twelve resultant pitches are a natural harmonic series, built on a fundamental tone of 68.27 Hz. The twelve tones were then layered with a range of synthetic and sampled sounds and mixed ambisonically to create the final complex texture. As with the kinetic sculpture, the rhythmic intensity of the music changes as each 240-second phase cycle passes; the clearly regimented rhythmic form present at the start gradually dissipates to match the decreasing amplitude of the pendulums' movements. By the end of the complete 16-minute cycle, we are left

in a formless sea of ambience and atmosphere, not knowing quite how we got there, but ready for the pendulums to drop once more, and for the process to begin again."

Some examples of collected audience feedback

"Hypnotic – sometimes almost anthropomorphic. Beautiful reflections and refractions. Fantastic"

"Mesmerising, hypnotic and emotional"

"Beautifully simple and complex at the same time. Immersive and organic. One of the best expanded/paracinematic works I've seen"

"Fascinating and strangely soothing"

"Eerie and thought provoking"

"Wonderful, beautiful and moving

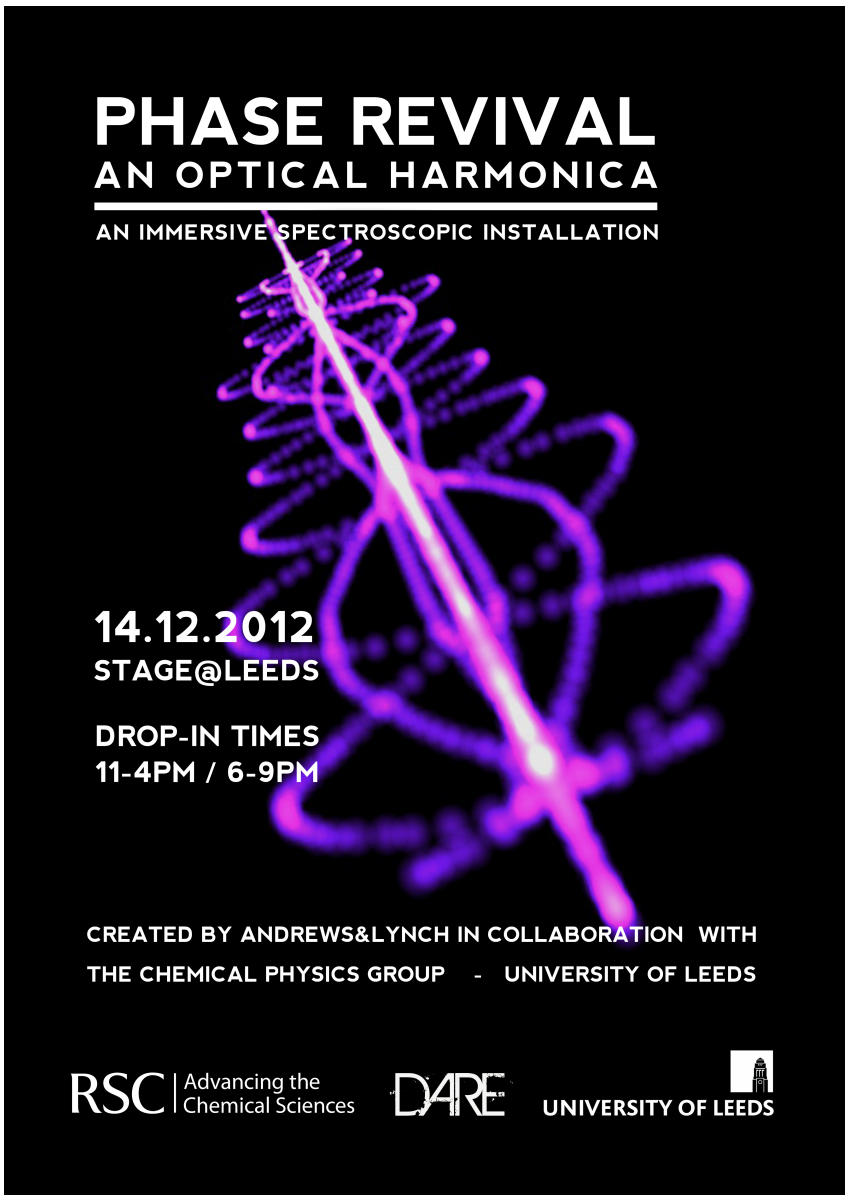

Figure 15: Phase Revival flyer for first performance

Appendix 1:
Phase Revival conference poster

Phase Revival: An Optical Harmonica

RJ Andrews[1], J Hughes[2], DS Lynch, MGD Nix[3] and BJ Whitaker[3]

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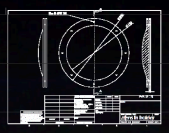
[3]School of Chemistry, University of Leeds, Leeds LS2 9JT, U. K.

UNIVERSITY OF LEEDS

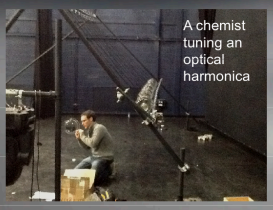
DARE

1. Experimental Set-up

"Phase Revival: An Optical Harmonica"



is a spectroscopic installation viewed as an immersive theatrical performance lasting exactly 16 minutes. The 'harmonica' comprised a 6 m aluminium scaffold bar suspended approximately 3 m from the floor at an angle of 9 degrees. Twelve 330 mm focal length glass lenses (AC Entertainment) were hung in laser cut clear Perspex holders (Oomlout) from pairs of eye-hooks (ScrewFIX) at 300 mm centre-to-centre.
A kabuki bar attached to the "A" frame supports suspending the scaffold bar was used to manually launch the lenses on an audio cue encoded into the musical score

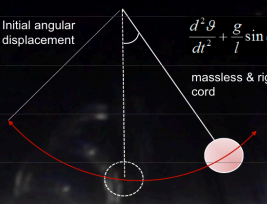


2. Defining Equations

Initial angular displacement

$$\frac{d^2\vartheta}{dt^2}+\frac{g}{l}\sin\vartheta=0$$

massless & rigid cord



The period of an ideal simple gravity pendulum can be written as an infinite series

$$T=2\pi\sqrt{\frac{l}{g}}\left(1+\frac{1}{16}\vartheta_0^2+\frac{11}{3072}\vartheta_0^4+\ldots\right)$$

The frequency of each pendulum is therefore proportional to the square root of the length of the supporting cord

Close to the Earth's surface $\frac{g}{\pi^2}=0.994\approx 1$ and $T\approx 2\sqrt{l}$ s

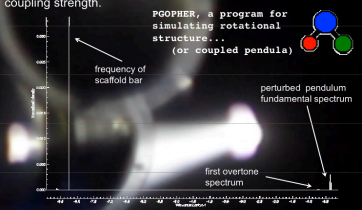
The longest cord in Phase Revival is 223.64 cm in length giving a fundamental frequency of 1/3 Hz. The shortest cord is 172.80 cm (0.3792 Hz).

The full phase revival time is therefore
$80/0.333333 = 91/0.379167 = 240$ s

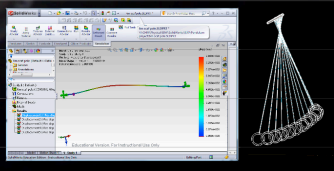
3. Vibrational Coupling

To understand the coupling of the pendula with the scaffold bar we have run spectral simulations using PGOPHER. We express the fundamental frequencies of the unperturbed pendula as wavenumbers.

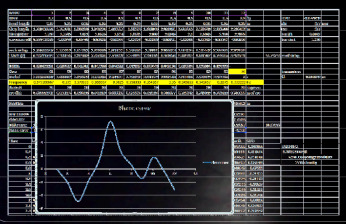
We assume each pendulum is coupled to the bar with the same coupling strength.



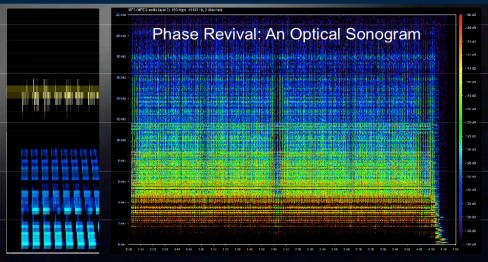
We calculate the normal modes of a 6 m aluminium scaffold bar (Young's modulus 69 Gpa, density 2.71 g cm^{-3}) to be 6.66, 6.68, 18.34, 18.39 and 35.96 Hz.



From the perturbed spectrum the accumulated phase error at the first full revival can be calculated.



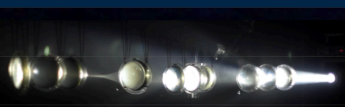
4. Audio Waveform



The full phase revival time of the 12 oscillators is 240 s. The first four minutes of the audio waveform accompanying piece is built from the twelve fundamental tones each shifted by 8 octaves (2^8) into the audio frequency range.

A sonogram of the first arpeggios as the oscillators initially dephase is shown on the left. After the first cycle of 4 minutes the waveform is mixed with random elements until the second full revival. For the last 8 minutes of the performance cycle as the pendula slowly come to near rest only ambient tones colour the audio waveform.

5. Results



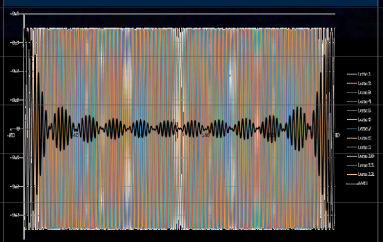
'Phase Revival' was first performed on December 14th 2012 over 8 hours. Around 180 people experienced the installation (30 performances with an average audience of ~6)

Audience experience was monitored by interview, postcard feedback forms in addition to email and twitter/facebook social media. The audience appeared to like it and some interesting conversations about science were in evidence!

During the performances over 100 Gb of video data were recorded.

Modest coupling through the supporting scaffold bar was observed. This had the effect of shifting the pendula to slightly higher frequencies leading to a dephasing effect that became particularly noticeable after the first half revival.

6. Discussion



Twelve independent pendula with string lengths in a square root relationship between 1.7280 to 2.2364 m released simultaneously are expected to exhibit a full phase revival 240 s after launch. Fractional revivals are expected at intermediate times as shown in the figure above.

In "Phase Revival: An Optical Harmonica" the pendula are not independent because they are coupled through the supporting 6m scaffolding bar, which is quite flexible. This introduces a non-linear effect which we model using the PGOPHER spectral simulation program and the SolidWorks CAD package (see Section 3).

The coupling leads to a significant phase error. Although the half revival is quite visible by the full revival the long period pendula are out of phase by up to a quarter cycle, which spoils the physical but not the psychological effect because interestingly the audio waveform "cues" the visual experience.

7. Future Work

We are working on both a demonstration scale version and a large touring version. Our proposed idea for the latter involves using 'trilite', which can be shaped along custom curves and which offers better rigidity to reduce the coupling of the current installation. Once we have costed a touring version we hope to reprise 'Phase Revival at:

FACT
Leeds Science Week
Maker Fair – Newcastle
Light night – Leeds and Liverpool
Illuminating – York
Le Nuit Blanche – Paris
Latitude!

8. Acknowledgements

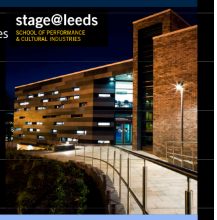
RSC Advancing the Chemical Sciences

stage@leeds SCHOOL OF PERFORMANCE & CULTURAL INDUSTRIES

DARE

PGOPHER, a program for simulating rotational structure... (or coupled pendula)

.:oomlout:.



Technical support:
Chris Megginson, Andie Mills, Steve Ansell

9. Star Carr: Sonic Horizons of the Mesolithic

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Cover Image: 'After the Ice' exhibition at the Yorkshire Museum.

All photographs Jon Hughes.

Preface

What follows below is an overview of the *Star Carr: Sonic Horizons of the Mesolithic* project. The text is an adapted and edited version of a much longer and more detailed paper published in *The Journal of World Archaeology* by Hughes and Elliot in May 2014.[1] The full paper can be found on the Data Drive.[2]

Introduction

Star Carr, Sonic Horizons of the Mesolithic is an installation and research project developed as a collaboration between composer Jon Hughes and archaeologist Dr. Ben Elliot. The installation was created in 2013 for performance at a number of events throughout the course of the summer of 2013. The Data Drive contains a number of files that accompany this document, including Bformat and stereo renders of the Sonic Horizons soundscape.[3]

Creating the Installation

The original idea for the project came in a meeting between the two collaborators in late 2012. Ben Elliot had recently secured a postdoctoral research position as part of the Postglacial project at the University of York, and was interested in finding innovative ways to work with the resources recently placed at his disposal. The Postglacial project is funded by an ERC grant to further explore the world famous Star Carr archaeological site in North Yorkshire.[4] Beginning in this initial meeting, Ben and I developed a plan to use sound in new and innovative ways to explore the landscape narrative of the ancient Mesolithic site at Star Carr.

[1] HUGHES and ELLIOT 2014.
[2] See: /DataDrive/Sonic Horizons Media/Sonic Horizons World Archaeology paper.
[3] See: /DataDrive/Sonic Horizons Media/Sonic Horizons audio files/
[4] https://sites.google.com/site/starcarrfieldwork/Home.

Our starting point was to ask the following simple question: what were the 'sonic horizons'—the horizons of the sonic experience—for people living in Star Carr?[5] In an attempt to answer this question, we set out to build an archive of sounds that might have been experienced by people at Star Carr. Once the archive was built, we used it in a number of different ways, as will be explained in more detail below.

The use of sound in the museum and heritage industry has developed substantially in recent years, with many well-known institutions in the UK initiating projects that engage with sound in innovative ways.[6] There has also been a growth in projects seeking to foster collaborative relationships between creative artists and cultural institutions, such as the Museums and Heritage Partner Network. These developments reflect a growing academic interest in the study of sound in relation to a range of disciplines, frequently referred to under the umbrella term of 'sound studies'.[7] *Sonic Horizons of the Mesolithic* emerged in part from an engagement with this field. One particularly relevant strand in this field, acoustic ecology, developed under the auspices of the World Soundscape Project, founded by Raymond Murray Schafer, Barry Truax and Hildegard Westerkamp during the 1970s at Vancouver's Simon Fraser University.[8] Truax defines a soundscape as any sonic environment, with particular emphasis on the way it is perceived and understood by an individual or by a society.[9] Elsewhere Schafer[10] has given a more general definition, describing a soundscape as 'any acoustic field of study', which includes a piece of music, a radio program or any sonic environment.

The approach taken for the *Sonic Horizons of the Mesolithic* project developed in part from exposure to the field of sound studies, but also from my own recent compositional practice. Particularly relevant in this regard are two site-specific installation pieces, both discussed in detail elsewhere in this document: *Terrarium*, a dance work commissioned by the North York Moors National Park Authority in 2012 (see Chapter 6), and a John Cage-inspired sound installation, *A Dip in the Lake*, performed in York in 2012 (see Chapter 7). Both utilised environmental sound recordings mixed ambisonically and played back through the use of a large outdoor 30 metre ambisonic speaker circle to creates a

[5] As far as I can tell I coined this phrase. A search on the internet for Sonic Horizons today (2nd November 2014), will lead almost exclusively to references to this project. A Google search of 'Sonic Horizons' results in eight of the first ten entries being for the project under discussion here. (The other two are a reference to Sonic Horizons Hurricane cable and a page regarding acoustic theory). I have however found one other use of the phrase in BORN 2013, page 13, although used in a different context, and published later than our project.
[6] SHARP 2013 .
[7] PINCH and BIJSTEVELD 2012 page 7.
[8] PINCH and BIJSTEVELD 2012 page 7.
[9] TRUAX 1999.
[10] SCHAEFFER 1977 page 7.

high-quality, fully immersive sonic experience. Furthermore, both *Terrarium* and *A Dip in the Lake* drew their primary sound recordings from a specific geographic area and sonic community. In the case of *Terrarium*, this consisted of the landscape and community of the North York Moors National Park while *A Dip in the Lake* drew on the sounds of the City of York itself during a single twenty-four-hour period. In both cases, the primary recordings were used as a source of audio material to create the final sound fabric.

In the case of *Sonic Horizons of the Mesolithic*, we adapted this approach, focussing on the construction of a sound archive for a specific *archaeological* landscape: Lake Flixton during the time that Star Carr was occupied (c. 9000 cal. BC). Since the initial discovery of a series of Early Mesolithic sites around the edges of an extant lake by John Moore in the late 1940s, this landscape has been the focus of intense archaeological and palaeoenvironmental investigation. Clark' s famous excavation of a rich assemblage of organic and inorganic Early Mesolithic material culture at the site of Star Carr brought this landscape to the attention of the academy internationally,[11] while the pioneering integration of palaeoenvironmental studies alongside archaeological investigations helped to set the tone for future approaches to the study of the Mesolithic period.

Using the archaeological and palaeoenvironmental data from this region,[12] a catalogue of sound recordings was assembled, featuring the sounds of animals, environments, materials and human activities that have a demonstrable presence in and around Lake Flixton during the Early Mesolithic. These recordings originate from a variety of sources: some environmental and animal sounds were kindly donated by the British Library's National Sound Archives, and some human activity sounds were created experimentally using flint, antler, water, wood and stone.

The Form of the Installation

These sounds, once assembled and catalogued, were used to create a thirty-four-minute long soundscape composition inferred from the Mesolithic archaeology of the Vale of Pickering. This utilized a series of sixteen 'scenes' to provide an overarching structure. The theme of each was based directly on the human activities evidenced within the archaeological record and set against the backdrop of environmental sounds inferred from

[11] CLARK 1954

[12] CLARK 1954 ; CLOUTMAN 1988a , 1988b ; CLOUTMAN and SMITH 1988 ; CONNELLER et al. 2012 ; LANE and SCHADLA-HALL, forthcoming; MELLARS and DARK 1998

the palaeoenvironmental record. As an aid to the compositional process, two recurring, fictitious Mesolithic characters, Jack and Amber, were used to link the various activities together. For example, the considerable body of evidence for flint knapping and the use of fire around Lake Flixton[13] formed the basis for one particular scene. This was set by a fireside in front of a hut-like structure, similar to that excavated at Star Carr,[14] but located some 20m from the lake edge. Recorded sounds of flint being experimentally knapped by Elliott in a studio environment were mixed ambisonically with the sounds of night-time forest and marshland environments from the British Sound Archive's environmental sound recordings. To this was added the sound of a modern-day campfire, recorded by Hughes in York in 2012 as part of his previous work. British Sound Archive field recordings of various birds and animals were then mixed into the scene: a tawny owl, barn owl and long-eared owl, alongside the sounds of red deer and wolves. The remains of these species have been recovered from Star Carr and several other sites around the edges of the Vale of Pickering.[15] These were situated at varying distances from the listener to create a sense of spatial scale and place within the landscape. For example, sounds from the lake-fringes were positioned as if coming from the left, sounds from the forest on the right and the fire and flint knapping sounds positioned centrally. Animal sounds such as wolf and red deer were positioned at a distance from the right, as if being heard from deep within the forest.

The total list of scenes featured within the soundscape included: midnight flint knapping, stalking red deer in woodland, heating water with fire-warmed stones, and a coracle journey across marshland and Lake Flixton. Details of each of these scenes can be found in Appendix 1, where copies of the handouts given to visitors to the installation can be found.

During the mixing process, recordings were positioned and blended together to create a continuous sound fabric. This allowed the full texture and richness of specific sound recordings to be explored and to build towards an immersive and captivating sonic experience for the listener, without compromising the academic integrity of the research on which the scenes were based. However, it should be stressed that the mixing of the soundscape was in itself an interpretative and expressive process; the final piece has been referred to as a 'soundscape' rather than a 'sonic reconstruction' in recognition of this fact.

[13] CONNELLER and SCHADLA-HALL 2003
[14] CONNELLER et al. 2012
[15] FRASER and KING 1954 ; ROWLEY-CONWY 1998 ; LANE and SCHADLA-HALL, forthcoming

Presenting the Installation

The thirty-four-minute soundscape was presented in an ambisonic set-up at four events through the summer of 2013. The first took place at the public opening of the Yorkshire Museum's *After the Ice: Yorkshire's Prehistoric Peoples* exhibition, an open-air event in the Museum Gardens adjacent to the Yorkshire Museum in York. This featured a set of eight outdoor speakers, set up in a circle 24m in diameter with a series of benches positioned in the centre. A small marquee was erected to one side of the speaker circle, housing the less weatherproof equipment from the elements and sheltering a small display board. Appropriate handling objects lent from the adjacent Yorkshire Museum were also housed within this marquee (see *Figure 1* below). Members of the public were free to wander through the speaker circle and experience the soundscape, and the authors and museum staff were on hand to discuss the content and relevance of the sounds being played with the aid of laminated printouts providing a scene-by-scene overview of the piece. These have been included in Appendix 1[16]. The installation lasted from 10 am until 3 pm.

Figure 1: *Sonic Horizons* ambisonic sound installation set up within the Yorkshire Museum Gardens, York. Note the marquee containing display boards, handling collections and non-waterproof equipment.

The second event took the form of the opening lecture and reception of York' s *Festival of Ideas,* a ticketed event featuring a lecture on world prehistory from Peter Watson alongside a scaled timeline representing 15,000 years of human activity in Europe. This 30cm thick, annotated line ran through several rooms of a large exhibition space, working at a scale of 1cm for every year. This differed from the first event in that it took place indoors, and used an eight meter diameter circle of six indoor speakers.

[16] It can also be found on the Data Drive in PDF format: /DataDrive/Sonic Horizons Media/Sonic Horizons soundscape hand out sheets/

Figure 2: *Sonic Horizons* installation at the *Festival of Ideas*, York.

The speaker circle was set up at the point at which the Mesolithic period began on the timeline and was staffed constantly by the authors, who were on hand to explain the purpose and content of the soundscape and offer listeners a printed copy of the overall scene structure (see Appendix 1). Guests at the opening lecture were able to explore the timeline and soundscape during a post-lecture wine reception, which lasted around three hours.

The third event took place within the same exhibition space as the second, and it formed part of the *Festival of Ideas Fringe* event, a publicly accessible event aiming to engage children and young people with humanities research at the University of York. The space was shared with several other interactive activities promoting a diverse range of research. Again, an eight meter speaker circle was created with six speakers. In the centre of this circle, a tarpaulin was laid down and children and adults were given the opportunity to participate in red deer antler-working tasks using flint tools (see *figure 2*), in the manner employed at Star Carr.[17] Both authors were on hand throughout the event to supervise the antler-working activities and explain the soundscape with the aid of the print-out. The event was open to members of the public and was attended by families, meaning that a mixture of children, adolescents and adults experienced the soundscape through the course of a five-hour day.

The fourth event took place on-site in the Vale of Pickering, during the public open days of the 2013 excavations at Flixton Island. This site is situated approximately 1km away from Star Carr, and is being excavated as part of the Postglacial project, alongside

[17] ELLIOT and MILNER 2010

Star Carr itself. The open days featured guided tours of the ongoing excavations at the site led by the project leader Professor Nicky Milner, lectures on the artefacts and faunal remains being recovered from finds specialist Becky Knight and ecological landscape walks which dealt with the environmental history of the region, led by Tim Berkinshaw of Scarborough Borough Council. A 30m diameter speaker circle was set up using eight weather-proof speakers on the grassland adjacent to the open trenches (*figure 3*). Deckchairs were arranged in the centre of the circle and the authors were again available to discuss the purpose and content of the soundscape with any members of the public or project who showed an interest. Copies of the narrative structure were again made available to aid these discussions (see Appendix 1).

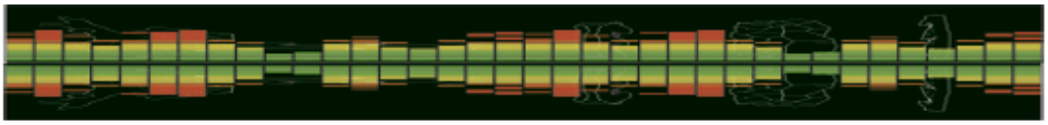
Figure 3: Visitors to the 2013 Flixton Island Open Day, in the Vale of Pickering, experiencing the Mesolithic soundscape on-site.

Appendix 1:

Installation handout 1:

Description of the 16 scenes.

Star Carr: Sonic Horizons of the Mesolithic



You are standing inside an ambisonic soundscape installation. It runs on a continuous 34 minute Loop, and takes you through a number of scenes and events in the lives of two hunter-gatherers, Jack and Amber, a young man and women living at Star Carr 11,000 years ago.

Scene 1 (0:00 - 5:20) Midnight Flint Napping. It is midnight, and Jack is outside, sitting by the fire. The location is a small settlement about 20 meters from lake Flixton, the ancient lake at Star Carr. Jack is flint knapping, chipping away at flint with a piece of stone in order to make flint tools. He is working on a large piece, called a core, to break off smaller fragments that can be used in a variety of different ways. Jack is an expert craftsman, and has been working with flint since childhood. He intends tonight to make some new arrowheads, and a selection of blades that will come in useful for everyday tasks such as slicing vegetables, cutting animal hide, and butchering animals killed on the hunt. Many such flint tools from Star Carr are on display in the *After the Ice* exhibition.

In the background we can hear the sounds of the forest, and nocturnal animal life: a long eared owl, tawny owl, barn owl, followed by the unmistakable sound of a red deer stag in the distance. Perhaps two miles across the forest, the sound of a lone wolf cries out, answered in the opposite direction by a wolf pack. The wolf pack is closer, maybe only half a mile away. Red deer were extremely important to residence at Star Carr. One of the most exceptional archaeological discoveries there were 21 deer skull frontlets, thought to be used as head dresses, perhaps for disguise when hunting deer, or perhaps as ritual dress by shaman. There is one of these frontlets on display in the Yorkshire Museum *After the Ice* exhibition.

Scene 2 (5:20 - 5:45) Foraging. The nighttime sounds fade away, and it is bright morning. We can hear footsteps walking through the undergrowth. Amber is foraging, perhaps out to gather berries or mushrooms. A good deal of nutrition came from foraging organic material, which would have provided an important food source alongside meat from hunting and trapping.

Scene 3 (5:45 - 8:10) Heavy Weather. Light rainfall in the forest. This becomes heavier, and develops into a storm, with the sound of a strong wind blowing through the trees. Mesolithic people at Star Carr would have lived imbedded in the natural environment, and exposure to the elements would have been an everyday fact of life. Home for Jack and Amber would most likely have been a hut constructed from birch wood and animal hide, similar to a structure found at Star Carr. There is a reconstruction of such a shelter in the *After the Ice* exhibition.

Scene 4 (8:20 - 9:45) Stalking Deer. The wind dies away, and we are back to a quiet, calm day in the forest. Amber crouches low in the undergrowth, with a spear in hand. We hear the sound of a deer close by. She is stalking a herd of red deer, hiding in the bushes, perhaps wearing an antler frontlet for disguise. She waits patiently for one to come into range to make a kill.

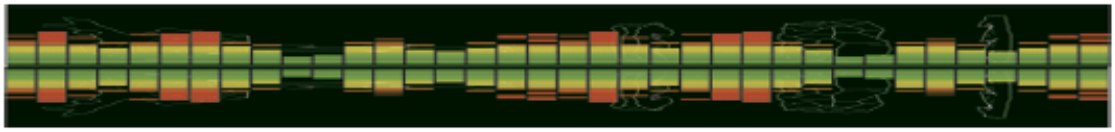
Scene 5 (9:45 - 12:38) Heating Stones. First we hear wood being prepared by Jack, with the sounds of chopping wood using a stone axe. A fire burns fiercely. Jack starts to move stones around and put some in the fire, before taking hot stones out. We can hear them sizzle as they drop into water drawn from the Flixton Lake. This method for heating water was effective, and the water could reach near boiling point.

Scene 6 (12:38 - 17:45) Coracle Journey. Jack walks in the mud at the lakeside, and climbs into a coracle, a kind of wood carved boat. He sets off on a journey paddling across the lake, and we are surrounded by the rich sounds of marshland wildfowl. Greylag goose, black throated diver, little grebe,

AFTER THE ICE
YORKSHIRE'S PREHISTORIC PEOPLE

Yorkshire Museum

Star Carr: Sonic Horizons of the Mesolithic



great crested grebe and fulmar. The remains of many of the birds you can hear have been found at Star Carr, and they are still common marshland birds in Britain today. Particularly noticeable is the strange, mysterious deep bass note of the bittern that echoes across the lake. There's also Bewicks swan, whooper swan, curlew, kestrel, stone curlew and osprey.

Scene 7 (17:45 - 19:00) Distant Thunder. The sound of thunder would surely have been among the most spectacular elements of the Mesolithic sonic experience. We can only speculate as to what the sound of thunder would have meant to Jack and Amber at Star Carr.

Scene 8 (19:00 - 21:00) Shaman Ritual. Amber walks into a shaman ritual. We can here drums being beaten by the shaman, and a crowd gathered near the fire. The shaman, a woman, moves around the fire, dressed in a deer's antlers and deerskin, and we can here the sound of red deer in the distance throughout the ritual.

Scene 9 (21:00 - 21:48) Rolling Birch Bark. It is a summer's day, and Jack is alone in the forest, busy rolling birch bark. A number of birch bark rolls were found preserved at Star Carr, and can be seen at the British Museum.

Scene 10 (21:48 - 24:50) Searching for Flint on the Beach. Waves break on pebbles. Amber has travelled to the Eastern coast of Ancient Britain, which would have been some 40 miles further out to sea than it is today. We do know that these coastal areas were a good place for high quality flint. She's using an antler hammer to test flint cores for quality.

Scene 11 (24:50 - 25:30) Snow Walk. It's winter, and Jack and Amber walk together with a companion. Three residents at Star carr walk past us in the snow. Where are they travelling? We don't know. Three companions on a winter hunting expedition perhaps?

Scene 12 (25:30 - 27:20) Making a Barbed Point from Antler. The rain has returned, and we can hear distant thunder. Jack is using the groove and splinter technique to make a barbed point from antler bone, which he will use for spear fishing. There are similar barbed points on display in the *After the Ice* exhibition.

Scene 13 (27:20 - 28:50) Wild Boar Hunt. A strong wind returns, blowing through the trees. After a little while, we hear the sound of a wild boar in the undergrowth, then the barking of a dog. The dog rushes up to the boar, and there is a stand off. The remains of large domesticated dogs have been found at Star Carr. Amber is some distance away, using the dog to track the boar.

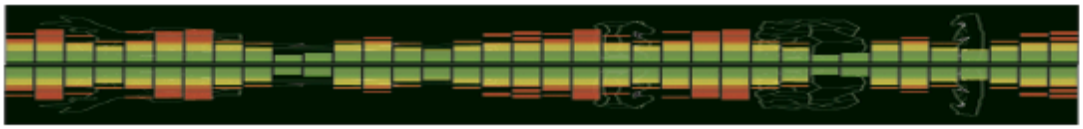
Scene 14 (28:50 - 30:40) Spear Fishing. We are back in the marshes. Jack is wading in the lake, waist deep in the water, spear fishing. He's using the antler barbed point he was making earlier, which has been tied to a wooden spear shaft.

Scene 15 (30:40 - 31:50) Roe Deer in the Rookery. The sound of a rookery, and in the foreground, the occasional bark of a roe deer. The remains of roe deer have been found at Star Carr.

Scene 16 (31:02 - 34:00) Forest River Walk. We can hear footsteps. Jack and Amber walk together near a flowing river. They come to a faster section where the water flows over rocks, and stop to enjoy the sights and sounds of rushing water.

Installation handout 2:
General description of the project installation.

Star Carr: Sonic Horizons of the Mesolithic



A new prehistory exhibition, *After The Ice*, has opened at the Yorkshire Museum this week. The exhibition is dedicated to Star Carr, the world famous archeological site in North Yorkshire. *Star Carr: Sonic Horizons of the Mesolithic* is a sound studies project running alongside the exhibition. Sound artist Jon Hughes and archaeologist Ben Elliot have spent time thinking about the sonic experience of people living at Star Carr, collecting sounds and building up a sound archive relating to the site. Sounds were sourced mainly from their own field recordings and the British Library Sound Archive, as well as from the online resource Freesound.org. They've used the archive to provide sound for different multi-media elements of the exhibition, and to create the ambisonic sound installation you are standing in today. Ambisonics is a type of very effective surround sound. This set up uses 8 speakers in a circle to envelop the audience in a rich and diverse soundscape.

They began by asking some simple questions. What sounds would Mesolithic hunter-gatherers have experienced living at Star Carr 11,000 years ago? What was the nature of their sonic experience, their relationship to the sounds around them in the world in which they lived? To answer such questions provides a different way to think about the Mesolithic, helping to bring archaeological artifacts out from the museum display cabinet, and to give us access to the sensory experience of human life in Mesolithic Britain.

Mesolithic hunter-gatherers at Star Carr would have lived embedded in a rich natural soundscape. Across the ancient landmass we now know as the British Isles, small, dispersed groups of human beings lived scattered through an incredibly biologically productive landscape, inhabited by dense populations of birds, plants and animals. Remains of many animals have been found at Star Carr, and so we know people there would have lived alongside and hunted a wide range of species, including wolf, red deer, roe deer, bear and auroch. In many ways, the natural world was something that Mesolithic people were embedded within, not separate from. All materials used to live life: food, clothing, tools, material used for building shelters: were drawn directly from the world around them. Listening to and thinking about the sounds that formed a part of everyday life is one way in which we can begin to recapture something of the Mesolithic sensory experience, and so it helps us to better imagine what it might have *felt* like to live at Star Carr.

It is interesting to think about how Mesolithic people might have understood sound. We cannot know exactly the nature of their understanding, but we can assume that it was in some ways very similar to our own, and in some ways very different. Whereas biologically humans at Star Carr were the same as us, the mind of the Mesolithic hunter-gatherer would have been very different. In Britain today, we use our knowledge of physics and biology to explain how sounds are created, travel across space, change, and are processed by our ears into something that we can experience. We understand what sound is, how it relates to the physical world of objects we can see and touch through often unconsciously accepted scientific paradigms such as energy transfer and cause and effect. But how might a society with a very different understanding of the way the universe works explain the phenomena of sound? What might a Mesolithic person think about the sonic images that echoed around them in the ancient forests? Throughout history, sound has formed a close relationship to the spiritual aspects of many different cultures; through music and ritual, song and the spoken word, sound has formed bridges and connections between what we might catagorise as the physical, emotional, imaginative and spiritual aspects of our experience. We do know that the red deer was extremely important to people living at Star Carr, and we can try to imagine, for example, what the distinctive sound of the deer meant to the men, women and children living there, as they walked through the forest, worked to make flint tools, told stories and played music around the fire, and lived life as part of the ancient landscape.

AFTER THE ICE
YORKSHIRE'S PREHISTORIC PEOPLE

Yorkshire Museum

10. Hydrology

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Cover Image: Helford Passage from Hydrology field recording trip.

All photographs by Jon Hughes

Introduction

Hydrology is a dance piece based on the theme of water and our interaction with it in the landscape. Created by project leader and choreographer Simon Birch, composer Jon Hughes, and twelve second-year dance students at Falmouth University, *Hydrology* was put together from scratch over the four weeks from the 11th of February 2014 to the first performances on the 13th and 14th of March. A complete audio mix of *Hydrology* can be found on the Data Drive, both Bformat and stereo files.

Figure 1: Working in the rehearsal studio with the dancers, Falmouth University.

Overview

Hydrology takes its inspiration from water and our relationship to it. It is an intimate work that invites the audience to share the space with the dancers whilst immersed in an ambisonic soundscape. Echoing the movement material, which was initially inspired by the surrounding landscape, the sound fabric was constructed exclusively from field recordings sourced from Falmouth and its environs.[1] Ocean recordings from the rocky headland at Pendennis Point are combined with ambient sound taken from inland rivers and waterways. Contact microphones and hydrophones were used to record less familiar sound worlds such as the underwater

[1] Falmouth in Cornwall, UK.

mechanical rhythms of the King Harry Ferry, the sounds below the surface of waves at Gyllngvase Beach, and melting ice.

Figure 2: Simon Birch working with the dancers in the rehearsal studio.

Movement material was directed by Simon Birch, and created along with the twelve dancers involved.[2] Throughout the four-week creative process, I worked closely with the dancers and choreographer, spending the weekdays either in the dance studio or in the field collecting sound recordings, and most evenings working on aspects of the piece.

Figure 3: Working with the dancers in rehearsal at Falmouth University.

[2] Alice Briggs, Jodie Freestone, Katherine Lewis, Cherelle Horton, Esther Bateman, Malin Blichfeldt, Ashleigh Coward, Jessica Cullen, Chloe Greer, Geraldine McDonald, Danielle Toop and Rudi Bird.

I kept an online record of the creative process in the form of a blog.[3] I have reproduced the first page of the blog in Appendix 1. A complete version of the blog can be found on the Data Drive.[4]

Sound Sources

We decided to set a clear boundary as regards sound sources, using only recordings of water made during the time I was in Falmouth. This included for example sounds of the ocean, the sound of melting ice, or the sound of a ship's engine out at sea, recorded using a hydrophone. I hired a bicycle for my stay, and spent a good deal of time in the first week or so travelling around the local area looking for material to record. I also spent time together with Simon on field trips. Through this field recording process, I built an archive of some 110 sound recordings for the project. The full archive Excel sheet can be found on the Data Drive. [5]

Figure 4: Field recording at the King Harry Ferry port, Foeck on the Fal River.

[3] The Hydrology blog can be found here: http://waterlandscapesound.tumblr.com/page/3
[4] See: /Data Drive/Hydrology Media/Hydrology Blog/
[5] See: /Data Drive/Hydrology Media/Hydrology Sound Archive/

As in the creative process outlined in *Terrarium* (see Chapter 6) each field trip resulted in the collection of a family of sounds, which were used to create corresponding sections of music. In contrast to *Terrarium*, however, all sounds in the final work were derived exclusively from field recordings, without the use of instrumental or vocal recordings. The blog pages included in Appendix 1 give an overview of this process, explaining each field trip in more detail.

Performance

The piece was performed in a large dance studio at the University of Falmouth. The audience was invited into the space and allowed to walk around freely. The dance took place within the space, sometimes taking up the whole floor, at which point the audience moved to the perimeter of the room, and at other times taking place in discrete areas of the space. The music was mixed ambisonically and decoded into an eight speaker octagon,[6] with the speakers placed around the perimeter of the room.

Figure 5: Image from the performance of *Hydrology*.

[6] We used the same software and hardware set-up as for *Terrarium* (see Chapter Seven)

Form

In the text that follows I explain the form in more detail. An illustration of the complete form of *Hydrology* can be found in *figure 6* below.

'Trios'

Hydrology opens with 'Trios'. Elements of the sound fabric are gradually introduced, beginning with sea sounds recorded using hydrophones buried beneath the sand at Gyllyngvase Beach, followed by sounds from above the surface recorded on the rocky headland at Pendennis Point. From 0:15 to 0:35, the sound of running water is introduced, recorded from woodland near Falmouth. At 0:31 we hear the sound of the wind heard through boat rigging from Penryn Marina, followed at 0:43 with the sound of children playing on the beach at Helford Village in the Helford Passage. At 1:00 there's the sound of birdsong, recorded at various locations in the countryside around Falmouth while recording water sounds. This section contains many sounds recorded from above the water's surface, which is why it includes ambient sounds such as birdsong and people on the beach; this is indicative of our interaction with water. 'Trios' is designed to convey a delicate quality: a sense of lightness, air and space, of water in the landscape.

'Quartet'

There is a gradual change in feel that begins at 2:43 with the introduction of a sustained pitch, and is joined by other similar pitched sounds as the piece progresses. These sounds were made from time stretching and processing a number of sounds from the *Hydrology* archive. The change in texture leads toward 'Quartet', starting at 3:16 and continuing until 6:12. The tension builds from 3:16 toward a moment around 3:40 we named 'Quartet Drop' in our rehearsal studio shorthand. My intention in 'Quartet Drop' was to create the sense of being sucked down into a subaquatic world; a downward spiral or whirlpool that transports the piece from the open, delicate feel of 'Trios' to a darker, more intimate texture. The move is from above to below the surface, and by 4:00 the sound world is drawn exclusively from underwater recordings made using hydrophones, taken from Crab Quays, Gyllyngvase Beach, and the headland at Pendennis Point.

'Boiling Point'

At 6:12 there is an abrupt textural shift as we transition into 'Boiling Point'. This section is dominated by a rhythmic loop constructed using sounds recorded at the King Harry chain ferry crossing on the Fal river. The pounding low frequency drum-like sounds are made from recordings of cars boarding the ferry, heard from under the water and captured using hydrophones. The more metallic sounding part of the loop comes from the sounds of the chain that pulls the ferry along, again heard from under the water.

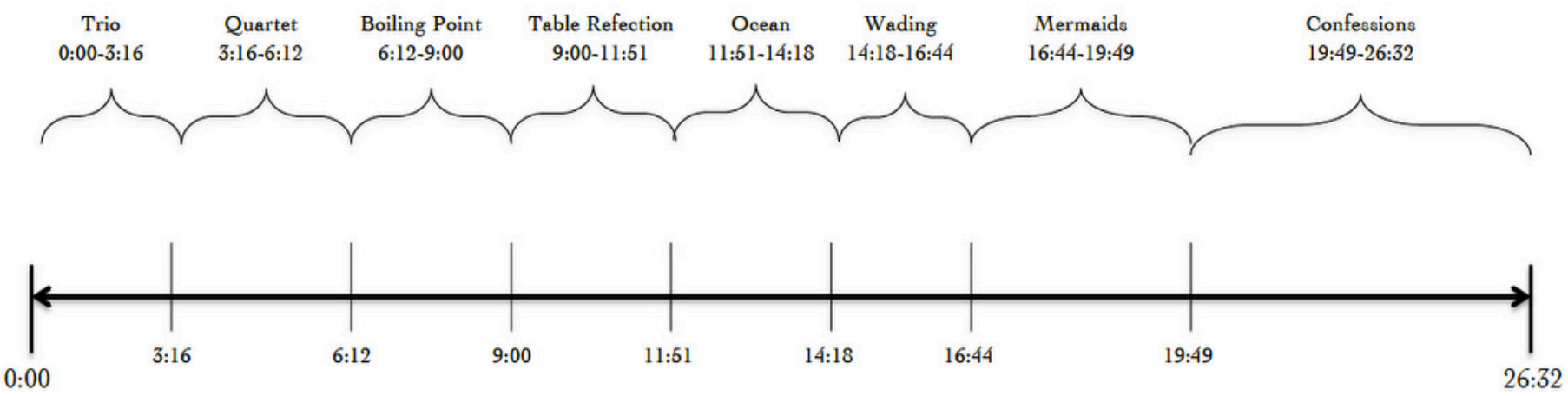


Figure 6: *Hydrology* Complete form.

'Table Reflection'

The next section, 'Table Reflection', starts abruptly at 9:00. The sound palate consists of recordings of water boiling and ice melting. The boiling sounds were made using a hydrophone inside various different metal pans placed on a gas stove and filled with boiling water. The melting sounds were recorded using a hydrophone and contact microphones from inside different metal and plastic containers in which a large block of ice was floated in tepid water. The resulting sounds, starting at 9:32 and becoming more prominent from 10:00, were caused by the ice melting and cracking in the warmer water.

Figure 7: The headland at Pendennis Point, with a ship on the horizon. Feb 2014.

'Ocean'

From 11:08 there are some running water sounds, taken from the *Hydrology* archive. These turn into waves from 11:25, recorded at Crab Quays and Pendennis Point. The wave sounds gradually become more prominent, until by 12:00 they dominate the texture, and we now enter the 'Ocean' section, in which the density of the ocean sounds grows.

'Wading'

'Ocean' begins to transform into 'Wading', which runs from 14:18 to 16:44. A new sound world is introduced with low frequency percussive sounds at 14:14, becoming fully established by 14:40. This section is made entirely from sounds recorded from above and below the water's surface at the King Harry Ferry port in Feock on the Fal River, Cornwall.

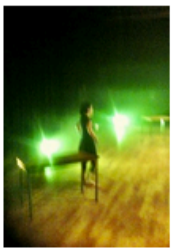
Figure 8: Gyllyngvase Beach on a field recording trip, February 2014.

'Mermaids' and 'Confessions'

'Mermaids' begins at 16:44 with the introduction of pitched material made from filtered and pitch-shifted *Hydrology* archive sounds. A calm, more focussed atmosphere is established, maintained through 'Confessions'. The transition to 'Confessions' is initiated by the introduction of a 3/4 rhythmic loop at 19:49. This is the sound of a ship's engine out at sea captured using hydrophones from the headland at Pendennis Point. 'Confessions' evolves slowly from the same musical material as 'Mermaids', but with a gradually expanding range of pitches. New sounds and textures are also slowly introduced. For example, different engine sounds are heard: a yacht motor from Penryn Marina at 24:31 and 24:45 and a fishing boat from the quayside in Falmouth at 24:36. Elements from the 'Trio' texture first heard at the opening of *Hydrology* are gradually mixed in, appearing first at 24:13, and becoming more prominent as the piece develops. Finally, from 25:40 to the close of the track at 26:32, we are left almost exclusively with material drawn from the opening 'Trio' texture.

Appendix 1: *Hydrology* blog

(http://waterlandscapesound.tumblr.com/page/3).
The full blog can also be found on the Data Drive.[7]



Second performance of *Hydrology* tonight - the first performance was last night. All went very well! The piece was performed in Studio C at the Falmouth University Performance Centre, with the audience free to move around the space.

— 8 months ago

Final rehearsals this afternoon for the first performance tonight. This was the first time we've done a full run through with the lights and proper sound. All rehearsals till now have used rough stereo mixes played through a not too great sounding system, so it was exciting to be able to give the dancers the real sound world to work with. Throughout the creative process I've been playing back completely dough sounding stereo rough mixes knowing in my mind how it will sound eventually. I've been telling the dancers 'it will sound much better than this'- so it's a relief to be able to deliver on that promise! We work with a sound system owned by the Simon Birch Dance Company that uses 8 speakers (EV ZX4) and 8 separate amp channels (QSC GX5). This set up is fed audio from a Moto Ultralite firewire soundcard, with 10 separate analogue outputs, running off my laptop. In this particular set up, in addition to the 8 EV speakers, we also used 2 subs provided by Falmouth Uni. We've used this set up outdoors in lots of contexts, including with the dance installation *Terrarium*, (see website here) where the speakers were arrange in a large 30m diameter ambisonic circle. It's an important dimension to our work; using field recordings and obscure sound material (such as ice melting and underwater sounds etc) is one thing when simply playing them back with

Tech day and mixing in the space

A busy day on Tuesday. I was up late the night before preparing and completing finished rough mixes of the whole piece for the rehearsal. Thursday and Friday last week involved getting detailed timings down regarding different sections of the piece and also making final decisions regarding what sections of music and sound to match with each section of choreography. The weekend was then spent working on creating a final master composite project in Reaper containing the complete piece mixed ambisonically. This needed to be ready and complete for the session with the dancers yesterday. We spent the first part of the day setting up the lighting rig, the ambisonic sound system and trying out costume ideas. Then for the last couple of hours we ran through sections of the piece making alterations to the sound where necessary. I then had an evening to work with the sound in the performance space with the ambisonic rig. I was there till 2am, so it was a long session! The picture above shows my little work station in the centre of the room.

— 8 months ago

▶ Listen

Time stretched sounds of water flowing. Slowed down in speed and pitch to start with, and then time stretched, which mean slowed down in speed, but not pitch. I used some of these types of sounds to build up tension going from the opening trio section into the quartet section.

[7] See: /DataDrive/Hydrology Media/Hydrology Blog/.

Jazz in the foyer bar Tuesday night just down the corridor from the studio I was mixing in.

— 8 months ago

Putting together the first half ambisonic composite tonight - it's going well!

— 8 months ago

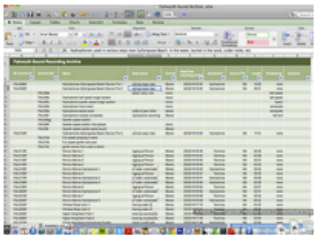
Fixing sound, time and movement - floating elements bind to create form

Today was very productive - we worked on fixing the sound and movement for the first half of the piece. I've been working hard over the past week on the sound, coming up with textures and ideas. I had a tricky weekend - I got food poisoning (I think from some underdone mussels I had at a restaurant) which took me out from Friday to Monday. I managed to work but it was slow. So I lost a bit of time. But I'm back on track and have been developing things. Last night I came up with a nice idea to move from above the water surface to below - a kind of sonic whirlpool that builds tension, then takes the sound down in pitch to a place that sounds like it's below the surface. A bit like falling down a waterfall. We used that today to make a transition between the opening trios and the quartet section. The atmosphere changes, from a lighter, more open feel at the start to something darker, more intense. It worked well we thought. We also fixed the use of a boiling water sound in a section that

headphones or in a studio environment - it's kind of interesting conceptually, but not really very exciting. But playing them back in a large scale sound field is something else. The sound then becomes an immersive experience, and has a physical dimension - it fills a large space, and the audience are *inside* the sound fabric; it passes through them, and is all around them. So it's more exciting as an experience for the audience and dancers involved, and you can generate an emotional response. The work becomes an emotionally engaging musical and sonic experience in itself, rather than simply an interesting artistic idea or concept. Also, with ambisonic systems, because you have so many speakers and amps, non of the equipment is being driven hard, so you can have high levels of volume and intensity without any distortion or interference in sound quality.

— 8 months ago

Sound Archive



The sound archive for the project has grown to over a hundred and thirty entries. The majority are source files - original recordings made here in Falmouth. They are prefixed with the text FALSF and a number. For example FAL086SF is a source file of recordings of ice melting. I store notes and info regarding time, place, equipment used, format, if there's processing etc. Other sounds are labelled without the SF, meaning they are derived from source files. A sort of second layer. These are often named in reference to the source. For example FAL009a, FAL009b etc. This is very useful, as there's no way to keep a mental image of everything you've done once you end up with hundreds of individual sounds.

— 8 months ago

— 8 months ago

Bike ride out to the Helford Passage on Saturday 8th March to take a break from working on mixing the piece and enjoy the good weather. The Helford Passage is a ria (flooded river valley) through which runs the Helford River before it runs out into the English Channel.

— 8 months ago

On Wednesday we set up 4 speaker from our sound system up in the flat I'm staying in. I figured it was better to have constant access to a studio of sorts, rather than sporadic access to the studios at Falmouth. This way I can mix in ambisonics, decoding it to Quadrophonic for monitoring. Even though the sound will be different in here, at least I'm using the same speakers. I'm going to have to play with the sound in the performance space a good deal anyway, as it's such a big space. Ideally I'd have more access to the system in the space, but that's not going to happen, so this is a pretty good compromise. The nice thing about ambisonics is that you can mix it and then decode the mix to whatever format you like - the spatial

11. Transmission

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Cover Image: Transmission in performance. (©Chris Nash)

All photographs not carrying a copyright symbol by Jon Hughes.

Introduction

Transmission is a dance piece and interactive installation developed collaboratively by a number of artists and researchers: choreographer Simon Birch, composer Jon Hughes, lead artist and producer Becs Andrews, sound programmer and musician Dr Tom Mitchell, visual artist and programmer Phil Tew, electronic engineer Dr Seb Magwick, and evolutionary biologist Professor Mike Brockhurst. It was first performed as a dance piece and installation in June 2014 as part of the University of York's *Festival of Ideas*. It was subsequently performed as an installation only at the *Manchester Festival of Science* in October 2014. It has also been shown as a dance film (Made by FACT, Liverpool) at public screenings in York and Manchester. The Data Drive accompanying the text contains a number of relevent files: *Transmission* complete stereo audio file;[1] stereo audio files of the individual sections of the music;[2] a complete video film of *Transmission*; a ten minute documentary about *Transmission*;[3] a two minute trailer for *Transmission*; an archive of photography by Becs Andrews, Pete Le May, and leading dance photographer Chris Nash.[4] *Transmission* was funded by The Welcome Trust and Arts Council England.

Figure 1: the *Transmission* creative team, photographed on the interactive dance floor: Becs Andrews centre front, and on the back row left to right: Phil Tew, Professor Mike Brockhurst, Dr Seb Magwick, Jon Hughes and Dr Tom Mitchell. (©Pete Le May)

[1] see: /Data Drive/Transmission Media/Transmission Audio/Transmission (complete stereo mix)
[2] see: /Data Drive/Transmission Media/Transmission Audio/Transmission individual section sound files/
[3] see: /Data Drive/Transmission Media/Transmission Video/
[4] see: /Data Drive/Transmission Media/Transmission Photographic archive/

Starting point

The starting point for the piece was a day-long meeting set up by Becs Andrews and Mike Brockhurst in London. This involved the entire creative team mentioned above and took the form of an informal discussion. The project was funded primarily by The Centre of Chronic Diseases and Disorders (C2D2) at the University of York. C2D2 is an institution-wide 'virtual centre' for coordinating, promoting, supporting and maximising the benefit of interdisciplinary research and research-linked activities in the area of chronic diseases and disorders. It is funded by The Welcome Trust to promote and foster interdisciplinary work and research that promotes health issues.[5] Adhering to the primary concerns of the funding body, the focus of *Transmission* was to help publicise aspects of Professor Mike Brockhurst's research that relate to health issues, specifically the transmission of disease. Mike's research as an evolutionary biologist involves work with evolution in relation to the mechanics of disease transmission. It is possible to successfully study evolutionary processes in microscopic organisms such as bacteria or viruses owing to the fact that the life cycle of such organisms is so brief; replication happens at a fast pace due to the exponential nature of a bacterial population's growth curve.[6] As a consequence, the mechanisms of genetic mutation and natural selection that take place within a rapidly expanding bacterial population can be studied in some detail. Epidemiological research employs techniques relating to evolutionary biology, for example to track the transmission of a disease through a human population by identifying changes in the organism's genome. Such research might produce 'transmission trees', visual representations of an epidemic showing who infected whom, created through a fusion of epidemiological and genetic data.[7] Such transmission trees emphasise the ways in which disease transmission is bound up with social networks.

Figure 2: *Transmission* installation. (©Pete Le May).

[5] For details see http://www.york.ac.uk/c2d2/.
[6] The growth rate of specific bacterial species is measured as a 'Bacterial population growth curve' (ENGELKIRK 2010 page 372). A population increase of a factor of ten in under an hour is typical with E Coli bacteria in ideal laboratory conditions for example. (TROPP 2013 page 192).
[7] See for example JOMBART T et al 2014.

Our first meeting in London enabled us as a team to develop embryonic creative ideas. This initial meeting was then followed by a research and development (R&D) week at the University of York in December 2013. The next stage of the process was a two-week R&D at dance studios in Falmouth in March 2014 in which the dancers, choreographer and composer worked together more closely. This was then followed up with a weeklong final development period culminating in the first performance in June 2014. The programme for the first performance can be found reproduced in *figure 3* below.

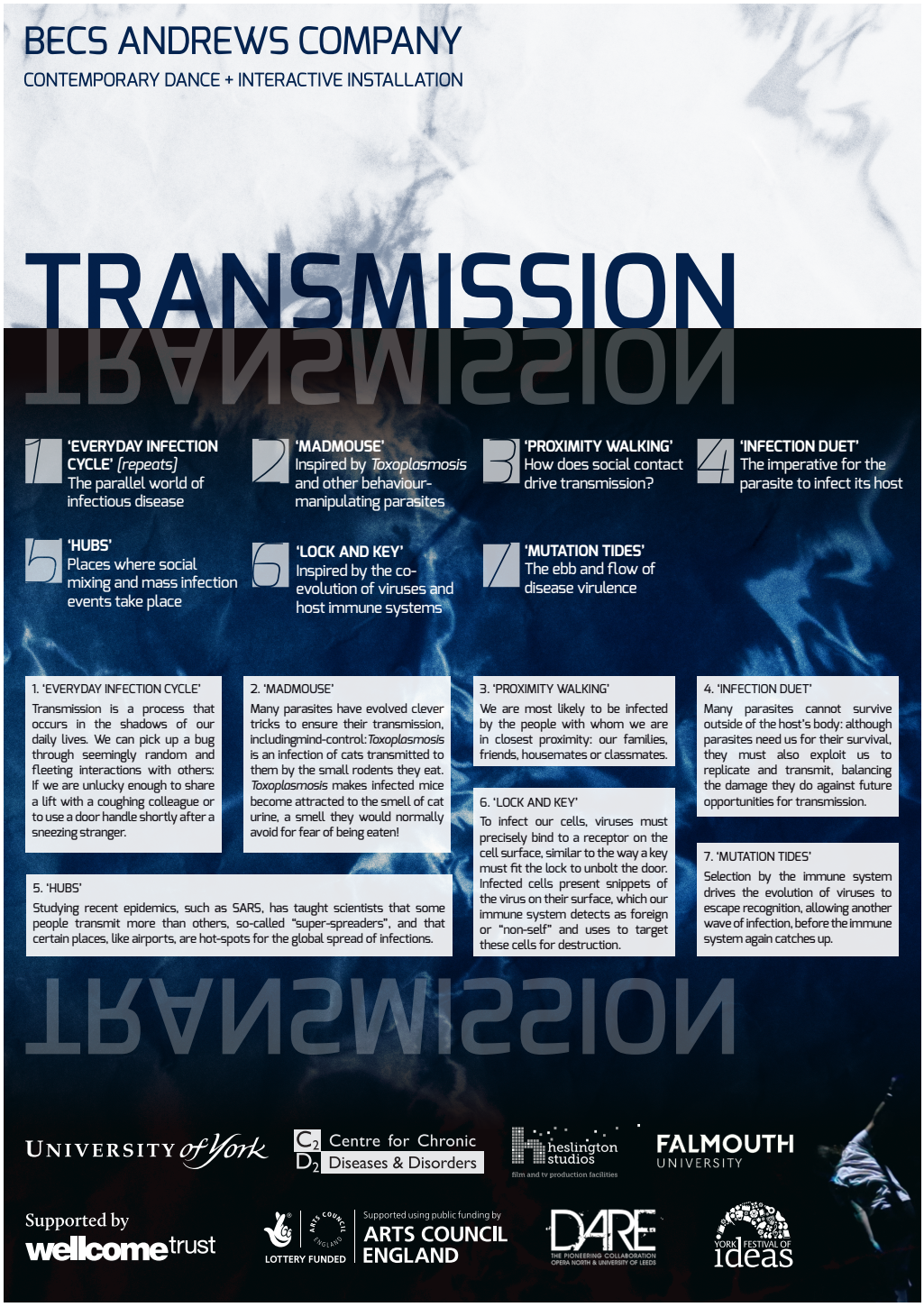

Figure 3: *Transmission* programme.

The Use of Technology

From the start, the intension was to create a piece utilizing considerable technological resources. These resources were provided primarily by Dr Seb Madwick, Phil Tew and Dr Tom Mitchell, who had worked together as a team on past projects, including for example the award winning *Danceroom Spectroscopy.*[8] As a group they had devised a working system of interactive audio and visual technology; we adapted and developed this existing technolgy in specific ways for *Transmission*.

The Interactive Visual System

The visual system involved the use of an interactive dance floor designed and built by Phil Tew. Infrared Konnect cameras were mounted overhead in the performance space, operating together with bespoke software written by Phil Tew. This system enables the presence of any number of individuals entering the dance floor to be detected. Their movements can then be independently tracked and used to generate visual imagery that is projected onto the floor in real time. *Figure 2* below shows the interactive dance floor in use in performance.

Figure 4: *Transmission* Interactive dance floor in use in Performance ('Proximity Walking'). (©Chris Nash)

[8] *Danceroom Spectroscopy* – see here: http://danceroom-spec.com/, which was given an honorary mention at Ars Electronica in 2013.

The Interactive Audio System

The music for *Transmission* was originally written using Max/MSP[9] and the digital audio workstation Reaper. In performance, Ableton Live and Max/MSP were used together with interactive software and hardware. The hardware for the interactive audio system included two different types of sensors worn on the body: the X-Bimu and X-OSC, both of which are made by X-iO technologies, a company run by Seb Magwick and Tom Mitchell.[10] In *Transmission*, X-Bimu sensors were worn on the wrist, and they enabled the dancers' wrist movements to be translated into data that could be used to produce and manipulate sound.

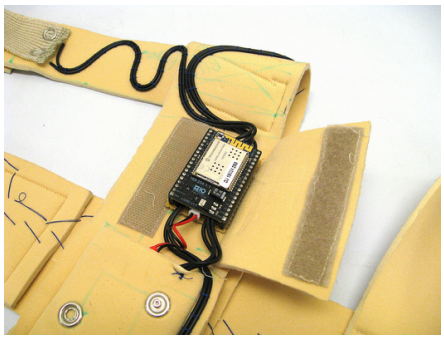

Figure 5: X-iO technologies sensor.

The X-Bimu uses on-board sensors and specially designed algorithms to provide both inertial sensor data and real-time measurement of orientation relative to the Earth. This is communicated as OSC data wirelessly (using an integrated XBee wireless module made by Digi International), and this is then converted to MIDI data via specially made software written by Dr Tom Mitchell. This MIDI data was then used to control music production software such as Ableton Live and Max/MSP. The second type of sensor, the X-OSC, was used alongside infrared proximity sensors. These were worn by the dancers and transmitted OSC data wirelessly which in turn was converted into MIDI data by software written by Dr Tom Mitchell.

Figure 6: X-iO technologies sensor holster. Worn by *Transmission* dancers beneath their costumes.

[9] Max/MSP is a visual programming language developed by Cycling *74*.
[10] http://www.x-io.co.uk/

My role as composer was to create a sound world and musical landscape as a response to the scientific research that was developed closely with the choreography. The project also required me to think of ways to integrate the technological resources described above into the piece, a process that threw up some challenges: the use of interactive technology does not *automatically* make a work more interesting; in fact, the use of such technology can potentially be a limiting, rather than liberating, factor. For both the maker of work and the audience member experiencing it, interactive technology has the potential to become a kind of rigid experiential limiter, a governing 'grid' placed over an experience. The subtle process though which an individual responds to the stimulus of an artwork, or through which makers relate to one another in the process of creating such a work, can become simplified and filtered through the somewhat coarse perceptual and experiential resolution imposed by technology.

Figure 7: *Transmission* in performance ('Everyday Infection'). (©Chris Nash)

From the perspective of the audience, the danger, to quote theorist Brian Massumi, is that the work '*operates more on the level of predefined objective function that fully lived relation*.'[11] To put it another way, the interaction that takes place in the psyche of an audience member when exposed to an artwork is extremely complex, whereas the complexity of interactions that takes place when interactive technology is used can often be rather simple; once the interactive processes are understood, and the 'trick' of the interactive game is worked out, the effect of the

[11] MASSUMI 2011 page 46.

work as a whole is limited; however difficult and complex an operation it might be to programme and create the technology employed, the meaning of the work is governed by a process of working out what amounts to a set of simple relationships in the physical world.

This kind of distinction is also an issue when *creating* work using interactive technology. There is a danger that the psychic depth of the interactions shared by creative practitioners might shrink to fit the parameters set by a programmer or sensor maker. A wrist sensor that can provide a trigger when moved in a particular way is fun to play with, but the whole enterprise is easily reduced to a game of 'air drums': air drums can be fun, but their expressive capabilities are limited, and they have a tendency to dominate. If one is trying to create an artwork, rather than a game or interactive exhibit, then there is a problem here that needs to be negotiated. Otherwise work made with such technology can very quickly become about a simple one-to-one correspondence between movement and sound. This is the reason I think that in the final piece, the interactive audio technology was kept to a minimum: it was used in only two sections, 'Proximity Walking' and 'Hubs'.

Figure 8: *Transmission* installation.

This is also a result of my own lack of expertise with the technology; I did not want the whole compositional process to become about my struggle to master the technology, and so on the whole fell back on my own methods and habits of working in order to get things done. For 'Hubs', in contrast, I specifically set out to develop a way of working that depended entirely on the sensors; the choreographer and I agreed to do this to see what would happen and experiment with a different way of working. I reasoned that this was a reasonable proposition for a single section of the piece.

The Complete Piece

The final piece consists of seven sections, as can be seen on the timeline in *figure 9* below:

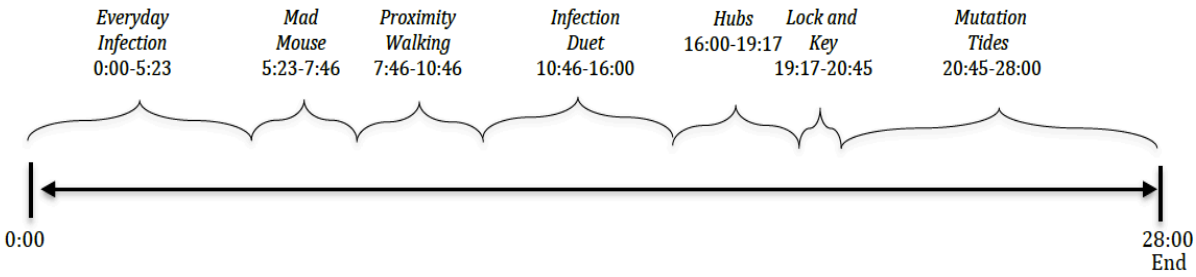

Figure 9: *Transmission* complete form.

Sound Sources

Sounds used in *Transmission* come from a range of sources. I dipped into my own sound library for a lot of material, using sounds originally created for other projects such as *Another Place* (see Chapter 5) and *Ice Pictures* (see Chapter 3). For example the reverse gong sounds used in 'Everyday Infection' (first heard at 0:00 to 0:19) were originally made for 'Gunderlay', a track from the album *Ice Pictures*. Other sounds, however, were created specially for the piece. For example 'Mad Mouse' and 'Proximity Walking' are made entirely from processed percussion sounds recorded in a session with percussionist Beaux Stocker conducted specifically for the project. Each individual section of *Transmission* will be discussed in more detail below.

Figure 10: *Transmission* in performance. (©Chris Nash)

Individual Sections

'Everyday Infection'

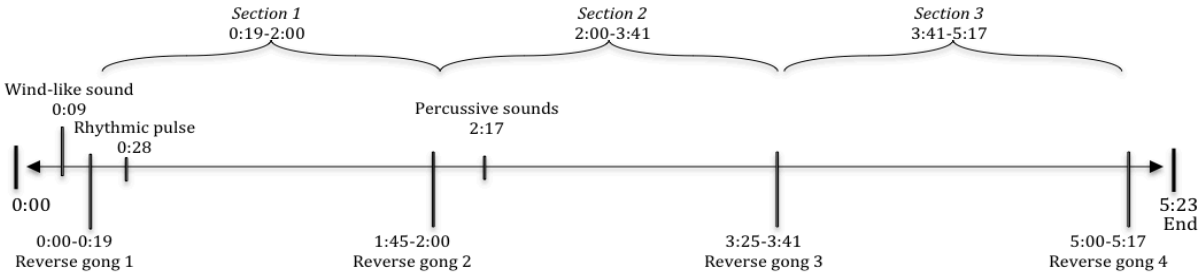

Figure 11: *Everyday Infection* complete form.

'Everyday Infection' can be subdivided into three sections; the beginning and end of each is marked by a reversed gong tone[12] that gradually increases in volume, building towards a gong strike. This tone appears for the first time at 0:00, with the gong strike at 0:19. Wind-like sounds created from processed rebab recordings are first heard at 0:09 and occupy the foreground in sections 1 and 3.[13] Section 2 is dominated by a more overtly rhythmic texture, beginning with the loop that starts at 2:00 and continuing with the percussive sounds that first appear at 2:17. These percussive sounds are sourced from a recording session with percussionist Beaux Stocker conducted specifically for *Transmission*. Section 3, which begins at 3:41, sees a return to the texture first presented in section 1.

The biological concept operating as a creative stimulus for 'Everyday Infection' is the notion of infection as an invisible force is everyday life: beneath the surface layer of our daily lives and social interactions, the mechanisms of infection and transmission operates outside of our awareness on the microscopic level.

'Mad Mouse'

'Mad Mouse' is constructed almost entirely from processed percussion sounds from a recording session with percussionist Beaux Stocker conducted specifically for *Transmission*. I worked with Beaux in the studio using a rhythmic loop constructed from processed gender recordings (originally made when creating *Ice Pictures*). I had first used this loop when working with the dancers in the R&D session in Falmouth, and they created movement in response to it. This movement was strong, rhythmic and expressive, and I decided that the best way to move

[12] Sourced from my own sound library, and originally used in *Gunderlay*, a track on the album *Ice Pictures* (see Chapter Three).
[13] These rebab recordings were originally recorded for *Ice Pictures*, but not used until here.

the piece forward would be to match that intensity in the music by working with a percussionist. The gender loop originally used with the dancers provided an acoustic backdrop in the studio, along with video of the dance from the R&D session in Falmouth. Beaux worked to respond to this material on drum kit under my direction. I then edited and processed the recordings to create the texture heard in 'Mad Mouse'.

Figure 12: *Transmission* in performance ('Lock and Key Duet'). (©Chris Nash)

The biological idea behind 'Mad Mouse' relates to Toxoplasmosis, which is a kind of virus that infects cats, amoung other animals, but can be transmitted by mice. Toxoplasmosis is caused by a single celled microbe called toxoplasma gondii, and infects most types of mammal and birds. It affects mice in a particular way however, by removing their innate fear of cats, even making them mildly attracted to cat odour. The reason for this is that toxoplasma can only reproduce in a cat's gut, and so has to affect the behaviour of mice in order to get itself there. Under the influence of toxoplasma gondii, the reckless and inappropriately fearless mouse gets eaten by the cat, and the toxoplasma can complete its life cycle.[14] In humans, studies have linked the toxoplasma infection with behaviour changes and schizophrenia. One study found links between an increased risk of traffic accidents with people infected by the parasite.[15]

'Proximity Walking'

'Proximity Walking' was created working with Beaux Stocker in the studio to record a wide range of hand held percussion sounds, including chime bells, cymbals, frame drums, baoding balls and pieces of scrap metal. The idea of the session was to capture a pool of interesting sonic material that could be used to construct an appropriate sound world. Sensors attached to the

[14] BARFORD 2013.
[15] BARFORD 2013.

dancer's bodies were also used in this piece: proximity sensors using infrared to detect the presence of other dancers were connected to a track volume control in Ableton Live. As a result, when dancers approached one another, the volume was turned up on specific audio tracks. The proximity sensors also triggered the water-like visual effect seen around the dancers (see the video at 08:56, for example) by sending trigger messages to the computer system controlling the projections.

Figure 13: *Transmission* in performance ('Infection Duet'). (©Chris Nash)

The relationship to biology and disease transmission here is connected with the notion of how we live alongside one another, often in anonymity; we pass by one another silently in our lives on a daily basis, and whilst most of these interactions are benign, some can have more serious consequences.

'Infection Duet'

This section of music dovetails into the preceding 'Proximity Walking' section and contains some elements from it, including some cymbal sounds, for example. These sounds are mixed with a texture constructed from various gamelan samples from the composer's sound library. The inspiration here for the choreography is the concept of viruses identifying host cells by a "lock and key" mechanism—that is, a neat fit between proteins on the outside of a virus and

specific receptor molecules on the host's surface. Viruses use a cell receptor protein to lock onto and identify their particular prey.[16]

'Hubs'

'Hubs' is entirely different from any other piece in that all sounds, except for the constant low level background ambient sound, are triggered by the dancer's movements. I created this piece using sound files from field recordings drawn from my own collection. The hubs referred to in the title are transport hubs such as airports and train stations. These act as nodal points in human culture at which we collect and gather in large numbers. As such, transport hubs are important places when it comes to the transmission and spread of disease across populations and international borders. Three of the dancers are wearing wrist sensors in this piece, each of which is connected to its own sampler made in Max/MSP by the composer. This sampler fires a sound file each time the dancers move the sensor in a fast percussive motion, creating a 'spike' in the amount of data transmitted when it passes a certain threshold. An important refinement to the Max/MSP patch is that the sampler will not fire another sample until the last one has finished. In this way, each dancer moves through a selection of eight samples in sequential order.

Figure 14: *Transmission* in performance ('Hubs'). (©Chris Nash)

I created the soundscape for the piece first, and then made a 'score' for the dancers, which gave them a map of the times at which they needed to trigger each sample to reconstruct the piece through movement.

[16] LOCKERE 2006, page 177.

'Lock and Key Duet'

'Lock and Key Duet' uses a background static sound that was originally generated for the background of 'Hubs'. The inspiration in terms of choreography is the same as for 'Infection Duet': the 'lock and key' concept mentioned above.

Figure 15: *Transmission* in performance ('Infection Duet'). (©Chris Nash)

'Mutation Tides'

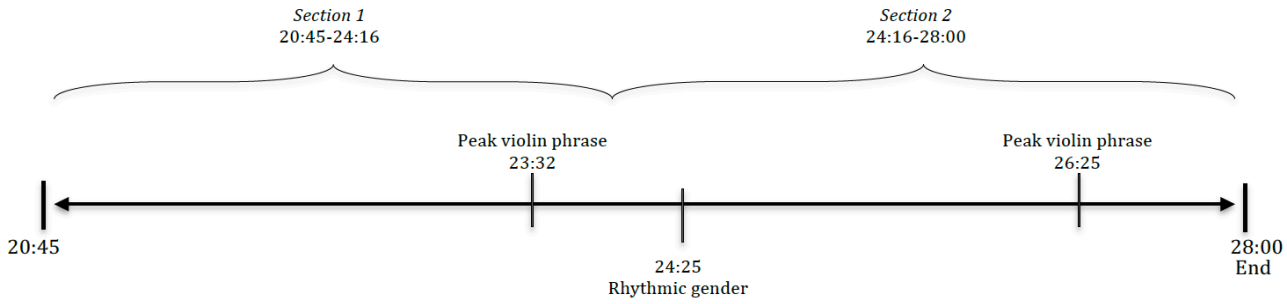

Figure 16: 'Mutation Tides' complete form

'Mutation Tides' was created from a single violin phrase played by violinist Dan Hodd and originally recorded in June 2013.[17] When working in Falmouth with the choreographer and dancers, I had the idea of using a more gentle and human sound source for this section of the piece. I started to experiment with this phrase, chopping it up and playing with transposing and

[17] Recorded as part of an arrangement I had created of the Norwegian folk song *Denne Jorde* for Finnish singer Andrea Eklund.

processing fragments of it. My original plan was to create a sketch in the rehearsal room, and work with a violinist in the studio at a later date. But the dancers and choreographer responded well to what I produced from this initial fragment, and so I stuck with it.

'Mutation Tides' is constructed in two sections: section 1 runs from 20:45 to 24:16, and section 2, a repeat of section 1 with some variation, runs from 24:16 to 28:00. Section 1 begins with a loop of approximately nine seconds. This loop plays throughout the remainder of the piece on two composite grouped tracks, one panned toward the left, the other towards the right. Over these loops, other fragments of violin enter, thickening the texture and building tension. These fragments continue to develop, building towards the 'peak' moment at 23:32, when a clear melodic phrase is articulated. The same material is then repeated in section 2, but overlaid by the rhythmic gender loop texture that enters at 24:25. Again the violin fragments build towards the peak violin phrase at 26:25.

Figure 17: *Transmission* in performance ('Everyday Infection'). (©Chris Nash)

The evolutionary biology concept underpinning this piece is the idea of gradually increasing complexity that grows from a single source code. In this instance, the source code is the single fragment of violin melody that, through transformative repetition, gradually accumulates mutations and evolves into a more complex version of itself.

Resource List

Resource List

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