The Memory of Music and
Music of Memory:
A Portfolio of Original Compositions

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Volume 3 of 3: Academic Commentary

Cardiff University School of Music
2017

Presented in partial fulfilment of the requirements for the degree
Doctor of Philosophy (Music) in Composition
Summary of thesis

The thesis explores through composition the processes of listening, remembering, storing, and recalling music and the ephemeral nature of these same actions, recognising that musical experiences can never truly be preserved. To explore preservation and entropy in memory and music, the portfolio of works is guided by three research areas: multi-level systemisation in compositional methods; reflection on the experience of music itself; and integration of acoustic and electronic techniques. The research concepts draw from the fields of ecological psychoacoustics, music cognition, memory studies, history of music technology, and philosophy and aesthetics.

The thesis consists of three volumes with accompanying supplemental materials. The first two volumes present a portfolio of original compositions, comprising sixteen works ranging from three to twenty minutes and from soloist to large string ensemble, including six electroacoustic pieces, with a combined duration of circa 100 minutes. Appendix One contains one piece, Artefacts for symphony orchestra, the composition of which provided the foundation for this project.

The third volume is a commentary on the portfolio (c. 27,000 words), providing context for the works and their compositional processes in terms of conceptual and theoretical bases, academic context, musical techniques and analysis, employment of electronic technology, the influence of other composers and artists, and placement of my work within the field of composition.

The commentary is divided into five parts. Part One covers research concepts and context; Part Two examines structural use of systemisation and collage; Part Three outlines approaches to harmony; Part Four describes the use of electronics in the portfolio, connecting these techniques to the research concepts; Part Five presents a detailed description and analysis of three pieces that illustrate a synthesis of the methods explored over the course of composing the portfolio. The supplementary materials include recordings of the works and Max/MSP patches accompanying the electroacoustic works.
DECLARATION

This work has not been submitted in substance for any other degree or award at this or any other university or place of learning, nor is being submitted concurrently in candidature for any degree or other award.

Signed ………………………………………… (candidate)       Date ………26/06/2017……

STATEMENT 1

This thesis is being submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy (Music) in Composition.

Signed ………………………………………… (candidate)       Date ………26/06/2017……

STATEMENT 2

This thesis is the result of my own independent work/investigation, except where otherwise stated.

Other sources are acknowledged by explicit references. The views expressed are my own.

Signed ………………………………………… (candidate)       Date ………26/06/2017……

STATEMENT 3

I hereby give consent for my thesis, if accepted, to be available for photocopying and for inter-library loan, and for the title and summary to be made available to outside organisations.

Signed ………………………………………… (candidate)       Date ………26/06/2017……
Acknowledgements

I am indebted to many for their kind support during this degree. First and foremost, I wish to express my great gratitude to my supervisor Dr. Arlene Sierra for her guidance, encouragement, and assistance in myriad areas throughout the degree process. I also thank John Howell and Joe Hillyard for generously taking on the time-consuming task of proofreading the portfolio and commentary.

This portfolio would not have been possible without the generous assistance of the performers, conductors, composers, producers, and ensembles who have workshoped, performed, recorded my works as well as advised and encouraged me along the way: Carla Rees, Odaline de la Martinez, Lontano, Robert Fokkens, Carducci Quartet, Dennis Russell Davies, Maki Namegawa, Bruckner Orchester Linz, Igor Retschitsky, Judith Weir, BBC National Orchestra of Wales, Jac van Steen, Frank Zielhorst, Cardiff University School of Music Contemporary Music Group, Heather Roche, Xenia Pestova, David Beard, Thomas Wilkinson, Sebastian Walker, Magnard Ensemble, Kenneth Hesketh, Signum Quartet, Michael Oliva, Dr. K Sextet, Gina Forsyth, Laura Beardsmore, Sorcha Rudgley, Lisa Nelsen, Gwenllian Llyr, Sarah Dacey, juice Vocal Ensemble, Louise Chartron, Elin Hâf Taylor, Orion Orchestra, Kelvin Lee, Maria Minguella, Lucy Fflur Jones, Thomas Goddard, Fiona Solenne Howell, Rich McReynolds, Blair Boyd, Leona Jones, Ivor Davies, Ashley Long, Karen Ní Bhroin, Jack Lewis, Daniel Bickerton, Alexander Davis, Matthew Poad, Michael Hearty, Sarah Vaughan Jones, Heidi Evans, National Museum Wales, Benjamin Atkinson, Alessandra Palidda, Kate Willetts, Emily Wenman, Andrew Mabey, Hope Vaughan-Hughes, and Matt Phenix.

I would also like to thank the faculty, staff, and postgraduate community at Cardiff University School of Music and my family for unstinting and gracious friendship and moral support. I extend my gratitude to Cardiff University School of Music for financial and logistical support over the course of this degree.
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Introduction

‘In the age of technological reproduction, we can sometimes experience an audible past, but we can do no more than presume the existence of an auditory past.’

‘In modern life, sound becomes a problem: an object to be contemplated, reconstructed, and manipulated, something that can be fragmented, industrialized, and bought and sold.’

My work in the portfolio presented here brings to the fore, simultaneously, the processes of listening and remembering music and specific, time-delimited environments, and the fallibility, ephemerality, and ultimate futility of these same actions—futility in the sense that specific experiences with sound can never truly be accurately preserved. To explore this somewhat paradoxical nexus of preservation and destruction, I have composed a portfolio of works guided by three overarching research areas: systemisation and generative compositional methods, reflection or commentary on the experience of music itself, and integration of acoustic and electronic techniques. The portfolio contains sixteen works that range in duration and size of instrumentation or ensemble, and represent varying compositional approaches informed by the three research concepts mentioned. While experimenting with the approaches and methods discussed in this commentary, my ultimate goal has been to mesh these methodologies with a distinct compositional voice.

In addition to this methodological experimentation, my research and the works presented here have been influenced by a range of related sources, including art forms and media outside music. The work of some composers often categorised as postmodernist (or at least exhibiting postmodernist characteristics or tendencies) and/or spectralist has been of particular interest to me in completing this portfolio and commentary; most especially, the work of Luciano Berio, Mauricio Kagel, Charles Ives, William Basinski, Laurie Anderson, Jonathan Harvey, Bernd Alois Zimmermann, Brian Eno, Sofia Gubaidulina, Salvatore Sciarrino, Kaija Saariaho, and Georg Friedrich Haas, among others, has proven particularly relevant to my work in the portfolio. Additionally, the work of French composers Maurice Ravel, Henri Dutilleux, Tristan Murail, Philippe Hurel, and Philippe Manoury has been of influence.

2 Ibid., p. 9.
In the portfolio, where I have used ‘found’ sources as inspiration for and/or elements contained within pieces, I make no substantive distinctions between sound sources and musical sources, and treat audio sources as roughly equal (for example, I make no categorical difference between the treatment of voices and instruments, or human and inhuman sources). As in the quotation above from Jonathan Sterne’s book on the archaeology of the auditory past, I have treated sound sources as objects for examination and manipulation on an equal footing, since listening and memory functions do not immediately create such categorical hierarchies, and listening experiences and sound memories are formed of collections of near-random auditory fragments grouped more by simultaneity and ecological factors than by source.3

The sources I have used have always been chosen with regard for my personal relationship to them, for a number of reasons. Firstly, it has been more fruitful for me to work with sources with which I already have some familiarity and past experience; secondly, I wished to avoid the wide and potentially problematically appropriative reach of a plunderphonics-style approach,4 as this is not a topic within the purview of this particular project; thirdly, I wished to reflect theories of both collective and individual memory that posit amalgamation of past experiences as central to individual and social identity formation;5 and finally, I do not believe that subjectivity and nostalgia are wholly escapable in this manner of working, nor do they exclude the ability of a listener entering into and engaging with a musical work,6 so I have not attempted to profess any form of objectivity in choosing my pre-existing materials. This represents new methodologies in my practice, and an exploration of Berio’s proposal of the composer as a kind of living text,


containing their own individual library of musical and sonic pasts upon which they draw for purposes of composition and interpretation.\textsuperscript{7}

This commentary is divided into five parts that examine different aspects of the portfolio. In Part One, I outline and define the three interrelated avenues of research (Chapter One constitutes the entirety of Part One). In Part Two, I examine generative procedures explored in several works that create structure on the local and macro levels by providing design principles for motivic materials and form. Following this, I investigate the use of collage as a different method by which to create compositional material and form, as well as to convey listening and memory concepts (in Chapters Two and Three respectively). Part Three, consisting of Chapter Four, examines categories of harmonic approach throughout the portfolio. Part Four discusses the use of electronics— in Chapter Five, as compositional and analytical tool, and in Chapter Six as an element of live performance. The final portion, Part Five, contains a substantial chapter (Chapter Seven) detailing a set of three pieces, \textit{Lost Museum}, which demonstrate a synthesis of techniques and methods combining my research topics.

Certain ‘watershed’ works in the portfolio will be discussed at greater length than others, as they served as primary research for specific concepts, and subsequent pieces trace their lineage to results achieved there. These pieces illustrate certain research concepts, serving as exemplary case studies. Additionally, while all of the pieces presented here contain some amalgamation of techniques and concepts, some are more allied to particular topics than others, or served in experimenting with techniques related to particular concepts; therefore, I will discuss some pieces in detail in relation to specific topics but make more broad mention regarding other aspects. A detailed listing of the works and their relevant history follows.

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N.B. The abbreviation CMG refers to Cardiff University School of Music's Contemporary Music Group
Part One - Research Aims

Chapter One - Research Aims and Context

The portfolio has been guided throughout by three main research concepts: 1) the design of systems that generate musical materials which result in multiple levels of structure; 2) reflection upon the experience of listening and remembering music; and 3) the integration of acoustic and electronic techniques. It is useful to distinguish the three areas for purposes of analysing different aspects of the portfolio, but in reality, there is a significant degree of overlap and interaction between the three. Compositional methodologies and concepts relating to the three questions usually coexist simultaneously within the portfolio works.

Systems designed to structure the work at multiple structural levels

Throughout this portfolio, an important principle I have attempted to follow, wherever possible, is to ensure that conceptual aspects of the pieces permeate multiple musical aspects of each piece: rhythmic, melodic, harmonic, textural, structural; this is especially a concern in relation to pieces that deal with extramusical concepts (e.g. in cases where the topic or reference treated in a piece does not inherently contain musical ideas and therefore becomes subject to transformational processes during composition). While each piece is a result of a subjective viewpoint and remains open to various interpretations (and I leave discussion of the efficacy of the works’ musical communication for another time), it is my intention to try and encode as much as possible of the concepts within the pieces in order to bestow a strong internal and independent logic upon them.

For the most part, this has taken the form of designing systems that are derived from the overarching concepts and which inform rhythmic, melodic, harmonic, and structural aspects. These systems are procedural and generative, specific to each work though possessing
similarities across different pieces, and can be combined with other compositional tools and employed with varying degrees of flexibility. This approach is not entirely dissimilar to Iannis Xenakis’ generative compositional procedures outlined in *Formalized Music.*

I see intriguing points of connection between systemised, procedural, and generative compositional processes and electronic sampling, as well as techniques of duplication and transmission more generally. Likewise, there are strong similarities to memory processes, which have, in turn, formed the models for technological and electronic reproduction and transmission techniques—a point to which I will return in the next section of this chapter.

Indeed, sampling is rarely a process of maintaining and transmitting a perfect duplicate of the original. Degrees of distance are introduced as the sample is divorced from its source; recontextualising and truncating the original changes its perceptual and semiotic value, and new variations are introduced. Far from static, samples (or borrowings of any kind) become subject to processes that can be described as procedural, generative, or evolutionary, acquiring a life and ‘biography’ (to borrow the term in this context from Joe Milutis) all their own. This effect has been widely noted regarding images and visual art, from surrealist collage to digital imagery and memes, where copies of images tend to acquire traces and artefacts of their journeys from context to context and through various editing processes.

In music, there are numerous examples where these transformative procedures have been employed, with varying degrees of intentionality. Some examples which I have studied in connection with the portfolio include the following: the recontextualised chord sampled from a recording of Stravinsky’s *Firebird* and integrated into the first digital sampler, the Fairlight Computer Musical Instrument, which subsequently became an ubiquitous and foundational sample in numerous hip-hop tracks; William Basinski’s piece *Disintegration Loops,* consisting of an electronic version constructed from repeated tape loops that were accidentally left copying

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10 Anne LeBaron, (p 27).
for many hours, resulting in decay and transformation, and an acoustic version transcribed and
orchestrated from the electronic piece (adding further transformation and distancing from the
original);\(^{14}\) a similar installation piece, *No Sharps, No Flats* by Alex Braden, Emily Francisco,
and Adam Richard Nelson Hughes, involving numerous tapes running continuously until they
wear out;\(^{15}\) and several pieces involving collage techniques which are conceptually adjacent to
these concepts of paradoxical continuity (transmission, reproduction, preservation) and decay or
metamorphosis (sampling, mash-up, recontextualisation, juxtaposition, procedural or
evolutionary transformation of a particular source), which I will address further in later sections.

**Reflection and/or commentary on the experience of music itself**

My second aim is to compose music that reflects and/or comments in some way on the
experience of listening to and/or remembering music. These two functions, listening and
remembering, are inextricably intertwined. The sounds that we actively notice, interpret, and
store in memory are conditioned by our existing memories—our listening is shaped by our
listening history.\(^{16}\) I wished to draw attention to the intermingling of hearing, listening, memory
processes, and environmental connections as a primary feature of all of the works in the
portfolio. Through varying approaches to this aspect in different pieces, I have experimented
with different forms of representation of this audition-memory confluence that are more or less
overt. While this nexus of perception and mind is often explored in art, in everyday experience it
is rarely a fully conscious phenomenon; therefore, I have found it worthwhile to examine this
through my compositional process, and in turn invite listeners to participate.


\(^{16}\) Clarke, p. 24. See also Snyder, pp. 23 - 25.
Memory and perceptual concepts

In order to create music according to the afore-mentioned rubric of reflection and commentary upon the experience of music, I have drawn on several concepts of memory and perception. These have encompassed a number of areas of theory and confluences of discipline. Some territories explored include the following: theories of ecological perception drawn mainly from the work of Eric F. Clarke, including perceptual learning, adaptation, and affordances; cognitive psychology of music, primarily the thorough summation of the key concepts provided by Bob Snyder, including features of auditory perception and cognition such as the tripartite schema of echoic/early processing, short-term, and long-term memory function as well as phenomena such as auditory streaming and grouping; technology as an extension of human memory, ostensibly expanding the capacity of perception and memory, as well as technology as externalised, inhuman memory storage, as elucidated in detail by Jonathan Sterne; and finally, collective and cultural memory studies regarding identity formation (individual and social) and mediation and transmission of the past, particularly the work of Maurice Halbwachs and Aleida and Jan Assmann as summarised by Astrid Erll.

These different strands of the study of memory and psychoacoustics have been investigated with a particular theme in mind: the fascinating contradictions between attempts to store, preserve, and interpret music, and the imperfections, fallibility, ephemerality, and mediating and transformative processes, of these same pursuits. Berio writes that, in contemporary times where ostensibly all of musical history could potentially be made available through various media of transmission (notation, recording, aural/oral transmission of various types), we ‘have at our disposal… an immense library of musical knowledge, which attracts or intimidates us, inviting us to suspend or to confound our chronologies. For over a century composers have been taking metaphorical trips to the library, to take stock of its endless shelves… a library that is unable to offer coherence, but can receive it from the right visitors. Today that library has become boundless. Rather like Borges’ “Library of Babel,” it spreads out in all directions; it has no before nor after, no place for storing memories. It is always open, totally present, but awaiting interpretation.’

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17 Clarke, pp. 17 - 32.
18 Ibid., pp. 36 -38.
19 Snyder, pp. 3 - 18.
20 Ibid., pp. 143 - 145.
21 Ibid., pp. 32 - 46.
23 Berio, p. 9.
Yet at the same time as this virtual flattening of time and space and profusion of resources exists, it is also true that we cannot truly access the past; in Halbwachs’ words,

‘a remembrance is in very large measure a reconstruction of the past achieved with data borrowed from the present, a reconstruction prepared, furthermore, by reconstructions of earlier periods wherein past images had already been altered.’

Recordings or other forms of storing musical information outside human memory are not immune from this, as they become artefacts with a life and history of their own, subject to entropy and decay or recontextualisation (intentional or otherwise).

Overview of collage techniques

While cellular and generative methods have often been employed primarily to create structure on a local level that in turn can generate larger structures, I have also used collage or borrowing as a means of creating structure on a large scale. I use the term collage broadly, to include any combination or juxtaposition of pre-extant materials, and not only to denote a stream-of-consciousness effect. Different pieces use borrowing or collage (in more or less the traditional sense of cut-and-paste or mash-up) in varying ways and in varying degrees.

Anne LeBaron has argued convincingly that there is a strong link between the use of musical collage as a postmodernist tendency and the surrealist practice of automatic writing; Glenn Watkins posits further that collage is often used as a means of relinquishing or at least calling into question the authorship of the composer. However, the use of collage in music is broad and versatile, and in many cases is not an abdication of authorship (pursued at times by both John Cage and Pierre Schaeffer in divergent directions), but conversely a means of exerting compositional authority or building structure by manipulating carefully selected borrowed materials in a highly controlled manner.

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25 Sterne, p. 332.
26 LeBaron, pp. 27 - 73.
28 Milutis, p. 72.
29 C. Catherine Losada, ‘Between Modernism and Postmodernism: Strands of Continuity in Collage Compositions by Rochberg, Berio, and Zimmermann’, *Music Theory Spectrum*, 31/1 (2009), pp. 57 - 100 (p. 59);
Rochberg, among others, have often tended towards this means of employing collage principles (a prime example being Berio’s *Sinfonia*).\(^{30}\)

I see my own use of collage or ‘found object’ practices from a slightly different, though not opposing, angle: something more akin to music as micro-autobiography, though not quite linear and perhaps more suggestive than fully representational (in the sense of communicating in a near-literal manner a particular environment, event, thought or emotion). My intention is to direct the listener’s viewpoint to a specific concept or experience through the lens of my own. In this way, I am in fact asserting authorial control by my use of collage. As a photographer might invite a viewer to ‘look through’ the photographer’s own eyes, I invite the listener to hear through my ears. This is similar to Walter Benjamin’s equating the audience of a film with the point of view of the camera.\(^{31}\)

While I do believe I exercise this control over my compositional material, I do not believe it is possible for the composer’s intentions to control the listener’s experience of a piece, as each listener brings their own unique listening history to the performance in quite a literal sense—the processing of heard music travels down existing neural pathways and interacts with existing memories.\(^{32}\) At the same time, each hearing of a piece is changed by its environment and performance format, visual and gestural aspects, and variations in performance, in addition to the listener’s own contribution of individualised history and hearing the piece afresh if not for the first time.\(^{33}\) Thus a definitive, idealised version of a work is not practically achievable—even the score is not necessarily an immutable, unequivocal representation of the piece, nor can realisations of the score be regarded as perfect, unaltered duplicates of the notation. It is precisely this ephemeral, multifaceted, and adaptive quality of musical experience—to use James J. Gibson’s term, affordances\(^{34}\)—which I intend to bring to the listener’s attention.

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\(^{32}\) Snyder, pp. 23 - 25.

\(^{33}\) Clarke, p. 24.

\(^{34}\) Ibid., p. 36 - 37.
Ultimately, it is less important that the listener fully understands or recognises the specific referential material in my pieces or whether the personal memories I incorporate can be considered as translatable to the perception of others. The effect of *déjà entendu* invites the listener to examine the memory objects as they are presented, but leaves room for this hypothetical audience member to find their own affinities, to recognise the references I have incorporated, or to experience the material as self-contained. This aligns with C. Catherine Losada’s postulation that, for many compositions, juxtaposition is not a rejection of connections but an embrace of associations.\(^{35}\)

A question that arises with each new piece is the level of context I deem necessary for the audience to be able to understand and engage with the work. I believe it will not be beneficial to adopt a definitive overarching principle applicable to each and every work. I tend towards the perhaps somewhat equivocal stance that the works will be effective regardless of the level of context provided (whether this context comes in the form of programme notes or other communications I provide, the audience’s own personal contexts, or a combination of these sources), and by simply furnishing different affordances for the listener based on the context present at the time of their listening experience. In effect, while I presume to assert authorial control within the compositions, I do not seek to be highly prescriptive regarding the rules of engagement for the listener. This fits well with Katharine Norman’s framing of the composer as storyteller and the listener as equal participant in the performance:

> ‘Surely our creative, imaginative, “intelligent” listening reception is as much a part of the performance as the composer’s interpretation… In relating what we hear to what we already know, we continue to make use of “everyday” listening, but we “expand” this listening into a musical activity. And this creativity of reception—another aspect of performance—is encouraged by the experiential quality of the material… we are listening in *through* the composer’s interpretive performance of the sounds— an essentially emotional remembrance of experience… It seems that the way we make the related experience of stories our ‘own’ may have less to do with simple recognition than with an underlying emotional empathy that involves us with the teller’s public “remembering” of events… We accept, and emotionally incorporate, an interpretation of events which we haven’t ourselves experienced and personally remembered…’\(^{36}\)

For most compositions in which portions of extant material have been used, the palette of sources has been restricted to those with which I have a personal connection and history of

\(^{35}\) Losada, p. 59.

\(^{36}\) Norman, pp. 106 - 108.
experience. Naturally, this is partly for reasons of personal interest and emotional connection, and partly due to familiarity on a detailed level with the relevant recordings or traditions. But beyond these considerations, I also wished to take care that the compositions in question are clearly a representation of my own memories of, reflections upon, and engagement with the specific sources rather than an impressionistic portrayal or pastiche. This pursuit is related to Maurice Halbwachs’ conception of memory as taking a primary role in identity formation, and said identity attaining its unique, individual character by the specific nature of one’s combination of memories more than any individual, singular identifying feature. Pieces that most strongly exemplify this approach include *Artefacts, Night Studies, Afterimage, Sur le borde de l’eau*, and *And am I born to die?*. For certain specific compositions, I have deviated slightly in approach, intentionally using more ‘distant’ and/or less specific source materials to convey a sense of remove or otherness (without aiming to specifically deal with issues of otherness in a central way). Within this portfolio, *Paper Imitation* and *Lost Museum I: Lamentation* fit the latter description.

**Scope of ‘reflective space’**

The portfolio, for the most part, presents for the listener’s consideration musical objects which are relatively limited in scope and usually function on the scale of short-term memory processes (which occur over 3 to 12 seconds on average) as a means of examining wider concepts by extension, as opposed to large-scale, immersive environments comprising numerous, highly heterogeneous classes of materials. I see this as an analogous framework to Walter Benjamin’s observation in relation to photography,

"by close-ups of the things around us, by focusing on hidden details of familiar objects, by exploring commonplace milieus under the ingenious guidance of the camera, the film, on the one hand, extends our comprehension of the necessities which rule our lives; on the other hand, it manages to assure us of an immense and unexpected field of action."  

In other words, the intention is to create a lens for exploration of elements that might otherwise escape perception, creating a space for reflection and examination by the perceiver:

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38 Snyder, p. 47.  
39 Benjamin, p. 235.
‘with the close-up, space expands; with slow motion, movement is extended. The enlargement of a snapshot does not simply render more precise what in any case was visible, though unclear: it reveals entirely new structural formations of the subject.’

The photographic or cinematic concept above also relates to Pierre Schaeffer and Michel Chion’s modes of listening: in particular, écoute réduite (reduced listening) in which the focus shifts from sound as a vehicle of auditory information about its source to the traits of the sound itself. But whereas reduced listening involves abstracting sound completely from the context and environment of its source, the photographic or cinematic analogy is more apt in regards to my work, as the pieces in the portfolio intentionally preserve and centre vestiges of their context and environment. The concept of examining aspects of one’s environment (whether in the present or in the immediate past as accessed through memory or technology) informs my use of both collage/borrowing and electronic technologies, in a similar way to the photographic and cinematic concepts described by Benjamin.

While some works focus specifically on limited, detailed elements, several pieces do employ large-scale architecture built upon blocks of motivic material. The works contained in the portfolio run a gamut between more limited and more expansive approaches in terms of the scope and unity of materials; with each piece, it was necessary for me to delineate the scope afresh.

Integration of acoustic and electronic elements

As this portfolio is primarily concerned with deriving new compositions via reflection upon and usage of sounds from the past, an attempt to include, however indirectly, the means of transmission of these sounds (namely, sound reproduction technology) naturally followed. These technologies have been invented expressly as an extension of human perceptual and mnemonic capabilities, and are largely modeled upon these same physiological and neurological functions. They optimistically promise a high-capacity, less fallible external memory, and a

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40 Ibid., p. 236.
42 Sterne, pp. 32 - 85.
means of instant access to the past. Ultimately, the fulfilment of this promise is partial at most, as the specific context and environment of the original, live sound source can of course never be completely accessed again, and sound reproduction technologies invariably mediate and alter the original sounds. Jonathan Sterne writes:

‘Recording is a form of exteriority: it does not preserve a preexisting sonic event as it happens so much as it creates and organizes sonic events for the possibility of preservation and repetition. Recording is, therefore, discontinuous with the “live” events that it is sometimes said to represent (although there are links, of course). Like the body embalmed, recorded sound continues to be able to have a social presence or significance precisely because its interior composition is transformed in the very process of recording. This unique transformation of the interior to facilitate the functioning of the exterior is one of the defining characteristics of sound recording’s so-called modernity. If the past is, indeed, audible, if sounds can haunt us, we are left to find their durability and their meaning in their exteriority.’

This seeming paradox of preservation of ephemeral sound events causing different types of alteration and transformation is intriguing and worthy of examination through composition, especially when one considers the medium of a sound’s reproduction as part of the history and identity of that sound as opposed to a simple duplicate. The transmitting technologies themselves become a source of auditory or other information, adding to the specific listening experience of the sound in question: ‘Sound-reproduction technologies are artifacts of particular practices and… can be considered archaeologically’; furthermore, they ‘[encapsulate] a whole set of beliefs about the age and place in which [their creators] lived.’

Within the portfolio, I have used electronics and the interaction between electronic and live elements to reflect these concepts, while the actual technologies of the past themselves are not physically present or necessarily centred in the works. Instead, the focus is upon what traces are left, and what alteration occurs, in sound that has been acted upon by technology. This can be seen in numerous works, including Night Studies, Timestamp, and Sur le borde de l’eau, among others. One slight exception is Lost Museum II: Photo Booth where the sounds of wax cylinder rotations are present in the final work— though the wax cylinders themselves, or the machines to play them, are not physically present.

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43 Sterne, p. 332.
44 Here, I treat sounds and music identically as auditory sources, without defining a boundary or distinction between them as categories of auditory information.
45 Sterne, p. 7.
46 Ibid., p. 9.
Collage and electronic audio technologies

There are significant connections between musical collage and electronic audio recording, editing, and production—allowing for overlap between the second and third research topics in the portfolio. The connection between the two has been well documented and elucidated by numerous writers. Anne LeBaron links trends of surrealist collage and automatism in the visual arts beginning in the 1920s to more recent currents of collage employment in music (specifically, from *musique concrète* onwards); she argues, that while layering and collage were already certainly present in music by the advent of recording technology (particularly in the works of Ives, Varèse, and Satie), it was not prevalent until audio technology developed enough to make sampling, splicing, rearranging, overdubbing, and similar techniques available widely as compositional and orchestrational tools. As the pace of development of audio technologies accelerated and the possibilities for widespread and immediate mass distribution increased, electronic tools, processes, and concepts have become commonplace even when electronics are not directly employed in any fashion (to give one example, Ligeti’s acoustic compositions indirectly influenced by electronics, such as the Sonata for Viola Solo, which incorporates processes of looping, sampling, acoustic analysis and time manipulation that seemingly imitate electronic processes). These techniques in relation to the creation of collage have been explored by a large number of other composers, including Pierre Schaeffer and others’ *musique concrète* works, Daphne Oram’s ‘Oramics’ pieces, Karlheinz Stockhausen’s *Telemusik*, Jonathan Harvey’s *Mortuos Plango, Vivos Voco*, Philippe Hurel’s *Flash-Back*, Michael Daugherty’s *Elvis Everywhere*, numerous works by Olga Neuwirth such as *Lost Highway*, Andrew Norman’s recent *Play*, and the work of electronic musician and composer Colleen, to name but a few instances. The abundance and commonplace nature of electronic audio technologies (aided in no small part by genres of music and sound art previously considered outside the realm of art music becoming more interconnected as a postmodernist tendency) has undoubtedly altered the way

47 LeBaron, pp. 33 - 34.
48 György Ligeti, Sonata for Viola Solo, ED 8374 (Mainz: Schott, 2001).
musical collage is conceptualised and composed.\textsuperscript{50} In my own works, as in those mentioned above, these links are intrinsic to compositional process and audible result, whether electronics are used directly or not. As I will discuss further in Chapters Five and Six, electronics are employed alongside other tools as part of compositional methodology, and often are treated as part of the instrumentation and orchestration of pieces, whether as a standalone instrument in itself, an extension of another instrument, or an admixture of the two. This has often resulted in works that present a collage (in the literal senses of layering and/or employing blocks of materials) created of live and electronic elements, with a blurred boundary between the sources.

**Liveness**

When dealing with the use of borrowed materials, recordings, various technologies, and electronics in various ways throughout this portfolio, some questions of approach arise. Specifically, why no acousmatic\textsuperscript{51} electronic pieces, improvisatory works, or environmental soundscapes been included?\textsuperscript{52} There are a few reasons for not exploring these avenues in this portfolio. Firstly, there are the pragmatic choices that have kept the scope of the portfolio within manageable bounds regarding time and topic. Accordingly, I have retained focus entirely on integration of electronic and acoustic techniques, rather than electronic techniques alone, and while several works contain degrees of flexibility, there are no instances of improvisatory scores. Exploring the different effects of improvisatory versus fixed notation in relation to memory concepts is a fascinatingly rich area, but would have been tangential to my delineated research questions, necessitating a large research project in itself. Secondly, as already noted, I wished to assert my compositional voice and authorship within the works, which caused me to steer away from using sound sources in less mediated, more direct ways. Furthermore, the works in the portfolio are designed for live performers, rather than intended to be recorded listening experiences; with recordings, the listener has a greater level of control over some aspects of the


\textsuperscript{51} Acousmatic meaning music or sound that does not have a directly visible source, such as an instrument. Chion, *Guide des objets sonores*, p. 18.

\textsuperscript{52} I should note, however, that I do not consider there to be a hard boundary between music and soundscape, and the latter need not be considered a wholly separate genre. See, for example, Arielle Saiber, ‘The Polyvalent Discourse of Electronic Music’, *PMLA*, 122/5 (October 2007), pp. 1613 - 1625.
experience (volume, pausing or altering playback, choosing where and how the recording is
transmitted, engaging in other activities while listening, etc.). By translating borrowed recorded
material back to live performance, I am removing such controls from the listener in order to
present my interpretive, performative voice, as well as that of the players, while inviting listeners
to alter their mode of engagement. This relates to Norman’s framework of composers and
performers as storytellers and the audience as creative interpreters who are additionally
collaborative performers of the work.\textsuperscript{53}

While I have incorporated non-musical sounds (e.g. sounds not originally conceived or
presented as music, such as sounds produced by natural sources) and treated them as equivalent
to musical sound, my second research concept focuses upon the experience of music; hence, I
have tended to give primacy to sounds that are conventionally musical. Finally, I was interested
in experimenting with the effects created by re-embodying disembodied recordings— recordings
that capture (in mediated form) a specific performance, but have been abstracted from that
human, embodied, time- and environment-delimited original source. This approach adds extra
layers of distancing, mediation, and polyvalence (or multiple potential meanings or
interpretations) to the pieces, while also providing a refocusing on acoustic, live features,
interpreted by the performer(s) and listener(s) in new and unpredictable environments. The
dialogue between live performance and electronic elements calls into question which sources are
more live, more present, and more embodied than one another.\textsuperscript{54}

An important aspect relating to liveness connects to Marshall McLuhan’s notion of
‘environment’ and ‘anti-environment’ in relation to art:

‘Environments are not passive wrappings, but are, rather, active processes which are invisible… Anti-
environments, or counter-situations made by artists, provide means of direct attention and enable us to see
and understand more clearly.’\textsuperscript{55}

In effect, by re-translating electronic sources to acoustic ones, or transforming them into new
electronic versions, I am, from one perspective, removing the sources from their environment
and placing them into an anti-environment: from a space where the nature of the recording itself
might be perceived as secondary to the content of the recording, certain aspects of the recording

\textsuperscript{53} Norman, pp. 105 - 106.
\textsuperscript{54} Milutis, p. 72. See also McLuhan, p. 63.
\textsuperscript{55} McLuhan, p. 68.
ignored or given less focused listening attention, or the presence of the recording media itself completely bypassed in consciousness in favour of focusing upon the transmitted content. From another perspective, I am translating or borrowing from one anti-environment (the recording, which has already been divorced from the original performance in order to frame that particular sound experience in a particular way) to another (my piece, where I draw attention to specific aspects, qualities, or new renderings of the recording). This relates again to Schaeffer and Chion’s modes of listening, in particular the concept of ‘reduced listening’, in which focus is given to traits of a sound rather than consideration of its source:

“In “everyday” listening, sound is always treated as a vehicle. Reduced listening is therefore an “anti-natural” mode, which goes against one’s conditioning. The act of disregarding our habitual references in listening is a voluntary and artifical act which permits us to elucidate a great number of phenomena implicit in our perception.”

Schaeffer and Chion’s ‘anti-natural’ écoute réduite is, however, a degree of abstraction beyond that evident in the pieces in the portfolio. Instead, I intend to combine such focused, abstracted attention with the modes of causal, everyday, referential listening and recalling, as described by Chion in connection with film. I am inviting the listener to pay heightened attention to what is a normal combination of listening processes in the context of live music (causal, referential, and reduced modes) by creating hybrid environments/anti-environments through re-translation to more or less live, embodied sources.

Electronic technologies and memory

I was intrigued by the parallels between physical memory processes in the brain (such as echoic processing, auditory groupings, or short-term memory storage limits, to name a few) and technological processes such as sampling and looping. Jonathan Sterne has documented in his study of early audio reproduction technologies that the development of such technologies and devices has always closely mimicked anatomical understanding. Therefore, it is hardly

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56 Clarke, pp. 3 - 16.
59 Sterne, pp. 32 - 85.
surprising that technologies such as computer software for audio recording manipulation should
form close correspondences with brain functions associated with sound processing.

Audio technology is often conceptualised as a form of external memory and a tool for
preservation that abstracts sound as a reproducible object untethered from a specific, local,
temporally-limited source, but technology always mediates and transforms, and traces of it
make their way into the sound itself, keeping it within the progression of time and history instead
of preserved in pure form outside of it. Yet it also, by virtue of its accessibility, gives the sound
object a transhistorical and geographically unbounded aspect.

Traces of an object’s technological transmission history are inescapable even when the desire
is to preserve for posterity an unchanging and ‘accurate’ version of the object. ‘Perfect
transmission’ has been described as a ‘myth’ by Rosa Menkman as the introduction of ‘noise’
can never be fully avoided. In the case of audio recordings, this can take the form of distortions
of pitch, timbre, or tempo, noise artefacts such as hissing or crackling, decay of storage media
resulting in audible alteration or erasure, unintentional background sounds introduced into the
recording, etc. This effect can be seen in action across all forms of reproduction technologies; for
example, even digital image files, which ostensibly are intended to remain identical regardless of
how many times they are copied, tend to accumulate traces of their travels across the internet or
other transmitting technologies in the form of screenshots, visible compression/decompression
artefacts, watermarks, etc.

My pieces deliberately aim to incorporate their transmitting media, not in a direct or literal
fashion, but treated as an integrated part of a source’s make-up, on equal footing with other
parameters such as pitch, rhythm, timbre, etc. There are relevant analogs in digitally-based visual
art that have been of influence to my practice. The work of Hito Steyerl, among others, focuses
upon the visibility of the producing or transmitting technologies or media which occurs within
these genres of digital arts. A prime example is her recent installation Factory of the Sun,
described in an exhibition text as follows:

Hito Steyerl’s immersive three-dimensional grid is modeled on motion-capture studios, where body
movements are recorded and translated for use in computer-generated imagery. The video on view within

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60 Ibid., p. 65.
62 Steyerl, pp. 32.
also features a motion-capture studio. In that one, workers are forced to dance in order to generate sunlight—though they also dance as a form of resistance to their data-mined servitude. The video shifts between mock newscasts, drone footage, and personal narratives, moving between different levels of reality like a video game. Simultaneously playful and critical, the work hints at the utopian potential of the Internet while also critiquing its use for surveillance and economic exploitation.  

While I do not intend a specific stylistic comparison with these genres of visual art, my aim and approach is conceptually akin: to make the means of transmission part of the fabric of the work alongside, and on equal footing with, the material contained within it—‘a shift in focus from the signified to the signifier’. Steyerl, in her writing and work, makes the further point that rather than regarding objects such as images and sounds as degraded or distorted by transmission in a negative way, the entropic changes that occur as a result should be viewed as part of the object’s story and material presence. In my works, I aim to represent this process of entropy and change (whether caused by passage of time, mediation by memory, or technological processes) in a direct way.

Music that links electronic technologies and memory processes, as my works often do, has a lengthy, established history and I do not present my overall approach as entirely novel—a few predecessors in this area who have influenced my practice include Laurie Anderson (especially Songs and Stories from Moby Dick), William Basinski (Disintegration Loops), Salvatore Sciarrino (Efebo con radio), works by Gavin Bryars and Steve Reich, and a range of others. Nevertheless, this portfolio does present aspects that are distinctive and personal: the particular confluence of generative and borrowing procedures combined with the focus on mnemonic concepts; the transformative methods, usually making use of electronics, employed with borrowed materials; and a ‘subtractive’ general approach to harmony (conceptually akin to subtractive synthesis in electronic music) with a tendency to modality, standing in contrast to

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64 The direct correlations to visual art here and elsewhere may not seem fully apposite to a discussion of auditory perception or music, and indeed, different media and different modes of perception should not always be treated as equivalent or interchangeable. However, as other art forms have been of great influence to my work in a direct sense, and concepts applying to visual media have long proven useful frameworks for considering and contrasting certain aspects of sound and music, the connections to visual media are a worthwhile if not holistic solution for addressing certain points.
65 Waters, ‘Beyond the Acousmatic’, p. 70.
66 By entropic changes, I mean those brought about by decay and a breakup of intended order or construction.
67 Steyerl, p. 38.
many collage- or memory-based pieces that employ an approach of harmonic saturation, chromaticism, or post-tonality.
Part Two - Structural Aspects

Chapter Two - Systemisation of methods for creating multi-level structures

Motive development and generative systems

As discussed during Chapter One, a primary concern at the commencement of this portfolio was the development of systematic ways of working within my practice. In particular, I started out by researching various methods of procedural generation, from analog methods such as following mathematical operations to computer-based methods. While originally this pursuit was intended to result in the design of overarching principles which could be applied to any work in the portfolio, for several reasons outlined in the following discussion these methods have become one set of multiple flexible ways of composing, dependent on the needs and aims of individual works.

A piece which served as a preliminary investigatory exercise of these concepts and which illustrates my employment of them is Phyllotaxis; in the next section I analyse and critique this piece in order to explore these ideas and my conclusions regarding them.

Concepts in Phyllotaxis

Phyllotaxis (pp. 1 - 30 in Portfolio Volume One), composed for B flat clarinet, cello, and piano, is designed to represent the spiraling growth patterns of plant leaves in sonic form, mediated by a systematic pre-compositional design. The instrumentation was chosen to provide degrees of contrast between the three instruments, allowing three strands of music to be distinguished by individual timbre at the outset, with opportunities for combined timbres and blending as the piece progressed. The title describes this growth process. In terms of texture and instrumental interactions, the piece is loosely inspired by Inuit vocal games, or competitive

music, usually known as *katajjaq*. In these competitions, usually two or occasionally four participants (usually women)\(^{69}\) face one another and produce patterns of motivic sounds (derived, at least partly, from the morphemes of words) using the breath and throat; each individual performs their own pattern, but the patterns interlock with complex hocketing and imitation that creates a phasing effect.\(^{70}\) The main motifs are repeated at specific time intervals and identified by particular intonation patterns.\(^{71}\) The game continues as long as the players can correctly perform the pattern in rhythm without becoming out of breath, laughing, or making errors.\(^{72}\) One participant may also change patterns without warning, and the other competitor(s) must adapt.\(^{73}\) Of the resulting textural effect, Jean-Jacques Nattiez writes:

> ‘In spite of the competitive nature of the game, the resulting sound must project the feeling that there is perfect harmony between the singers and such uniformity of sound that the audience is not able to discern exactly who does what.’\(^{74}\)

This effect takes advantage of the auditory streaming or melodic fission function of listening and short-term memory, in which groups of sounds heard in close succession and containing similar features (especially closeness of pitch height) are perceptually grouped into a single ‘line’ of melody.\(^{75}\) The main musical interest in the game involves manipulating this effect: each participant must sustain their individual line, but the combined streaming effect makes it difficult for the participants to maintain their line without errors, and confuses audience’s perceptions in terms of the source and independent nature of the different lines. While the game is in full swing, composite melodic, rhythmic, and structural features form out of the individual components of the stream. In addition to *katajjaq* and numerous other traditions worldwide, similar streaming effects can be readily found in the music of Steve Reich and Kevin Volans, among others.

The sounds and morphemes used in *katajjaq* often reflect and encode aspects of environment: names of ancestors or animals, toponyms, and the sounds of animals or other

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\(^{70}\) Ibid., para. 7 of 14.

\(^{71}\) Ibid., para. 8 of 14.

\(^{72}\) Ibid., para. 5 of 14.

\(^{73}\) Ibid., para. 8 of 14.

\(^{74}\) Ibid., para. 8 of 14.

\(^{75}\) Snyder, p. 144.
natural sounds, such as a burbling river or buzzing mosquitos. Katajjaq could therefore be seen as a means of storing and preserving environmental or natural memory data.

While I was interested in the aspect of ‘natural memory’ or sonification in the katajjaq tradition, the human memory element was also equally interesting to me. The ‘throat games’ (for they are not considered music or songs in the usual sense) could be seen as a means of preserving the environment of the original, unknown devisers of individual songs within the collective memory of the practitioners and listeners. This is particularly intriguing as the specific environments extant at the time of composition have vanished or changed. The ‘songs’ themselves are somewhat individualised through each new performance and undoubtedly transform over the course of their oral transmission, but at the same time offer a means of continuity and preservation. In composing Phyllotaxis, it was not my intention to imitate the katajjaq in a literal sense (not least because it is a tradition outside my own heritage), but to engage similarly with the concept of encoding aspects of one’s environment while retaining some vestige of the ludic and competitive nature of the practice. There is an interesting connection here between the katajjaq tradition and Jan and Aleida Assmann’s ‘Cultural Memory’ framework—specifically, it strikes me as an example of the so-called ‘floating gap’ between an incompletely-accessible, almost mythological, past and current living memory, a means of cultural continuity and preservation of memories and traditions considered important to those preserving them.

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76 Nattiez, para. 9 of 14.
78 Nattiez, para. 4 of 14.
Generative and systematic compositional processes in *Phyllotaxis*

The motivic materials for *Phyllotaxis* are derived from two sources: subsets of two well-known (and, I should note, widely used within music) number sequences, the Fibonacci sequence (the chosen numbers being 1, 2, 3, 5, 8, 13, 21) and the complementary Lucas series (the chosen numbers being 4, 7, 11, 18, 29, 47, 76), and one main motif representative of the plant growth hormone auxin, which is responsible for governing the formation of leaf buds on plant stems in patterns often corresponding to Fibonacci or Lucas sequences. These numbers dictate both pitch and rhythmic content. Taking an arbitrary pitch centre of E with an assigned value of 1, pitches are then organised according to the number of semitones above E; therefore 2 becomes F, 3 becomes G, 5 becomes B, etc. Similarly, taking a semiquaver as the smallest unit, corresponding to the number 1, a set of durations is derived for each number set.

![Fig. 1 - Pitch correspondences in *Phyllotaxis*](image1.png)

![Fig. 2 - Rhythm correspondences in *Phyllotaxis*](image2.png)

Computer processes could easily have been used to generate these systems, as seen in many generative musical works— for example, Brian Eno’s *Generative Music 1*, the documentation of

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81 Jönsson and others, p. 1635.
which, concerning both design and programming, has proved useful to this study.\textsuperscript{82} At the time of composing *Phyllotaxis*, I did not yet possess robust enough programming skills to accomplish this, though it is an area of research I am keen to revisit now that my knowledge of programming languages and software packages useful in such an endeavour has improved (specifically Python and Max/MSP, though I have also been researching the multimedia possibilities of the interactive fiction programming environment Inform 7). As the intention in composing *Phyllotaxis* was to keep the level of rhythmic and pitch complexity relatively limited to increase practicality and playability of the piece (and particularly as the standard piano cannot produce microtones), it became apparent that it would be more straightforward in this instance to generate materials non-technologically.

The main motif representing auxin, shown in Figure 3 below, is designed relatively arbitrarily in comparison to the other materials— the rhythmic profile matches the stresses heard when the molecular composition, NH-OH-o, is spoken aloud. The pitch contour also roughly corresponds to these stresses, as well as containing a repeated pitch, B, to represent the repeated H. Additionally, the uppercase and lowercase O’s are represented by a D sharp and the D natural one octave below respectively. The pitches provide several points of consonance and dissonance in combination with the two number sequence pitch sets. For example, the opening sections of the piece contain the three pitch sets overlapped in such a way that intervals consist almost entirely of widely-spaced perfect fourths and fifths, while as the piece progresses the accumulation of intervals and the shifts in alignment between cycles of the pitch sets produce more dissonant clusters, such as in mm. 148 – 149 (p. 11 in Portfolio Volume One) where major and minor seconds appear in closer spacing.

course of the piece by instances of the ‘auxin’ motif, resulting in ever more layers of complexity and interaction between the different instruments, as in a katajjaq game. The ‘auxin’ motif appears at the beginning of each repeated section in the clarinet part, followed by the first note and first duration of each set in the other two instruments, then the first two pitches and durations, then the first three, etc. Each instance of the ‘auxin’ motif appears with proportionally increasing frequency until the repetitions become indistinguishable as distinct segments. This first results in six instances of the motif followed by a few notes of shorter duration and successively decreasing periods of silence.

The results of these procedures cause a macrostructure to form: a period of accumulation shifting from a predominance of suspenseful silences to busier activity, until there reaches a point where all pitches and durations are in play and a continuous stream of activity occupies all three instruments by figure G, creating both separate layers of the systems at work as well as a combined melodic and textural overall whole. From figure G, the individual strands, heretofore restricted to their designated instrumental parts, begin to be divided more freely amongst the instruments and varied further in timbre by shifts of playing techniques, dynamics, and range displacement. Additionally, the ‘auxin’ motif, while still appearing according to its system and remaining in the clarinet part, begins to disappear within the texture, eventually vanishing entirely at figure R, to create an effect of absence and foiled expectation. In essence, the clarinet loses the game of endurance, or alternatively the vanishing motif could be heard as representative of vanished tradition, memory, or natural environment.

The rhythmic and pitch content of the piece required occasional intervention after strict deployment of the elements according to the structural system. In several instances rhythmic results were unnecessarily complex and could be simplified for ease of reading and performing without audible difference, and pitches sometimes needed adjusting (usually by octave) for instrumental range or to make a specific figuration more playable in the context of its surrounding passage. Overall, further interventions were deliberately limited as an exercise in becoming familiar with working in a more strictly systematic way than in my past compositional practice. One further alteration, less germane a point in this discussion of systematic methods, was to shift the pitch content one semitone higher at figure N through to figure P in order to highlight the peak section of intensity after such a lengthy stretch of duration during which the listener becomes thoroughly familiarised with expected patterns of pitch content. This decision
was the result of subjective consideration and does not reflect the systematic design of the material.

**Analysis of results of sonification and systematic processes in *Phyllotaxis***

The methods employed in *Phyllotaxis* I found to be constricting and, in particular, an obstacle to the level of desired control over the structural shaping of pieces. In subsequent works, similar systems are often used in a localised way, and the principle retained of ensuring that the piece’s concept permeates the compositional techniques as far as is possible in a medium of abstract representation. The construction of systematic parameters serves as a useful starting point while composing; however, systematic procedures are not adhered to in other works as rigorously as in *Phyllotaxis*, but rather these ways of working are treated more flexibly and in combination with other techniques.

My initial interest in sonification of ‘natural memory’, while strongly related to the other research concepts for the portfolio, I judged too broad a field of work to combine with human as well as technological memory within the scope of one project. It has proved useful, at least in terms of focusing the areas of research in this portfolio, to preserve the distinction Eric F. Clarke posits between memory itself and environmental shaping or adaptation—memory being active and recursive, adaptation being more passive and progressing in a relatively linear fashion (though of course, in reality, the distinctions between these processes are less definite).  

Furthermore, many works using sonification are slightly at odds with my own compositional framework for the portfolio. Some pieces encountered in the course of research have offered a very interesting premise accompanied by music that is relatively unstructured by comparison and lacking autonomy from the respective conceptual context; while I do not claim there is lesser value in such approaches, my personal aims differ, and the resulting listening experiences are fairly different. Specifically, the aim is to create pieces in which the structures on various levels are clear to the listener, rather than a perhaps more purely meditative, ambient-listening experience. Large-scale, slowly-changing works effectively act to foil or sabotage normal perceptual categorisation within music-related memory functions, while with regards to

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83 Clarke, p. 30.
84 Snyder, pp. 237 - 238.
Phyllotaxis and several other relatively smaller-scale works in the portfolio the intent is to work in accordance with memory processes in order to draw attention to their usual functions and phenomena.

One example of sonification which initially piqued my interest in relation to composing Phyllotaxis is John Eacott’s ongoing work Floodtide. In this work, data is read from electronic sensors submerged in tidal waters, processed through software written by Eacott which produces the results in notation, and performed live by a mixed and variable ensemble, reading the notation while processing is ongoing. The aim of the piece is for the musicians and the audience to experience the tidal patterns in a direct and meditative way. The idea of providing a way to experience with immediacy a natural pattern that occurs otherwise in near-silence and near-invisibility was highly intriguing in connection with Phyllotaxis, though my compositional approaches diverged significantly over the course of writing and the resulting piece stands in some contrast.

In accordance with my first research concept, systems structuring works at multiple levels, I found that more direct control was needed over the structural shaping of my pieces, rather than allowing data to dictate structure with little mediation by myself. Typical sonification methods also proved an inharmonious fit with my second research concept, reflection on the experience and remembrance of music. The goal of most works using sonification is to present the data, pattern, or process for the listener’s focus and reflection, whereas I wish to present the work itself (in essence, my commentary on the data, pattern, or process) as an object of attention and contemplation. Therefore, sonification techniques have been useful as an early phase of composing for pieces within this portfolio, while the final resulting work represents a number of steps of mediation and manipulation of the original set of data or elements—a process during which I am reflecting upon the music myself before it reaches the performer(s) and listeners. While of course any sonification process incurs some mediation and alteration of the original data set, the aim is to make the process of fairly extensive mediation a central aspect of most pieces. Finally, the pieces aim to encompass the possibility of coherence for a listener even if this listener might be unaware of the extramusical concepts embodied in the piece. While this is partly achievable by a work based on sonification as any listener will obviously form their own

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86 Eacott, p. 191.
thoughts and associations regarding any music they hear, this is more immediately achievable if
the music contains strongly-defined motivic organising principles. For example, in Eacott’s
*Floodtide*, while aspects such as general harmonic language might be easily grasped by a
listener, other elements such as rhythmic patterning and overall structure would be difficult to
comprehend without knowing something about the source of the generating data, and due to the
variable instrumentation the timbral and textural features contain a higher degree of
randomisation than desired for this particular work.\(^{87}\)

*Phyllotaxis* has yet to receive any performance in its original trio form, though it was later
revised for flute, oboe, B flat clarinet, bassoon, horn, and piano, for performance by the Magnard
Ensemble during the 2016 MusicFest Aberystwyth composition course. The revised version
allows for much greater flexibility of timbre and more possibilities for blending of instrumental
parts, creating a more interesting surface texture and approaching more closely the principle of
auditory streaming present in *katajjajq*. Additionally, the structure has been adjusted slightly
(specifically tempi and length of pauses) to improve the proportions of structural sections and
give the piece a less rigidly mechanical, more playful feel to its unfolding. These changes were
the result of listening to and discussing the piece in workshops with the Magnard Ensemble. The
score for expanded instrumentation is included alongside the trio version in the portfolio (pp. 33
- 57 in Portfolio Volume One), and recorded excerpts of the sextet version are present as tracks
number 1 and 2.

**Use of systematic techniques in subsequent works**

While, as mentioned, the same level of rigorous generative procedures has not been used in
works other than *Phyllotaxis*, the general design principles of these systems has been fruitful as
regards the composition of other, subsequent pieces. This is particularly true of rhythmic
elements. Where pitch content has been derived from spectral analysis or other forms of analysis
(as discussed in Chapter Four) and timbral and structural elements have stemmed from pre-
existing sound or music sources (as discussed in Chapter Three), this has sometimes left

\(^{87}\) I should note that Eacott himself questions these concepts and related issues as part of the ongoing work on
the project, with an emphasis on audience and performer perception and reception as discussed in Eacott, pp. 189-
195.
rhythmic elements without a basis in predecessor material and in need of a design principle with the parameters of the specific piece in mind.

**Concepts and processes in *Mojennoù***

The piece which contains the greatest similarities to the methods used to compose *Phyllotaxis* is *Mojennoù* (pp. 115 - 123 in Portfolio Volume One), written for two soprano and one alto solo vocalists. It bears a conceptual resemblance to *Phyllotaxis*: the majority of the material is based on another ludic singing tradition, this time *kan ha diskan* from Brittany.\(^88\) The choice of this source of influence relates to the text used in *Mojennoù*—two poems, one in Breton and one in French, by Breton writer, folklorist, and ethnographer Anatole Le Braz\(^89\) (incidentally an ancestor of mine who worked with fellow ethnographers and authors François-Marie Luzel and Théodore Botrel to document Breton music).\(^90\) Excerpts from the two different poems form the basis for two sets of musical materials. As with *Phyllotaxis*, I did not wish to represent this vocal tradition in a strongly literal sense, though in this piece by nature of its use of voices with minimal timbral differences is closer to its source of inspiration; rather, the intention is to provide an interpretation of some features of *kan ha diskan* while also introducing further degrees of interpretation and distancing— the varying, evolving nature of orally/aurally transmitted tradition, the preservation efforts of Le Braz and his colleagues, Le Braz’s own expression of his Breton culture, contemporary environment, language, and personal and cultural past through his poetry, and my own musical materials and ideas, newly-created but influenced by the latter elements.

The first and longest section of the piece, running from the first bar to figure D, consists of music based upon the *kan ha diskan* tradition\(^91\) in conjunction with the text in Breton. In *kan ha diskan*, a partial call-and-response takes place between two or more singers: one singer (*kaner*) begins a melody, joined partway through the phrase by the respondent (*diskaner*) or

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\(^90\) Bibliothèque National de France, ‘Anatole Le Braz (1859 - 1926)’, in [data.bnf.fr](http://data.bnf.fr/ark:/12148/cb11911531z) [accessed 12 October 2014]

\(^91\) Defrance, p. 135.
respondents. The lead singer will then immediately begin the next phrase, often with some overlap. Both tempo and rhythm are maintained at a fairly relentless pace, while the melodic lines are often varied, ornamented, and/or partially improvised. The lead singer is judged based on their skill at varying the melodies, the respondents on their ability to follow the lead singer without errors, and the pair or group as a whole on their ability to keep the continuity of the music throughout the session. This bears a resemblance to the melodic streaming concepts previously discussed, and also creates interesting opportunities for blended timbres and spontaneous dissonances (similar to these same features arising from the near-unison voice and guitar in the source music for Night Studies).

In this first section of Mojennou, the pitch palette is limited to a set resembling the Dorian mode centred on D, one of the typical pitch sets used in kan ha diskan (though pitch centres are determined according to tessitura of the singers’ voices). The pitches appear in repeated but slightly varying motivic cells, with a systematic widening of range accompanied by an increasing pace of pitch-set change, shortening of phrases, and decrease in unison material between the three voices. The pitch range reaches continually higher, first spanning from D4 to A4 (bars 1 to 17), then expanding up to D5 (bars 18 to 38), then to E5 (bars 39 to 40), F5 (bars 41 to 50), and finally G5 (bars 51 to figure D). Meanwhile, the range also occasionally extends lower, to C4 beginning in bar 16, and then including A3 beginning at figure C. As the pitch set widens, the motifs become progressively more distributed across the three parts, breaking up melodic lines and increasing both fragmentation and auditory streaming; in conjunction, the text becomes fragmented as well, progressing from lines of the poem to small groupings of words to single words and finally syllables (bars 46 to figure D).

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92 Ibid., p. 137.
94 Ibid., p. 137.
95 Ibid., p. 137.
96 For highly typical examples of kan ha diskan, see Les soeurs goadec, Konskried Sant Nikolaz, online video recording, YouTube, 4 November 2009 <https://youtu.be/lSWwHQXt0d8> [accessed 13 October 2014] or Les frères Morvan, Les frères Morvan, online video recording, YouTube, 8 August 2009 <https://youtu.be/H0CQTfZIDkU> [accessed 13 October 2014].
97 Defrance, p. 138.
98 In this particular piece, the intelligibility of the text was secondary to its sound potential, and I have treated it as a motivic aspect alongside rhythm, pitch, and melody rather than as a strictly literary text. Therefore I will refrain from detailed analysis of the relationship between this text and the music, or my interpretive thoughts on the poems, for the moment, other than to note that I did endeavour to retain something of the contrasting moods of the two poems as I interpreted them— liveliness juxtaposed with melancholy.
The second major structural section of *Mojennoù*, lasting from figure D to bar 103, deliberately undermines and resists the systems employed in the rest of the piece to accompany the change in text (a new extract from a poem, also by Le Braz, in French). The material here focuses on harmony, with a succession of chords formed on the basis of shared pitches and avoiding any sense of functionality. This harmonic approach is quite similar to John Cage’s *Quartet in Four Parts*, where sense of functionality has been deliberately avoided in order to promote a sense of stasis; it could also be considered as a more limited, less chromatically dense, and less rigorously methodical, yet nevertheless related, approach to Mauricio Kagel’s ‘serial tonality’. Such harmonic approaches will be discussed further in Chapter Four.

![Fig. 4 - Chords employed from figure D to figure F in Mojennoù](image)

Instances and influence of systematic techniques in other works

While *Mojennoù* contains perhaps the most straightforward usage of procedural systems, similar features appear in several other pieces. Most notably, similar motivic development that informs structure appears in the three *Lost Museum* pieces, which are discussed in detail in Chapter Seven. With other works, there is somewhat less focus on motivic aspects as primary sources of structure and design, and more upon systemisation of harmonic and/or timbral aspects; a work that would fall into this category is *Night Studies*, discussed in detail in Chapter Five. Most pieces represent a hybrid of these approaches, with systemisation forming one strand of an integrated process— for example, *Artefacts, Timestamp, Triskelion, Sur le borde de l’eau*,

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Afterimage, and And am I born to die? all contain some aspects of similar systematic design, especially in terms of rhythmic motifs.

In particular, Triskelion, with its tripartite spiral-based motifs, represents succinctly a systematic design employed with a degree of flexibility. A triskelion is a symbol constructed from three connected spirals; hence, this piece consists almost entirely of rhythmic groupings of threes (for example, bars 8 - 12). As the piece continues, the groupings of three are somewhat obscured, leading to a point where clearly rhythmic material completely vanishes for a few measures (bars 43 - 50) before reappearing in the descending, converging figurations that form the ending of the piece (bars 51 - end). Thus the overall piece is a group of three segments, though their borders are slightly elided. The pitch material similarly is constructed on a principle of groupings of threes: three sets of dyads, internally grouped in sets of three, six, or nine. The three pitch sets, illustrated below in Figure 5, are constructed to follow arbitrarily-composed rising or falling contours that give the impression of flexible patterning (e.g. the rising third and/or stepwise motion seen in the lower notes of set one in Figure 5).

![Fig. 5 - Pitch sets in Triskelion](image)

The pitches appear according to this design, mapped onto subtly shifting rhythms. The resulting piece achieves a balance between generative design and expressive flexibility; the latter aspect is one considered important in this particular piece; performed by a soloist, it therefore benefits from some room for freedom and expressive colour. In addition to the desire for flexibility, the design of this piece was kept very simple as the piece is quite brief, based upon one relatively small idea (the symbol of the triskelion), and has a fairly spare, almost austere character. In my estimation it would not readily bear a more rigorous or mathematical approach.
such as in *Phyllotaxis* and the generative portions of *Mojennoù*. This work therefore represents a
synthetic approach to systematic and intuitive composition.

One work in which compositional processes have in fact run counter to the type of
systemisation previously described is *Paper Imitation*, where overall disunity is a deliberate
feature of the piece; each section contains its own material following its own, local-level
parameters. Aspects of the latter will be discussed further in Chapter Three.
Chapter Three - ‘Found’ sounds and collage as conceptual and structural basis

Composing with borrowings vs. generative processes

The employment of pre-existing musical or sound sources (which have largely been treated as fluid and nearly interchangeable rather than distinct categories) has formed a major foundation for all of the works contained in this portfolio, whether as the starting point for the design of new musical materials as outlined in Chapter Two, or as elements that themselves form the structure and material of a piece while undergoing varying degrees of manipulation, transformation, or translation. These two approaches—creation of new materials and manipulation of extant materials—are, I argue, different expressions of the same process of encountering and interpreting sources from past and present environments, and not as diametrically opposed as they may seem. Rather it is a matter of adjusting where in the musical process the sources appear—during composition, performance, or listening—which in turn creates differing effects and experiences. This creates a dialogue between these stages or levels of processes and adds to interpretive and experiential richness. Berio writes that such explorations of referentiality create ‘a musical space inhabited by the significant presence of absences and by the echo of absent presences.’¹⁰⁰ In other words, the musical space occupied by the work comes into dialogue not only with its own immediate materials, but also its history, its points of connection to the past and other music or sound experiences, and the references brought to it by its audience as well.

In accordance with the concept of placing sources at different points of a spectrum of composition and experience, the focus is shifted in some pieces from pre-compositional use of extant materials (as seen in the works discussed in Chapter Two) to the incorporation of ‘found’ sounds, quotations, references, and ‘samples’ (whether literal digital samplings or non-electronic borrowings) directly within the resulting piece, with varying levels of transformation interposed. The approach differs from piece to piece in order to achieve the conceptual or perceptual effects specific to each work. Throughout, varying levels of unity versus disjunction and the effect juxtaposition of materials exerts upon the perception of these aspects is explored, as well as differing levels of potential recognisability or ‘presence’ of borrowed materials.

¹⁰⁰ Berio, p. 29.
I make a slight distinction between ‘found’ sounds and collage: ‘found’ sounds denote the use of one or more pre-existing sounds and/or music materials as the basis for elements that have been newly composed or constructed from transformed versions of such materials, while collage refers to instances where pre-existing sounds and/or music (more or less transformed) appear more directly within a piece. Of course, within most pieces both categories are employed in tandem, and the boundary between them is fluid.

Numerous pieces in the portfolio feature forms of collage as a primary principle of structure; I will first discuss Artefacts (Appendix 1, pp. 19 - 53 in Portfolio Volume Two), as this piece and its research and composition have strongly informed all subsequent work.

**Artefacts and influence on further works**

The first version of Artefacts for symphony orchestra was originally composed as part of a master’s degree in 2012\(^1\)\(^2\) prior to beginning the PhD, after which revisions and reworkings were carried out through the course of workshopping the first movement with the BBC National Orchestra of Wales as part of the March 2014 Composition:Wales programme and then preparing the complete piece with the Bruckner Orchester Linz for performance as part of the September 2014 Ars Electronica Festival in Linz, Austria. This foundational piece and the methods employed while composing and revising it represent a shift from my previous practice, and have formed a basis for this portfolio and my subsequent work. As this piece has been instrumental to the remainder of the works contained in the portfolio, and some of its composition overlapped with the commencement of this PhD project, I include the most recently reworked incarnation (from September 2014) in Portfolio Volume Two, and will discuss the piece here for reference, as I have not previously described or analysed this piece other than in a programme note.\(^2\)

The three movements of Artefacts describe a narrative arc progressing broadly through stages of accumulation, transformation, and finally, decay. The first movement mimics learning and memorisation habits which are common to children as well as other young animals, such as

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2. The unpublished thesis referenced above consists of the score (a different, earlier version than the one contained within Portfolio Volume Two of this present work) with a programme note, but no further accompanying text, per the regulations then in place for the degree.
songbirds and whales: the imitation and mental or physical rehearsal of snippets of sound in order to learn specific songs.\textsuperscript{103} Over the course of these processes, the original sound is often transformed or distorted, through misremembering, reordering, or otherwise altering the structure and content, for example through repetition. The second movement draws on street music experienced during several years of living in New Orleans to reflect on the effect of music moving through public space and how it engages with tradition and collective memory, in a manner not dissimilar to some of the works of Charles Ives.\textsuperscript{104} The final movement represents a decay of memory, with a highly fragmented use of small musical units and the inclusion of distorted echoes of material heard in the previous movements. The representation of these concepts is primarily achieved through the use of collages constructed from specific source materials.

All subsequent pieces of mine have been strongly influenced by work on Artefacts and its process of workshops, rehearsals, and performance. Other works most closely allied with the topic of collage, ‘found’ sound, and memory-influenced structures include Timestamp and Night Studies (both of which I will discuss in more detail in Chapter Five); La sirène engloutie, Afterimage, Lunar Echoes, and Sur le borde de l’eau (discussed further in Chapter Six); the three Lost Museum pieces analysed in Chapter Seven; and Paper Imitation and Carried on the Air.

Employment of borrowed material in Artefacts as basis for further explorations

The first movement, ‘Largo sostenuto,’ treats as source material a recording I made during an informal musical gathering in the living room of my aunt’s New Orleans home—specifically of family friend Gina Forsyth, a Cajun fiddle player, performing her own song ‘Sparrows’ on violin and voice.\textsuperscript{105} The recording provides a rough snapshot of these sessions, which my aunt has been hosting for several decades, primarily with the same core set of players who often performed from setlists that were established over this time. The house was partially destroyed by flooding during Hurricane Katrina in August 2005, and many of the usual musical guests displaced far

\textsuperscript{103} Petr Janata and Daniel Margoliash, ‘Gradual Emergence of Song Selectivity in Sensorimotor Structures of the Male Zebra Finch Song System’, The Journal of Neuroscience, 19/12 (1999), pp. 5108 - 5118 (p. 5108).

\textsuperscript{104} Specifically, I studied Ives’ Three Places In New England in relation to composing Artefacts. See also J. Peter Burkholder, All Made of Tunes: Charles Ives and the Uses of Musical Borrowing (New Haven and London: Yale University Press, 1995).

\textsuperscript{105} Gina Forsyth, ‘Sparrows’, unpublished audio recording, rec. by Julia E. Howell (2 February 2004).
afield. This sudden and dramatic dispersal of a small musical community important to my family life and my own childhood, which had been characterised by such strong continuity, caused me to reflect on my personal formative musical memories and how music-related memories are formed more broadly. Furthermore, the aim of the piece is to explore how memories of music relate to the preservation and continuation of the music in question.

Listening to the aforementioned recording on several occasions, some small features were identified as particularly intriguing or salient to this particular performance. One feature was the blurring effect created by the voice and the fiddle sounding in unison, but having a slight mismatch in timbre, pitch, and/or timing (a feature also explored in *Night Studies* and *Mojennoù* explicitly, and occasionally appearing in other works as well, such as *And am I born to die?* and *Lost Museum III: Llyn*). Another was the use of the open A string with a stopped A in unison, common in Cajun fiddle technique, which creates a distinctive blended timbre. Additionally, I wished to capture something of the experience of listening to the recording itself. The recording only begins partway through the song, catching it mid-phrase, and the other participants can be heard discussing that this is a new song that they would like to learn. This latter aspect, captured somewhat accidentally in the recording, reflects the process of learning and memorising new songs by listening, remembering, and rehearsing or replaying a musical memory mentally over time.

These features of particular interest having been identified, small snippets of the recording were then isolated, transcribed, and transformed into motivic ideas that develop and unfold over the course of the first movement. This technique of sampling and digitally manipulating recordings, then transcribing and translating them (with further transformations), later became an important strand of compositional process in other works in the portfolio, and will be discussed further in Chapter Five. In this first movement of *Artefacts*, only a limited collection of pitches (A, E, F sharp, G sharp, C sharp) is heard at first, with no overt motivic definition—there is no clear rhythmic or melodic profile. Gradually, motifs are implied by the use of spaced repetition, with the sliding figure outlining a major or minor third becoming an identifiable, persistent feature beginning at bar 11. The aforementioned bariolage figuration (stopped A, open string A) begins to appear in bar 23.

Through an increase in rhythmic activity, progressively denser layering of instrumentation, shortening of duration between repetitions of these motifs, and occasional punctuating solos
from individual string players, an effect of accumulation or acceleration becomes apparent by figure D (and continuing beyond). In bar 57, a third motif begins to appear (first heard in the first horn part): a descending third, G to E, which contrasts with the rising third figure (in particular the instances where E moves to G sharp). This sets up the central point of tension in the piece: the dissonance between G natural and G sharp, adding modal inflection of the 7th scale degree to the pervading suggestion of A major tonality.

Meanwhile, longer melodic lines appear from figure D onwards in the woodwinds, building upon previous phrases (reflecting the concept of memory rehearsal, and also strongly linking to the systematic generative techniques, which represent a direct extension of techniques employed in this movement, outlined in Chapter Two). The first appearance of an unaltered motif taken from the recording appearing in its entirety is at bar 73 in the first violin; the motif’s pitch content, interval contour, and rhythmic profile have already been heard in diffused, rhythmically augmented, and orchestrationally varied forms, so this appearance should simultaneously draw attention and feel familiar. This method of ‘rehearsing’ disguised motifs that become fully apparent over time appears in several other works in the portfolio as a direct result of the satisfactory effects achieved in Artefacts, movement one, including Timestamp, Sur le borde de l’eau, and Lost Museum I: Lamentation.

At the same time as this quasi-retrospective motif is revealed in its full form, the low brass take over the extended form of the descending third motif and, once joined by cellos and double basses, begin to bring it to more prominence, creating a point of dynamic and textural climax at bar 78. Here all previous material already heard is in play at once—different elements of the piece have been heard, repeated, and ‘learned’ or become familiarised. The dense tutti texture now dwindles, with some last melodic snippets recalled in bars 82 and 83. At figure F, a much thinned instrumentation repeats key motifs in slightly transfigured form: the G sharp/G natural tension has been resolved, with G sharp having dropped out entirely, a new emphasis on G natural as pitch centre, and some auxiliary pitches shifted down a semitone (C natural, F natural). A last G sharp interjection in the double basses, however, gently undermines a total shift.

As evident from the compositional procedures outlined above, the first movement of Artefacts represents something of a hybridisation between the type of generative, motive-based techniques analysed in Chapter Two and the use of re-interpreted, borrowed elements. This particular method of composing—listening to and analysing recordings, isolating certain
distinctive features, and interpreting and transforming them into new yet referential materials—
has become an important schema for the composition of many other pieces in the portfolio,
appearing within Night Studies, Timestamp, Sur le borde de l'eau, Carried on the Air, Paper
Imitation, And am I born to die?, and the Lost Museum triptych.

Showing some degree of contrast, the second movement, ‘Allegro con brio’, employs
relatively straightforward collage techniques. A collection of several related recordings formed
the sources: personal recordings of marching bands from Mardi Gras parades I attended during
February 2006 (the first festival held post-hurricane) and recollections of Haitian rara music
(processional music associated with public vodou ritual, heard during another street parade in
2007), as well as an older recording of the Balfa Brothers performing the traditional Cajun song
‘La danse de Mardi Gras’106. Aside from personal connection, these particular sources were
chosen because of their associations with cultural and collective memories and ritual; each of the
musical traditions represented exists to accompany specific, highly formalised collective
experiences that contribute to identity formation and transmission of past tradition (functions
described more broadly as ubiquitous phenomena of collective memory and social cohesion by
Maurice Halbwachs).107

While these traditions seemingly provide a strong connection to a past shared history, they
also represent imperfect remembrances. The alteration of these specific sources was further
exacerbated by the particular environment at the time of recording (in the case of the live
recordings)— the immediate aftermath of the hurricane, when there was profound disruption and
dispersement of the usual social communities that produced this music. Additionally, the
recordings themselves capture only one version of particular portions of these traditions at a
specific time, again echoing Halbwachs— ‘each memory is a viewpoint on the collective
memory’.108 Here, I equate recording to a form of memory in the sense of a heard and stored
experience, especially since I made three out of the four sets of recordings myself; in this case,
these music and sound sources were perceived both by a microphone and personally, and
retrieved both digitally and mentally. Following on from this movement of Artefacts, the

106 The Balfa Brothers, ‘La danse de Mardi Gras (feat. Dewey Balfa, Rodney Balfa & Will Balfa)’, The Balfa
treatment of technology as a form of external memory or extension of memory is further
explored in *Timestamp, Night Studies, Sur le borde de l’eau, and the Lost Museum* pieces.

The second movement, in contrast to the first, uses layered blocks of material based upon the
sources described above, bringing it closer to the traditional sense of a collage. This movement
represents something of my listening experience at the time these sources were encountered:
namely, in a crowded festival environment, hearing different music approach and recede over the
course of the parades and my own movements around the space. The motion of sound sources in
this environment produced interesting distortions, shifts, and transfigurations of the music.
Therefore, the second movement is comprised of sections of differing (occasionally clashing)
music based (somewhat freely) upon the aforementioned sources, where certain elements of the
musical ‘block’ become audible before others and similarly fade in a patchwork fashion. This
listening phenomenon, where audibility and comprehensibility change according to motion,
subject position, and auditory filtering, is an idea which returns in several other pieces as a direct
result of the composition of *Artefacts* (specifically *Night Studies, Paper Imitation, and
Afterimage*).

In addition to the listening effects caused by literal, physical motion, the movement explores
the sometimes disorienting phenomenon of experiencing a sense of motion caused by listening to
music even when the listener is still. This effect seems to be imperfectly understood on a
cognitive basis, but nevertheless it is a common and documented experience to sense that
something or someone (perhaps oneself, though not always) is in motion while listening to
music

The layers of different rhythmic activity in *Artefacts’*
second movement, occurring at differing rates and in unrelated patterns, aim to create a sense of
constant and irregular motion. The unconducted section (at figure K) brings these layers,
cohesive within themselves but disjunct in combination, into a swirl of chaos, where tempi and
rates of speed become further destabilised.

In constructing these somewhat nonlinear collages of competing and combining musical
‘blocks’ that nevertheless retain a sense of teleology or continuity of concept, this composition
was also influenced by Berio’s *Sinfonia* and *Rendering, Kagel’s 1898, Philippe Manoury’s*  
*Sound and Fury, Ravel’s La Valse, Lutosławski’s Concerto for Orchestra, and John Cage’s

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109 Clarke, pp. 91 — 125.
110 Clarke, pp. 91 — 125.
Imaginary Landscape series, in addition to the aforementioned research into spatial aspects of Ives’ use of collage and borrowing. These pieces all share features with mine beyond the mere presence of some use of collage, in that they use multilayering of different materials, often proceeding at different or variable tempi, to create a combined effect of unpredictable motion, disorientation, sense of space, or an amalgamation of these features. Continued study of each of these works mentioned and the different effects achieved has also proven influential in relation to composing other works in the portfolio (for example, further study of 1898 impacted the composition of Paper Imitation).

The third movement of Artefacts deals with decay and absence, displaying a sparser type of collage containing incomplete references that purposely do not develop. The main sources for this movement are two recordings of family members, now deceased: firstly, the ‘strumming’ figure in the strings is based upon a tape of my young cousin imitating a blues song with accuracy of figurations and style despite not yet knowing how to form chords on his guitar; secondly, the snatches of melody are derived from recordings of my grandmother singing songs remembered from her youth despite advanced dementia. The spare passages composed from these sources are then interspersed with unconducted sections similar to the passage seen at figure K in the second movement, but containing a greater quantity of layered materials. The effect of these passages is a kind of sudden telescoping of previously-heard music—a flattening of time and space. The concept represented by the third movement is a contemplation of how remnants of the past are left behind almost at random, in the form of some memories or audible artefacts that survive over time (though altered) as others are lost. This exploration of fragments and absences progressed in the wake of this movement’s composition, and can also be seen in Night Studies, Sur le borde de l’eau, And am I born to die?, Afterimage, and the Lost Museum set. The difficulties of suggesting absence while also using quotation and reference, and maintaining some sense of motive, are examined further in the latter pieces, as Artefacts does not completely address this issue. In the pieces mentioned above, there is some experimentation with differing levels of presence and disappearance of quoted material, effectively shifting references to the foreground or background of the musical space and making referential aspects more or less potentially recognisable to the listener.

Collage in Night Studies

The string quartet *Night Studies* (pp. 59 - 91 in Portfolio Volume One), begun in 2013, is directly influenced by methods and techniques devised in *Artefacts*. *Night Studies* is an exploration of the process of sampling, transformation, and translation of recorded sources most prevalent in the first movement of *Artefacts*, applied on a more focused, smaller, yet more detailed scale. These methods, as employed in *Night Studies*, will be addressed further in Chapter Five, though it is worth noting some aspects of collage and structure here. Instead of presenting a collage in the usual sense of multilayering of heterogeneous materials (such as in movement two of *Artefacts*), *Night Studies* unfolds as a collage over the course of the five movements. Each movement focuses on a different facet of one source recording (blues musician Blind Willie Johnson’s *Dark Was the Night, Cold Was the Ground*). In effect, it presents a collection of different, indirect, mediated viewpoints onto the same object. Rather than a collage that is mainly constructed in space (e.g., a broad field of layered materials occurring more or less simultaneously), it is a collage primarily constructed over time, the different sections of material effectively assembling a collage within the recent memory of the listener as they hear each movement in succession. This process of cumulative collage indirectly mimics the listening experience the piece is intended to capture: through repeated listenings, ‘new’ sound features actually become more apparent as the listener’s brain becomes more familiar with sound elements that vary and those that remain constant.\(^{112}\) *Night Studies* presents a collection of such variable, more transient features heard (by myself) in the recording, unfolding over time for re-interpretation by the listener and re-contextualised by the juxtaposition of the different materials in each movement within a variegated but cohesive whole.

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\(^{112}\) Clarke, pp. 32 - 34.
**Paper Imitation: montage and disunity**

Unlike other works in the portfolio where unity and cohesion at multiple levels is a structural premise, *Paper Imitation* aims to use collage for a much more fragmentary effect, with a different structural result. *Paper Imitation* (pp. 153 - 197 in Portfolio Volume One) is a piece for Pierrot ensemble (with bass clarinet replacing B flat clarinet) commissioned by the Lontano Ensemble. In contrast to other works in the portfolio where unity was an important feature, *Paper Imitation* is characterised by strong contrasts and sudden juxtapositions of very different materials. The piece is based on Bruno Schulz’s short story *The Street of Crocodiles*,\(^{113}\) and loosely aesthetically influenced by two works responding to Schulz’s story: the film of the same title by the Brothers Quay with music by Leszek Jankowski,\(^{114}\) and Kamil Turowski’s photographs referencing Schulz’s work.\(^{115}\) Additionally, some of the sounds incorporated allude to the nocturnal ambiance of urban neighbourhoods in which I have lived. In *The Street of Crocodiles*, the reader is escorted by an anonymous narrator through a series of vignettes of a fictional city, a collage of scenarios presented as both dangerous and delightful, shoddy and intriguing. Time is handled fluidly in the story, blending memories and imagined scenes with action occurring in the present. The title of my piece is derived from the final paragraph of the story:

> ‘The Street of Crocodiles was a concession of our city to modernity and metropolitan corruption. Obviously, we were unable to afford anything better than a paper imitation, a montage of illustrations cut out from last year’s mouldering newspapers.’\(^{116}\)

Originally, *Paper Imitation* was sketched as a multi-layered, flexible, at times open-scored piece, more akin to a typical surrealist collage in the visual arts, such as those of Schulz’s contemporary Hannah Höch. Related works studied in connection with this type of structure include Berio’s *Circles*, Boulez’s Third Piano Sonata, Stockhausen’s pieces which employ moment form, Kagel’s *1898*, and Chin’s *Akrostichon-Wortspiel*. A flexibly- or open-scored format was difficult to achieve in *Paper Imitation* due to the size of the ensemble and difficulty

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\(^{116}\) Schulz, p. 110.
of coordinating and rehearsing the different instrumental parts, and a more fixed form proved necessary for practical reasons. This also fits more closely with the structure of the story, creating a cinematic montage that unfolds over time, as opposed to several layers of material competing in the same temporal space.

The piece is built from three categories of materials: a ‘fog’ or ‘static’ texture, comprising microtonal pitches chosen from spectral analysis of a fohorn\(^{117}\) and indistinct, wavering motifs that appear and disappear, reminiscent of the sounds of an electrical substation in my Cardiff neighbourhood; a scherzo collage, including snippets of motifs drawn from (but transformed and fragmented so they are only obliquely referential) ragtime, the Squirrel Nut Zippers’ ‘Ghost of Stephen Foster’,\(^{118}\) Brahms’ ‘Rondo alla zingarese’ from the Piano Quartet No. 1 in G minor, Op. 25, the ‘foxtrot’ from Shostakovich’s *Jazz Suite No. 1*, and recordings by the New Leviathan Oriental Fox-Trot Orchestra; and ‘mechanical’ thematic material, using percussive and interlocking figurations to create a combined texture resembling machinery sounds. The fog/static can be seen from the beginning of the piece to figure C, the scherzo material from figure C to figure I, and the machinery elements from I to L; a coda from L to the end briefly re-establishes the static texture of the opening, with some fragmentary motifs appearing to contribute to a sense of incompleteness. Within these four larger sections, the materials ebb and flow, transforming or fragmenting; for example, from figure A to B the music seems to build in activity by increase in rhythmic activity and timbral changes only to subside again at figure B, while from figure G to figure I the instruments drop out or slow their activity in an irregular manner, creating an effect of deterioration. The overall principles of the piece are contrast, disjunction, and incompletion. In this portrayal of decay and absences, there are stylistic similarities to the *Lost Museum* pieces, or the final movement of *Artefacts*.

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that the result would closely resemble a quotation, though in reality there are no direct
quotations, only the referential contents of my own memory. This piece was commissioned for a
European String Teachers’ Association workshop day held at Cardiff University School of Music
on the seventh of February, 2016. The given parameters were concerto grosso string ensemble
instrumentation, two minutes’ duration, a specific harmonic figuration (for pedagogical
purposes), and accommodation of an ability range from young beginners to professional players.

In connection to the first requirement, concerto grosso instrumentation, the piece was
devised as a response to the concerti grossi for strings by Corelli, the innovator of the genre.119
After listening to the Opus 6 set of concerti grossi (familiar to me from past experience as a
violist) several times, some distinctive, memorable, and reasonably common figurations were
sketched out from memory (invariably and intentionally not quite accurately). These include the
descending scale patterns, oscillating octave leap figures, portato bowing, and pizzicato
punctuation, seen, for example, from figure A to figure B, as well as the long, imitative melodic
lines seen in the three soloists’ parts. These figures are overlapped and offset to create a sense of
blurring or indistinctness through the divided ensemble (violin, viola, and cello sections each
being divided into two parts). As at least some of the parts were required to be playable with
little rehearsal by a group that included young learners, the rhythms and harmonic content are
kept very simple, and the tempo slow; this also contributes to the blurring effect by causing the
motifs to be heard in a less detailed or complex form, as if at a distance or slightly degraded from
their original appearance, and at a slightly slower tempo than usual, similar to a record playing at
the incorrect speed, a tape deck winding down, or digital timestretching. The overall effect of the
piece is of distance and distortion.

The version of the score included in the portfolio represents a more advanced and complex
update of the piece created for an opportunity to have the piece read by more experienced players
than the first incarnation (the Orion Orchestra, at MusicFest Aberystwyth in July 2016,
conducted by festival participant Kelvin Lee). This version contains slightly more variety in the
pitch content and harmony, more offsetting of figurations to enhance the blurred effect, and the
insertion of some new material (as seen from the beginning to figure A, for example) that adds
contrasting rhythmic activity and timbral roughness due to the more varied bowstrokes required.

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119 Michael Talbot, ‘Corelli, Arcangelo’, in Grove Music Online in Oxford Music Online, (Oxford University
This enhances the level of distortion in the piece, reminiscent of a much-simplified version of the representation of radio static in Salvatore Sciarrino’s *Efebo con radio*. The new version, while still quite brief in duration, better conveys the concept—that of snatches of music that sound familiar but can’t quite be recognised, heard from a distance via radio or other mediating transmission medium.
Part Three - Harmony and Pitch

Chapter Four - Harmony and use of spectral or other harmonic analysis

Harmonic approaches

In accordance with the first research principle of the portfolio, systemisation on multiple levels to form cohesion, harmony and pitch content has been approached within much the same frameworks as other aspects such as rhythm, duration, and structure, and therefore has not been treated as an independent feature of primary importance. This has resulted in a selection of related but differing approaches, varying with each work to fit the piece’s individual parameters, as overall unity of concept and design is important to the compositions as a group (as discussed in Chapter One, section one, p. 6). In effect, each piece contains a relatively individualised harmonic language. As harmony is subservient to other governing principles and pitch has been discussed in relation to the principles operating within specific pieces at other points within the commentary, I will not focus in great depth on harmonic analysis of individual works in this chapter; nevertheless there are some distinctive common features of the harmonic schemes present in the portfolio, which I will briefly categorise.

Generated pitch sets

As seen in Chapter Two, in some cases pitch sets for use within a piece have been generated in a systematic way reflecting the conceptual basis for each, and designed in tandem with other aspects, specifically rhythm and structure. This can be seen most overtly in Phyllotaxis, where pitches have been derived from the same mathematical basis as rhythm; in passages in Majennoù where modal harmony undergoes a procedural unfolding; and in Triskelion, in the three sets of symmetrical progressions of dyads. These instances are cases where pitch material is not derived from pre-existing music or practice, but rather newly designed in connection with the concepts
represented in each piece. The majority of the works in the portfolio, in contrast, borrow, or inherit, pitch and harmonic aspects from extant sounds or other music relevant to the individual piece. This is not to say that there are no connections between the treatment of pitch in generative and borrowed instances; in fact, the two approaches often interact. For example, in *Lost Museum I: Lamentation*, the pitch palette was derived from a recording, but employed within the composition in a motivic, generative manner (described in Chapter Seven). Further overt instances can be observed in *La sirène engloutie* and *Sur le borde de l’eau*, while less direct interactions are present in other works.

**Spectral analysis**

For a number of works, portions of relevant pre-existing recordings were sampled and imported into the spectral analysis software SPEAR\(^{120}\) for analysis and manipulation of pitch. SPEAR provides tools for analysing the frequencies and partials present within the sample, but also allows the editing and transformation of the pitch content. Where SPEAR has been employed, the general approach has been to selectively limit the pitch set to a small collection, which is then usually employed as a mode, verticalised into a set of pitch fields, or, commonly, a combination of the two. Examples of this approach are present in *Night Studies* and *Timestamp* (discussed in Chapter Five), *Lunar Echoes* (discussed in Chapter Six), and *Paper Imitation* (analysed in Chapter Three).

In this approach, I have been influenced by the work of spectralist composers; in particular, Tristan Murail, Gérard Grisey, Jonathan Harvey, and Georg Friedrich Haas. Some common features shared by my work and that of these composers include a focus on timbre as affected by the frequencies and partials present; referentiality in employing pre-existing sounds and music, albeit in a heavily transformed manner and used as a source for newly composed materials, rather than being a more direct quotation; and a conceptual kinship in terms of the topics of hearing and listening, the ephemeral and less easily perceptible details of sound, and affordances.\(^{121}\) The works have not usually approached a level of microtonal complexity often

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\(^{120}\) Michael Kateley Klingbeil, *SPEAR* (version 0.7.4, 2009).

\(^{121}\) Affordances being the multiple potential types of interaction a listener might have with sound or music, or, in effect, the multiple functions sound or music might serve in relation to its environment. Clarke, p. 36 – 37.
encountered in the work of the composers mentioned, with some small exceptions. This is due to the mainly subtractive, deliberately delimited approach to deriving the pitch sets desired for most of the pieces (which will be further elucidated below), as well as considerations of practicality for the performers of the works and the requisite instrumentation.

Inheritance of harmonic content

In some works, pitch content has been inherited wholesale from the pre-existing music which serves as their basis. Most commonly this represents a process of straightforward analysis and transcription, as opposed to the transformative techniques outlined above. Examples of this approach can be seen in portions of Night Studies, the main motif of Timestamp, And am I born to die?, Sur le borde de l’eau, and some passages of both Paper Imitation and Artefacts. In these cases, the use of relatively unaltered pitch content has always been employed in order to maintain a strong connection to the source material with lesser degrees of transformation. This most commonly appears where relatively direct quotation or collage effects are present, as discussed in Chapter Three.

Subtractive derivations of pitch sets

Overall, the feature common to all the outlined approaches to pitch content is that of subtraction, fragmentation, limitation, and filtering of material. This is a deliberate framework based upon the concepts elaborated in Chapter One— the distancing effect of time and geography, ephemerality and fragility of memory and sound events, the creative but also filtered aspect of working memory, and concepts of listening and hearing. The overarching principle here stands in some contrast to other composers working from a similar conceptual standpoint, such as Berio and Kagel. Whereas these two composers in particular often deliberately create a pitch field operating on an expansive yet systematic principle of chromatic saturation,¹²² both approaches are representative of the concept of the ‘flattening’ of space and time and increased accessibility of past and present music due to methods of preserving and transmitting past

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¹²² Losada, p. 96.
music,\textsuperscript{123} juxtaposed with distancing, mediation through transmission, decay and entropy, subjectivity of individual and collective viewpoint, and the ultimate inaccessibility of the past. However, my works strongly emphasise the latter aspects; therefore, instead of an additive, polymodal, or extensively chromatic approach that might emphasise saturation and expansiveness in more than one dimension, the portfolio generally presents a subtractive, selective, limited approach, employing the harmonic ‘survivors’ of an evolutionary or entropic procedure much as the use of other types of remnants of the past is explored.

This methodological basis also represents a means of marrying generative and selective procedures: by reducing pitch space to a specifically defined, transformed set, generative motivic processes can then operate upon these collections, creating further stages of mediation, distancing, and creative progression. Most often, this has resulted in the treatment of pitch collections in an analogously modal fashion, with an established pitch centre and distinctive intervallic relationships; occasionally this also aligns with modality inherited from the source music, creating another point of connection.

\textsuperscript{123} Berio, p. 9.
Part Four - Electronics approach and integration with acoustic techniques

Chapter Five - Use of electronic techniques as compositional tools

Electronic techniques as analytical and compositional tool

In order to explore the interaction between audio technology and memory and the integration of electronic and acoustic techniques, a prominent aspect of the composition of the portfolio is the use of digital technologies as compositional tools, often resulting in works that are purely acoustic in their performance version, but contain traces of a technological and electronic history. The rationale and conceptual basis behind these approaches has been discussed in Chapter One, but will briefly be reiterated below before discussing individual pieces.

Translation of electronic to acoustic

As a rule direct quotations of recorded materials have been largely avoided, and in particular, completely unaltered recordings\textsuperscript{124} do not appear within a final piece. This is partly to avoid some questions of ethics and aesthetics of borrowing which fall outside the purview of this particular portfolio, but also to more strongly engage with concepts of listening and remembering as opposed to hearing. Hearing is defined in this context as environmental perception and immediate, unconscious or semi-conscious auditory cognition, while listening implies focused, conscious attention, filtering, categorisation, and interpretation of perceived sounds, and interacting with short- and long-term memory in order to contextualise the present acoustic environment.\textsuperscript{125} Wishing to furnish an externalised representation of these latter functions in my work in order to turn focused listening and thought towards a recursive reflection upon

\textsuperscript{124}I refer here to third-party recordings rather than samples of my own materials recorded by myself.

\textsuperscript{125}Here I follow summations of psychoacoustic and cognitive theories outlined in Clarke, pp. 41 - 46, and Snyder, pp. 3 - 18.
themselves, degrees of mediation, filtering, transformation, recontextualisation, and interpretation have been incorporated in my use of pre-existing materials.

If works of mine were to be based primarily on functions more associated with hearing and ecological perception, recorded and electronic materials with lesser degrees of post-production alteration, or perhaps none, would then be included. I appeal here again to McLuhan’s environment versus anti-environment framework.\footnote{McLuhan, p. 68.} Of course, some pieces do refer more or less overtly to hearing as opposed to focused listening, and/or specific environments, but usually as a secondary feature, or at least at some remove as it appears through the lens of transformational techniques. For example, *Lost Museum III: Llyn* (discussed in detail in Chapter Seven) involves site-specific hearing, but in an allusive, transfigured way focusing on one particular sound detail. One piece where this is more prominent than in other works is *Paper Imitation*, where I wished to convey a slightly more direct acoustic image of an ambient environmental space than in the majority of my works.

Electronic methods in compositional process in the portfolio

Pieces in which transcription, software-based analysis, and/or electronic manipulation have been used as compositional tools include *Am I born to die?*, *Paper Imitation*, *Artefacts*, *Timestamp*, *Lunar Echoes*, *Night Studies*, *Sur le bord de l’eau* (which I will discuss in more detail in Chapter Six), and the trio of *Lost Museum* pieces (discussed in depth in Chapter Seven). There are several methods employed: simply listening to a recording multiple times, noting down striking features, and creating motivic materials based on this listening; using Logic X to cut and select samples for further compositional development; using Sonic Visualizer,\footnote{Centre for Digital Music, *Sonic Visualizer*, (version 2.0, Queen Mary, University of London, 2012).} Capo,\footnote{Super Mega Ultra Groovy, *Capo* (v. 3, 2013), Mac OS 10.11 and later.} and SPEAR\footnote{Klingbeil, *SPEAR* (version 0.7.4, 2009).} to identify and select pitch sets and interval relationships present in the recordings for use within my own composition; and manipulation of recordings (namely adjusting duration, reordering samples through cut and paste, and layering of different samples), again using Logic X, and subsequently transcribing these resulting elements for use as compositional materials. These techniques are employed in varying ways and with varying degrees of prevalence
throughout the portfolio, yet are all guided by the overall principle of using audio technology as means of gathering information about specific recordings and gleaning details for further interpretation. This process involves actively reflecting on factors of mediation, distance, distortion, and destruction that act upon the relevant recording and its past history as well as upon my own listening, remembering, associating, and reinterpreting of these sources, in accordance with the concepts outlined in connection with the third research concept in Chapter One.

Electronic tools and processes in Timestamp

The piece Timestamp (pp. 93 - 99), commissioned for a workshop day held by Cardiff University School of Music’s Contemporary Music Group on the 15th of November, 2014, represents an exercise in progressing the technologically-informed methods seen in Artefacts, movement one. In the latter work, as described in Chapter Three, a small sample of a recording was isolated, timestretched, and transcribed in order to derive the motivic materials for the movement. In Timestamp, this technique proved useful in connection to the brief for this work: to recontextualise the soprano saxophone motif from Harrison Birtwistle’s The Triumph of Time within a newly composed piece.

Fig. 6 - Motif from Birtwistle’s The Triumph of Time

After an instance of this motif in a recording of Birtwistle’s piece was isolated, it was then also timestretched as in the aforementioned movement of Artefacts. To take this process a step further, however, this altered microsample was then imported into SPEAR in order to analyse its component frequencies. Within SPEAR, I then selected particular partials to narrow the palette of pitch content for use within my work, discarding some duplicate pitches and frequencies outside the useful range of the ensemble instrumentation given in the brief. The resultant
collection of partials creates a kind of reduced echo or impression of the original sample, in
keeping with the exploration of the life of remnants and ‘poor’ copies outlined in Chapter One.

This collection of pitches appears in the final piece, redistributed amongst the ensemble to
create entirely new timbral colours. This adds yet a further layer of mediation: the sample
processed in SPEAR contained not only the soprano saxophone’s motif, but also the orchestral
accompaniment; hence, traces of the saxophone motif’s original context are carried forward into
Timestamp, though only the faintest hints remain. Aside from the new orchestration, the sample
processed in SPEAR is simply transcribed to construct the piece with no further transformations.
This heavily ‘degraded’, reduced version of one small sample is conceptually linked to Hideo
Iwasaki and Oron Catts’ art installation *Biogenic Timestamp*, in which microchips are
consumed by genetically engineered cyanobacteria, illustrating that no form of data storage is
exempt from the ravages of outside forces over time—in turn, linked to the concept of entropy
inherent in Birtwistle’s piece. While *The Triumph of Time* represents the experience of observing

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130 Hideo Iwasaki and Oron Catts, *Biogenic Timestamp*, 2010, Ars Electronica Museum
a passing funeral cortège as a reminder of death and decay as inescapable aspects of existence.\textsuperscript{131}

*Biogenic Timestamp* similarly illustrates that even technology designed to outlast the mortality of human memory cannot escape the ravages of time.

### Electronic tools and processes in *Night Studies*

*Night Studies* (pp. 59 - 91 in Portfolio Volume One) is a string quartet in which focuses on details of listening experience and outmoded audio technology, specifically in relation to experiences listening to ‘Dark Was the Night, Cold Was the Ground’ by Mississippi Delta blues musician Blind Willie Johnson.\textsuperscript{132} *Night Studies* presents a larger-scale employment of electronics as compositional tools with a purely acoustic piece as the end result, as well as an exploration of the effect of repeated listenings of a particular recording. Each movement of the piece is self-contained and contrasted from its surrounding movements, creating the effect of a collage in its totality, as noted in Chapter Three. This connects to the phenomena of habituation and perceptual invariants: over the course of repeated listening of a recording, the listener’s brain becomes habituated to the most prominent, constant features perceived in the audio and the processing of these sound features shifts from fully conscious perception to more unconscious functions of remembering and perceptual organisation.\textsuperscript{133} This filtering of invariants allows the listener to perceive details in the sound previously unnoticed, usually transient features or those which contrast from the more constant features.\textsuperscript{134}

In the case of *Night Studies*, the piece as a whole reflects on such perceptual filtering, and each movement focuses on specific features heard within the original recording that are not explicitly part of the recorded music — e.g. artefacts of the performance, environment, and technology retained and transmitted in the recording. This recording is very familiar to me, as I have heard it on LP and CD on numerous occasions. It contains some striking characteristics, similar to aspects explored in other recordings (particularly in *Artefacts*, *Mojennoù*, and *Sur le...*  


\textsuperscript{132} ‘Blind’ Willie Johnson, ‘Dark Was the Night, Cold Was the Ground’, *Slide Guitar Classics* (Los Angeles, Rhino, 1993). N.B.: This track within a compilation is in the public domain.

\textsuperscript{133} Snyder, pp. 23 - 24.

\textsuperscript{134} Clarke, pp. 32 - 33.
borde de l’eau): the near-unison between voice and guitar, causing moments of microtonal
divergence and a distinct combined timbre; various sounds caused by the action of playing the
guitar; distortion of timbre and pitch caused by the recording and playback technology; and noise
artefacts caused by the same technology and the increasing imperfection of duplicated and stored
copies of the recording over time.

The pitch content of the first three movements is derived via the same techniques used in
Timestamp: isolation of a small sample followed by processing in SPEAR, selecting specific
partials in a relatively subjective manner (though also with a view to reducing duplicate pitches
and those outside the practical range of the quartet), and then composing using this limited
palette of pitches as an invented mode. The fourth and fifth movements inherit pitch directly
from transcriptions of manipulated samples of the original recording, focusing more centrally on
rhythmic, motivic, and structural transformation as opposed to alteration of pitch and timbre.

The first movement is based upon the wavering shifts in timbre caused by technological
distortion in the original recording, and also linked to the sound of cicadas, often a subject of the
auditory filtering described above. To convey this effect, figures that slowly oscillate between
two pitches are employed in combination with transient distortion of timbre through changing
bow pressure and the use of harmonics, sul ponticello, tremolo, and pizzicato, with a small two-
note slide motif transcribed directly from the guitar part of the original recording. These figures
are repeated throughout the movement in a regular fashion, allowing the listener to develop
familiarity, though with subtle shifts of rhythm, register, timbre, and timing between parts; the
limitation and repetition of material causes some elements to fade into the background of one’s
hearing, while the small changes re-focus the ear or allow individual features to be actively
perceived as fresh or new.

The second movement combines the harmonic approach of the first movement (using
SPEAR to generate a limited palette of pitches) with the sampling approach of later movements.
A small melodic motif was sampled and transcribed, then employed as a repeated motivic cell.

Fig. 8 - Melodic sample in Night Studies movement two, ‘Cold Was the Ground’
This motif is embedded within the described harmonic context: a limited set of pitches, verticalised as pitch fields and distributed across the instruments to create a slight sense of spatialisation. The chords are designed specifically to achieve a sense of stasis and avoid any impression of forward development through modal or tonal functions other than a repeated return to the pitch centre of F; this technique of effectively halting discernible progression over time is directly inspired by John Cage’s similar employment of deliberately semi-disjointed block chords in *String Quartet in Four Parts*.

The third movement combines three features: the effect of rapidly skipping through the recording (seen in the alternating chord figurations in the opening of the movement, bars 80 - 96), the microtonal pitch space created by technological distortion as well as the variable intonation of the performance (seen in bars 97 - 113), and the remainder of the frequencies present when the frequency bands of the music itself are removed using SPEAR (appearing in this movement in a durationally augmented form as the glissandi figurations commencing in bar 114). In total, this movement focuses on the pitch elements that make up an integral part of the recording despite being unintentional inclusions, whether derived from ambient sounds, technological artefacts, or ‘unmusical noise’ created by the actions of performing the music; these elements could be considered extraneous to the music itself, but form part of the fabric of the recording and its history as a sound object.

The fourth movement focuses on the percussive and rhythmic nature of some of the noise artefacts present in the recording, sourced both from recording or transmitting technology and sounds caused by the guitar slide, plectrum, or fingers. These sounds were captured in small samples in Logic X, amplified, and then transcribed for use as motivic material. The motifs are further manipulated through shifts in rhythm and duration, metric modulation, alteration of the alignment between layers of the motifs in the different instruments, and tempo changes.

The fifth and final movement represents extensive use of sampling, manipulation, and transcription. Several slices of the original recording, transformed via timestretching, cropping, and multilayering, were rearranged and reconstructed to create a new version of the track. This resulting remix or collage was then transcribed and mapped onto the four instruments, with the only further transformation being the addition of playing techniques that alter the timbre of motifs at certain points (the timbre already being altered by virtue of transcription for string quartet as opposed to voice and guitar or the electronic medium).
These methods, employing electronic manipulation during composition but resulting in an acoustic work, also appear in *Sur le borde de l’eau*, *Paper Imitation*, the *Lost Museum* pieces, *Artefacts*, and *And am I born to die?*. However, *Night Studies* represents the most extensive and involved application of these techniques within the portfolio. This arose partly through the piece serving as a testing ground for different ways of executing this approach and building software skills. More importantly, the prevalence and detail of these techniques are due to the central focus on repetitive focused listening and auditory filtering, a theme touched upon in other works, but explored in depth in *Night Studies*. 
Overview of approaches

My approach to the inclusion of electronics in pieces has been guided by practical performance considerations, acquisition of new skills and knowledge in terms of tools, software, hardware, and procedures, and a particular focus on live, embodied auditory sources. Regarding practical considerations, limited rehearsal time has usually necessitated that I, as the electronics performer, follow and react to the instrumental performer(s) rather than vice versa. Regarding the focus on live sources, within most pieces the primary focus has been kept on live instrumental performance (e.g. embodied sources), using electronics as a means of enhancing or expanding the capabilities of the acoustic instruments, providing disembodied sources in dialogue with or responding to the live performer(s), or some combination of these approaches. Where pieces are based upon pre-existing recordings, I have attempted to explore the question of how listening experiences change when a sound object previously stored in a disembodied, acousmatic\textsuperscript{135} format is re-translated to embodied, acoustic formats, ‘re-animating’ it on some level; my aim here is to highlight the element of human listening and interpretation inherent in music-related memory processes, rather than provide alternate recorded or acousmatic versions of the original source materials, as previously discussed in Chapter One. This has resulted in an emphasis on using electronics as analytical and compositional rather than performance tools (as discussed in Chapter Five) and/or allowing live, acoustic performance to predominate within pieces. The electronics directly present in my compositions are both an instrument of the ensemble in themselves and an extension of the other instrument(s) present, resulting in a synthetic combination of sound sources. The electronics effectively form a bridge to the 'past' of the music while allowing a new context and sound environment to appear.

\textsuperscript{135} To recall Schaeffer and Chion’s definition, ‘acousmatic’ refers to music or sound that does not have a directly visible source, such as an instrument. Chion, \textit{Guide des objets sonores}, p. 18.
Use of fixed electronics

The use of fixed electronics within the portfolio is restricted to playback of samples responding to, or interacting with, a part for live performer(s), as opposed to fixed tracks to which the players must align their parts. This is partly for practical reasons: the amount of preparation needed to coordinate a live part to a track is greater than that necessary to rehearse a piece in which the performer(s) and electronics operator are able to maintain some flexibility. More importantly, however, the latter approach allows the exploration of certain avenues within the research topics. It more clearly defines the electronics operator as a performer within the ensemble, adding to the collaborative nature and reinforcing the focus on embodied, live sources as discussed in Chapter One; it allows the fixed elements a small but useful degree of spontaneity and flexibility in their dialogue with the live materials; and finally it allows for greater interaction between the first research topic, systemisation and generative compositional approaches, and the third, integration of electronic and acoustic techniques.

Fixed electronics, in the form of sample playback, has been employed in La sirène engloutie, Afterimage, Lunar Echoes, Sur le borde de l’eau, Lost Museum II: Photo Booth, and Lost Museum III: Llyn, with different degrees of prevalence. In some cases, as in Sur le borde de l’eau, the samples provide the link to the pre-existing materials upon which the piece is based; in others, they invoke a specific temporal or geographical environment, or idea, as in La sirène engloutie, Afterimage, and Lunar Echoes. In each instance, the fixed elements are always connected to other materials present, in order to enhance the dialogue between acoustic and electronic, live and recorded sound sources. La sirène engloutie, Afterimage, Lunar Echoes, and Sur le borde de l’eau will be discussed in more depth in this chapter, while the use of electronics in the two Lost Museum pieces is described in Chapter Seven.

Use of live electronics

In Chapter One and this chapter, I note that electronics have been employed as an orchestrational tool—an added ensemble member and/or a means of extending live instrumental capabilities. This aligns the focus of the portfolio with the third research concept, integration of electronic and acoustic techniques, without deviating to explore electronics on their own. The
techniques employed include delay lines, reverb units, transposers, and live looping, allowing alteration of several aspects: timbre, rhythm, and pitch; blending between acoustic, live processed, and purely electronic sources; and manipulation of the sense of space (by adding echo and reverb effects that change the listener’s perception of the musical space) and time (through repetition, blurring or timestretching, and echo effects) in performance. These transformations create degrees of distancing and mediation in accordance with the concepts of the passage of time, collective and individual memory, ephemerality, and mutation of copies described in Chapter One. Additionally, this use of live electronics as orchestrational tool and spatial manipulator has been influenced by the electroacoustic works of Kaija Saariaho (a relevant example being Fall for harp and live processing). Live processing, accomplished in all but one instance through Max/MSP patches I have built for each requisite piece, appears in La sirène engloutie, Afterimage, Lunar Echoes, Lost Museum III, and Sur le borde de l’eau.

**Live electronics in La sirène engloutie, Afterimage, and Lunar Echoes**

These three pieces represent a progression of skills and techniques from the first to the third, subsequently extending to later works in the portfolio. They contain similar instrumentation, with flute and electronics in each, and related approaches and techniques.

*La sirène engloutie* represents a first foray into combining electronics with live performance, as well as a means of learning the basics of constructing Max/MSP patches. The piece contains three categories of materials: recorded samples of a song, processed through granular synthesis; a part for Kingma system microtonal bass flute; and recorded samples of piano ‘noise’ (scraped and plucked strings, pedal noise, reverberation within the piano body, etc.) and a sequence of piano chords from the climactic passage of Debussy’s *La cathédrale engloutie*. The song and the Debussy piece both relate to Celtic myths of the drowned city of Ys and siren-like entities, but are otherwise unrelated, especially in terms of their musical features. The flute part contains motifs based upon the interval and rhythm contour of the passage from *La cathédrale engloutie*, with distortions of pitch (using quarter tones) and rhythm. The motifs follow a process of gradual accumulation, lengthening, and expansion of pitch range similar to the process seen in *Phyllotaxis* and accumulative motivic passages in other works, though in a more flexible and basic manner resulting in a lower level of complexity.
The live electronics are used expressly to enhance this additive process: the live recording and playback of loops adds layers of activity and increases complexity of texture as the piece progresses, and from figure D to F create a dense harmonic chordal progression which directly responds to those drawn from Debussy and heard simultaneously in the sample playback. The effect of the live electronics is to mirror in reverse the progression of granular vocal samples heard in the first section of the piece (beginning to figure D). These samples begin as short snippets of vocal melody recognisable as such, but are transformed into ever shorter and more distorted grains until the voice itself is completely lost and no melodic features are discernible, with only granular noise in its place. Meanwhile, the flute’s material begins from the most basic form of its motif (seen in bar 2), its own ‘grain’, and is transformed as described above into lengthier ‘samples’.

The live looping was designed to employ a Boss RC30 Loop Station foot pedal unit; however, during workshopping of this work with Carla Rees and Michael Oliva of rarescale, it became apparent that this hardware unit is unsuitable for the type of looping desired in this work. Its loop lengths, synchronisation, and mechanical triggering are not capable of the flexibility of loop durations and points of occurrence present in the electronics part as notated. I have therefore incorporated desired looping capabilities into Max/MSP patches in order to achieve flexibility and possibilities of detailed customisation. A further issue in the workshop arose: the samples used were deemed by performers, listeners, and myself alike to be perceptually perhaps overly dissimilar from one another and the live part (in terms of timbral aspects in particular). Such heterogeneity would not be problematic were it not for the explicit attempt to connect the live flute part with the piano chord samples; this creates the expectation that unity should be a prominent feature in the piece, rather than a more disjointed collage of different materials. With regard to the integration of electronic and acoustic techniques, then, this piece has not quite succeeded.

In order to approach the last issue from a different angle, Afterimage employs similar techniques, but is designed in a somewhat inverted manner compared to La sirène engloutie. The samples heard were recorded and processed first, with the flute part written to respond more closely and directly to the resulting sounds than in La sirène engloutie. Additionally, the samples contain a higher level of processing and transformation from their original recorded sources than the vocal and piano recordings used in La sirène engloutie, allowing for a greater blend of sound.
sources and less identifiably distinct blocks of material. Finally, recordings of flute sounds (from which some motifs heard in the live part were then derived) are also incorporated into the sample set to create more timbral affinity between acoustic and electronic parts. The one instance of live processing in the piece (bar 63, the final bar) further cements the interaction between electronic and acoustic parts by using delay lines and reverb to imitate the flute sounds heard earlier in the piece solely in the electronic part.

*Lunar Echoes* takes a slightly different approach to the two pieces previously discussed, while employing similar methods. It was commissioned for a concert responding to the *fragile*? exhibition of contemporary ceramic arts at National Museum Wales, Cardiff, 2015. *Lunar Echoes* responds to a specific work in the exhibition: Adam Buick’s *Massive Intertidal Jar*, a modern interpretation of the Korean moon jar tradition. Made with the inclusion of materials sourced near Abereiddy Beach in Pembrokeshire, Buick considers his work as a kind of distillation of, or container for, a specific landscape, inviting reflection on the particular qualities and transient or changing nature of the environment invoked.\(^{136}\) To preserve this concept in *Lunar Echoes*, the electronic samples used employ processed versions of recordings of waves on Abereiddy Beach\(^{137}\) (a location I had visited myself prior to composing the piece) as well as the sound of seawater trickling through stones and sand\(^{138}\) (in reference to the materials used in creating *Massive Intertidal Jar*).

Similarly to the flute part in *La sirène engloutie*, the flute and harp music is referential to the samples (using some pitches heard in the spectral freeze-processed samples, and having timbral similarities at certain points), but not as strongly integrated as the materials in *Afterimage*. This partial separation between electronics and live parts is intentional, the electronics being indirectly representative of the specific natural environment connected to *Massive Intertidal Jar*, while the live instruments, with their ‘circling’ motifs focusing on symmetrical contours, repetition, three-note figures (similar to those seen in *Triskelion*), and inclusion of details derived from the samples, are representative of the spherical jar itself, with its inclusions of fragments of natural matter. The live processing present in the final section of the piece (bar 65 to the end),

including delay lines, reverb units, and transposers, acts to greatly distort the timbre and pitch of
the live instruments, recontextualising transformed motifs recurring from the opening section of
the piece (beginning to bar 42) with inclusions from the middle, active section wherein the
sounds of water rushing through stones appears in the samples and is imitated by the flute and
harp (bar 43 to 64). This distortion of motifs and incorporation of elements ‘picked up’ along the
journey of the motifs from first to last segment creates both a sense of circularity and distancing
or metamorphosis, as *Massive Intertidal Jar* represents a mediation and reinterpretation of its
original environment.

**Sur le bord de l’eau: exploring liveness**

*Sur le bord de l’eau*, a piece for solo viola with electronics (pp. 141 - 150 in Portfolio
Volume One), represents the greatest level of fusion and equality of focus between acoustic, live
processing, and fixed electronic elements amongst the works in the portfolio, in order to explore
questions of liveness of sound sources in accordance with the third research topic of the
portfolio. This piece is based upon Alcide ‘Blind Uncle’ Gaspard’s recording of ‘Sur le bord de
l’eau’, a traditional Cajun ballad. This recording features several striking elements: distortion
and a particular timbral character created by the 78 rpm recording and playback; an idiosyncratic
style of guitar playing combined with a distinctive vocal tone; lyrics relating a story with
archetypal or mythical aspects; and some distinctive features of pitch and unexpected harmony
(specifically, the major/minor modal mixture, and the modal inflections in some of the guitar
chords).

These various distinctive components of the recording were analysed using the analysis and
song-tuition software Capo, and the live viola materials composed based upon this analysis.

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139 This title matches that given on the original recording label and is correct in Cajun French, although it diverges from academic French (where it would be given as *Sur le bord de l’eau*).
140 Blind Uncle Gaspard, *Natchitocheo/Sur le bord de l’eau* (Vocalion, 5333, 1929); an mp3 transfer of this public domain 78 rpm record can be found at Neal Pomea, npmusic.org
141 The lyrics are similar to the Canadian folk song of French origin titled ‘Isabeau s’y promène’, telling of a young woman walking by the water where she meets and falls in love with a sailor and later comes to grief. While the comparison of lyrics is my own, information on ‘Isabeau s’y promène’ is sourced from Hélène Plouffe, ‘Isabeau s’y promène’, in *The Canadian Encyclopedia* (2006) <http://www.thecanadianencyclopedia.ca/en/article/isabeau-sy-promene-emic/> [accessed 30 July 2015].
These materials are newly composed rather than simply transcribed from the analysis, using intervals, pitches, timbres, melodic contours, and rhythms derived from the recording but then transformed; nevertheless, they retain allusions to the source. For example, the pizzicato passages echo plucked guitar; repetitive sliding descending figures, such as the one seen in bar 22 or in a different form in bar 39, imitate the sliding vocal style; the use of compound time signatures interrupted by variations in metre reflects the unsteady tempi in the recording; the use of double-stops, open strings, and drone figures reflects common characteristics of Cajun folk playing style and the relationship between vocal melody and guitar in the recording; and use of harmonics, sul ponticello, and changes in bow pressure add occasional relative timbral roughness similar to the changing level of timbre distortions in the recording.

The live processing is achieved through a Max/MSP patch I created for this work (save for the inclusion of the karma~ external object for looping). The patch combines the recording and playback of live loops, playback of pre-recorded viola samples (some including processing, some without), processing of live input using delay line and reverb unit ramps, and playback of processed samples from the original recording. The piece begins with solo live viola, recorded for looping, then playback of the loop with the live viola accompanying. The music then begins a process of expansion of layers and complexity: live materials are frequently recorded and looped, then accompany the loops, while pre-recorded viola samples add a third layer of activity. The palette of motifs remains similar throughout, creating imitative, echoing effects; the timbres, however, shift over time, especially from figure D where a slow ramp of delay lines and reverb begins. From figure F, a processed sample of Gaspard’s original recording slowly begins to be audible. The samples of the original recording have been processed using Logic X and Soundmagic Spectral plugins, focusing on spectral freezing, comb filtering, and selective EQ to create blurred drones far removed from the original. As the sample playback becomes more audible, the frequencies within the drones begin to connect audibly with the pitch content of the viola elements previously heard.

By figure I, the viola elements (by this point, consisting of no further live elements and playback of a short loop) are subsumed completely by the sample playback— the original audio overwhelms its derivatives, though in a transmuted and heavily disguised form. The sample playback continues unaccompanied for a flexible amount of time, shifting between different

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143 Rodrigo Costanzo, *karma~* (2015), Max/MSP.
samples that have been processed in similar ways to allow for subtle and barely noticeable

durational changes. The processing causes an effect of flattened or slowed time, as details of the
recording (especially rhythmic figures) become smoothed or disappear, even as pitch space
expands. The samples present a sort of aura of the original, containing traces and remnants—an
amplification (quite literally) and expansion of the echoing effects heard earlier in the interaction
of the live and electronic parts.

The live viola part rejoins the texture with the melody of the ballad, played *ad libitum*. This
is one of a few instances in the portfolio of works where a pre-existing musical element is heard
mostly unaltered; as this piece was composed for a specific performance where the audience
would almost certainly be unfamiliar with the original recording, it seemed a suitable opportunity
to experiment with allowing a less disguised version of the original music to appear in the final
work, an approach mostly avoided in other compositions and therefore worth testing (for
example, compare *Night Studies*, where only very small samples of the original music can be
heard, or *Timestamp*, where the motif is treated as a whole unit but manipulated in time and
orchestration to prevent direct recognition). A brief coda returns *Sur le borde de l’eau* to
the solo viola material after the sample playback and ballad melody have faded,
recontextualising the opening passages that have now ‘passed through’ the sound space of the
original audio (in the altered form presented by the processed samples).

While, from a compositional standpoint, *Sur le borde de l’eau* shows a successful attempt at
seamless blending of acoustic and electronic sources, it presents some difficulties from a
performance perspective. As regards production it is difficult to blend the sound of the amplified
viola with the pre-recorded viola samples to a sufficiently indistinguishable degree; the desired
effect of slight disorientation regarding sound sources did not come across fully in the piece’s
premiere performance, as noted by some listeners. The recording presented on the supplementary
Disc 1 (track 13) is a studio recording of the piece, allowing a greater level of control over the
mixing of the different parts. A comparison of studio techniques versus performance and
questions of performer and listener control in reference to the specific topics described in this
commentary are outside the realm of the current portfolio as the focus is limited to works for live
performance, but should be addressed further in future when live electronics are employed in a
similar manner.
Part Five - *Lost Museum: a synthesis*

Chapter Seven - *Lost Museum*

*Lost Museum* is a series of three interrelated compositions reflecting on themes of systemic and institutional violence, destruction caused by the passage of time, preservation, and the interactions between artwork and museum. Each piece contains some treatment of ‘found object’ source sounds; representation of memory concepts; motif-based systematic structures; and use of electronics either in the compositional process or as a part of the resulting piece. As a result, this set of works forms a useful case study for the synthesis and integration of the different concepts and methods outlined in the previous chapters of this commentary.

‘Das Verschwundene Museum’ exhibition, Bode Museum, Berlin, 19/3/15 to 27/9/15

The exhibition ‘Das Verschwundene Museum’ (‘The Lost Museum’) was shown in the Bode Museum, Berlin, in the summer of 2015 to commemorate the 70th anniversary of the end of World War II.144 The exhibit described and explored the mysterious destruction by fire of much of the collection of the museum, primarily comprising medieval and Renaissance painting and sculpture, which was stored in the Friedrichshain flak tower for safekeeping at the time of the Soviet occupation of Berlin.145 The exhibition included damaged works of art left in their semi-destroyed state as well as restored pieces, replicas of damaged or lost pieces, and photographs of missing works alongside displays and text discussion regarding restoration and replication techniques.146 The exhibition was described in its introductory wall text as ‘a polyphonic

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reflection: curators, conservators, archivists, historians, moulders, and artists… offer a variety of perspectives and even contradictions’.\(^{147}\)

Somewhat ironically, a plaster replica factory set up prior to the outbreak of the war to provide inexpensive tourist souvenirs to museum visitors has provided the main avenue for restoration of damaged and lost pieces, as many molds have survived; this raises interesting questions of high versus low art, rarity versus mass production, and the value of originals versus copies.\(^{148}\) Beyond questions of the treatment of individual works, the exhibition also overtly posited questions regarding the role and responsibilities of a museum as a reflection of its particular social, political, and temporal context\(^{149}\) as opposed to an idealized, transhistorical institution in which the (lowbrow?) public may view ostensibly canonical (highbrow?) works in an abstracted setting in a manner bordering on devotional.

Having visited this exhibition in July 2015, I became interested in exploring some of these concepts in my work as there were numerous affinities apparent. The considerations of how best to commemorate and preserve or recreate artifacts (of any variety) from the past, the value of copies versus originals, and the use of technology to attempt to reverse or prevent decay and destruction are closely linked to my research questions and are of ongoing interest after having completed work in a very similar conceptual and technical vein during the 2014 Ars Electronica Festival in Linz (specifically, work on *Artefacts* leading up to the festival, then *Timestamp* which immediately succeeded the festival). The first piece in what would become a set of three, entitled *Lost Museum I: Lamentation* (pp. 205 - 208 in Portfolio Volume One), was composed in November and December of 2015 for solo double bass, using a recording of Giovanni Pierluigi da Palestrina’s ‘Jod: Manum suam misit hostis’ from the third book of his *Lamentations*,\(^{150}\) composed for the Maundy Thursday liturgy during Holy Week in the calendar of the Catholic church.\(^{151}\) The reasons for this instrumentation and source material are outlined in the next section.

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\(^{147}\) Freudenheim, para. 2 of 7.

\(^{148}\) Ibid., para. 6 of 7.

\(^{149}\) Ibid., para. 2 of 7.


Conceptual overview of Lost Museum I: Lamentation

Beyond considerations of practicality and the specific performance opportunity on offer, solo double bass was chosen due to its percussive and timbral capabilities, its ability to produce pitches rich in overtones (given the use of spectral manipulation of the recording, noted below), its physical similarities to some of the sculpture collection in terms of materials and construction techniques, and its link to contemporaneous instruments, being a member of the viol family, a kind of transformed throwback to past lutherie and woodcarving practice. Prior to composing the piece, I revisited an earlier study of Stefano Scodanibbio’s four-movement work *Voyage That Never Ends* (composed 1979 - 1997). In addition to being of influence in its idiomatic writing for the bass and systematic use of a distinct palette of timbral effects, the piece clearly highlights the bass itself as a somewhat archaeological link to the past (specifically in its use of scordatura). Furthermore, the work contains extramusical links to a past which is implied to be unfinished, ongoing or recursive, and in a state of fragmentary decay (suggested by the titles of the work as a whole and its individual movements, which reference an unfinished anthology by Malcolm Lowry and a travelogue by 19th-century explorer John Lloyd Stephens respectively).

Palestrina’s *Lamentations* as a whole appealed as a subject and source for this piece by virtue of its contemporaneity, geographical concordance, and similarity of theological topics with the majority of the artworks in the scope of the exhibition. Additionally, its polyphonic style is felicitous for spectral manipulations. The movement in question, ‘Manum suam,’ furthermore sets text which is germane to the topic of the destruction of war and of objects considered sacred:

The enemy has stretched out his hands over all her precious things; yea, she has seen the nations invade her sanctuary, those whom thou didst forbid to enter thy congregation.

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154 Scodanibbio, ‘Ex Novo Musica 2010: Stefano Scodanibbio’.
155 Lamentations 1.10 (RSV).
The concept expressed here of a ‘sanctuary’ for ‘precious things’ is reminiscent of the idea of the museum as a kind of ideal shrine to particular masterworks, called into question in the exhibition.

The majority of the Bode Museum’s collection consists of pieces created for churches or for domestic devotion. As religious artefacts (even if the artworks were perfectly unchanged since their creation and undamaged), their display in the museum divorces them from their original setting, context, and purpose. Similarly, the recording of ‘Manum suam’ is removed from its original environment; in fact, it is distanced by three degrees. Firstly, by its performance outside of a Catholic church and for a purpose other than the specific liturgy for which it was composed; secondly, by performance outside of its time period; and thirdly, by its existence as a specific recording of the live performance (what could be considered a copy of one version of a performance). These aspects of the piece’s polyvalence coincide with the exhibition’s aim of presenting multiple possible perspectives: ‘this legacy [of missing art] has meant something different for each generation. Every approach reflects the prevailing political zeitgeist and thus the decision to favour one version of the past over another.’

Compositional process and analysis of Lost Museum I: Lamentation

The composition of 'Lamentation' began with isolating a small sample of the recording of Palestrina’s ‘Jod, Manum suam misit hostis’ from the third book of his Lamentationem. The small sample was chosen somewhat arbitrarily for the distinctive quality of a particular motif within it: the E, D, F figuration seen, for example, in bars 41 – 42. This sample was then processed in Logic Pro X using Michael Norris’ suite of spectral plugins and Apple reverb plugins to create altered, layered drones and to limit the partials to a smaller range. Limiting the range yields a pitch set consisting of the notes of the Locrian mode with E as the final. This pitch set was then used as the basis for constructing motives within the piece.

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156 Exhibition wall text quoted in Freudenheim, para. 2 of 7.
157 Giovanni Pierluigi da Palestrina, Lamentations, Book 3, I Cantori di Lorenzo, cond. by Filippo Maria Bressan (Tactus, TC521603, 2009).
To create the sense of a fragment glimpsed or revealed, the directly-quoted motif is reserved for the final section of the piece. Consequently, the piece begins with an inversion and expansion of the pitches contained within the quoted motif: the A, G, A figure seen in bars 1 - 3 (with the exception of the tremolo interruption, to be discussed momentarily). This is immediately followed by a combination of this motif with the quoted motif: the E, G, F figure of bars 4 - 6. Both of these motifs contain an interjection in the form of a two-note tremolo (bars 2 and 4), and the phrase concludes with the reappearance of the A which is ‘missing’ from the second motif, but in the form of a natural harmonic.

The piece continues the established pattern of similar pizzicato motifs broken by the interpolation of interjectory figures and punctuated by harmonics at phrase ends, with each iteration of each type of motif often becoming slightly more complex through the alteration of rhythm (for example, in bar 16) or a change of timbre (for example, harmonic glissandi as in bar 14 - 15 or snap pizzicato in bar 19). This pattern is not adhered to in a rigidly systematic way in order to create a sense of flexibility and forward motion through the use of lengthening phrases and uncertainty. The first major section of the piece concludes with bars 23 - 26, in which two new motifs- the tremolo of bars 23 and 25 and the glissandi of bars 24 and 26- are introduced as
a point of both punctuation (by the new, previously unheard figurations) and transition (in the
context of the related materials which follow this passage).

The second major section of the piece begins with the introduction of the original form of
the quoted motif. The E and F are heard isolated between interruptions of the tremolo and
harmonic figures (e.g. bars 27 - 31). The quoted motif is heard in its entirety for the first time in
bars 38 -39, before being disrupted once more by the tremolo figure and the B flat harmonic
which punctuated the phrase endings of the first section of the piece. To finish, the quoted motif
is heard once more, then fragmented into the glissandi figures seen in bars 44 - 45 and 47 - 48,
which preserve the minor third present in the motif. One final version of the three-note motif
from the first section reappears in bar 46. Finally, a much slowed, pizzicato variation of the
tremolo motif concludes the ultimate bar.

Further plans for revising this work include lengthening it, extending the additive process
in order to include a more direct quotation of the melodic fragment from the Palestrina work
and/or including the manipulated sample as a fixed electronic part alongside the solo bass. These
questions are a consequence of the inclusion of so small a quotation and hardly an immediately
recognizable one, while signposting the quotation with the title and program note- issues raised
during the rehearsal and first performance and, afterwards, in discussion when presented at the
School of Music’s weekly composition seminar. Some listeners felt that the piece itself did not
de deliver enough of the source material to warrant the strong emphasis placed upon it by the title,
programme note, and my verbal communications. This emphasis was intentional, as a sense of
fragmentation and absence should be the primary characteristics of the piece; however, in its
current state, this potentially creates a confusion as regards listener expectations. The title has
now been updated to *Lost Museum I: Lamentation*, which perhaps better reflects its character
while slightly de-emphasizing the quotation as a feature of overarching importance without
completely obscuring it.

**Overview of Lost Museum II: Photo Booth and Lost Museum III: Llyn**

The next two pieces were composed concurrently from December 2015 to March 2016.
Each deals with a particular artwork in two separate, slightly later, museum exhibitions which, in
some respects, happened to deal with the same general questions- the exhibition ‘Constellations’
at the Tate Liverpool, and the recent retrospective of Welsh artist Ivor Davies at the National Museum of Wales Cardiff.¹⁵⁸

‘Constellations’ is an ongoing, rotating exhibit featuring works from Tate Liverpool’s permanent collection arranged thematically or conceptually rather than in a linear or chronological fashion.¹⁵⁹ The curatorial approach is summarized thus:

‘At the heart of each constellation is a ‘trigger’ artwork, chosen for its profound and revolutionary effect on modern and contemporary art. Surrounding the trigger works are artworks that relate to it and to each other, across time and location.’¹⁶⁰

This deliberate centring of interrelationships within the museum’s collection and its method of presentation carries obvious echoes of concepts explored by the Bode Museum.

Concepts and composition of Lost Museum II: Photo Booth

My piece subtitled ‘Photo Booth’ (pp. 211 - 228 in Portfolio Volume One) focuses on one of the so-called ‘trigger artworks’ within the ‘Constellations’ exhibit- an installation of the same title by Lorna Simpson.¹⁶¹ Tate’s catalogue describes this piece as

‘a multi-part installation comprising fifty found photo booth portraits predominantly depicting black men and fifty ink drawings on paper of the same dimensions as the photographs. The elements are each individually framed and they are hung on the wall in a deliberately loose and irregular cloud-like shape.

The photographs are all small-scale black and white photo booth portraits taken in the 1940s. The historical specificity of the images was important to Simpson. She has said, “The ’40s, in American culture, were a tough time in terms of life, work, Jim Crow laws, segregation and lynchings. And so the nostalgia of

how beautiful these portraits are is one thing, but the context of the era is important with respect to what was endured at the time."\(^\text{162}\)

Around the same time as I was viewing this exhibition, I was exploring the recently-digitized collection of wax cylinders in the library of the University of California Santa Barbara.\(^\text{163}\) I was immediately struck by some parallels between the outmoded cylinder recording technology and the discarded photo booth portraits. Both collections came into being with the intention of identifying and capturing a specific individual person or individual moment in time; however, they have now become opaque and practically esoteric through the passage of time and the excision from their original contexts and purposes. As with the aforementioned Palestrina recordings, several degrees of distance between the original object and the current viewer or listener have been introduced.

Taking this concept as a starting point, I chose several wax cylinder recordings\(^\text{164}\) as an analog to the snapshots in Simpson’s work. I chose the cylinders in a relatively arbitrary fashion by browsing and selecting recordings that contained strong rotation/mechanical sounds and/or snippets of music, more or less audible or distorted. The interplay between these elements over the course of a recording was the primary area of interest. These were edited and processed electronically using very similar methods to the source recordings for ‘Lamentation’. However,


\(^{163}\) University of California Santa Barbara, UCSB Cylinder Audio Archive <http://cylinders.library.ucsb.edu> [accessed 31 January 2016].

in this piece, I chose to incorporate the resulting electronic part within the final, acoustic, piece alongside the trio of piano, bass flute, and bass clarinet in order to clearly centre the technology which transmits yet mediates and distorts the fragmentary voices and snippets of music which can be heard. The notated materials in the piece are analogous to Lorna Simpson’s ink drawings, interspersed amongst the electronic part as well as acoustic elements which directly echo sounds heard in the electronics. For example, the piano part contains a repetitive ‘scissor’ motif which forms a kind of auditory ‘scribble,’ which sometimes also appears transformed into an oscillating, ‘rotating’ figure resembling the percussive sound of the wax cylinders rotating, prominently heard in the electronics.

![Fig. 11 - ‘Scissor’ motif](image1)

Meanwhile, the bass clarinet and bass flute pass hocket and/or layered motifs between their respective parts to create a fragmentary *Klangfarbenmelodie* texture which advances and recedes in prominence at different points throughout the piece. These elements combine into a large-scale mirror form, where the motifs are ‘passed through’ a central static passage formed of vertical layering of previously-heard harmonies (bars 65 – 81) and reappear, transformed, in loosely inverted retrograde thereafter (bars 82 – 112).

Thus, while the music has progressed over time, it is ultimately circular, perhaps representative of the rotation of a wax cylinder or recurrent patterns of historical events- or both. This piece also served as something of an experiment in how connections between fixed electronics and acoustic parts might be perceived as connected or disjointed based on their
timing and levels of related features. After workshopping the piece, I felt that, while the acoustic instrumental parts were sufficiently suggestive of the electronic sounds, the electronics could be improved by incorporating pre-recorded samples of the instrumental materials and/or were timed more closely with the live performers. These adjustments might change the presentation of the electronic sounds as the primary source from which the live sounds follow; however, ambiguity or questioning of which source is more primary would be intriguing.

**Concepts and composition of Lost Museum III: Llyn**

Finally, the third composition in this group, subtitled ‘Llyn’ (pp. 231 - 238 in Portfolio Volume One), the Welsh word for ‘lake’, was written in response to the collages of Welsh artist Ivor Davies. While Davies works in many media, his body of work primarily deals in destruction, decay, and political and institutional violence. In particular, his recent collages focus on what he perceives as the cultural suppression practised upon the Welsh language, communities, and people. One such collage, titled *Epynt*, references the 1965 deliberate flooding of the village of Capel Celyn in order to create a reservoir to supply the city of Liverpool. This event has been widely perceived as an act of political violence perpetrated by the English government against a community supposedly deemed expendable by nature of its rural Welshness.

The collage presents a nearly flat surface, with granular fragments of dust and detritus. I wished to reflect this grainy yet limited material, as well as evoke the calm surface of the lake that hides decaying remnants of the razed village- a literal, visual image of the site of the drowned village as well as a figurative representation of decay, fragmentation, and scattering of

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165 The piece was workshopped at Cardiff University School of Music on 17 February 2016 by Carla Rees, Heather Roche, and Xenia Pestova, with electronics operated by myself and conducting assistance by Dr. Robert Fokkens.
168 Wilson, p. 32.
171 Wilson, p. 32.
site-specific identity (the latter aspect being present in a literal sense in Davies’ collage by its use of dirt from the site). To this end, I constructed the piece from a palette of eight limited motifs using interrelated rhythms and derived from a hexachord which hints at the Phrygian mode.

![Hexachord](image.png)

**Fig. 13 - Hexachord employed in *Lost Museum III: Llyn***

The piece is scored for flute, viola, and electronics, and consists of four sections. In the opening section of the piece, from the start to rehearsal figure D, each cell recurs eight times before moving to the next motivic cell, with the overlapping of the two parts manipulated by a non-linear overall decrease in the time between each instance of a cell. For instance, the viola begins the pattern with a new cell heard every eight crotchet beats, then seven, then six, followed by five and a half, then six. Meanwhile, the flute enters after the third instance of the first cell in the viola part, with spaces of seven crotchet beats, seven again, seven and a half, six, five and a half, and five and a half again until the new cell appears at the end of bar 15. This establishes a sense of flexible patterning, with ‘echoes’ which vary slightly between the two instruments, reminiscent of ripple patterns on the surface of water. The close range and nearly-identical dynamic swells used enhance the effect of slightly-distorted echoes.

This treatment of the motivic materials continues to rehearsal figure D, with slight expansion of the timbral palette from figure B through the use of flutter-tongue in the flute and tremolo in the viola, gradual introduction of vibrato in both instruments, and the interpolation of dyads in the viola part from figure C. Thus the ‘ripples’ or ‘echoes’ are subtly distorted or transformed as they ‘expand’ or travel outward in the imagined space of the music. The viola’s dyads add emphasis to the B flat heard against the A natural of the flute part, while also briefly introducing a new pitch, G flat, in bar 39. This destabilises the established hexachord and foreshadows the harmonic shift at figure D. This section is punctuated at its close by a new timbre- the artificial harmonics in the viola at bar 49.

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172 I omit here an analysis of this instrumentation as it was determined purely by the available performance opportunity at the time of its composition.
At this point, at figure D, the accompanying Max/MSP patch is activated, and delay lines and reverb units begin to slowly ramp up on each part. This has the effect of intensifying the echo effect that has already been present in the imitation between flute and viola, increasing the level of distortion, and also introducing an element of uncertainty to sourcing the sounds (especially as the patch’s effects begin very subtly, so the new sounds are not quite noticeable at first).

After the delay lines and reverb units have reached their peak values, at figure F the texture changes and sample playback begins in the Max/MSP patch. The sample is a combination of processed and unprocessed wave sounds as well as underwater samples (from Llyn Gwynant in North Wales and Lake Winnipesaukee near my family’s home in New Hampshire), with added layers of spectral drones created from the same recordings by processing using Michael Norris’ suite of spectral plugins in Logic X. In effect, the slow progression of materials to this point leads to a slightly more direct experience of the sound of the referenced environment, with a shift from the abstracted instrumental materials to more literal, recorded sounds; however, there is also a shift from more live, present, acoustic sources to acousmatic, disembodied sources, raising the question of which is the more direct or ‘present’ source and manipulating degrees of distancing.

From bar 102 to the ending, electronic elements vanish, leaving only the instrumental parts with faint, transformed versions of the motifs trailing off.

**Representation of Memory Function in Lost Museum III: Llyn**

The granular nature of the employment of limited motifs in this section is not only conspicuously analogous to the materials present in Davies’ collage, but also relates deliberately to the functioning of echoic memory. Echoic memory, or early processing, forms the first step in the process of understanding and storing sounds in memory. A steady stream of sound information is received through the anatomical structures of the ear into the auditory nerves and thence into neural pathways for processing; the earliest and most instantaneous processing

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174 Michael Norris, *Soundmagic Spectral* (beta v. 2, 2010), Logic X, Mac OSX.

175 Snyder, p. 8.
(echoic memory) involves the extraction and categorisation of auditory features (e.g. pitch, timbre, loudness) for perceptual understanding by the brain and the activation of short-term and long-term memory functions.\textsuperscript{176} Auditory events at this sensory level are grouped together by virtue of their timing, similar perceptual features, and the neural pathways of the listener (familiar sounds traveling through already-established pathways).\textsuperscript{177} The listener is primed by repetition of current sound events as well as their past experiences (previously-reinforced neural pathways) to then subconsciously group the sounds into larger patterns and form an understanding of their basic relationships over time, forming an integrated perceptual experience of ‘sound-images’ of the acoustic environment that interact with extant memories.\textsuperscript{178}

It was precisely this granular, unconscious level of perception I wished to reflect in \textit{Lost Museum III: Llyn}. Echoic memory processes occur on a scale of milliseconds,\textsuperscript{179} which would be impossible to accurately portray compositionally for obvious practical reasons; therefore, the motivic materials in the piece occur more closely in relation to the understood scale of short-term memory processing, around 3 to 7 seconds per event.\textsuperscript{180} Despite this necessary expansion of scale, the operation of the motifs does form a near analogue to echoic processing: encapsulated events defined by pitch, timbre, and loudness, transformed by subtle adjustments to these aspects, and grouped in a patterned and integrated fashion by means of their timing and repetition. As the particles of dust used in Davies’ artwork formed by their grouping a kind of ‘place-memory’, so the motivic ‘grains’ in my piece should form a specific ‘sound-memory’ reminiscent of the immediate perceptual experience of a sound source (in this case, of the lake). Similarly, the electronics also play upon the concept of grouping versus disjunction of sound events and orientation versus disorientation in the perception of sound sources.

\textsuperscript{176} Ibid., p. 20.  
\textsuperscript{177} Ibid., p. 20.  
\textsuperscript{178} Snyder, p. 23. See also Clarke, p. 31.  
\textsuperscript{179} Snyder, p. 19.  
\textsuperscript{180} Ibid., p. 47.
Conclusion

Taken as a whole, this portfolio demonstrates a process of exploration along the boundaries of and within the interactions between the three research concepts discussed in detail in Chapter One—systemisation and generative compositional methods, reflection or commentary on the experience of music itself, and integration of acoustic and electronic techniques—while discovering methods of working that effectively combine these concepts in ways that successfully achieve the individual aims of the pieces.

Regarding the first theme, Chapter Two’s analysis of Phyllotaxis and subsequent works containing derivative techniques describes an investigation of a strict application of procedural generation as a method of achieving unity of design while maintaining local-level contrasts, and the consequent adaptation of these techniques to more flexible deployment to accommodate the inclusion of other concepts and methods in later works.

Chapter Three describes a process of exploration of the effects of different collage techniques, settling upon a hybrid approach combining collage elements with the aforementioned generative techniques and electronics-informed methodologies in order to better represent concepts of listening and remembering as a creative, generative act as well as a selective process of preservation, entropy, and bricolage.

Chapter Four illustrates the development of pitch approaches that satisfactorily serve the other concepts and design principles in order to adhere to multi-level structural unity.

Chapters Five and Six show solutions discovered regarding how to convey most effectively the pieces’ individual histories of transmission and traces of their technological past, as further mediated and interpreted by my own listening and remembering.

Finally, Chapter Seven’s in-depth case study of the Lost Museum set of works illustrates the refined synthesis of approaches and techniques building upon the findings in earlier pieces in the portfolio, showing a way of working that efficiently combines the research concepts in service of the desired goals of the individual compositions and displays a distinctive compositional voice. These compositional methods, refined over the course of the composition of the portfolio and representing significant shifts and progression in my practice, add up to a specific blend of techniques that, taken together, define the original features of the works presented: the balance of
generative and borrowing procedures combined with the focus on mnemonic concepts; the
technologically-informed transformational methods; and a deliberately delimited yet inclusive
post-tonal approach to pitch with a modal trend.

As the research in connection with the portfolio has been wide-ranging and interdisciplinary,
there have been points in the composition of the portfolio where it has been necessary to truncate
or disregard possible branches of work in order to maintain specific focus on only the three
defined research topics and their integration. In particular, some topics deliberately left
unexamined in this portfolio include: the implications of purely electronic or acousmatic sources
versus acoustic sources in terms of the memory concepts relevant to the portfolio, focusing
specifically on a blend between electronic and acoustic sources; possibilities of procedural
generation using computer and electronic tools; questions of soundscape versus collage as
compositional frameworks; questions of listener control and interactivity; detailed investigation
into implications of site-specific performance on spatial and perceptual aspects of the works in
the portfolio; more nuanced and complex employment of microtonality, spectral techniques, and
live electronic processing; and undoubtedly, several other pathways. In particular, the latter three
listed aspects—site-specific performance, expanded pitch space, and more extensive and
complex use of live processing—are avenues for future development of the foundational
practices explored by the portfolio works that will form next steps for me to build upon my
previous work.

The music composed for this portfolio is representational, in the sense that each piece
communicates specific sonic ‘images’, moments, and environments; yet it is also mediated by
personal memory, compositional processes, and technology. This allows it to present a holistic
auditory experience tying together numerous divergent threads with both cohesion and
heterogeneity. By focusing on the active, ongoing nature of listening, memory, preservation, and
destruction, the pieces can act as a conduit for connections and collaborative listening and
remembering—a kind of lightning rod for musical memory.
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