Media and Compositional Action:  
Folio of Compositions and Critical Commentary  
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Abstract

This thesis comprises a folio of musical compositions and a critical commentary. Using a “practice as research” methodology, the musical works explore the question of how different compositional media influence the compositional process.

The outcomes of this creative exploration are presented in the form of Practical Mechanics, a major work for chamber ensemble; Your Heart is a Stupid Thing to Trust, an acousmatic audiovisual work; Sunrise Industry, an album produced by digitally cutting and recombining recorded improvisations; and a number of other new works. These works are diverse in genre, but share a post-modern stylistic pluralism, combining art music aesthetics with popular styles. They also exhibit a tendency toward rhythmic complexity and polyrhythm.

The critical commentary contextualises the creative work through a discussion of the effect of composition media (including tools, technology, and representational systems) on compositional style and choices. It is argued that the effect of any particular medium cannot be understood in simple terms, due to the complex and integrated relationship between the composer and their environment and the intuitive and unconscious nature of compositional action. All works within the folio are discussed with a particular focus on the question of media use, with more detailed analyses reserved for selected significant works.
**Declaration by author**

This thesis is composed of my original work, and contains no material previously published or written by another person except where due reference has been made in the text. I have clearly stated the contribution by others to jointly-authored works that I have included in my thesis.

I have clearly stated the contribution of others to my thesis as a whole, including statistical assistance, survey design, data analysis, significant technical procedures, professional editorial advice, and any other original research work used or reported in my thesis. The content of my thesis is the result of work I have carried out since the commencement of my research higher degree candidature and does not include a substantial part of work that has been submitted to qualify for the award of any other degree or diploma in any university or other tertiary institution. I have clearly stated which parts of my thesis, if any, have been submitted to qualify for another award.

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Publications during candidature
Your Heart Is A Stupid Thing to Trust, Audiovisual Composition, presented at International Computer Music Conference (ICMC) 2014.

Publications included in this thesis
Your Heart Is A Stupid Thing to Trust, Audiovisual Composition, presented at International Computer Music Conference (ICMC) 2014 – forms part of the folio of compositions.
Contributions by others to the thesis

Practical Mechanics was developed with the assistance of my chamber ensemble Nonsemble, which consists of myself and the following musicians:

Samuel Andrews (Violin)
Briony Luttrell (Cello)
Samuel Mark Mitchell (Piano)
Hikaru Sugimoto (Percussion)
Kieran Welch (Viola)
Flora Wong (Violin)

Sunrise Industry relied on contributions in the form of recorded instrumental improvisations from the following musicians:

Chelsea Campbell-Wilson (Clarinet)
Helen Carrington (Piano)
Jacob Hicks (Drums)
Briony Luttrell (Cello)
Sam Mitchell (Drums)
Fern Thompsett (Electric Violin)
Mitchell Knox (Bass Guitar)
Hik Sugimoto (Percussion)
Sangdae Yang (Drums)

Statement of parts of the thesis submitted to qualify for the award of another degree
None.
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Practical Mechanics (Septet, 24 minutes)
- Score and Parts (pdf, 72.7 MB)
- Audio recording (16 bit 44.1kHz wav, 250MB, 5 tracks)
Performed by Nonsemble (Hikaru Sugimoto, Samuel Mitchell, Chris Perren, Flora Wong, Samuel Andrews, Kieran Welch, Briony Luttrell, Helen Carrington), Recorded by Briony Luttrell and Chris Perren, Produced, Mixed and Mastered by Chris Perren.

Your Heart Is a Stupid Thing to Trust (Acousmatic with video, 20 minutes)
- Video (h.264 mov, 720p HD, Stereo, 867MB)
Recorded, Produced, Mixed and Mastered by Chris Perren. Video source material courtesy of Archive.org Community video archives (Public Domain), Prelinger Archives (Public Domain), Track Chic TV (Creative Commons Attribution-noncommercial license), and Neils Robitzky (©, used with permission). Video Edited and Produced by Chris Perren.

BMX (Sextet with video, 5 minutes)
- Score and Parts (pdf, 366KB)
- Video (h.264 mov, 720p HD, Stereo, 217MB)

Major League Geometry (Percussion Trio with video, 5 minutes)
- Score (pdf, 50KB)
- Video (h.264 mov, 720p HD, Stereo, 208.2MB)
Recorded, Produced, Mixed and Mastered by Chris Perren. Video source material courtesy of Prelinger Archives (Public Domain). Video Edited and Produced by Chris Perren.

Sunrise Industry (Acousmatic, 37 minutes)
- Audio Recording (16 bit 44.1kHz wav, 386MB, 7 tracks)
Performed by Chris Perren, Chelsea Campbell-Wilson, Briony Luttrell, Fern Thompsett, Helen Carrington, Jac Hicks, Mitch Knox, Sam Mitchell, and Hikaru Sugimoto and Sangdae Yang. Produced, Mixed and Mastered by Chris Perren.
*On Rainy Days, Be in the Rain. On Windy Days, Be in The Wind.* (Electro-acoustic, 22 minutes)
- Score (pdf, 603KB)
- Audio Recording (16 bit 44.1kHz wav)

Performed, Produced, Mixed and Mastered by Chris Perren

*Snares = 2 & 4 (Orchestra, 7 minutes)*
- Score (pdf, 461KB)
- Audio Demo Recording (16 bit 44.1kHz wav, 81.6MB)
Chapter 1

Introduction and Background

As one of the many factors which guide compositional action, the medium can sometimes be overlooked. In some musical traditions, the means of production or communication may remain static, using a single standardised method of notation or set groups of instruments. Within such traditions the oversight of media is understandable, as it is more interesting to talk about those elements which are variable, and which distinguish one piece from another. In such traditions, discussion may rightly focus on musical structure, intention, and interpretation. However in a time when transgressing genres and traditions has become the norm (Cook Music, i), an inevitable collision occurs not only between wildly different musics, but also between wildly different means of creating music. In this environment, the medium emerges as a key variable, as important for discussion as any other musical element.

This critical commentary accompanies a folio of original compositions of a rather broad scope including chamber and orchestral music, electronic compositions, and audio-visual work. In its creation I have employed a wide range of approaches, including improvisation, recording, sequencing, staff notation, and collaboration. Because of this diversity, I frame the work as a practical exploration into how various media, tools, processes and technologies influence my music creation. My analysis of the works will pay particular attention to the means used to create them, and the influence this has had on my musical thinking and on the final product. I have chosen this focus because I believe that to present a traditional structural analysis of these works would be to neglect what is interesting and important about them. In 1983, Kowalski predicted that the content and significance of music in the near future “may be inextricably confused with the technology used to produce it” (12). My exegesis aims to accept this inextricability where it exists, toward presenting a meaningful discussion of my music.

The musical works themselves are presented as research outcomes. The theoretical ideas discussed in the exegesis are not intended as a contribution to musicological debate, but as a key to understanding the intellectual and philosophical influences behind my musical practice.

This exegesis is structured as a zooming-in from general to specific. Later in this introduction I present a broad context for my practice, discussing musical and theoretical backgrounds. Chapter 2 focuses in detail on the influence of media on my compositions, addressing four key discussion areas of action, media, polyrhythm and pluralism.

Following this will be a more detailed discussion of the works themselves, which include
the large scale chamber work, *Practical Mechanics*, a body of audio-visual compositions, an electro-acoustic album-length work entitled *Sunrise Industry*, a work for solo guitar and electronics, and a chamber orchestra piece.

To ensure depth of discussion whilst staying within scope, I favour a close and detailed discussion of a narrow range of material, rather than a shallow survey of the entirety of the folio. Therefore while every inclusion to the folio is at least touched upon, some components are dealt with in significantly more detail than others. For example, in discussing *Practical Mechanics* I have limited my detailed analysis to the first and third of the five movements. The works selected for thorough analysis generally represent the broadest range of techniques and ideas.

**Methodology**

This project uses a “practice as research” (Barrett and Bolt) methodology, where the musical works themselves are presented as research outcomes. My contribution to knowledge therefore is embedded in the creative work, and this exegesis serves to contextualise the work and its connections with broader traditions both artistic and theoretical. Reiner and Fox have identified that in this style of research, “the folio of compositions has the status of a thesis, and an original contribution to knowledge is made in the form of an aesthetic argument articulated in the musical works themselves” (3).

Reiner and Fox further clarify that “for music composition to qualify as research, it would have to be (1) of an investigative nature, (2) the investigation would have to be systematic, and (3) the investigation would have to result in an original contribution to knowledge” (7). My PhD project is investigative in the sense that a research question was posed at the outset regarding compositional media, and the works are a practical exploration of this question. Though the creative act of composition is complex and rarely systematic, each body of works has been approached with some systematic limitations related to the research question, which will be explained further in each analysis chapter. Finally I contend that the folio of works embodies a unique aesthetic argument within an existing musical dialogue, and is therefore a contribution to knowledge.

The theoretical arguments presented in this paper serve to contextualise the creative work, and are not intended to contribute to knowledge in themselves. Any weight these arguments may carry in a wider musicological or philosophical discourse is secondary to the main purpose of explaining the creative process behind the works presented here. My approach to the discussion section of the exegesis is broadly phenomenological, in the sense that priority is given to that which shows itself in direct experience. During the course of the PhD program I have kept reflective journals to uncover insights into the act of composition which are not immediately visible on the surface.
Artistic Context

My work exists within a number of diverse musical dialogues. Though it is difficult to label, Ben Neill broadly sums up the musical movement to which I belong, stating in 2004 that,

“In the past 10 years, a new breed of composers, with no regard for the former distinctions of pop versus high art, has evolved. Their new aesthetic approach has been made possible by the continuing evolution of computer music technologies that started in the 1970s and 1980s, along with the aesthetic progression of late-20th century culture into a more global, less Eurocentric form.” (387)

For the purpose of brevity, I have identified three specific historical threads with which my music aligns: folktronica, post/math-rock, and post-minimalism.

My compositional roots lie in the digital realm. As a teenaged guitarist unacquainted with classical techniques or Western art music in general, I discovered Cakewalk (Steinberg) music software. Fascinated by the possibilities this presented, I spent long hours at the family computer, composing naive midi symphonies. This led to tertiary studies in composition, and the use of more sophisticated software such as Logic (Apple) and ProTools (Avid). My fascination shifted from midi to audio, and accordingly from structure to texture. Many of my early compositions explore the texture and grain of recorded, edited and processed sound, and this exploration continues in my practice today. This aligns strongly with the lineage of “folktronica.”

Folktronica is a genre which might be referred to as “post-digital” - it combines the raw, complex, and imperfect nature of acoustic sound with the affordances and idioms of the digital audio workstation (DAW). The peak of the movement occurred around 2005 with the release of Tunng’s Mother’s Daughter and Other Songs, The Books’ Lost and Safe, Four Tet’s Everything Ecstatic, and Caribou’s The Milk of Human Kindness. Key to the folktronica aesthetic is imperfection, aligning somewhat with Kim Cascone’s concept of “The Aesthetics of Failure.” This is highlighted by the critical discourse around the genre; Peter Hollo when discussing The Book’s 2003 release The Lemon of Pink refers to the cello editing as “impeccably slap-dash.” Though the genre tag has somewhat fallen from currency, the legacy of folktronica techniques exist in the emphatically un-mechanical electronica of Flying Lotus, Lapalux, Hudson Mohawke, and others.

As folktronica is largely an acousmatic genre, its limited performability led me to seek a performance outlet in the world of post-rock. As a guitarist I have gradually become more and more resistant to typical classical and rock playing, and I enjoy exploring the sonic possibilities of electric guitars and effects. My longest-running rock band project for which I was the principle composer has been Mr. Maps. This five-piece instrumental rock
band combined intricate and heady rhythms with powerful walls of noise, and has played a significant role in the Australian post/math-rock scene.

The cultural origins of the post-rock movement lie in the fiercely independent and “do-it-yourself” aesthetic of the punk and indie rock of the 80s and 90s, however the music itself is rather removed from this tradition, assuming “a loftiness associated with high art” (Hibbett). Whilst the attitudes, performance spaces, and distribution methods remain true to its indie origins, post-rock “dissociates itself from the mundane and the trivial, securing instead a cultural value predicated on exoticism and grandeur” and “aims for depth and drama, and demands long, unbroken periods of listening to be rewarding” (ibid.). Within post-rock is the sub-genre of math-rock, exemplified by bands such as toe, This Town Needs Guns, and Don Caballero. It distinguishes itself from the parent genre with “extensive use of asymmetrical or ‘odd’ time signatures and shifting mixed meters” (Cateforis, 244). Math-rock offsets its intellectualised rhythms with accessible and affective harmony.

My career in rock bands has been characterised by an ongoing attempt to bring a conceptual attitude more associated with classical music to what is often perceived as a commercial music format. Conversely in my career as a composer of art music, I have often tended to import the attitudes, techniques, and aesthetics of post-rock, indie, and electronic music. In this way I align with a growing number of composers, loosely associated with the terms “post-modernism,” “post-minimalism” and “totalism”, who incorporate the materials and techniques of current pop and electronic music into a classical context.

This style has its roots in the downtown movement (Gann “Breaking the Chain Letter”), and those composers of the experimental tradition, which Nyman sets in opposition to the Avant Garde (1-2). The work of Steve Reich, John Adams, and the influential Bang on a Can ensemble have helped to introduce a more pluralistic compositional language, freeing many composers from what has been viewed as the strictness of modernism (Fink). I share in this dialogue with composers such as William Britelle, whose intricate and experimental chamber works sit comfortably alongside his post-punk and epic art-rock projects (Smith); Leah Kardos who combines classical materials with the affordances of cutting-edge digital tools (McIntire); and Corey Dargel, who takes advantage of the rigour of classically trained players to make a sort of refined indie pop, which owes as much to conservatory culture as to independent music (Oteri). This terrain is also shared with composers such as David T. Little, Son Lux, Shara Worden, Judd Greenstein, Bryce Dessner, Nico Muhly, Caroline Shaw, Missy Mazzoli, ensembles such as yMusic, Alarm Will Sound, and Australia’s Topology, as well as organisations such as New Amsterdam, Wordless Music, and I Care if You Listen.
Whilst somewhat reductive, this has been a broad survey of the landscapes within which my music exists, and the artists and composers I align with. My music is also heavily contextualised within and influenced by theoretical concepts, which the next section will address.

**Theoretical Context**

Reading across a diverse range of disciplines informs my understanding of my own work and of music in general, and this exegesis draws from a long history of literature from the fields of music theory, philosophy, and media studies. It is of course impossible to provide an exhaustive account of my theoretical context, but I hope in this section to introduce a few key texts from the fields addressed throughout the document. I will structure this section around my four key discussion areas of action, media, polyrhythm, and pluralism.

My arguments around “compositional action” conceptualise musical creativity as a highly complex and intuitive activity with many unconscious elements. Theories which characterise the creative process in this way include Czikszentmihalyi’s theory of ‘Flow’ (*Flow; Creativity*), which has been applied in numerous studies to the field of music composition (Green; Kennedy; P. Webster), and more recently Kounios and Beeman’s theory of “insight” thinking, which has drawn similar conclusions within the cognitive science discipline. Jon Hansen’s adaptation of Deleuze’s “Body without Organs” image makes similar arguments about the fluid and unconscious nature of creative music making. These ideas can be seen to reflect ancient Zen Buddhist philosophy (Suzuki; Watts) and the early 20th century philosophy of Heidegger. Heidegger’s philosophy alerts us to the intertwined nature of self and world, by highlighting the invisible and automatic nature of many human practices. Heidegger’s sometimes cryptic writings have been elegantly elucidated by Hubert Dreyfus, from whose ideas I draw my use of the term “action”. Some theorists have applied Heidegger’s ideas to the field of music composition, (Bowie; Hamman; Sangild) most notably Agostino Di Scipio, specializing in electro-acoustic composition (Anderson; Di Scipio "Interpreting Music Technology"; Di Scipio "Questions Concerning Music Technology").

Insights about the unconscious nature of certain types of thinking also rely on a parallel shift toward the understanding of chaos and complexity, as introduced to non-technical readers in James Gleick’s *Chaos*. Taleb has highlighted new implications of complexity in the arts, health, and economy in his works *The Black Swan* and *Antifragile*. The idea of emergent complexity has caught the imagination of many composers as a source of musical material, perhaps most seminally in the writing of Iannis Xenakis, and
others more recently (Burraston; Salter). Little’s article “Composing with Chaos” deals particularly insightfully with the implications of chaos for composers.

My discussion of media broadly follows Marshall McLuhan’s influential works on the transforming nature of the medium (Understanding Media; "Visual and Acoustic Space"), and subsequent theorists who have expanded on and clarified McLuhan’s ideas (Carr; Levinson; Miller). My more specific argument that the means used to create music leaves a mark on the musical product has been recognised to some degree throughout history. Jessie Owens’ comprehensive study of 15th and 16th century compositional practice, Composers at Work considers the historical importance of various tools such as paper, slate, lute, piano, and “composing in the mind.” The effect of music media comes into music theory discourse as early as Ferruccio Busoni’s 1907 “Sketch of a New Esthetic of Music,” and increasingly throughout 20th century literature as technology begins to feature prominently in new musical styles (Griffiths; Whittall).

This topic has seen a considerable increase in attention over the turn of the millennium due to rapidly advancing technology. David Toop (Ocean of Sound; Haunted Weather), Erik Davis, Andrew Brown (’Modes of Compositional Engagement”; Computers in Music Education), and Steven Holtzman have all made significant contributions to the understanding of digital media’s effect on composition. The effect of notation software in particular has been addressed (Watson) as well as DAW environments (Marrington).

Though my discussion of polyrhythm, polymetre, and polytempo is largely related to technical aspects of the creative work, my ideas have many precursors in literature. Early treatises such as Cowell’s New Musical Resources, and Joseph Schillinger’s method introduce important concepts of multi-layered rhythm. There has been significant research into use of polyrhythm in African music (Randel, 23; Arom et al.). Use of polyrhythm in the works of Mikel Rouse, Steve Reich, and Michael Gordon has been analysed in literature (Gann "Downtown Beats"; Tones). Butler’s “Unlocking the Groove” gives an enlightening account of cross-rhythmic techniques in electronic dance music.

The emerging tendency for composers to break out of a single genre or tradition to incorporate diverse influences has been discussed increasingly since the 1970s. Nyman’s Experimental Music, Gann’s Music Downtown, and Alex Ross’ The Rest is Noise all map an increasingly fragmented musical landscape where the straddling of multiple genres and traditions is the norm rather than the exception. Some view this increasing pluralism as a “symptom of decay” (Tavener qtd. in Ford, 90), while others see opportunity and excitement in the opening up of the tradition (Neill). In particular the role of classical music as an artistic vanguard in opposition to commercial entertainment has been hotly debated (Fink; Johnson; Lebrecht; Taruskin; Kowalski) and remains a divisive issue.
Chapter 2
Compositional Philosophy and Approach

Compositional action is shaped by media. In other words, the means used to create a work guides the process, and leaves its own idiosyncratic mark on the product. Compositional media could include pencil and manuscript paper, notation software, midi sequencers, DAWs, instruments, tape, vinyl, verbal and symbolic languages, instrumentation formats (the string quartet for instance), physical and virtual spaces, or even a particular group of individual performers. Anything at all which acts as a means to translate or carry musical ideas will be considered a medium for the purpose of this discussion.

Like many composers practicing today, I engage with music through many different lenses. I create music with midi sequencers, pencil and paper, Digital Audio Workstation software (DAWs), notation software, and in bands using no notation of any kind. In all of these diverse musical environments, I have observed changes in my musical thinking. On the simplest level it is a change in the ratio of attention given to musical elements; when using staff notation I find myself obsessing over harmony and melody, while DAW software encourages me to find the perfect timbre first and foremost, and when playing in rock bands the momentum of the groove and the dynamic range seem of paramount importance. At a deeper level, the things I use to create music seem to mould my very understanding of music in the long term, shaping my compositional style. When collaborating with composers whose musical upbringing was more notation-centric than mine, I notice clear differences in the way we think and talk about music. Likewise when working with musicians and composers from a completely aural background, we bring very different ideas and perspectives to the situation. Gradually I have come to realise that my own compositional voice is at least in part a result of the media that I use.

I have explored this issue in depth both practically and theoretically over the course of my PhD program. My early hypothesis was rather simple - that a composer should understand the biases of any medium, so they may wilfully embrace or compensate accordingly. But as I worked, read, and reflected, I began to perceive an unexpected depth to the problem, I was led from Marshall McLuhan to Heidegger and Merleau-Ponty, from Cognitive Science and Music Psychology to Zen Buddhism, and amongst a complex web of ideas in between. Without outlining the entire journey, this chapter provides a sketch of the philosophical ideas which informed my creative approach.

I have identified four key areas of discussion which emerged throughout my theoretical and creative inquiry: compositional action, media, polyrhythm, and stylistic
pluralism. The first two are directly related to the question of medium, whereas the final two sections address prominent characteristics of the creative works themselves.

**Compositional Action**

Composition is a complex activity. In writing just a few bars of music, there is sufficient variability to allow for the possibility that this exact music has never been written before in human history. For a single note, the variability of pitch, duration, instrumentation, timbre, articulation, dynamics, and so forth, amount to an enormous matrix of possibilities. When another note is added, and another, the possibilities quickly explode into the astronomical. If we also consider context, meaning, culture, place, and the fact that the very concept of a discrete “note” is a simplification of a more complex reality (Cook "Music and Psychology", 79), we begin to see the incredible complexity of musical composition. Music, like weather, is a chaotic and complex system, with too many variables and interdependencies to be accurately calculated or modelled (Borgo, 4).

And yet when we are composing, it certainly doesn’t feel like we have made thousands of decisions. It often feels like the right choice is right there in front of us, even before we commit it to paper or hard disk, despite the fact that at each note, we essentially eliminate vast worlds of possibility to settle on very specific options which best suit our needs. Of course many factors help us to narrow the infinite scope of possibility – style and tradition, an internalised musical “grammar”, practicalities of instruments and media – but that still leaves sufficiently mind-boggling variables. And for many composers working at their best, the activity seems obvious and effortless.

I argue that in the creative “flow” state (Csikszentmihalyi *Flow*), we do not experience composition as a conscious decision-making process, informed by theory and directed by conscious thought. Rather, we experience composition as action, “drawn out of us” (Dreyfus "Intelligence without Representation", 380) by a specific situation. I concede that composers certainly experience conscious decision-making on a broad-brushstroke level – selecting a tempo, form, or mode, deciding to go in one particular direction rather than another – but this cannot account for the immeasurable variables dealt with at every step of the process.

Dreyfus suggests that a novice at any skill must rely on conscious rules which prescribe a limited number of responses to limited categories of situations (368). As skill increases, the learner distinguishes between more situations, increases their repertoire of responses, and the rules therefore become more finely graded. At a certain point of expertise, the number of discernible situations increases beyond that which can be listed or even expressed in words. At this point the learner must begin to rely on a less conscious,
more intuitive kind of thinking. “We do not experience our intentions as causing our bodily movements; rather, in skillful coping we experience the situation drawing the movements out of us” (380). In this case, “movements are experienced as action.” This idea resonates most immediately when one considers physical activities such as sport or instrumental performance, however Dreyfus claims these phenomena “are not limited to muscular responses, but exist in all areas of skillful coping, including intellectual coping” (93) which of course includes music composition.

There is good reason to believe that when a task reaches some level of complexity, the conscious mind must relinquish at least part of the task to a more mysterious and intuitive realm of the mind. Eagleman suggests that the conscious mind is a sort of bottleneck, capable of dealing with only a handful of thoughts at a time (28), whilst parts of the mind to which we have no conscious access routinely perform highly complex and sophisticated processing, completely outside of our awareness (McCrone and Marshall, 135). Indeed, “the conscious mind is not at the centre of the action in the brain; instead, it is far out on a distant edge, hearing but whispers of the activity” (Eagleman, 9).

I wish to draw a distinction in compositional activity between conscious decision-making and unconscious action. Decision-making involves the coarse choices we are aware of making in the course of writing music, and action describes the intuitive processes which shape our creations at a much finer level, and do not rely on awareness. Compositional action describes those many decisions that we have no conscious memory of making. The distinction is validated in the work of numerous researchers. Kounios and Beeman have shown evidence for a distinction between “insight,” where “a solution is computed unconsciously and later emerges into awareness suddenly,” and more conscious, methodical problem-solving strategies. Insight is different to more conscious and analytical cognitive styles in that it occurs suddenly and easily, and is accompanied by positive feelings and a confidence in the solution without the need for systematic verification (Topolinski and Reber). An excellent discussion of this distinction as it applies to music, framed in terms of “intuition” and “analysis,” can be found in Swanwick’s “Musical Knowledge” (26-45).

The degree to which composition is experienced as action depends on the composer. At one end of the spectrum, there is free improvisation, where the conscious mind works far too slowly to contribute to the composition process, and intuition and embodied knowledge must take over. At the other extreme, one may consider the student of composition completing a short exercise in counterpoint – with limited scope and possibility, this activity could be a completely conscious application of explicit mental knowledge. There are many cases in between these two poles – for example, as the very same student gains proficiency and turns their attention to bigger-picture intentions such
as form, expression, and meaning, the choice of individual notes may gradually slip into an unconscious realm. The case of composers who employ determinant processes to direct musical choices is slightly more difficult to characterise, but one can easily imagine that designing a compositional system towards an aesthetic goal must involve some element of intuition. Indeed, the process-dependent works presented in this folio certainly arose from rules and structures that were arrived at with some degree of intuition and insight.

My casting of the term “compositional action” therefore incorporates a number of concepts: the complex and non-linear nature of music; the significant role of unconscious elements of the compositional process; and the phenomenological observation that when performing fluidly, actions are not consciously calculated, but are experienced as being drawn out of the subject by the situation. This terminological shift from “decision-making” to “action” is fundamental to my understanding of media’s effect on composition.

**Media as an Environment for Action**

As I have pointed out in Chapter 1, a basic understanding of the role of compositional tools, equipment and technology has not been neglected historically. Conlon Nancarrow’s player piano studies cannot be analysed without reference to the affordances of automated playing (Carlsen); Morton Feldman has attributed great prominence to “notation’s effect on composition” (133); Brian Eno at one point prohibited computers in the recording studio, stating that they encourage a “cautious, perfectionistic way of working” (qtd. in Toop Ocean of Sound, 128); and Steve Reich remarks tellingly on what he calls “paper music,” described as “very black with notes; totally beyond the ability of the composer to play; one doubted whether, in fact, the composer heard it in his or her head” (qtd. in Ford, 62). It is recognised broadly for example that traditional notation neglects timbre (Cutler), that improvised music challenges formal structure (Borgo), and that computers facilitate repetitive music (Butler).

However, I have found the effect of media to be more complex and mysterious. Andrew Brown states that “when we are aware of this transforming nature of a medium, we can either compensate or utilize it. Only when we ignore it, or deny it, we risk the transformational change taking us by surprise or undermining our true intention” (Brown Computers in Music Education, 9). I concur with Brown that awareness of a medium’s effect is important for a composer to understand. In addition, I wish to further append this notion to propose that while we can be aware that the medium does transform compositional action, there is a limitation to our understanding of exactly how any particular medium will affect a particular composer’s work.
Human beings are inextricably immersed in and entangled with their environment. The Zen Buddhist negation of the distinction between self and world, Heidegger’s conception of humans as “being-in-the-world,” and Marshall McLuhan’s description of media as “extensions of the self,” all point to a similar insight into the nature of reality: that the line we draw between the self and the world is incredibly blurry and malleable. Heidegger gives the famous example of the hammer, which withdraws from awareness in the hands of a skilled carpenter (98). Dreyfus expounds, “I am not aware of any determinate characteristics of the hammer or of the nail. All I am aware of is the task” (Dreyfus, 65). Heidegger’s phenomenological insight has been empirically demonstrated. By conducting cognition tests on competent computer users operating a mouse, Dotov et al. demonstrated that when the mouse is working smoothly, it exhibits properties of being an integrated part of the human nervous system. When the mouse suddenly ceases to work correctly, this integrated system is severed and the mind switches to dealing with the mouse an object separate from itself. We are not separate from the world around us, but entwined in a deep “structural coupling” with it (Maturana and Varela).

These ideas also fit rather snugly with the cognitive science concept of “affordances.” Gibson introduced the idea of affordances in 1977, to describe the possibilities offered to an organism by its environment. According to Gibson, affordances exist as properties which can be directly perceived in the environment (Gibson). Focusing on music, Menin and Schiavo emphasise the embodied and automatic nature of affordances, through the simple illustration that when “a skilled guitarist might be unable to say where to put her/his finger to perform a solo, but s/he can use the motor knowledge of the fingers to reconstruct the actual set of notes played,” the actions arise from a “sub-cognitive, pre-linguistic, intrinsically motor form of intentionality” (210). The clear similarities between Gibson and Heidegger have been pointed out in a number of instances (Dotov, de Wit and Nie, 35; Dreyfus “The Current Relevance of Merleau-Ponty’s Phenomenology of Embodiment”, par. 3; Kadar and Effken), and in both theories it is central that conscious deliberation is not necessary for skilled action. We are inseparable from an environment which evokes from us specific kind of actions depending on its nature.

For composers, any musical medium becomes an extension of the self. Thus, when a composer uses manuscript paper, a piano, a computer, or an analogue hardware sequencer, they cannot simply stand back from the medium, separate from its idiosyncrasies or tendencies. By taking on the strengths and positive affordances of the medium, we must also take on its prejudices, idiosyncrasies and limitations, which may be as complex and nuanced as music itself. The means we use to conceive, create, and communicate music not only shapes the output of the creative process, but profoundly influences our musical thinking in ways that are not visible to us. Erik Davis points out
that “because the self is partly a product of its communications, new media technologies remould the boundaries of being” (17).

As I have discussed, the idea of compositional action makes clear that many compositional decisions are committed without any conscious deliberation. This basic proposition, combined with the acknowledgement of our intimate involvement with our immediate environment, leads to the conclusion that media have already profoundly influenced our decisions well before we have begun to consciously think about them. Not only this, but they have done so in complex ways which we may not be able discover even upon the most dedicated reflection. To put it rather sensationalistically, the knowledge that “notation neglects timbre” gives as much insight into the effect of that medium as the knowledge that “hot air rises” gives to predicting tomorrow’s weather.

In practice therefore, compensating for the effect of media is much harder than it seems on the surface. We can consciously identify idiosyncrasies of some media and attempt to work against them, but considering that so much of our creative thinking occurs “under the hood,” and the fact that our thinking is intertwined with media in subtle and complex ways, it becomes apparent that we are powerless to truly subvert the effects. We become like the fish trying to consider the objective properties of water. When a compositional decision is made by insight and experienced as action, we cannot be aware of the myriad options that have been eliminated, nor even what other options we might have otherwise considered. When working intuitively, the answers are drawn out of us by the environment without conscious deliberation, and when we employ any medium, the medium becomes our environment. We cannot therefore be completely aware of how any medium has affected our compositional process at a level of fine detail. As McLuhan states, “media, or the extensions of man, are ‘make happen’ agents, not ‘make aware’ agents” (Understanding Media, 48).

Polyrhythm

Different media present different affordances. Certain compositional options become visible in one environment, but may remain invisible in others. In my compositional work, I frequently explore layers of competing time-structures, and this features heavily in the body of work presented here. I believe this has a connection to the media I have engaged with over the course of my compositional career. The techniques I use fall under various overlapping categories, and the terminology around these is not always agreed upon in literature; polyrhythm, cross-rhythm, polymetre, phasing, polytempo, and isorhythm are all terms which could be used to describe certain aspects of my music. I will eschew any technical discussion here, as this will be discussed in subsequent chapters, and employ the umbrella term “polyrhythm” to indicate all of these kinds of techniques.
The idea of musical events moving at different rates has its roots in multiple theoretical and practical movements. The most commonly discussed background for polyrhythm in literature is the music of Africa, where commonly cited examples use 2:3 relationships to create ambiguity of pulse (Randel, 23). However Henry Cowell happened upon his conception of polyrhythm in a far more intellectual way, musing on the simple integer ratios in harmonic relationships, and considering how these could be applied rhythmically (Schedel, 247). Schillinger’s use of polyrhythm is an expression of symmetry, which he believes to be a key ingredient of musical beauty (Arden). Nick Zammuto of the Books has argued a more cultural basis of his extensive use of polyrhythm, drawing a line between “indigenous” and “colonial” rhythm, where the indigenous is free, polyrhythmic and unbounded, and the colonial is strict, dominating, and bound to its barlines.

I argue that the use of polyrhythmic techniques is heavily influenced by media use. Polyrhythms often look more awkward when expressed in traditional Western notation than in other media. At best, polyrhythmic material in traditional notation looks more complicated than it really is, and is at worst impossible to write without specially invented notation. Consider the example illustrated below (fig. 1), where a simple 2:3 rhythm in : looks much simpler on a piano roll than on traditional Western notation. Whilst a musician who reads notation will have no difficulty with the passage, it is much less elegant and intuitive than the piano roll expression of the same thing. For the composer, a certain effort must be made to construct polyrhythmic ideas in notation, whereas in piano roll and other similar grid-based environments, it is achieved so easily that in my experience it has occasionally occurred by accident. When composing, there are infinite ways forward in a composition, and we have little conscious control on what certain options become visible to us. Any given medium will avail some options and hide others.

![Fig. 1. Comparison of rhythms represented on Western notation and on piano roll.](image)
This principle is corroborated anecdotally in Steve Reich’s story of discovering phasing practises while dubbing tapes; the polytempic phasing happened because of an error in tape speeds (Ross, 543-544). This media-specific accident made new compositional territory visible to Reich, and could not have occurred within a notation-only composition practice. Reich was then able to apply this technique excellently to traditionally notated works. The tape medium revealed a previously invisible way ahead, which, once discovered, could be applied in any other medium.

Since my late teens I have often composed pitch and rhythm content in the grid environment of the piano roll. Using this medium in my own practice, I find that harmonic and rhythmic relationships have always appeared clearer to me in this format than in Western notation. The abstract conception of musical structure that exists in my mind seems to agree more readily with piano roll than with notation. It is impossible to know whether my musical thinking has been shaped by the piano roll, or whether finding the medium more naturally intuitive drew me to it in the first place. I would speculate both of these statements are true, and have reinforced each other over time. As this extension of myself has gradually become more intimately entwined with my creative practice, it has shaped my musical thinking.

There are a few reasons why the piano roll environment favours polyrhythmic composition, which can be summarised in the metric representation of time, relationship between bar and note durations, and looping and stretching functions. Firstly, the piano roll represents time in a strict chronological graph, unlike the symbolic time of Western notation. This means the only difference in appearance between a dotted quaver, a minim, a quintuplet, or fourteen bars of tied semibreves, is simply where they stop and start. This makes different rates of motion look much more intelligible on the screen. Secondly, in notation, note duration is subordinate to bar length. That is to say, the note must not cross the barline without the special permission of a tie. Contrastingly in the piano roll, note duration is unfettered by bar length, and the bar lines exist only to aid visual organisation. It is conceivable that this disempowerment of barlines on the screen would also disempower barlines in the composer’s thinking, making polyrhythmic ideas a more readily visible option. Finally, the ability to easily loop and stretch things in a piano roll makes polyrhythms very easy to enact. For example, in the Apple Logic software, one needs only to create two midi regions of different lengths, say, one with seven beats and one with eight beats, and hit the “L” key to loop them indefinitely, to instantly create a slowly evolving isorhythmic composition which will not repeat itself until 56 beats later. Or, the two regions could with one motion be stretched to matching lengths, easily executing a complex 7:8 ratio polyrhythmic passage.
Polyrhythm was an important part of my work well before I was acquainted with African music, minimalism, or any literature on the subject. It simply seemed to happen naturally. Given that the possibility of rhythms moving at different speeds is a compositional option that makes itself visible and readily available in the piano roll environment, I speculate that my frequent use of this medium has played a part in my determining this key aspect of my compositional style.

Pluralism

My music draws eclectically from beyond the Western classical tradition, aligning with an international trend toward stylistic pluralism. Fink outlines this trend from the 1970s onwards in his article “Elvis Everywhere,” arguing that “the ruling hierarchy of musical styles that supported the very idea of “classical music” … for the last two centuries is simply no longer operative” (Fink, 136). I argue that this widening of musical style has its roots, at least in part, in widening media use. Due to the inseparability of style and medium, a multi-media approach to composition leads naturally to acceptance and inclusion of various musical styles. As Nicholas Cook states, “modern communications and sound reproduction technology have made musical pluralism part of everyday life” (Cook Music, i).

The distinctions between classical music and other traditions can often be framed in terms of media. Certain media are the signifiers of a classical work – Western staff notation, paper on music stands, concert halls, typically classical instruments, and so forth. Pop music tends to dwell in big commercial recording studios, CDs, stadiums, and music videos. Indie music has the home project studio, collectible vinyl, small pub venues, and bandcamp.com pages. Regardless of musical content, production and consumption media are powerful determinants of what musical tradition a work will be considered to belong to. Note Kyle Gann’s telling discussion of the breakdown of classical boundaries, exemplified by composer Laurie Anderson’s first “hit single.” Gann’s description of this confusion tellingly focuses almost exclusively on aspects of medium.

So great was the demand for “O Superman” that Anderson was forced to sign a deal with a major record label, Warner Brothers, in order to supply it. And thus suddenly, in 1981, the boundary between the world of rock and the world of art music definitively broke down. During the 1980s, rock groups performed at classical spaces, classical composers performed at rock clubs, punk rockers wrote symphonies, and avant-garde musicians discovered the electric guitar. Categories became totally confused - often, so did listeners. (Gann "Between a Rock and a Hard Place")
Cutler suggests that due to Western art music’s notation-centricity, new technologies threaten not just the old means of production, but the entire tradition.

The whole edifice of Western Art music can be said, after a fashion, to be constructed upon and through notation, which amongst other things, creates “the composer” who is thus constitutionally bound to it … No wonder then that recording technology continues to cause such consternation. On the one hand it offers control of musical parameters beyond even the wildest dreams of the most radical mid-20th century composer; on the other hand it terminally threatens the deepest roots of the inherited art music paradigm. (Cutler, 140)

Because of this inseparability of style and media, expanding media options for composers can be seen as an important driver behind the fragmentation and increasing pluralism of styles. Both production and consumption media are important in this shift – regarding production media, I would quote once again Neill’s statement that the new movement of composers disregarding classical and pop divisions “has been made possible by the continuing evolution of computer music technologies” (387). Consumption media has also catalysed composers’ incorporation of non-classical elements; for example, Reich’s rebellion from the twelve-tone obligations of his education had its roots in listening to LPs of Miles Davis, Charlie Parker, and John Coltrane (Ford, 62-63).

My incorporation of styles from within classical music and from outside is natural. It does not come from a conscious “cross over” attitude, where “the strategy is to ‘cross over’ by referencing taboo aesthetic devices from the “other” side of contemporary music, and to create a provocative tension by remaining firmly grounded in their respective institutional bases” (Born, 21). Rather, it is the natural result of an immersion within a multi-media, multi-stylistic environment. By moving away from staff notation as a sole medium for my musical communication, it has become almost inevitable to also move away from composing in the language of European modernism, neo-classicism, or the “new complexity,” as these styles tend to have their roots in a very specific kind of media use. My musical communication has often been mediated by electric guitars and computer programs, and many of my skills have been gained through obsessive tinkering rather than formalised instruction – these are traits that I share more commonly with popular or commercial musicians and producers than with composers trained in conservatory traditions.

I do not mean to say that I draw indiscriminately from all music. I certainly hold biases which are linked to my own experiences. My upbringing in a working class family of non-musicians, and consequent lack of exposure to classical music in my formative years has perhaps lead to some degree of advocacy on behalf of the “low” arts. I also acknowledge the negative effects of commercial interests on music. Without going so far as agreeing
with Adorno’s provocative claim that “the monopolistic means of distributing music stood almost entirely at the disposal of artistic trash and compromised cultural values” (6), I recognise that the free market doesn’t always favour challenging art which requires time and attention to be rewarding. I perceive this as a valid reason for some theorists to find use in drawing a line between “high” and “low” art, despite not finding such a distinction useful or productive in my own work or thinking. My difficulty is that as Cutler has pointed out, the line is sometimes drawn to protect a medium rather than a level of mastery or objective quality. The ambitious, challenging and fiercely non-commercial music of Flying Lotus, Don Caballero or Godspeed You! Black Emperor should not be pushed aside simply because it is not notated nor performed in concert halls. I believe very strongly that the medium associated with a work should not be used as a shortcut toward an assessment of its value.

Practical Inter-media Techniques for Composition

As I have argued, deliberately compensating for the effect of a particular medium whilst still immersed in that medium is an impossible task. Having realised this, I have become interested in how to use media to draw out richer compositional ideas and developments. Some of these are techniques have always come naturally to me and I am only now able to explicate them clearly. Some may be common strategies amongst many composers, though they are not considered “compositional techniques” in the traditional sense. I have identified three main techniques for discussion here: multimedia fluency, cross-media translation, and balancing fluency with novelty. For each I have given a brief example of its application in the context of this folio.

1. Multimedia Fluency

Becoming fluent with multiple differing media, especially in terms of musical languages or instruments, can widen the scope of creative possibility. Earlier in this chapter I invoked the metaphor of the fish contemplating the objective properties of water; multi-media fluency can be seen as a way of escaping this condition. For example, by learning a new software program, I become more aware of the idiosyncrasies in other programs that I’ve used. Someone who plays two instruments arguably has a larger repertoire of ways of thinking about music than someone who is devoted to just one. Multi-media fluency can help to expand not just a composer’s tool kit, but also their repertoire of responses when using any single medium.

One example of how I have explored this technique is in learning Schillinger notation systems. In 2011, early in my PhD program, I travelled to Oxford to study the Schillinger method under Dr. Jeremy Arden. The method has its own way of visualising and
conceptualising musical material, which in itself acts as a sort of medium. Though I have rarely applied the technique rigorously, its logic and representational style has given me new ways of thinking.

2. Cross-media translation

The translation of a musical idea from one medium to another can stimulate creative and unexpected thinking. This may simply mean taking a notated composition and re-writing its notes into a sequencer, or vice versa. The almost infinite variability of the compositional situation ensures that we cannot predict what thoughts or ideas will be drawn out of us by translating an idea into a new medium. In my practice I perform these media translations extensively when developing materials. I find it useful to explore musical ideas in various modalities that encompass aural, intellectual, and physical engagement. If I begin to write a piece on a computer sequencer, a largely aural and intellectual activity, I find that setting myself the challenging of learning to play it on one or two different instruments yields new possibilities through introducing a more physical aspect. Likewise if an idea has emerged through free instrumental improvisation, I may then try to engage with it in more abstract forms on grid paper. I also enjoy involving archaic and obsolete media; for instance, the rather tedious process of recording a work onto a four-track tape recorder has sometimes lead to new insights.

This technique is clearly illustrated in the composition process of Practical Mechanics, which I will discuss in the next chapter. While the final composition is presented in Western notation, numerous cross-media translations were performed throughout.

3. Balancing Fluency with Novelty

There are strengths and weaknesses to be found in both high and low levels of proficiency with any medium, and I propose that using a balance of familiar and challenging media is a useful strategy. Gaining proficiency with any instrument, tool or musical language is a powerful achievement, by which an artist can unlock an otherwise impossible level of clarity. However, as McLuhan has taught us, media are never transparent. As they become more intimate extensions to the self, the biases of the medium become invisible, making us liable to slip into habitual patterns of thinking. On the other hand, an unfamiliar medium, whilst clumsy and time-consuming, can provide avenues to new ideas. Bruner captures this idea perfectly in discussing the merits of drawing with the left hand “that might tempt the right to draw freshly again … to find a means of importing new life to a hand that has become too stiff with technique, too far from the scanning eye” (qtd. in Swanwick, 34). By making a conscious effort to combine media for which ones skill level differs greatly, we can escape the potential naivety or lack of control inherent in
being a novice, whilst also avoiding the habits or over-thinking that may come with mastery.

An example of how I have used this is by deliberately adopting an unfamiliar guitar tuning system in the work *On Rainy Days*. Over 20 years of playing, the guitar in standard tuning has become an extension of myself, and a drastic tuning adjustment severed some of the ingrained connections that I have developed. It forced me to step back from the instrument and reconnect with its capabilities in a slightly new way.
Chapter 3

*Practical Mechanics*

*Practical Mechanics* represents one of the more traditional compositional projects in the folio, being a fully notated work for chamber ensemble. Though its presentation format is a familiar one, the compositional process embraced a wide range of media, with each medium exerting some influence on the shape of the final product. The work is in five movements, and is arranged to suit the instrumentation of “Nonsemble” – a seven-piece chamber ensemble consisting of a standard piano quintet augmented by a percussionist, and myself on electric guitar and electronics.

As can be seen throughout this project, I have a fascination with the interface between human beings and their technology, and in *Practical Mechanics* this theme runs through both the process and the artistic content. *Practical Mechanics* is an ode to technological optimism, and playfully explores the belief that science can solve all human problems. The titles and text excerpts are taken from the tattered pages of vintage issues of *Practical Mechanics* Magazine, a home science and technology magazine published between 1933 and 1963.

![Practical Mechanics Magazine covers](image)

**Fig. 2.** *Practical Mechanics* Magazine covers. Left to right: March 1954; January 1953; June 1953; June 1956; April 1961.

**Themes**

My fascination with the theories of Marshall McLuhan, Heidegger, and Zen Buddhism converged into a grappling with what technology means to human beings. I am very interested in questions such as the inherent value of scientific progress, and the impact of technology on the human psyche. There is something puzzling about the relationship between the irrationality of human desires and the highly rational scientific enquiry which serves to fulfil those desires. The mid 20th century, an era often characterised as naively optimistic about the power of technology, appealed to me as fertile soil for exploring these
questions creatively. Simon Reynolds observes that “for the greater part of the last century, modernism and modernisation were the watchwords: the emphasis was on harking forward, an intent focus on everything in the present that seemed to present “tomorrow’s world today” (Reynolds, 23). At the beating heart of “tomorrow’s world” is of course, science, reason, and technology. This is beautifully captured in a rather bizarre 1955 documentary entitled *To Enrich Mankind*, in which a magically reanimated statue of Archimedes explains that “these simple machines are so important. They are the shining symbols of hope, security, and happiness for the future, for you, and for the benefit of all” (American Society of Mechanical Engineering).

Aesthetic choices in *Practical Mechanics* were informed by a meditation on the technological optimism of the 20th century, when rapid advances in science promised a brighter, easier, happier future for human beings. New scientific discoveries made their way from laboratories to living rooms faster than ever before, in the form of television sets, microwave ovens and other seemingly magical appliances. Modernism reigned in Western cultures, bringing with it “an optimistic belief in the power and possibilities of machines, technology, science, rationality and progress” (O’Shaughnessy and Stadler, 307).

The turn of the millennium brought a shift away from this modernist enthusiasm, and towards a more complex and cynical worldview. Although cultural historians now describe a humanity which has left its unwavering belief in technology behind (ibid., 309), I am fascinated by the remaining legacy of the modernist era. On sober reflection we may be able to admit that technology doesn’t make life unequivocally better, but one could argue that our actions often tell a different story. It is my own observation that advertising for new technologies almost always promises some wonderful life improvement, and the success of this advertising is indicative of a widespread belief in the promise of a better life through machines. Focusing on the past as a theme for this work has helped me to express something about our current age in a more stark and playful way.

**Techniques**

A central tension in the theme of *Practical Mechanics* is between hard, rational scientific law and irrational human desires and aspirations. This dichotomy is reflected in the work by the juxtaposition of mathematical and rule-based compositional approaches and the ineffable and chaotic nature of human musical intuition. Various rational and rule-based pattern-making techniques have been employed, including Schillingerian methods, list structures, additive and constructive techniques and others which I have devised myself. This is especially prominent within the rhythm of the piece, and these machine-like processes imbue the work with a complex yet controlled sense of mechanical determinacy. On the other hand, the harmony has an immediacy akin to popular and folk music,
thematically reflecting the human desires which are central to the development and use of technology.

These processes have been facilitated by various media, and all of the movements have undergone media transformations during their composition. Some originated on paper (as both music notation and as diagrams), in the Logic DAW, or as instrumental improvisations, and have been re-presented in various other media, before settling into their final notated forms. In my analysis I will discuss a few aspects of the work which have clearly resulted from use of a certain medium, but as I discussed in the previous chapter, it is impossible to quantify exactly what effect any particular medium has had on my compositional action. The nature of media is such that it is impossible to know what options simply weren’t visible to me in my environment, or to know which potential actions have been made visible to me through use of a certain medium. I am confident however that my use of various media did indeed expand the repertoire of creative responses available and visible to me, thereby enriching the work.

The score is presented in a condensed, diagrammatic style. I am captured by the idea that a musical score should reveal its underlying structure immediately and transparently, showing on the surface that which a score analyst might normally have to dig deeply to find. For example, polymetric patterns are displayed as single cells with a number of repeats indicated, or by indicating pitch and rhythm separately in cases where one changes and the other remains the same. However, all of this is done within reason; some early drafts were condensed into rather incomprehensible diagrams (see example in fig. 3), which were found to hinder understanding. Although these difficult representations were ultimately abandoned for more intelligible treatments, the practice helped to conceive and clarify musical ideas in my mind. The final full score differs in presentation from the part booklets, where I have written out each part in full so as to facilitate easy sight-reading for players.
Overview

The five movements of Practical Mechanics are structured as a journey through various expressions of my associations with the idea of technological optimism. There are moments of unabashed jubilance combined with a giddy feeling of falling forward into the unknown; serene and stately progress undercut by vague unease; and the ever-present churning of cogs and machine-like motion. There is shared material between the movements, which is sometimes subtle – for example the descending dotted figure which first appears early in Movement I – and at other times bold – the vocal themes of Movements I and V being the most obvious. Movement I works as a kind of overture, in that it shares more material with all the other movements than the other movements share with each other.

In order to provide depth whilst keeping within the scope of this paper, I have chosen to present a very brief overview of the entire work here, and restrict any detailed analysis to Movements I and III only. These two movements demonstrate most of the techniques and ideas in the larger work, which I believe benefits from a close read rather than a broad skim.
Movement I encapsulates most of the techniques and moods contained in the greater work. It is through-composed, and structured in three main sections – a steadily building A section, climactic B section, and the final C section which is based around a solo vocal line. It contains a number of techniques which will be analysed in detail below, including simple polymetre using repeated single notes, and a polymetric melodic figure of five beats in length, which cycles over the dominating 4\textsubscript{4} rhythmic feel. The final note of the solo vocal line emphasises the sense of optimism, landing on the sixth scale step, suddenly harmonised as the root of a VI major chord.

Movement II introduces a more mechanical and cold sound world, employing strict processes for much of its composition. It is built on a series of six notes in a specific order, which are transformed in various ways throughout each section. Movement II was influenced significantly by the Schillinger method of musical composition, using a variation of Joseph Schillinger’s “attack group” procedure (Arden, 92-98). In the climax of this section I apply a “faux sidechain effect” – a play on the idiosyncrasies of music created by machines, and also a playful nod to the electronic music which has influenced my style. Sidechain compression is a popular technique in post-millennial electronic music production, which uses the kick drum as a cue to automatically duck the volume of everything else in the mix, in order to increase the perceived volume and power of the kick drum.

Movement III, which I will analyse in detail later, provides some relief from the mechanical churning of the previous movements. It is notable in its use of polytempo, as the ensemble is split into two groups which play at unrelated tempi. To achieve this effect, the slow group have fully-notated parts, while the fast group have repetitive cells to move through at their discretion, paying attention to the progression of the other group through their written material. It is the most “minimal” of the movements, and as such there are no separate parts - each player reads from the same A3 page.

Movement IV is the climax of the piece, and the clearest expression of rushing jubilance combined with a slight anxiety of the unknown. A single rhythmic idea forms the backbone of the entire movement. The rhythm itself has a sort of fractal nature to it, containing two seven-semiquaver cells enclosing two three-semiquaver cells, each separated by a single semiquaver rest. This construction affords a great number of inflections, and it appears amongst implied meters of 7\textsubscript{2}, 7\textsubscript{4}, and 7\textsubscript{8}, taking on different characteristics in each. It serves as a structural framework for various melodies and figures in the piece. In addition to this basic source of rhythmic material, Movement IV also relies on a very simple and lyrical melodic theme which contrasts the rather mechanical rhythmic construction. This first appears in bar five and is developed throughout.
Finally, Movement V is built around the harmonic progression of the vocal theme introduced in Movement I. Like Movement III, it is presented on a condensed A3 score which is the same for each performer. Perhaps the most notable aspect is its requirement that four of the performers assemble at the piano, each playing simple ostinatos of differing durations, from five quavers to five 4 bars in length. A gradual and methodical build-up leads to the final vocal theme, which the entire ensemble sings. It acts as a sort of meditative epilogue to the work, lyrically presenting a more apprehensive attitude toward scientific progress. Notably, the final note of the melody, the sixth scale step, is once again suddenly reharmonised. But in contrast to the first movement, in this iteration it becomes the third of a ♯iv minor chord, concluding the entire work in a state of uneasy suspension.

Movement I - The Great Awakening

As I have mentioned, Movement I’s position within the work is somewhat like an overture. It is rather multifaceted, where the other movements are rather more singular in their use and development of material. It also shares more material with the other movements than the other movements share with each other, most noticeably sharing the memorable vocal theme with Movement V. In this way, it introduces and maps out the musical territory of the work at large.

This piece has its origins in a rather traditional compositional process. The major themes emerged from improvisations at the piano, and were scribbled with a pencil into a notebook. Three distinct groups of material for the piece emerged in this way, which included the piano-driven A section, the polymetric B section, and the final C section based around a solo vocal line. The A and B sections were entered into Logic’s software instrument sequencer, where the bulk of the development of these sections occurred. Some hallmarks of this medium can be seen in the final product, especially in its use of characteristically revolving polymetric layers. Following this, the score was developed from scratch (that is, not from imported midi) in Sibelius notation software, and this process encouraged further developments and changes which tended to focus more on the performative journey of each individual instrument.

The movement opens in strict diatony with the most basic of materials – octaves and triads on the piano – setting up a simple framework to encase the coming developments. Above this simple introduction, carefully placed speech samples from the aforementioned 1950s documentary extol the virtues of science.

The structure of the A section is built on a pattern which slowly reveals itself. In a C-major tonality, the piano alternates between G and F bass notes, each held for six bars of 4 and a short turnaround bar of 3. Over these, triads are placed in dotted crotchet rhythms, beginning with natural triads on the ninth and seventh step from each respective bass
note, then expanding downward in thirds with a new step added in each repeat. As the figure repeats, the right hand descends further into the chord, getting closer to connecting it with the bass notes. As the chords plane downwards, the effect is the gradual building of eleventh and thirteenth chords. The image in fig. 4 shows the condensed, zero-redundancy diagram of the piano part in A, which was worked out during the process to help me formalise the pattern in my mind.

Fig. 4. Sketch diagram of piano pattern from *Practical Mechanics* Movement I, A section.

The simple crotchet-based rhythm skips a beat each cycle at every ¾ bar, obscuring its structure amongst carefully placed irregularity in the other instruments. The arrangement surrounding this section serves the purpose of keeping the metre perceptually ambiguous. Each repeat of the main cycle is peppered with seemingly random events, but each event is placed carefully so that the listener’s perception of the beat is drawn smoothly from duple and triple meter and back again a number of times.

As the piece builds momentum, this ambiguity is replaced with a solid percussion groove as the strings move into the foreground. At bar 79 a complex texture is created where each player only plays one note, repeated at fixed intervals. The violins play every fifth and sixth quaver, the viola every seventh and the cello every eighth (see fig. 5). This
pattern is probably the most lucid example of my interest in complexity derived from simple rules, and is also a clear example of the influence of Logic’s loop function.

Fig. 5. Polymetric pattern in Movement I string parts.

The piece takes a sharp turn at the B section, where a rather intricate stack of layered rhythms is introduced. The most salient is the isorhythmic ostinato in the upper strings and right hand of the piano – a five-beat isorhythmic melody, orchestrated bluntly in parallel fifths. The implied 4\(\times\)4 meter is countered by emphatic bass notes at the beginning of each 4\(\times\)4 bar, ensuring the common time remains dominant in the perception of the listener. The melody appears to shift around the 4\(\times\)4 bar until its periodic realignment every five bars. The harmonic rhythm at this point is tied to these 5-bar cycles, gathering the smaller, competing patterns into a larger framework in which all the disparate parts line up neatly. A further competing layer is added in the percussion part, where a crotchet triplet rhythm works against the strict semiquaver-level subdivisions outlined by the rest of the ensemble.

Fig. 6. Excerpt of 5:4 polymetre in Movement I B section.
The next development increases in complexity, as the crotchet triplet feel in the percussion becomes a minim triplet feel, doubled by the cello. This pulls us further away from the original feeling of the pulse. The harmonic rhythm abandons the polymetric cycle, instead changing chords every four bars without regard to the re-entry of the melody—this serves to further confuse the unity of the parts. Here I attempt to reach a certain balance-point of rhythmic dissonance, where the sense of pulse threatens to collapse but doesn’t quite, remaining rhythmically intelligible to most listeners. The section is then let back down gently, with a string and piano treatment of the polymetric theme, with a Picardy cadence leading us to a stable A major chord.

The movement is capitulated by a dramatic solo vocal line, stated above a rough texture of arrhythmic pizzicato attacks. This texture is achieved through the physical process of each player repeating their pizzicato note as fast as physically possible within the specified dynamic. The intention of this instruction is that due to physical variations, each player will play at a slightly different rate, resulting in a bed of irrational polyrhythms. The ideal execution of this is made challenging by performers’ natural tendency to entrain to each other; to avoid this performers need to focus intently on the physical process rather than the effect.

This is the first iteration of the vocal theme, which will also appear in chorus at the very end of the final movement. The melody is mostly the same in both appearances; the difference is the great optimism of the lyrics in Movement I versus the more realistic and depressing sentiments that close Movement V. In both instances, the final chord unexpectedly modulates using the final melody note (the sixth) as a pivot point. In the first movement this final note becomes the root note of a VI major chord, with the intention of ending the movement on a bright, assured tonality. This contrasts with the final chord of the entire work, in which the same melodic tone is employed as the third of a ♯iv minor triad.

**Movement III - Hovercraft: Transport of the Future**

This analysis will focus on the multiple media used in the conception of the movement, and the significance of improvisational and indeterminate elements in promoting a certain kind of performance engagement. The compositional process of the work is an excellent example of the effect of using varied media, and how this can open up new possibilities which couldn’t have been visible otherwise.

The first exploration of this idea occurred as a diagram on paper, with the basic premise of creating a piece in two unrelated tempi. I imagined a texture akin to the view out of a train window, with tall grass and trees rushing by in the foreground, and rolling hills slowly creeping past in the background. I experimented with a number of ways of
visually representing the different segments, and exploring various strategies of relating them to each other (see fig. 7). It became clear that the faster section would need minimal and repetitive material, so the players could easily adjust the pace with which they move through the piece.

Fig. 7. Early paper sketch of Movement III.

With solid ideas on paper, I began mocking up the piece in the Logic software. Using Logic’s ‘loop’ function, it was very easy to test various ways of presenting the repetitive material in the score. Fig. 8 shows the second violin, viola, and cello parts in orange - these have a set duration, so it was possible to sequence these against the grid, and simply stretch them to change them to the desired tempo, without regard for the tempo of the other material. The blue regions show the faster parts, consisting of piano, percussion, guitar, and first violin. The Logic interface displays looped copies as darker regions, which play back as exact copies of the lighter region preceding them. The loops are very easy to adjust, and allow the composer to model the way a performer might interpret a particular instruction – notice in the violin part (fourth from the top) that loops are used to model the gradual expansion of the melodic passage, as indicated in the score. Using Logic in this way revealed possibilities and problems which were not obvious on paper.

Fig. 8. Mock-up of Movement III using Logic software.
Finally the score was prepared using a combination of Sibelius and Adobe Photoshop. Exporting raw notation as images from Sibelius and arranging and editing them in Photoshop, I was able to circumvent the limitations of Sibelius’ adherence to conventional notation, and thereby express musical ideas which would otherwise not have been available. The final score used a numbering system to indicate where the two groups should endeavour to align in time. This responsibility inevitably falls on the faster group, as they have control over the speed at which they move through their material, and the slower group must simply play what is written. This makes it necessary for all of the players to see the full score, and follow all of the parts as they go along.

This condensed, low-redundancy presentation format of Movement III serves to facilitate a more intense and lively interaction between ensemble members. Through playing in rock bands and collaborative ensembles I have become interested in how to draw players away from the printed parts toward a more engaged performance. In Hovercraft, there are two ways I aim to elicit this from performers: by engaging the memory, and facilitating a degree of uncertainty.
Condensed scoring techniques require the performer to scan a short passage of notes, commit this to short-term memory, and then direct their attention to structure, dynamics, and the ensemble as a whole before looking back at the score. When musicians read from a single linear part, it is not particularly useful to look for or understand underlying patterns. However, in any memorisation task it is helpful to find shortcuts – frameworks which can help us condense the information into rules and patterns. Through engaging memory, it is hoped that those patterns are necessarily discovered by musicians, who can then deliver a more expressive performance through a more intimate understanding of the musical structure.

I have built a small degree of uncertainty into “Hovercraft,” with the intention of achieving ensemble engagement. The flexible and uncertain nature of the piece means a certain level of abstraction is necessary to predict and understand what might be played, and what direction the piece might take. In a way, the musicians become creative directors, aware of their shared purpose and trajectory. The intended consequence of this is that the level of interaction between musicians must increase to react to unpredictable elements. Essentially, “Hovercraft” is not completely unpredictable – the combination of uncertainty with very clear musical goals is designed to encourage an interactive and lively performance as musicians collaborate in real time toward a known outcome.

Of course, such techniques thrust upon classically trained musicians can lead to new problems: understanding the score will take longer; the first reading may sound considerably more woeful than the first reading of a fully-notated piece; and the composer must consider carefully how the score might be interpreted by performers from diverse musical backgrounds. The luxury of time is therefore extremely important for the success of this sort of piece. In my case I was lucky to have musicians who were not only willing to dedicate a great deal of time, but were also very open to different ways of working. Movement III, “Hovercraft: Transport of the Future” has since become a favourite of the ensemble, who enjoy the freedom and teamwork it requires.
Chapter 4
Audiovisual Compositions

My composition folio includes a number of works accompanied by video. These explore the possibilities of revealing complex rhythmic structure visually with the use of synchronised loops of moving images. They use a number of varied rhythmic techniques such as phasing, polymetre and polytempo, all of which involve the layering of a number of parts with similar characteristics moving at different rates. The videos were constructed and edited as an integrated part of the composition process, and follow the same rhythmic structure as the music.

These works are an exploration into two questions. The first asks what complexities can arise from the layering and repetition of simple patterns of differing lengths or played at differing speeds. This question has caught my imagination for a long time, as can be seen throughout this folio of works. It also has a long history in the work of other composers, as I have discussed in Chapter 2. I find I am inexplicably drawn to the geometric nature of polyrhythmic music – the beauty of its patterns, the elegance of its construction, the engaging character of its sonic results. However I have often contemplated the problem of the listener’s perception – even if a listener finds complex polyrhythmic music very sonically pleasing, the chaotic surface texture may obscure the regular patterns underneath. Given my own fascination with elegant patterns, I found myself wanting to share this more clearly with my audience. I have an interest in what Steve Reich has called “perceptible processes,” and like Reich, “I want to be able to hear the process happening throughout the sounding music” (34). I began to consider whether some processes might be more easily seen than heard.

This led to my second question, which asks how these patterns might be represented visually to elucidate their underlying regularity and complexity. Walter Ong has observed that “sight isolates, sound incorporates” (70), explaining that our sense of hearing tends to take everything in as a whole, whereas vision is a dissecting sense that tends to cut up the world into discernible pieces. Given these different characteristics of sound and vision, I began to consider the ease with which we can comprehend patterns visually as opposed to aurally. I began exploring a new compositional method where minimalistic and rule-governed musical material was paired with corresponding visual material to create synchronised, unified, audiovisual music compositions.

After a few early experiments I began to develop a methodology that guided these works. This can be summarised in four rules:
1. A minimal amount of footage is matched to an equally minimal amount of musical material.
2. The musical and visual materials are layered and repeated, employing polymetric and polytempic techniques to generate complexity and variation.
3. The music and video are composed concurrently, and any rhythmic structure applied to the music must be applied to the corresponding video, and vice versa, as accurately as possible.
4. All follow a journey toward or away from equilibrium, or both.

The visual material is chosen more for its form and movement than its semantic or representational content. The compositions experiment with the idea that much like Diana Deutsch’s “sometimes behave so strangely” experiment (Deutsch, Henthorn and Lapidis), the repetition of the video content quickly empties it of any semantic importance, and allows the viewer to consider its non-representational aesthetic qualities. The effectiveness of the audiovisual pairings relies heavily on the phenomena of synchresis – audiovisual theorist Michel Chion’s term meaning the mental fusion between a sound and a visual when these occur at exactly the same time. He gives the example that in cinema, "the sound of an ax [sic] chopping wood, played exactly in sync with a bat hitting a baseball, will "read" as a particularly forceful hit rather than a mistake by the filmmakers" (24-27).

By composing both video and audio concurrently – frequently skipping back and forth between audio and video software during composition – the visual and musical ideas have been able to influence each other, ensuring a tight synaesthetic fit between the two. Freed from the need for any semantic relationship between sound and vision, I have often selected visual content which is playful or unusual, or, as in the case of BMX and Major League Geometry, contain imagery not often encountered in the context of the concert hall.

Your Heart is a Stupid Thing to Trust

My first set of experimentations in this vein is titled Your Heart is a Stupid Thing to Trust, and consists of seven short videos. These are all acousmatic, in the sense that they are produced for loudspeaker playback, without any intention of live performance. The title is a sarcastic play on the tension between the pursuit of modernist ideals in the deterministic purity of the process, and my post-modern compulsion toward immediacy and affect. The very humanistic expressivity in the music – largely driven by my choice of pitch material – clashes against a caricature of high modernist thinking that might suggest that the heart is the least reliable guide for aesthetic expression.

The series includes seven videos, which can be roughly split into two categories of irrational and rational rhythmic construction. The irrational rhythms are similar to Steve
Reich’s phasing techniques, where the parts do not share a single authoritative pulse. These include “Butterfly,” “Motor,” “Taxi,” and “Backflip.” “Butterfly” (as will be discussed) uses simple crotchet durations juxtaposed against other parts in very long Carter-esque polyrhythmic ratios of 112:111. In Motor, the placement of notes is aleatoric – the video loop was found first, and the timing of the passing vehicles defines the rhythms. Each panel of the video plays 24 times, but the phasing is created by staggering the beginnings and aligning the ends of each part. “Taxi” and “Backflip” both work very much like wave pendulums – six parts start and begin together, but each must play one more loop than its neighbour, causing all parts to cycle through various configurations of phase relationships before reaching final equilibrium.

Those which are constructed upon rational rhythm – where the polyrhythmic relationships between parts is expressible in simple integer ratios – include “Locomotive,” “Droplet,” and “Footwork.” Locomotive explores the layering of simple 1:2 and 2:3 relationships, gradually building a stack of rhythms reminiscent of Henry Cowell’s Rhythmicon (Schedel). Droplet explores rather simple integer ratios with pitch cycles, as will be discussed below. Footwork employs a gradual expansion of loop length, beginning with a quaver-length loop and extending it by a quaver every four bars. This is then played in canon by two more parts with entries staggered by 16 bars, and the three parts play out until they have all reached the full one-bar loop length.

Due to restrictions on the length of this exegesis, I have chosen to provide detailed analysis only of three selected pieces – “Butterfly,” “Locomotive,” and “Droplet” – as these cover most of the techniques used throughout the entire series. My hope is that once the reader has understood these three works, the processes behind the remaining ones will also become clear.

I. “Butterfly”

“Butterfly” was the first of the many experiments I undertook. It consists of an eight-bar piano loop which corresponds to an equal length of footage. The loop is played by four separate piano parts, with the parts split across four octaves and the corresponding images split horizontally across the screen. Each part plays the loop seven times through, with the four parts beginning staggered by one crotchet, reaching unison in the middle, and then drifting off again in the opposite direction, achieving symmetry across the piece.

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1 A wave pendulum is a device used to demonstrate physical properties of wavelengths and periodicity. It consists of an array of pendulums which swing parallel to each other, hanging from strings cut to increasing lengths. When they are all activated simultaneously, they cycle through series of wave patterns and eventually realign.
“Butterfly” is an example of polytempic phasing. While it is possible to express the rhythms in the form of a ratio – 112:111 between each part and its nearest neighbour – there is no perceptible rational relationship between them. There is no common pulse amongst the four parts, and rhythms are emergent rather than static. Quaver, semiquaver, and triplet-based rhythms gradually assemble and then dissipate. The rhythmic phase position is reflected in the emergent motion between the four dancers on-screen: when the top melody is leading we can see the movement passed from left to right; in equilibrium we see the dancers in perfect synchrony for a fleeting moment; and in the final half the top melody drags and motion reverses.

The eight-bar pattern was carefully composed to accommodate contrasting subtlety and robustness in the harmony. The notes leap around drastically, ensuring that when the pattern is out-of-phase, the harmony becomes rich and subtle, containing a range of intervals from seconds to fifteenths, while the very centre of the piece is robust and blunt, delivering the theme across four parallel octaves. In addition to this, the sequence is constructed so that in certain phase positions, short stepwise ascending and descending lines emerge and disappear (see fig. 11).
Emergent patterns from this excerpt with 3/4 (three quarters) crotchet distance between parts:

Emergent patterns from this excerpt with 2/3 (two thirds) crotchet distance between parts:

(Parts are coloured blue, green, orange, and red in ascending order.)

Fig. 11. Emergent melodic motion from one two-bar excerpt at phase positions of dotted quaver and minim triplet separations. Note durations have been simplified to show melodic relationships. The second example is shown in a 1\text{\texttime{4}} time signature, where one crotchet from the original pattern is written as one dotted crotchet.

II. “Locomotive”

“Locomotive” contrasts with “Butterfly” in a number of ways. It employs rational rhythm, meaning that all parts share a common pulse and metric basis of time, and differing speeds are based on small integer ratios, expressible in terms of traditional rhythmic units (crotchet, quaver, etc). It employs no pitch content; all sound comes from one percussive loop (a mix of train & drum sounds) played at different speeds. The visual content is presented in concentric rectangles, where the largest correspond to the longest loops, and the smallest to the shortest. The correspondences between image and loop length are shown in figure 12.

The introduction is simply all loops played once through, which begins very dense, and quickly pares down to the longest loop. After the introduction, the development of the piece follows an additive process of gradually stacking loops on top of one another (both musically and visually). This process begins with a loop of one breve (eight beats) in length, reflected by its corresponding video loop which fills the screen. After 16 beats, a
minim loop is added, with video scaled to half the size. The process continues in this way, adding semibreve-, crotchet- and quaver-length loops. These first five cycles of the process consist only of simple 1:2 relationships between layers, resulting in an intricate but rather bounded rhythm. In the next cycle, the first dotted rhythm is introduced. The dotted semibreve’s corresponding video panel is scaled in between the breve and semibreve loops. Further dotted loops are inserted in between the five basic loops, resulting in a more erratic and unpredictable rhythm.

An important element of the video content is the puff of white steam that acts as a sort of rhythmic marker to illustrate clearly the lengths of the loops. When the loop points line up, this puff of steam causes a satisfying rush of emergent motion toward the centre. As the dotted rhythms are added, this motion becomes more chaotic and fragmented. The process ends when all layers line-up for the first time. After this moment, a short coda consists of a repeat of the introduction, plus the same construction assembled in reverse, allowing all parts to be present at the final closing moment.

Fig. 12. Video frames and corresponding loop lengths in Locomotive.

IV. Droplet

Droplet is rhythmically the simplest of the series, and the most meditative. The video content is a very short clip of a drop of milk falling into a glass in slow motion. A piano stroke is assigned to each moment of impact. The video and audio are split into three parts, and the parts share a common pulse but contain notes of differing durations, based
on the simple ratio 2:4:3 (expressed left to right – see fig. 13). A further level of complexity is introduced by having each part follow a unique pitch sequence – these are five, four, and five notes long respectively. This ensures that the pattern will not resolve for well beyond the duration of the piece.

A slow and penetrating percussion beat appears, where the kick drum is represented by a momentary colour inversion of the entire image. I have applied a side-chain compression technique to empower the kick drum with a sense of all-encompassing gravity, linking it effectively with the visual flash effect.

![Fig. 13. Structural diagram of Droplet](image)

**BMX**

As I was creating the videos in *Your Heart*, I began to consider the possibility of creating a similar style of video composition that could be performed by a live ensemble. I wrote *BMX* for my group Nonsemble, with an aim to perform it alongside a projection of the video. *BMX* uses the ideas of *Your Heart*, but is not as purely process driven. Where the videos in *Your Heart* function as elegant etudes exploring specific processes, *BMX* is a more complete composition, which employs similar ideas and techniques within a more intuitive and free compositional approach.

At the core of the piece is the two violins and the right-hand line of the piano – these are the featured polymetric parts which synchronise with the video. The first violin’s pattern is nine beats, the piano right hand line is eight, and the second violin is seven. The three parts all share a melodic shape and rhythm, but are pitched differently, with the melodic shape and rhythm mimicking the action of the backflipping cyclist used in the video. Each repetition in each part is represented by a repetition of this video content. At the beginning the cyclists are overlaid in the same place on screen, but soon drift apart to
three separate positions, corresponding with the three instruments, and revealing the rhythmic relationships more clearly (see fig. 14). The duration of the piece is the exact time it takes for the three polymetric parts to realign. Throughout the piece, the rest of the ensemble performs an arrangement around the three core parts, which provides harmonic and rhythmic development.

![Image](image_url)

**Fig. 14. Polymetric parts in BMX and their corresponding visualisations.**

BMX is designed to be accessible to an uninitiated audience, and this meant that producing a product that engaged a live audience was favoured above the strictness of the process. To this end, the somewhat intellectualised polymetric techniques are encased within the immediate familiarity of a IV-vi-V progression, with the harmonic motion accelerating as the piece builds energy. The avoidance of any instance of the I chord suggests a Lydian tonality, and maintains a sense of suspension throughout the piece. Percussion enters around 2:30, building gradually into the back-beat driven groove which lifts the climax between 3:30 and 4:00. At this peak in energy, the video abandons its mathematic rules somewhat, morphing into an entertaining kaleidoscope of swirling forms, before breaking back down to resume its strict deterministic process toward the end.

The live performance of the work is achieved by embedding a metronome click in the video file. The click is muted in the loudspeakers, and fed from the projector computer to a headphone distributor. The musicians can then hear the click through headphones, and keep in perfect synchrony with the video. In practice it has been sufficient for just the violinists, pianist, and percussionist to hear the click, as the viola and cello parts do not
enter until the pulse is already well established. The practicalities of performing BMX are made simple by the fact that all parts share a pulse. To perform irrational rhythms such as those found in “Butterfly” or Taxi”, a more complicated setup will be required – this is a problem I am working on for future compositions of performable video works.

BMX’s well-received premiere led to an invitation from TEDxBrisbane conference organisers to present the work at their 2013 event. Along with the performance, I was asked to give a short talk about my ideas and methods, which gave me an excellent opportunity to distil my practice into a clear methodology which could be communicated to a non-musician audience.

**Major League Geometry**

Following on from the success of BMX, I composed another ensemble work in a similar style. *Major League Geometry* is scored for Xylophone, Marimba, Vibraphone, and Video – in this case with an audible backing track embedded in the video. The electronic backing removes the need for headphones, and also allows for greater textural and harmonic variety with fewer live performers.

The rhythms throughout the piece are based upon 3:4:5 polymetric relationships, and section lengths are determined by the time necessary for the cycling rhythms to resolve. For example, in the first section the main eight-beat loop is joined first by a layered three-beat loop, and this simple construction takes only 6 bars to resolve. When the third loop – a five-beat duration – enters, the complexity increases and the section plays for the full 30 bars required to re-align the rhythms.

Major League Geometry is yet to be performed live, but I believe it to be the most easily performable of my live ensemble video works.
Chapter 5
Electro-Acoustic Compositions

Software of Seagulls’ *Sunrise Industry* constitutes a major part of the folio. It is a 37-minute, seven-track album of acousmatic compositions, constructed mainly from recordings of improvisations. Stylistically it draws on post-rock and electronica, aiming for a texture-rich and expansive sound. The compositional process – a methodology which I call “capture/construct” – aims to harness intuitive responses to unexpected or uncontrolled musical and media environments. In this process, control over the generation of musical materials is partially relinquished, while development and elaboration of the material takes advantage of the full level of control afforded by the Digital Audio Workstation.

The capture/construct methodology was the subject of my 2007 Honours dissertation in composition (Perren), and essentially gives a name to a process which is widely employed amongst digitally literate composers (Eno, 129). The technique is not such a large departure from traditional composition methods – it is recognised that composers throughout the history of Western classical music have generated material through improvisation, before turning to more rational or intellectual methods to develop that material (for example Haydn qtd. in J. Webster, 174). It can be seen as a way of harnessing both the Apollonian and Dionysian attitudes to reach a result which is both well-formed and intuitively affective. Taleb, while speaking toward a more general philosophical approach, encapsulates the rationale of the capture/construct methodology neatly in stating that, “growth in knowledge – or anything – cannot proceed without the Dionysian. It reveals matters that we can select at some point, given that we have that optionality. In other words, it can be the source of stochastic tinkering, and the Apollonian can be part of the rationality in the selection process” (*Antifragile*, 256).

While a traditional compositional approach could be seen as creation of new material from nothing, the capture/construct process consists more heavily of selection and manipulation of recorded material. This shift can be seen to be inherent in the use of new media. Manovich suggests that while pre-electronic artforms generally operate on a principle of “creation from scratch,” the tendency of new media art is “modification of an already existing signal” (126). In *Sunrise Industry* I embrace this tendency, but rather than using factory soundbanks for “fingertip replication” (Oswald), the process of guiding and facilitating improvisations ensures the originality and uniqueness of the source material.

**Process**
At the core of the capture/construct process is two basic activities: the capture of improvised sound as audio, and the construction of new works from the captured sound. Improvisations may be free or guided, responsive to existing works in progress or to the environment. In my work it has also involved sampling of found sound – sonic objects taken from old audio cassettes, VHS tapes, and my own field recordings. The construct phase involves selecting interesting and useful moments from this pool of source material, processing and combining them, and using them as the basis for new work. The cutting and re-assembling of audio material can happen on a range of time-scales – from microscopic fragments under 100 milliseconds, to passages which may run unedited for as long as the duration of an entire piece.

While the term “capture/construct” may seem misleadingly ordered, I find the process in my own practice necessarily complex, messy, and iterative. When first exploring the technique in my Honours year, I had imagined I would simply capture all of the necessary material first, and then retreat to the studio to construct and complete the works. But in reality it became clear that a less restrictive process would yield much better compositions, and the process became more cyclical. After reconstructing some recorded material into a new musical idea, it is possible to present that work-in-progress as stimulus for new improvisations. In this way, musical ideas grow, and reinforce themselves naturally in a sort of iterative feedback loop.

This body of work explores very directly my ideas about action and media as discussed in Chapter 2. Many of the creative decisions are intuitive responses to the affordances of musical instruments, tape, and DAW environments. Working with audio and midi in the DAW is my native tongue as a composer, and so within this medium I experience composition as “action”, more so than in any other environment. It is thus the most difficult segment of the PhD folio for me to reflect upon and analyse objectively, as many crucial decisions seemed to occur without conscious deliberation. When working in the DAW, my process is rather chaotic – attending to musical structure whilst simultaneously mixing and refining sonic characteristics, and responding the complex inter-relationships between these elements. I experience this as the growing of a creative work, rather than building or writing. Unlike some of the very elegant and deterministic works presented in the previous chapter, it is hard to break these works into their essential elements and present a simple and clear analysis. I understand this could be seen as evidence of a lack of elegant structure or inner logic, but I argue that this is not the case. As will be shown, the works all exhibit deep structural cohesion. I rather see this difficulty as a by-product of the medium. Conventional notation, for instance, leads the creative mind in directions which lend themselves to explicit discussion, whereas the media used for the Software of Seagulls project leads to musical thinking which is less readily explicated.
Overview

Over the course of the 37-minute work, a great deal of ground is covered in terms of basic melody, harmony, and rhythm, as well as timbral and textural techniques, analogue and digital processing, and structure. There is a great deal that could be discussed; however I must restrict analysis to a few key features. I will give a brief overview here of all of the tracks, and then move on to a more detailed discussion of compositional process behind two selected pieces: “Carve Silence Into Me”, and “2 a.m. Jungle Gym.”

The opening track, “Sunrise Industry,” is built mainly around some acoustic guitar improvisations. These were recorded to a click, so it was possible to reassemble these into repetitive themes with slight variations throughout. The clarinet improvisations (by Chelsea McNelliey) were a response to the reconstructed guitar part. This piece is an interesting example of the iterative feedback loop – its second melodic theme which enters in full force at 3:30 originated as a guitar improvisation, but in its reconstructed form became the stimulus for new improvisations on keys, bass, percussion and clarinet. Interesting permutations of the theme emerged, using its rhythm and shape but developing it in ways that sound immediately natural and intuitive.

“Adelaide St.” uses a technique which I often employ for capture/construct style pieces; this involves cutting a lengthy sample into many short chunks and loading these into a sampler instrument. The short chunks are mapped across the keys at their original pitch, allowing them to be freely played on a midi keyboard. I created sampler instruments from drum kit, cello and clarinet improvisations (by Sangdae Yang, Briony Luttrell, and Chelsea McNelliey), and used these to construct the basis of the piece. The cello and clarinet samples were originally responses to an early version of Sunrise Industry; this is a good example of how new tracks can grow from material originally intended for another work. This kind of cross-pollination occurs a lot throughout the album, and contributes to its unity.

The immediately striking feature of “Carve Silence to Me” is its sonic texture. The heavily distorted guitar sound is abrasive but somehow pleasing, occupying the full frequency spectrum and moving glacially through a simple harmonic progression. The sound of this track was achieved by means of analogue tape processing – a technique which I believe warrants some detailed discussion which I will return to below.

Despite its cumbersome title, “Redundant Array of Independent Worlds” consists of a minimal amount of source material. The key elements are a repetitive guitar pattern, and a heavily edited electric violin solo (improvised by Fern Thompsett). The electric violin improvisation was originally performed against an early version of “Carve Silence Into Me,” which coincidentally led to the subtle bitonality between the guitar and violin, as the
violin traces a Dorian mode against the guitar’s Aeolian. The editing of the electric violin part foregrounds the grain of the instrument, balancing its natural flow against occasional rough digital interruptions (such as at 1:20). The piece is meditative and gentle, encouraging the listener to attend to the textures and resonances of the instruments.

The foundation of “And Yet Dreams” is a nine-bar loop constructed using a Schillingerian attack group procedure (Arden, 92-98). Starting with a rhythmic “seed” in \( \frac{3}{4} \), attacks are alternated between two pitches to double the pattern’s length. The same procedure is then applied to the top row of attacks. To add further complexity, the bottom row of attacks are distributed across three pitches, making a 12-bar pattern. In “And Yet Dreams”, the results of this procedure are set in a \( \frac{4}{4} \) rhythmic framework to complete the repetitive yet strangely unpredictable pattern (see fig. 15). With this as a central motif, the piece explores various arrangements and developments of the nine-bar cycle.

![Fig. 15. Schillingerian attack group procedure in “And Yet Dreams.”](image)

The following track, “2 a.m. Jungle Gym,” provides some relief from the intensity of “And Yet Dreams.” The central source material for this track emerged from a single session of piano improvisation, in which I used the quiet ticking of my living room clock as a metronome. The low volume of the ticking led to a necessarily gentle improvisation, where I explored different ways of subdividing the seconds rhythmically. I am captured by this idea of allowing an environment to guide composition, and embracing rather than controlling that which might normally be considered an acoustic intrusion. The ticking clock can still be heard in the recording, particularly in the soft final section.

The finale, “Sunset Industry” was formed around a recording of Helen Carrington and I improvising together on the twin Steinway pianos in the University Of Queensland
School of Music. Selections of the half-hour improvisation were played alongside each other in Logic, and carefully calibrated tremolo effects were applied, which essentially dove-tailed the separate audio files together – one audio file sounds during every on-quaver and is silenced during every off-quaver, and the other file is treated vice-versa. This forces a strict rhythmic grid onto the rubato improvisations, resulting in interesting emergent melodies. This idea is developed further throughout the piece, using pitch-shifting and applying the dovetailing effect to further subdivisions. The piece culminates in a cinematic climax, using very simple and slow harmonic movement below the fast-moving surface of the dove-tailed pianos.

Fig. 16. Visualisation of “dovetailing” effect used in “Sunset Industry,” created by rhythmic alternation of muting between two different tracks.

Track 3: “Carve Silence into Me”

The piece “Carve Silence into Me” is an interesting hybrid of analogue and digital processes. Its pitch content, if considered at a fundamental level, is very simple, however the interesting spectral content lies in the overtones produced through tape saturation. It moves through an unevenly spaced I-iii-vi-V-I-IV-iii harmonic progression over 16 bars, and repeats this basic cycle from beginning to end. Instruments and textures are gradually added to build a wall of noise which is simultaneously beautiful in its musical expression, and grotesque in its abrasive distorted texture.

The harsh sound which opens the piece and continues throughout, is a recording of an electric guitar improvisation in which a raw signal was heavily effected by distortion and delay pedals, and recorded direct to tape on a Yamaha four-track tape recorder. The overdriven signal overloads both the circuitry of the tape unit and the magnetic tape itself, resulting in a saturation which sounds (to my ears) quite unlike anything which could be achieved digitally. The inconsistency of the low-quality consumer tape results in random fluctuations of volume and spectral content, and by overloading the tape so severely I was able to magnify and foreground these fluctuations. The tape was then played back and recorded into the computer, to be sliced up and manipulated.
The randomness and grain of the tape also contributed the unusual stereo image of the track. Very similar audio content was recorded to different parts of the same tape, and the results were played together and panned to left and right speakers. Where the tape has reacted similarly to certain frequencies in both iterations, those frequencies are heard in the centre of the stereo image. Where the saturation has caused transient or nonlinear responses, such as high overtones or momentary silence, these anomalies are heard clearly in one speaker or the other.

As the piece progresses, the texture is built additively. The synthesiser melody emerged from performing long keyboard improvisations over the guitar pattern, then selecting a short phrase from within the improvised content, and finally looping and reinforcing this new melody. Various other textures and sounds are added, notably the low synthesised bass which simply follows and reinforces the guitar part, and the sparkling arpeggiated synthesiser. The slowly crescendoing drums came from a separate percussion improvisation performed by Nonsemble percussionist Hik Sugimoto. I recorded the drum track from the computer onto the tape machine, and used the tape speed control to slow it down to the correct tempo, which also resulted in a warm thumping sonic character.

![Waveform of “Carve Silence Into Me,” showing its gradual crescendo structure](image)

The high frequency sound which appears suddenly at 3:01 was also recorded out to tape and back into the computer. This was originally an electric violin improvisation by Fern Thompsett. The dense texture of the piece made it very difficult to find space for each element I added, so in this case I used the tape machine to re-pitch and reverse the violin sound. The design of the Yamaha four-track recorder is such that once something has been recorded, it is possible to flip the tape over and listen to it immediately in reverse. It also has a tape speed switch, which allows the user to very quickly halve or double the tape speed, also resulting in a pitch drop or rise of exactly one octave. I took advantage of both of these affordances in processing the violin, resulting in an eerie shimmering sound which fits perfectly in its own sonic space above the rest of the mix.

The complexity introduced by analogue processing, being essentially grounded in the physical world, occurs at a much finer level than that which one can introduce.
deliberately, for example by applying equalisers and filters. I find that while difficult to control, this leads to very rich timbral characteristics which inspire my compositional process, reveal opportunities, and stimulate further creative ideas.

Track 6: “2 a.m. Jungle Gym”

This is a soft ambient piece constructed from layered piano improvisations, sampled percussion, field recordings and heavily processed guitar improvisations. It is a great example of the foregrounding of imperfections in capture/construct style compositions. As I have mentioned, the piano improvisation is a result of unique environmental constraints. The softly ticking clock was used as a metronome, requiring a sensitivity to volume and allowing for various ways of subdividing its steady beat throughout my improvisation.

In this track I was especially interested in allowing naturally occurring sound artefacts to simply be themselves, both acoustically and digitally. The clock is audible in the recording, and has been used as a soft percussive element. Other sounds such as the creaking piano stool, the sustain pedal mechanism, and the ambient room noise are not covered over, but add to the ambience of the work. I have also avoided any attempts to mask the digital aspects of the process. Samples are cut roughly and not faded or smoothed, resulting in pops and clicks which have also been utilised as percussion. Some samples are cut short just as a new attack enters, leaving only a staccatissimo fragment of a piano stroke and foregrounding the digitality of the medium (see fig. 18).

Fig. 18. Rough sample edges in “2 a.m. Jungle Gym” producing fragmented notes, clicks and pops.

The rhythm of the piece is a result of layering different parts of the improvisation which subdivided the ticking clock in different ways. Over the course of the recording session, I used the ticking as the minim of a : bar, the minim in a : bar, and the dotted minim in a : bar (or minim triplet in :). By playing simple repeated patterns and layering
them together, interlocking isorhythms form between the parts. The pianos are treated with a Roland Space Echo tape delay which slowly drifts in pitch – this forms the cloudy warbling texture which is present throughout the piece. As with all of my pieces which layer pianos or other full-spectrum instruments, the piano tracks were carefully equalised to ensure that only one track provides the lower frequency content. All other tracks are high-pass filtered to avoid muddy bass frequencies.

The melody which enters at 2:40 was created using a similar technique to the violin in “Carve Silence.” Guitar improvisations were recorded to a cassette tape, which was then flipped and recorded into the computer at double speed. From this material I selected useful and interesting phrases to form the melodic motifs.

At 3:03 the piece shifts in character, adopting a relative minor tonality and becoming more rhythmic. A sampled orchestral bass drum anchors the rhythm, which becomes more unified in contrast with the drifting freedom of the previous section. Reverb and delay is used to create a vast sense of space. The percussion is enhanced with cuts from a field recording made while hiking, which is used for its textural scraping quality – this has been kept quite dry, establishing a long depth of field from the distant reverberant wash of the other instruments.

In the final section the piece winds down in energy. The artificial reverbs and delays are gradually removed, and the expansive space is gradually reduced back to the true acoustic space of the original recording. The piece ends in this intimate space, with the clock and other sounds completely exposed. This transportation from a vast virtual world into a small suburban living room and a humble upright piano has a very interesting effect – revealing a certain artifice made possible by recording technology. The speech sample at 1:07, sampled from an unmarked VHS tape bought at a garage sale, says “Wonderful, we have the whole town to ourselves” – I found this to be an apt reflection on the artifice of vast virtual space.
Chapter 6
Other Works

This chapter deals briefly with two smaller works included in the folio. Firstly On Rainy Days Be In the Rain, On Windy Days Be in the Wind, a work for solo guitar and electronics, and secondly “Snare = Two and Four” for chamber orchestra.

On Rainy Days Be In the Rain, On Windy Days Be in the Wind

On Rainy Days is a three-movement work for a solo electric guitar, 5 guitar amps, voice, and a specific configuration of delay effects. Given my conviction that compositional decisions are driven by media choice, it follows that in order to create a unique new work, one may simply create a unique new media environment, and move forward instinctively. On Rainy Days explores the idea that the majority of the compositional work could be in setting up an elaborate and unusual system of rules and boundaries, and the content is created simply by playfully exploring within it.

This work operates within a basic technological setup, involving one guitar, 5 guitar amps, and electronics. I have chosen to use as few signal processing elements as possible, in order to ensure the piece can be translatable for other performers. In contrast to some late 20th century electro-acoustic works which specify a particular array of obsolescing equipment models and settings, On Rainy Days only tells the performer what simple signal processing needs to be performed. The performer is free to use whatever is at his or her disposal to achieve this, whether it be a rack of studio outboard, a tangle of guitar effects pedals, or a neatly programmed Max/MSP patch.

The signal of the guitar is split into five switchable channels, and delay processes are performed on each of the channels. The delay must have feedback capability – that is, all or some of the delayed signal can be fed back into the delay input, making infinite looping possible. The output of the five channels are fed into five guitar amplifiers of any make or model. The amplifiers are spatially separated within the performance space, and preferably of different sizes and types for further timbral separation. The performer is required to sing the vocal part without the aid of a microphone.

The title of the work is a translation of a short poem by Japanese poet and calligrapher, Aida Mitsuo. The poem in its original Japanese appears in Movement III as lyrics. Aida’s poetry is rooted in the philosophy of Zen Buddhism, and this particular poem expresses the notion of experiencing reality exactly as it is, rather than the grasping activity of trying to enact change on ones environment. This is sometimes referred to as Tathagata or “suchness” (Suzuki, 73).
While an in-depth discussion of Zen Buddhist teachings is obviously beyond the scope of the present discussion, these ideas have been central to my thinking over the past few years, and have strongly influenced my compositions. When I first began to write *On Rainy Days*, the process became a sort of meditational tool. Each note played irreversibly becomes part of the ongoing texture – even the slightest sound on the strings is amplified and repeated. The activity of improvising in such an environment started to feel like a training ground for subtlety and restraint. One aim of Zen meditation is to train oneself out of the habit of constantly trying to effect change on the environment, and similarly in music I believe it is important to control our impulse to do more, add more, and play more, rather than allowing a sound to be what it is.

The piece consists of three movements. The first movement uses the delays to create a sort of canon, as a cycle of a fixed length is repeated one at a time in each amplifier. No delay feedback is used in this movement, as each amp simply plays back the input signal once, staggered by a set time delay. In the second movement the delay times are set very close to each other, creating a Reichian phasing effect, and the feedback is set quite high, allowing the delayed signal to loop and decay gradually over a long period. Finally the third movement explores short delays which loop infinitely (or until they are manually made to stop). The delay times are related by simple integer ratios, which creates polyrhythmic interplay between the layers.

To add to the unique limitations of the work, the score calls for the performer to sing, unmediated by a microphone. In keeping with the McLuhanist notions woven throughout this project, I considered the decision to eschew the microphone – especially in the potentially noisy sonic environment of five guitar amps – to be of far more significance than any of the notes that I might prescribe the performer to sing. The decision itself is based on aesthetic preference for the directness of the unmediated human voice, and the heightened emotion which comes from pushing the volume of the voice to its limits. The actual melodic content of the vocal part is then largely influenced by the conditions imposed on the vocal delivery by the choice of media.

*On Rainy Days* is an example of a unique process which triggers creativity by setting up an unusually reactive environment within which the composer may explore. By taking the spotlight off the decisions about chords and melodies, I was able to compose in a natural, instinctive, unforced manner, whilst still producing a unique and innovative musical result.

**Snare = Two and Four**

This work for chamber orchestra runs for around seven and a half minutes. It has been elaborated from two simple ideas – manipulation of the basic rock beat, and a three note
melodic figure consisting of the first, second, and fifth scale degrees (do-re-so). My aim was to write a challenging and complex work which would not be out of reach for an amateur or student orchestra. Like much of my work, it is influenced by both twentieth century art music – especially in this case Copland, Adams, Michael Gordon – as well the more adventurous fringes of rock music such as Tortoise, Don Caballero, and Mogwai.

Due to our cultural conditioning from the ubiquity of rock music, I have begun to consider the power of the basic rock backbeat to single-handedly define rhythmic perception, regardless of what other instruments are playing. We often teach budding rock drummers that they should play the snare on beats two and four, however I wonder if the snare drum has come to wield such power that wherever the drummer chooses to play it is two and four, or at least becomes so in the listener’s perception. This work explores this phenomenon by placing rock-beat-esque drum patterns against conflicting or ambiguous rhythms, testing its ability to force a particular perception of the beat against any and all odds.

The melodic material is all elaborated from the do-re-so figure, which contains internal intervals of a second and a fourth, aligning it pleasingly with the title. I have always found this pattern mystically intriguing, and it appears frequently in my music. The three notes seem to retain a certain sonority regardless of how they are transposed or juxtaposed. The construction could be seen as two stacked fifths condensed into a single octave, which may go some way toward explaining its sturdy consonance.

**Snare = Two and Four** moves through a number of elaborations of these basic elements, which culminate in three distinct peaks over 9 sections, labelled A to I. It begins with a meditative chordal introduction elaborated from the do-re-so motif, before launching into the faster, minimalism-inspired B and C sections. The rhythm is occasionally ambiguous in these sections, as the dominant perception of the pulse shifts between dotted crotchet, crotchet, and dotted quaver with the help of the drum kit. Throughout B and C, the drum kit hints briefly at the basic rock beat pattern, but often incompletely or at a rate which is at odds with the main tempo. We hear the first full-blown backbeat pattern at the end of C, where its strong pulse re-contextualises the ostinatos of the rest of the orchestra. Sections D and E provide a break from the intensity of the previous sections, and set up the motif which forms the basis of F, a gradual build back up towards a second climax. This peak is found in the next section, G – essentially a high-energy treatment of the materials from D. Section H returns the quaver patterns used in B and C to build toward the third and final peak. In section I, the final climactic moment, the arrangement morphs gradually from to . The bar length is kept constant from the to the , gradually expanding the rhythms to eventually settle into the more stable and final rhythm.
This work can be seen as a study into the economy of materials. In my experience I have found that the more minimal the source material, the more abundant the possibilities are for development and manipulation. The three-note figure used in this piece proved particularly fertile for ideas, and I found it more difficult to narrow down to fewer developments than to come up with new permutations. The completed work is rhythmically challenging, but in the hands of a skilled conductor I believe it can be effective and achievable for professional, amateur and student orchestras.
Chapter 7
Conclusions

The threads within my work discussed in the exegesis, whilst seemingly disparate, have converged and connected in interesting ways throughout the PhD journey. The influence of media and technology, my interest in complexity emerging from simplicity, the powerful role of intuition and embodied knowledge, and my compulsion toward musical pluralism have proven to be inextricably interwoven. I have presented a case here which frames my musical production as dependent on the means by which it is produced, and my explorations have supported this notion both practically and theoretically. However I also recognise my own claim regarding the infinite complexity of the true experience of music, and I concede that the discussion presented here represents only one way of looking at the highly interdependent and complex activity of music composition.

Regardless of theoretical viewpoints, a body of musical work has been produced which could not have emerged in its exact state under any other circumstance. The works themselves articulate ideas which cannot be accurately translated or summarised into words. They contain a richness of aesthetic information unique to a specific time, place, and culture. It is my hope that the exegesis might give some hint toward what is being communicated aesthetically, however the words have little meaning without the experience of the music itself, in its entirety.

Looking forward I can see many opportunities for further research. My video compositions have contributed a style of audio-visual music making which did not previously exist, and I look forward to the development of this style by myself and by other composers. Practical Mechanics and Sunrise Industry on the other hand enter more readily into existing musical dialogues, and I look forward to being challenged and engaged by other composers in these ongoing traditions. In addition to this, it is my conviction that the insights presented here regarding media and compositional action deserve further investigation from philosophical and musicological perspectives.

The experience of undertaking a PhD program in music composition has been challenging and enlightening, and the process has opened my ears and mind to a great many new ideas, techniques and philosophies. The analects of Confucius describe knowledge thus: “when you know a thing, to recognise that you know it, and when you do not know a thing, to recognise that you do not know it” (Waley, 91). Though I have gained many new insights during my PhD journey, I have also come to recognise the vastness of that which I do not know. This recognition brings both humility and a sense of
excitement for the future. The compositional and philosophical pathways I have opened here show promise of rich exploration for many years to come.
Works Cited


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