A New Way of Moving: Developing a Solo Drumset Practice Informed by Embodied Music Cognition

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Statement of Originality

I certify that the intellectual content of this thesis is the product of my own work and that all the assistance received in preparing this thesis and sources have been acknowledged. This thesis has not been submitted for any degree or other purpose.

James McLean
December 6th, 2017

Abstract

This research examines how insights drawn from the field of Embodied Music Cognition can be repurposed to instigate creative development within the practice of an improvising drummer. Following a process-driven practice-led research model, I correlate academic research to aspects of pedagogical and professional practice, generating original theoretical insight and embodied knowledge in two primary areas: first, I arrive at an understanding of *sticking cells* as embodied knowledge encoded with specific rhythmic forms; second, I develop an original taxonomy for classifying types of individual and combined *movement cycles* as applied to the drumset. I combine these two as variable parameters within an original generative process entitled *somatic parameter layering*; which I use to furnish musical outputs that are found within a series of original recorded works, embedded throughout this dissertation. Through analysis of these works, I identify five strategic implementations of somatic parameter layering: *Hide / Reveal, Modulation Obfuscation, Unison / Interlace, Fragmentation*, and *Expansion / Contraction*. I then repurpose the parameters of sticking cells and movement cycles into an analytical model for investigating drumset activity, which is tested on an excerpt drawn from a live performance by American jazz drummer Bill Stewart, revealing his manipulation of movement as a parameter for both idea generation and development. The creative works of this research are situated within a historically emergent community of Australian improvising musicians, whom I refer to as *Antripodean* improvisers. I present an outline of the key artists working in the idiom and provide analysis of representative works to build a profile of the improvisational logic underpinning their shared practice. I explain how the professional requirements of interacting with these musicians have provided a primary motivation for undertaking the research project.

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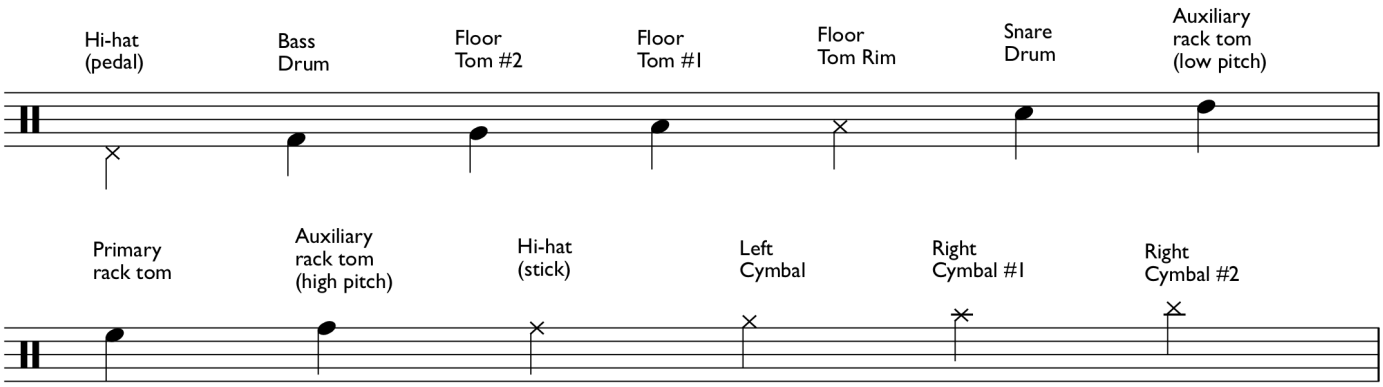
Drumset Notation Key



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The other musicians who are heard on the various audio excerpts I have included to contextualise my own practice - I am very lucky to have shared the stage with you all: Marc Hannaford, Samuel Pankhurst, Alistair McLean, Samuel Zerna, Joseph O'Connor, Marty Holoubek, Eugene Ball, James Macauley, Mick Meagher, Paul Williamson, Jamie Oehlers, Chris Hale, Andrea Keller, James Bowers, Ben Harrison, Tom Noonan, Kieran Hensey, and James Gilligan.

Chapter One
Introduction

1.1 Introductory comments

I bring to this research project the combination of knowledge and applied skill accumulated through fifteen years of study, and ten years of professional activity, as an improvising drummer. While I work freelance with numerous ensembles across a variety of genre or style designations, the majority of my creative work has taken place within the domain of contemporary or experimental forms of jazz. As a form of musical introduction, Audio 1.1, 1.2, 1.3, 1.4 and 1.5 present brief excerpts from a selection of recordings I am featured on, released by the Marc Hannaford Trio (*Sarcophile*, Marchon, 2013), All Talk (*A Shorthand of Sensation*, independent release, 2014), the Joe O'Connor Trio (*Praxis*, ABC Jazz, 2015), the Eugene Ball Quartet (*Hi(gh) Curious,* independent release, 2016), and the Paul Williamson Quintet (*Finding The Balance*, Jazzhead, 2017) respectively.

Audio 1.1. Excerpt from *Jack Hammaford* (M. Hannaford), released by The Marc Hannaford Trio

Audio 1.2. Excerpt from *Uhuru* (J. McLean), released by All Talk

Audio 1.3. Excerpt from *Lady Lachs Shinken* (J. O'Connor), released by the Joe O'Connor Trio

Audio 1.4. Excerpt from *Hi(gh) Curious* (E. Ball), released by the Eugene Ball Quartet

Audio 1.5. Excerpt from *Hook* (P. Williamson), released by the Paul Williamson Quintet

In 2010 I joined the trio of pianist Marc Hannaford. Hannaford's compositional and improvisational language, while cached within many conventions of contemporary jazz, featured complex rhythmic devices and structures beyond those I had previously encountered. Over the three-and-a-half year lifespan of the trio, I gained an awareness that these inventions were not purely Hannaford's, but rather his extension of the works of a lineage of Australian experimental improvisers, who themselves draw from a variety of sources including, but reaching far beyond, conventional American or European jazz. Chapter Two of this dissertation discusses this creative community at length, detailing primary artists, works, rhythmic char-

acteristics and musical aesthetics; for the purposes of this research, I have coined the term *Antripodean*[1] *Improvising* to describe their collective practice.

In the years following joining Hannaford's trio, this community became a significant influence on my personal practice, as I worked to develop an improvisational language compatible with the Antripodean aesthetics I identified. Whilst I did slowly progress in this area, I felt that I had trouble escaping from the broad conventions and aesthetics of jazz-style drumming that I had studied extensively through my youth.

A chance encounter with the research of Vijay Iyer, himself a musician/researcher, introduced me to the research field of Embodied Music Cogntion (1998, 2002). Various ideas of Iyer's resonated with my personal professional experience, in some cases providing theoretical explanation for phenomena I had discovered through practice and/or performance. As such, I saw potential for the research of Iyer and others within the field to provide new theoretical frameworks with which I could contexualise my own practice, in doing so revealing novel developmental processes with which to affect the realignment towards Antripodean aesthetics I was attempting. This research project spans three-and-a-half years of this realignment process, documenting both the theoretical frameworks I developed (through this dissertation) and the music stemming from this process (through accompanying recorded works).

Thus, this research examines the role of situated body motion within my own practice as an improvising drummer. I argue that body movements can be utilised to form both deliberate generative processes within solo drumset improvisation, and as a set of parameters through which to understand broader drumset practice. Following a self-developed practice-led methodology called *The Practice/Research Cycle*, I interweave drumset-situated experimentation with traditional academic analysis and theorisation, generating multi-modal research outputs including original recorded works, a taxonomy for classifying drumset-situated movement patterns, exegetical commentary on my own practice, and an analytical model.

These outcomes are communicated through mixed media, with this written document augmented by notation, diagrams, audio, and video. The ebook format allows for these diverse forms to be interwoven, enabling audio and video content to be situated within relevant passages of text; it is my hope that this format will make explicit the intimate connection between theory and practice fundamentally underpinning this research project.

1.2 Research methodology

1.2.1 Practice-led research and The Practice/Research Cycle

This research project has been conducted through a practice-led process, engaging with both academic research practices and my creative practice as an improvising drummer. My engagement with both traditional and non-traditional research practices is reflected in the multi-modal research outputs, comprising audio recordings, this written text, and numerous videos embedded within. More importantly, the interaction between creative and academic practice has been central to my method throughout the project, leading to many unforeseen, emergent outcomes.

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1 Named for *The Antripodean Collective*, an ensemble whose music epitomises this improvisational style. Note that the word Antripodean is portmanteau, combining "antipodean" and "trip".

Smith and Dean's *Practice-led Research, Research-led Practice - Towards the Iterative Cyclic Web* has been influential on my understanding of practice-led research as a reflexive research model (2009). The authors argue that just as "practice can result in research insights…, academic research can lead to creative practice", and coin the complementary term *research-led practice* for the latter process (2009, 2). Furthermore, they argue that these two processes should not be seen as separate, but as interacting, with potential for both to exist within the same research project (2009, 2). Their "iterative cyclic web" provides a flexible model of the possible interactions and pathways a researcher can take within (or across) projects, engaging in practice-led research, research-led practice and traditional academic research, with each stage providing different options for research output (2009, 19-25).

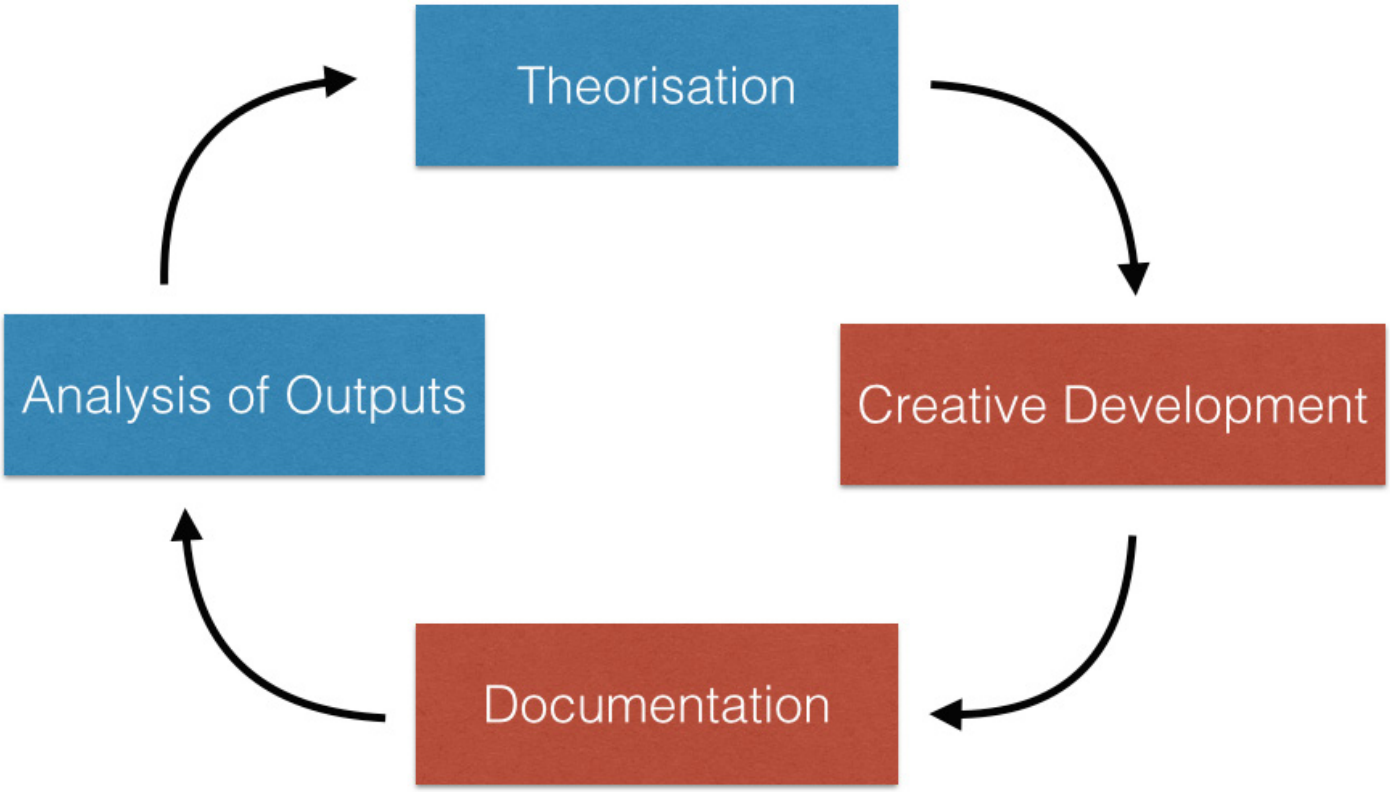
Mindful of this potential for reflexivity within the project, I approached this research period with what Haseman describes as an "enthusiasm of practice"; choosing to "dive in" and see what emerged rather than restrict the research scope so as to fit to established methodologies (2006, 3-4). Smith and Dean describe this approach as "process-driven", a way of working that has "no pre-conceived end" and is "directed towards emergence, that is the generation of ideas which were unforeseen at the beginning of the project" (2009, 23).

That is not to suggest that there was no initial focus to the research. Instead, a general framework was established that allowed for the emergence of knowledge when "processual logics and methods are followed as well as contradicted or undermined" (Haseman and Mafe 2009, 219). My opening research framework comprised three directions of activity and investigation: (1) to develop and record a series of solo drumset works, (2) to engage with academic literature regarding embodied music cognition, and explore potential applications of research findings to my creative practice, and (3) to document the recent history, musical techniques and aesthetics of my musical community.

Reviewing the final outcome of this project shows that these three elements all inform the final text, with the weighting between the three areas having shifted throughout the research timespan. In particular, the emergent theory of somatic parameter layering (explored in Chapter Four), and the related analytical model (explored in Chapter Five), necessitated that a greater portion of the text be allocated to exploring the application of embodied music cognition theory than I had initially expected, requiring a commensurate reduction in text regarding my musical community. However, I consider the emergence of such theory to be a clear positive example of the creative potential of process-driven research such as this project.

Throughout the research project, the steps undertaken followed a similarly emergent path: an interesting observation from a research paper may have inspired me to attempt something within my own practice, or an observation upon listening back to recordings I made may have planted the seed of a generalisable theory which I then developed. Towards the end of the research period, lasting almost four years, I was able to retrospectively chart the critical phases within the project. Considering my research in this way, I noticed certain phases seemed to share similar attributes, and align with one of four general processes: *theorisation, creative development, documentation,* or *analysis of outputs.* Furthermore, when viewed chronologically, these processes followed each other in a regular order. These observations led to my conception of *The Practice/Research Cycle*, shown in Figure 1.1.

Figure 1.1. *The Practice/Research Cycle*



The practice/research cycle arranges the four phases I observed within my research project, which combine in a repeating pattern. Two of the phases, *analysis of outputs* and *theorisation*, are academic processes (presented in blue), while the other two, *creative development* and *documentation*, are creative practice processes (presented in red). Progressing through the cycle, the outcome of each phase directly leads into the next phase: the theories developed or gathered in the theorisation phase will direct the creative practice of the creative development phase; the works emerging from the creative development phase will be documented in the documentation phase; the works or texts produced from the documentation phase will be analysed in the analysis of outputs phase; the insights gained through the analysis of outputs phase will lead the creation of new theory in the theorisation phase; and so forth.

Although I developed the cycle out of reflection upon my own research project, I hope that it can be useful as a research model for others engaging with process-driven, practice-led research. I anticipate a given research project will comprise at least one full cycle, but there is no set length. Furthermore, while the order is fixed, the start and end points are flexible. My own research project comprises two full passes of the cycle, beginning with theorisation and finishing with analysis of outputs. While the outcome of each phase feeds into the next phase, there is also potential for discrete research outputs at each phase.

Theorisation

The theorisation phase comprises processes such as the development of new theory, the testing of new theoretical models, or the gathering of theory from existing literature. When completed within a loop of the cycle (rather than at the beginning of a research project), I anticipate that this theory will arise from the preceding analysis of outputs. Potential research outputs from this phase include original theoretical models and analysis arising from their application.

Creative Development

The creative development phase comprises any of the multitude of processes practitioner-researchers use in the development or creation of their works. Within this project, being directed towards the development of musical works, the major developmental process was at-instrument practice. When completed within a loop of the cycle, I anticipate that these processes will be informed or directed by the theories developed or gathered in the previous theorisation phase. Potential research outputs from this phase include developmental methodologies.

Documentation

The documentation phase comprises processes by which creative practice is documented, producing research data for analysis. In many cases, this will be the point at which creative ideas are corralled into discrete creative works or texts, however this is not essential so long as data is produced. Within this project, the documentation phase comprised two data-gathering recording sessions, collecting both audio and visual data. Potential research outputs from this phase are the creative works themselves.

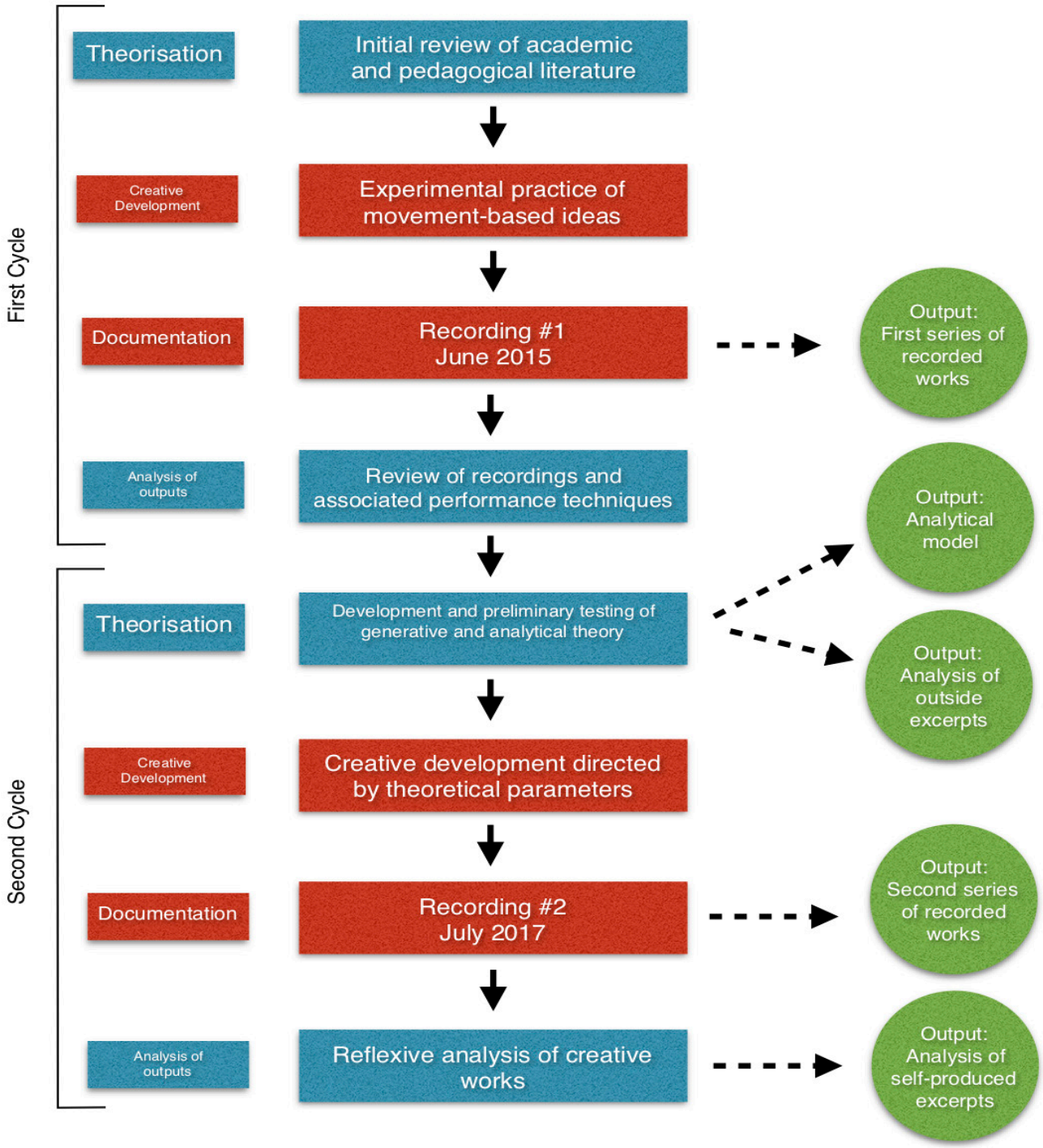
Analysis of outputs

The analysis of outputs phase comprises any process by which outputs of creative practice are analysed or otherwise reflected upon. Within this project, the analysis of outputs phase comprised both rigorous analysis of data produced from the aforementioned recording sessions, and personal reflection upon my experience of developing and documenting the creative works. Analytical insights are the primary research output of this phase.

1.2.2 The Practice/Research Cycle within this research project

Figure 1.2 shows the chronological structure of this research project. The centre column describes each of the key research phases, moving chronologically from top to bottom. To the left of each phase is the general phase (of the practice/research loop) to which that activity aligns; to the far left are brackets delineating the first and second pass of the cycle. To the right, each discrete research output is noted, linked to the research phase from which it emerged.

Figure 1.2. Chronological structure of research project



This project began with a theorisation phase, comprising an initial review of academic and pedagogical literature, through which I gathered theory, rather than developed my own. The initial review was purposefully broad, however due to my prior professional knowledge of many pedagogical texts, I was primarily focused on academic research at this point.

I then undertook a period of creative development, during which I pursued experimental practice of movement-based ideas. At this time I was inspired by texts I encountered in the previous phase (particularly the writing of Iyer (1998/2002) and Bailey & Driver (1992), and the pedagogical resources of Weiss (2013)) to explore movement as a primary generative process for musical ideas. The practice here was experimental, by which I mean largely process-driven, pursuing ideas with no particular aim. As this progressed, I began to isolate musical ideas that interested me, and build pieces around them.

This led directly to a point of documentation, which was a single day recording session in June 2015. This session produced audio recordings of all the pieces I had developed thus far, plus a series of improvisations. Audio recordings of *Boubacar*, *(you never did) The Kenosha Kid*, *Rolling Chant*, and *Code Switch*, which were produced at this time, are embedded in Chapter Four of this ebook.

The production of these outputs then led to a period of analysis, which took the form of a review of recordings and associated performance techniques. By 'associated performance techniques' I am referring to both the physical techniques underpinning movement-based ideas, and the improvisational strategies I developed to manipulate movement-based ideas in performance. Through reviewing these techniques (in light of my embodied experience performing them) I observed similarities between types and combinations of movements which produced seemingly disparate results (as documented in the recordings produced). These initial observations were varied, such as noting that circular movements felt different to perform than linear movements; or that I often tended to combine movement cycles such that my right hand followed a clockwise trajectory while my left hand followed an anticlockwise trajectory.

These observations led me to a second phase of theorisation. Combining and extending the disparate observations of the previous phase led to the development of a taxonomy for types of movement cycles and possible combinations. Integrating this with other theory (relating to the pedagogical conception of sticking cells) led to the development of an original generative process (somatic parameter layering) and an analytical model, which I then applied to a selection of excerpts (taken from the work of other drummers) to test.

These theoretical developments functioned to codify the variable parameters of sticking cells and movement cycles, which in turn suggested potential patterns and combinations that I had not yet creatively explored; applying these ideas to the drumset began a second period of creative development which was consciously directed by these parameters. While still process-driven, the creative materials for this period were much more clearly defined, and led to the second set of solo works.

Again, the creative development phase led directly to a point of documentation, also taking the form of a single day recording session, this time in July 2017. Outputs from this recording include audio recordings of the pieces *Oscillator* and *Isolator* (included in Chapter Four), and the 'top-down' demonstrational video excerpts embedded throughout this ebook.

Finally, I undertook a second phase of analysing outputs. In this case, I reflexively examined excerpts taken from my own creative works. During this period I codified the improvisational strategies utilised in applying somatic parameter layering. In some instances this was simply developing the language with which to describe my deliberate process; in others I analysed improvisational excerpts, revealing to myself embodied processes that occured subconsciously.

1.3 Chapter summaries

Chapter one will conclude with an annotated glossary, defining specialised terminology used throughout this thesis.

Chapter two situates my creative practice within a community of contemporary Australian improvising musicians, who have collectively created an idiosyncratic style of improvisation. Drawing on George Lewis' hermeneutic classifiers of "Afrological" and "Eurological" improvisational logic (1996), I construct a similarly structured definition of *Antripodean Improvising*, combining specific musical traits with overarching aesthetics. I then conduct an "artistic audit" (Haseman, 2006) identifying the style's primary artists (such as Phil Treloar, Mark Simmonds, Scott Tinkler, Simon Barker, John Rodgers, Ken Edie and Marc Hannaford) and surveying their works. This audit intertwines audio excerpts, interviews, academic literature, analysis and personal observation to document the development of the style from a form of experimental jazz to a unique local practice; particular attention is paid to the complex shared rhythmic language developed by the involved artists. I finish by situating my own creative practice within this lineage.

Chapter three documents my process of recontextualising theory from the research field of embodied music cognition, in order to transform my physical relationship to the drumset. Specifically, I draw two correlations between research findings and my instrumental practice. The first draws upon Joti Rockwell's study of bluegrass banjo music (2009), in which he connects primary picking patterns to rhythmic figures characteristic of the style. I correlate this with the pedagogical concept of sticking cells, examine some extant sticking systems, and document my process of developing personal sticking cells encoded with Antripodean rhythmic forms.

The second draws upon Bailey and Driver's theorisation of "motor structures", being the physical positions and patterns of movement specific to the performance of a given style (1992); applying this theory to my own practice, I identify motor structures implicit in my own improvisational practice. Drawing upon the developmental exercises of contemporary American jazz drummer Dan Weiss (2013), which foreground physical motion as the primary variable, I develop the concept of *movement cycles*, being the pattern of motions undertaken in sounding a repeating series of hit points on the drumset. I conclude the chapter by outlining a taxonomy for classifying movement cycles and their constituent features.

In **Chapter four** I outline the real-time generative process of *somatic parameter layering*, wherein I combine sticking cells and movement cycles as interacting variable parameters to create musical outputs I term *physically-generated isorhythms*. After unpacking this process, I detail how I have used somatic parameter layering to create the recorded solo works accompanying this thesis. Specifically, I intertwine audio, video and analysis of illustrative excerpts from a range of works to reveal five distinct strategies of implementing somatic parameter layering: *Hide / Reveal, Modulation Obfuscation, Unison / Interlace, Fragmentation* and *Expansion / Contraction*.

In **Chapter five** I repurpose the variable parameters of somatic parameter layering - sticking cells and movement cycles - to form an analytical model through which to investigate contemporary drumming practice. An excerpt from a video recording of contemporary American jazz drummer Bill Stewart is then examined through the model. This analysis reveals how a variety of musical characteristics (such as phrase construction and motivic development) could be attributed to variation of situated, embodied parameters (that is, movement cycles and sticking cells) rather than conscious audiation.

1.4 Glossary

Antripodean

As defined within this text, Antripodean Improvising is a unique mode of improvisational music making, practiced by a small collective of contemporary Australian improvisers. The primary characteristics of their shared style are:

- A predilection to foreground rhythm as a primary element of musical manipulation within improvisation;
- A highly developed, shared, rhythmic language, combining a nondiscriminatory approach to subdivision with fluent control of number grouping sequences;
- An aesthetic tendency towards obfuscation; manifestations of which include frequently eliding musical pulse and a general avoidance of unified musical activity;
- The combination of influence from many musical cultures, including Jazz, 20th century classical, Indian Carnatic and Korean shamanic music, wherein overt stylistic reference is avoided in favour of repurposing procedural knowledge, and;
- A democratic approach to improvisation, in which all ensemble members are expected to contribute equally, thereby eschewing any sort of soloist/accompanist duality.

Thereby, anything identified as Antripodean is related to this style.

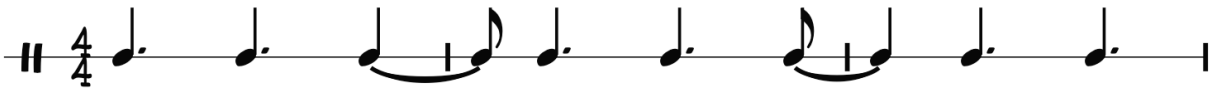
Concomitant Rhythm

A concomitant rhythm is the rhythm produced by the attacks of a single-hand, within a two part sticking cell.

Cross-Rhythmic Cycle

A cross-rhythmic cycle is formed by a consistent pulse moving at a different rate of speed than the underlying, metrical pulse. For example, a consistent dotted-crotchet pulse in 4/4 meter creates a three-bar cross-rhythmic cycle (Figure 1.3).

Figure 1.3. Dotted-crotchet cross-rhythmic cycle



Double Strokes

Drum strokes performed with a repeating hand-order sequence of two-strokes with one hand, followed by two strokes with the alternate hand, and repeated.

Drag

An ornamented type of drum stroke, where the main stroke is preceded by two grace notes, sounded by the alternate hand.

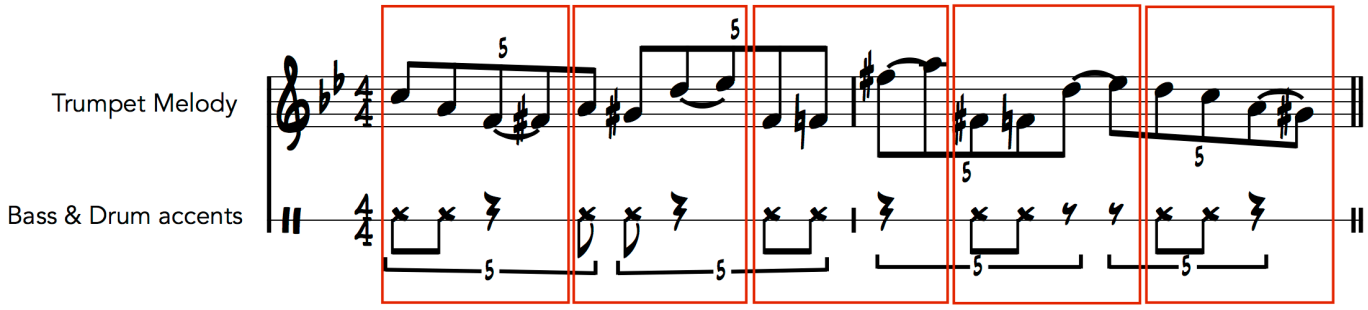
Flam

An ornamented type of drum stroke, where the main stroke is preceded by a grace note, sounded by the alternate hand.

Grouping

Within this dissertation, grouping refers to a specific process wherein rhythmic activity is by numerically-formed "groups" of a consistent subdivision. Figure 1.4. shows a melodic phrase organised to articulate a four-quintuplet grouping pattern.

Figure 1.4. Example of grouping



Hit-point

Hit points are the elements of the drumset that are struck to make sounds. The most common form of a hit point is a cymbal or the skin of a drum, but can be any sound source with a unique spatial location.

Movement Cycle

An *individual* movement cycle is the pattern of motions undertaken in sounding a repeating series of hit points with one hand. A *combined* movement cycle is the pattern of motions undertaken as the right and left-hands simultaneously sound individual movement cycles.

See Chapter Three for a taxonomy for classifying both individual and combined movement cycles.

Movement Span

The timespan between two rhythmic attacks during which the physical motion of the hand from one hit point to another is executed

Number Grouping

See *Grouping*

Physically-Generated Isorhythm (PGI)

The musical output of somatic parameter layering.

Rhythm Cycle/Rhythmic Key

A repeated rhythmic figure around which other composition or improvised rhythms are organised. The rhythm cycle or rhythmic key itself is usually left unstated.

Single Strokes

Drum strokes performed with a repeating hand-order sequence of one stroke with the right-hand, followed by one stroke with the left-hand, and repeated. Single strokes is the widespread pedagogical term of this pattern; within this text I use this term interchangeably with *interlaced strokes* or *alternating strokes* as context dictates.

Somatic Parameter Layering

The generative process of applying a sticking cell to a movement cycle to generate a musical ouput (known as a physically-generated isorhythm).

Sticking Cell

A short combination of drum strokes, wherein a hand order sequence is aligned to a fixed rhythmic form.

Chapter Two
Antripodean Improvising

2.1 Situating the research

This research is situated within an emerging tradition of practitioner-researchers engaging with a source of outside knowledge in order to direct and transform their creative practice. When this field is delimited to only improvising musicians such as myself, the source of outside knowledge is primarily drawn from alternative musical traditions, such as contemporary Western art music (Hannaford 2012, Lehman 2012, O'Connor 2016) or traditional Korean music (Barker 2010, 2015). My research utilises an academic field - embodied music cognition - as this source of outside knowledge.

Given the nature of this kind of research - engaging with both practice-led and research-led processes, and embodying the emergent knowledge in multimodal outputs (in this case text, audio, and video content) - it is perhaps unsurprising that the theoretical footprint of the work intersects multiple fields of knowledge, from within and outside academia. This research has been informed and shaped by knowledge from three sources. The first is the aforementioned academic field of embodied music cognition; the second is the broad array of academic, pedagogical and informal resources regarding the drumset and its practice that I have engaged with throughout my fifteen years as a drummer. I will return to address these areas in Chapter Three.

The third field is the creative community of musicians within which my artistic practice exists and occurs. More specifically, underlying every part of this research project is the indelible influence of a community of interacting musicians that engage in what I have termed *Antripodean Improvising*. This small group of contemporary Australian musicians, who are usually associated with the experimental fringes of jazz and contemporary classical music, have communally developed a shared improvisational practice that is both unique and uncompromising. Developing and decoding the skills and aesthetic to become an active member of this community forms the artistic undercurrent of this research.

2.2 Previous research pertaining to Antripodean improvising

To my knowledge this is the first research to theorise of Antripodean musicians as practitioners of a unique mode of improvisatory music making, rather than caching these artists within a broader field such as Australian jazz or improvised music. The body of written resources relevant to this music is not extensive, which is likely due to the recency of these works (most being from the last quarter-century) and their avant-garde qualities. The relevant literature can be split into two categories: academic writing by local performer-researchers; and non-academic writing by local critics, which take a variety of forms including reviews, profiles, interviews, or a mixture of the three.

To first address the academic texts, one benefit of the recent time-frame in which Antripodean improvising has established itself is the overlap with a growing movement of jazz musicians-cum-researchers in Australia, enabled by the growing acceptance of practice-led research within academic circles. As such, there are two sources written by members of the Antripodean community, namely drummer Simon

Barker and pianist Marc Hannaford, both of which detail core methods and motivations of their individual creative practice.

Barker's book *Korea and the Western Drumset: Scattering Rhythms* (2015) documents his adaptation of aspects of traditional Korean music to his own practice as an improviser within a contemporary Western setting. He details the personal rhythmic devices and processes he has developed for use in improvisational and solo performance settings. Of particular interest are the recurring use of odd-subdivision and numerical grouping sequences, which form part of the broader Antripodean rhythmic language (see Barker 2015, 16-18, 62-65, 94). Also notable is that Barker directly links his motivations for pursuing the creative research project in part to the challenge of performing with other Antripodean artists, namely Mark Simmonds and Scott Tinkler[1] (Barker 2015, 12-19).

Pianist Marc Hannaford's masters thesis, entitled *Elliott Carter's Rhythmic Language: A Framework for Improvisation* (2012), details Hannaford's process of analysing Carter's composition *90+*, identifying core rhythmic devices within it, and adapting those devices to a personal improvisational language and improvisation-enabling compositions. Similarly to Barker, Hannaford directly ties his motivation for the project to his creative interaction with other Antripodean artists, namely John Rodgers, Ken Edie and Scott Tinkler[2] (Hannaford 2012, 1). Hannaford's work provides a case study of taking influence from an outside source (in this case Carter's compositional language) and adapting it for improvisation within local aesthetics. Hannaford also provides definitions for many of the more complex polyrhythmic devices present in his music, some of which are used within this project (Hannaford 2012, 9-17).

Other academic resources come from performer-researchers active within the wider Australian jazz and research community. Andrew Fiddes' masters thesis provides transcriptions and analyses of excerpts drawn from trumpeter Scott Tinkler's compositions and improvised solos during the mid-late 1990's (Fiddes 2016). Fiddes' analyses draw heavily from the theory of Henry Cowell (Fiddes 2016, 5,-6, 10-15), which leads him to frequently analyse polyrhythmic melodic phrases within Tinkler's solos as imposed metric modulations (See Fiddes 2016, 26, 28, 26). While this may be a faithful application of existing rhythmic theory to Fiddes' transcriptions, I find this interpretation inconsistent with my professional experience interacting with Tinkler, whom I have found to be remarkably aware of the underlying beat at all moments, and the relationship of a polyrhythmic melodic phrase to it. Instead, through this chapter I am striving to explicate something closer to the rhythmic paradigms and processes in use by Antripodean artists such as Tinkler, so as to accurately communicate the creative processes used in the making of the music, rather than just recorded results. Nevertheless, Fiddes' research provides significant raw data showing the use of advanced rhythmic devices - such as polyrhythms, numerical grouping sequences, and odd subdivisions - in Tinkler's music.

Similar to Fiddes is the research of Jason Morphett, who addresses the rhythmic devices utilised within the music of saxophonist/composer Mark Simmonds (2010). Morphett draws heavily on interviews conducted with Simmonds to establish definitions of rhythmic principles such as pivot points (12), rhythm cycles (14-25) and velocity (26-27), which then form the theoretical model through which he analyses Simmonds' compositions. Due to this process, Morphett provides not only analysis of an essential Antri-

1 The drumset-specific elements of Barker's book have also been influential on this research, and will be addressed in Chapter Three as the focus turns to my own practice as a fellow drummer.

2 The quartet of Hannaford, Rodgers, Edie and Tinkler forms the Antripodean Collective, the ensemble for which I have named the style.

podean antecedent, but also valid insight into the artistic processes, values, and paradigms underpinning the work.

Lucas O'Neill's masters thesis also examines the work of another Australian artist, in this case percussionist Greg Sheehan (O'Neill 2013). While Sheehan is not one of the core Antripodean artists identified in this text, he is one of a number of closely related and regularly interacting musicians within the broader Australian musical community[3]. O'Neill's analysis of Sheehan's work documents his extensive use of numerical grouping sequences as a compositional device, to the extent of numerical grouping being the primary method of rhythmic organisation in these pieces (O'Neill 2013, 8-17). O'Neill also documents Sheehan's use of number diamonds, a method of organising permutations of a number series created by Sheehan himself (2013, 13). Number diamonds have become an important procedural resource of the Antripodean community, both as a compositional device (O'Neill 2013, 14-16), and as a pedagogical resource for developing grouping series derived improvisational skills (Barker 2015, 64-65, 67, 94, 100).

Notably, Fiddes, Morphett, and O'Neill all choose to foreground rhythm as the primary area of interest within their respective studies. As all three are practitioner-researchers, this suggests that idiosyncratic rhythmic practices of Tinkler, Simmonds, and Sheehan are both recognised and valued by other musicians.

Finally, Jeremy Rose takes a broader focus, arguing that the influence of "Oz Rock" of the 1970's and 1980's, and a conscious effort to engage with Asian musical cultures, are two forces creating an indigenous style of jazz in the Sydney jazz scene (Rose 2016). Rose particularly cites Barker's deep engagement with Korean musical forms as an example of a Sydney-based musician engaging deeply with an Asian, non-Western, musical culture, and the influence of that engagement upon their own music (Rose 2016, 42-43). Personally, I find Rose's arguments for the influence "Oz Rock" to be more persuasive, as it is plausible that the then-popular music would have had an influence on the generation of musicians who grew up surrounded by it; whilst his claims for a community-wide engagement with non-Western musical cultures rests too heavily on the rather exceptional case study of Barker's own creative (and research) journey, with no statistics or other examples to support this as a widespread influence. Furthermore, Rose's interest in theorising the broad forces affecting a large group of musicians only aligned by location (Sydney) and genre (jazz) can provide an illuminative counterpoint for my own research, which aims to focus on the specifics of a small group of musicians clearly aligned by their documented collaborations, specific musical devices and shared aesthetics.

Shifting focus to non-academic texts, the most frequently recurring author is Sydney-based jazz critic John Shand. Shand's most relevant contribution is his book *Jazz: The Australian Accent*, which profiles and interviews seventeen significant Australian jazz musicians, amongst them Antripodean artists Phil Treloar, Mark Simmonds, Scott Tinkler and Simon Barker (Shand 2009). Shand's writing here intertwines history, commentary and interview, and frequently includes extended quotes from the musicians providing specific musical details in a way that is admirable for a non-academic text. In addition to this, Shand has written profiles of Antripodean artists for magazines (see Shand, 1994a), and has frequently reviewed albums or performances by Antripodean artists (Shand 1994b, 1994c, 2008, 2010, 2011).

The other regular reviewer of Antripodean artists is another Sydney-based jazz critic, John Clare (see Clare 2007, 2008). Clare also authored an important book, entitled *Bodgie Dada & The Cult of Cool*, de-

3 In Sheehan's case, he is noted to have been a one-time member of Mark Simmonds' Freeboppers, and collaborated with Scott Tinkler in the group F.A.T.S. in the early 2000's (Fiddes 2016, 18-19)

tailing the history of modern Australian jazz from 1945 until the mid-1990s, when the book was written (Clare and Brennan[4], 1995). However, due to the time period covered, and the broad historical style of the book, it does not provide much detail regarding the activity at the centre of this research.

Another invaluable source of non-academic writing is the short-lived journal *Extempore*, which published five editions spanning November 2008 to November 2010. *Extempore*'s content incorporated a range of forms, including long-form interviews with musicians, photography, fiction, poetry, book reviews and essays, all of which orbited in some way the central theme of jazz within the then-current Australian music scene. Of particular interest to this research are the long-form interviews conducted with trumpeter Scott Tinkler (Jackson 2009) and violinist John Rodgers (Neil 2010). In both cases these are the most extensive interviews with the artist available in print, and both took place during the period of time most relevant to this research.

2.3 Developing a framework to define Antripodean Improvisation

As noted, the characteristics of Antripodean Improvisation have not previously been defined or delimited. Furthermore, the relationship of these artists and their musical works is found in a complex mix of shared improvisational processes and aesthetic considerations encoded within their works, rather than shared extramusical qualities (such as geographic location) that are inherently simpler to communicate and understand (cf. Rose 2016). In seeking to define the Antripodean style within which I situate my practice, I have found George E. Lewis' theoretical framework of "systems of improvisative musicality" to be an invaluable reference (Lewis 1996, 92-93).

In his influential essay *Improvised Music after 1950: Afrological and Eurological Perspectives*, Lewis aims to "historically and philosophically deconstruct aspects of the musical belief systems" underpinning the work of various improvising artists and communities (Lewis 1996, 92-93). In order to do this, Lewis constructs twin hermeneutic classifiers - the "Afrological" and "Eurological" of the essay's title - with which to examine two distinct "systems of improvisative musicality" emerging in America during the post-war era (Lewis 1996, 92-93). To further clarify the meaning of these classifiers, Lewis chooses to examine an exemplary artist of each tradition, namely Charlie "Bird" Parker for the Afrological, and John Cage for the Eurological classification. Whilst the connection to these artists (and the obvious cultural connotations of the terms Afrological and Eurological) seems to link Afrological to jazz or bebop, and Eurological to indeterminist or aleatoric traditions, Lewis is clear that he is aiming to delve deeper than superficial signifiers of music style, and instead examine deeply held approaches to improvisatory music-making influenced by extra-musical factors such as race, class, politics and philosophy (Lewis 1996, 92-94).

Through the essay, Lewis constructs profiles of Afrological and Eurological improvisation by contrasting the values of those communities on various musical-philosophical issues; and in doing so linking extra-musical factors to specific musical outcomes. Summarising Lewis' arguments, distinct profiles of the two systems can be assembled[5], wherein:

Afrological improvisation:

4 While Bodgie Dada's authorship is attributed to John Clare and Gail Brennan, "Gail Brennan" was in fact a pseudonym used regularly by Clare at the time. Nevertheless, whilst the book was written by Clare alone, I have decided to reference both Clare and Brennan in the interest of clarity.

5 Please note the characteristics listed here are intended only an illustrative selection of those argued by Lewis, rather than an exhaustive list of those contained in the essay.

- is intrinsically linked to the expression of the performer's personality, with an emphasis on personal narrative (Lewis 1996, 110-111),
- is inherently non-conformist, and in doing so is a musical expression of the African-American social experience (Lewis 1996, 94-95),
- is concerned with spontaneity within the scope of an entire song or performance (Lewis 1996, 107-108), and,
- believes improvisational freedom is only possible through discipline (Lewis 1996, 114),

Whilst Eurological improvisation:

- aims to remove the performer from the performance, idealising sounds "divorced from social or cultural implications" (Lewis 1996, 119),
- challenges the conventional boundaries of composition within the Western tradition, but does so whilst staying within the broader cultural framework (Lewis 1996, 96),
- is concerned with spontaneity within the individual moment, strongly emphasising ephemerality (Lewis 1996, 107-108), and,
- regularly applies external structures to improvisation, as a means to maintain musical coherence (Lewis 1996, 115-116).

Lewis' classifications have been influential upon younger generations of researchers and musicians, such as saxophonist/composer Stephen Lehman, who uses Afrological improvisation as a means to situate his own creative practice (Lehman 2012, 3-4). Lehman's construction of Afrological improvisation expands on Lewis' to also include other, more specifically musical, elements, such as: a salient, metronomic, sense of musical pulse; frequent use of polyrhythmic or syncopated rhythms; a "percussive approach to instrumental practice", and; a heterogenous approach to instrumental timbre within ensembles (Lehman 2012, 3-4).

Combining the theory of Lewis and Lehman, Afrological improvisation can now be understood as a particular mode of improvisational musical practice, defined by a series of philosophical values, aesthetic tendencies and musical qualities that are fundamentally intertwined. It carries value both as a framework through which to interpret and analyse other's works (as used by Lewis), and as a self-identifiable creative location (as used by Lehman).

Returning to my own research, I aim here to construct a theory of Antripodean improvisation in the same mould as has been developed for Afrological improvisation. That is, by using the term Antripodean I am identifying a particular mode of improvisational music making, delimited by it's own unique set of philosophies, aesthetics, and musical techniques. I consider the primary characteristics through which Antripodean Improvising is constructed to be:

- A predilection to foreground rhythm as a primary element of musical manipulation within improvisation;
- A highly developed, shared, rhythmic language, combining a nondiscriminatory approach to subdivision with fluent control of number grouping sequences;
- An aesthetic tendency towards obfuscation; manifestations of which include frequently eliding musical pulse and a general avoidance of unified musical activity;
- The combination of influence from many musical cultures, including Jazz, 20th century classical, Indian Carnatic and Korean shamanic music, wherein overt stylistic reference is avoided in favour of repurposing procedural knowledge, and;

- A democratic approach to improvisation, in which all ensemble members are expected to contribute equally, thereby eschewing any sort of soloist/accompanist duality.

To clarify, these qualities are not binary identifiers such that any work featuring them is Antripodean and any work without is not; instead they form a complexly interacting system such that any Antripodean work will embody most of these characteristics, but will rarely embody all of them. Likewise, many works of other styles can be found that contain some of these characteristics, but rarely more than one or two simultaneously.

2.4 An artistic audit of Antripodean Improvising

Haseman defines an artistic audit as a transformation of the traditional literature review, that provides "layered and rich analysis of the contexts of practice within which the performative researcher operates" (2006, 8). I will here undertake such an artistic audit of Antripodean Improvising, my intention being to delimit the core artists comprising the Antripodean community, review their primary recorded works, and provide evidence - through short recorded excerpts and analysis thereof - for the defining characteristics of the style listed in the previous subchapter. In doing so, this will not only situate my own recorded works within an aural tradition, but also explicate the aesthetic forces indelibly shaping my creative choices throughout the research process.

2.4.1 Antecedents

Whilst not superficially resembling later Antripodean stylings, the music of drummer/percussionist/composer Phil Treloar (born Sydney, 1946) set in motion many of the creative pathways developed by later Antripodean artists (Shand 2009). Of particular relevance to this research is Treloar's work during the period from the mid-1970s to the early 1990s[6], during which time he led or co-led influential ensembles in the Australian Art Ensemble (*Trio '79*, Feeling To Thought, Ft-009, 2011) and Feeling To Thought (*Primal Communication*, Feeling To Thought, Ft-010, 2012)[7].

One of Treloar's major innovations (within the Australian community of jazz and improvised music) was the study of, and then incorporation of, rhythmic techniques found in Indian classical music. In 1984 Treloar spent six months in India, which he states was spent studying the Khayal vocal music of Northern India and singing "rhythmic complexes" with tablaist Shafat Ahmed Khan (Treloar 2010, 89). Upon Treloar's return to Australia he began incorporating this influence into his own music, an example of which can be heard in the composition *Shades of Bhairav* (*Beyond El Rocco*, Vox Australia, VAST017-2, 1993).

Shades of Bhairav is performed by Treloar's ensemble Feeling To Thought, featuring tenor saxophonist Mark Simmonds, alto saxophonist Dave Ades, bassist Steve Elphick and Treloar on drumset (Shand 2009, 74). Following a double bass introduction, the piece settles into a repetitive 14-beat rhythmic cycle, which continues unbroken for the remaining fifteen minutes of the piece. Treloar describes the 14-beat

6 In the early 1990's Treloar moved from Australia to Kanazawa, Japan, where he still lives. During this period he has continued his creative practice, primarily focused his energy on composition rather than performance. What performing he has done in this time has mostly been as a marimbist, rarely playing drumset. Furthermore, his work (as both a performer and composer) over this period departed heavily from his work in the 70's-80's, eschewing all links stylistic links to jazz and generally avoiding any sense of rigid pulse or meter.

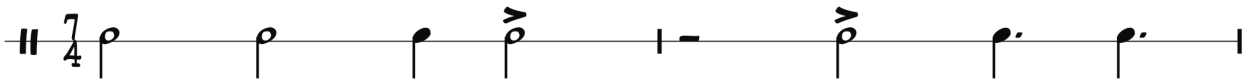
7 Note that the release dates for both of these albums are decades later than their recording; *Trio '79* was recored in 1979 but released in 2011, whilst *Primal Communication* was recorded in 1988-89 but released in 2012.

cycle as being organised so that:

> *"Each half of the 14 is divided into four and three beats respectively, but the 'three' of the first block has a stress on the second beat, whereas the three of the second block of seven it is divided into two dotted crotchets as stressed, and in addition, a polyrhythm of 4:3, creating tension for the downbeat of each new cycle. Further to this, the four-beat section of the second block of seven has a stress on the second minim. Thus, across the 14-beat cycle is a layer of offset stresses."* (Treloar as quoted in Shand 2009, 74)

Figure 2.1 presents a notated representation of this layer of stresses - henceforth a "rhythm cycle" - produced from Treloar's description. As Treloar described the 14-beat cycle as split into halves, I have notated this cycle as two bars of seven beats each.

Figure 2.1. Rhythm cycle from *Shades of Bhairav*



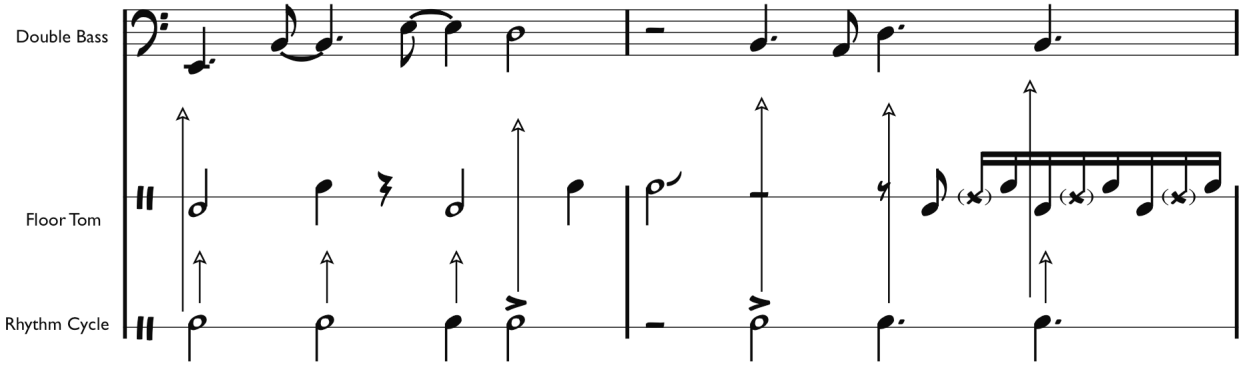
This rhythm cycle forms the framework for two recurring ostinati. One is a double bass melody, which Elphick loosely maintains for the entirety of the piece[8]. The second is performed by Treloar solely on the floor tom, and while not maintained strictly, is frequently returned to throughout the piece. The two ostinato can be heard in Audio 2.1, and their relationship to the underlying rhythm cycle is shown in Figure 2.2[9].

8 With the exception of the opening fifty seconds, which are an unaccompanied solo bass improvisation.

9 Through this figure Treloar sounds the floor tom using a mallet held in his right hand; on some strikes he also rests his (empty) left hand against the head. By using this technique Treloar is able to produce two distinct tones from the floor tom - a open/low tone, when the drum is struck with the mallet and the left hand is raised, and a high/muted tone, when the drum is struck and the left hand is resting on the drum head. Also of note is the upward pitch bend occurring on the first beat of the second measure; Treloar produces this effect by pushing into the head with a single finger of the left hand. These techniques can be observed in the video footage of the recording of *Shades of Bhairav*, which is available at the following link: https://www.youtube.com/watch?v=Ubyh43icT5w (accessed December 1st, 2017).

Audio 2.1. Excerpt from *Shades of Bhairav*

Figure 2.2. Relationship between ostinatos and underlying rhythm cycle in *Shades of Bhairav*



Each stress of the rhythm cycle aligns with at least one of the two ostinati, but neither individual ostinato completely adheres to the rhythm cycle. Rather, the rhythm of each ostinato independently shifts in and out of alignment with the underlying cycle, creating an interacting composite form. This is perhaps an early example of the Antripodean tendency towards obfuscation; as the rhythmic pattern that Treloar himself identifies as underpinning the composition shapes both of these ostinato, but is never explicitly stated.

A close musical ally of Treloar's was saxophonist Mark Simmonds (born Christchurch, 1955). As well as performing together in Treloar's Feeling to Thought, the Australian Art Ensemble, and other groups (see Shand 2009, 69), Treloar and Simmonds worked together extensively behind the scenes, including intensive rehearsals and shared practice sessions. Treloar notes that they would "spend hours together patiently working through difficult metric and polyrhythmic materials so as to access in performance the greatest freedom and spontaneity the music would allow for" (Shand 2009, 87). Whilst Simmonds was undoubtedly his own artist, it is clear that their was a strong transfer of ideas between the two, and evident in Simmond's work are traces of Treloar's techniques and philosophies.

For many years Simmonds' primary focus was his group, the Mark Simmonds' Freeboppers, which existed from the early 1980s until 1996[10], and featured a regularly changing group of sidemen through that period (Shand 2009, 88-94). Despite their longevity, the group only produced one album, *Fire* (Birdland Recordings, BL0002, 1994), featuring an acoustic quartet lineup of Simmonds (tenor saxophone), Scott Tinkler (trumpet), Steve Elphick (doubles bass) and Simon Barker (drums).

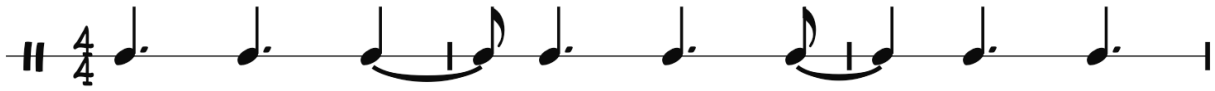
A compositional device found in many of Simmonds pieces is his use of rhythmic keys, which not only inform the composed material but also "forms the underlying rhythmic framework for ensemble improvisation" by offering a "series of rhythmic stresses that may be considered rhythmic cadence points" (Barker 2015, 14). This concept is perhaps influenced by Simmonds experience performing works of Treloar's such as *Shades of Bhairav*. Simmonds' rhythmic keys were derived from cross-rhythmic cycles[11] (Barker 2015, 14), which he utilised to give the effect of polymeter (being "the coexistence of more than one time signature") (Morphett 2010, 19).

10 At which point Simmonds ceased performing for personal reasons (Shand 2009, 84, 93-94)

11 Simmonds himself simply called these "rhythm cycles", but I will refer to them here as cross-rhythmic cycles for clarity.

One example of a rhythmic key is found in Simmonds composition *The Spotted Dog*, from *Fire*. The rhythmic key is derived from a cross-rhythmic cycle of repeated dotted crotchets within a 4/4 meter. The unbroken cross-rhythmic cycle of dotted crotchets forms a three bar pattern (Figure 2.3).

Figure 2.3. Dotted crotchet cross-rhythmic cycle

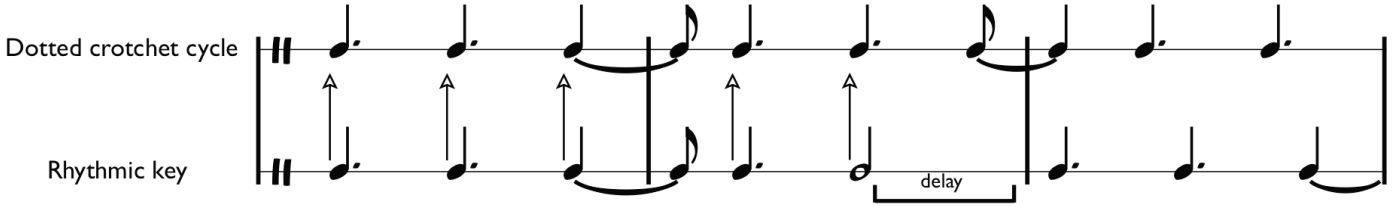


The rhythmic key of *The Spotted Dog* features an abbreviated form of this cycle, shortened to fit within a conventional two bar framework (Figure 2.4).

Figure 2.4. Rhythmic key from *The Spotted Dog*

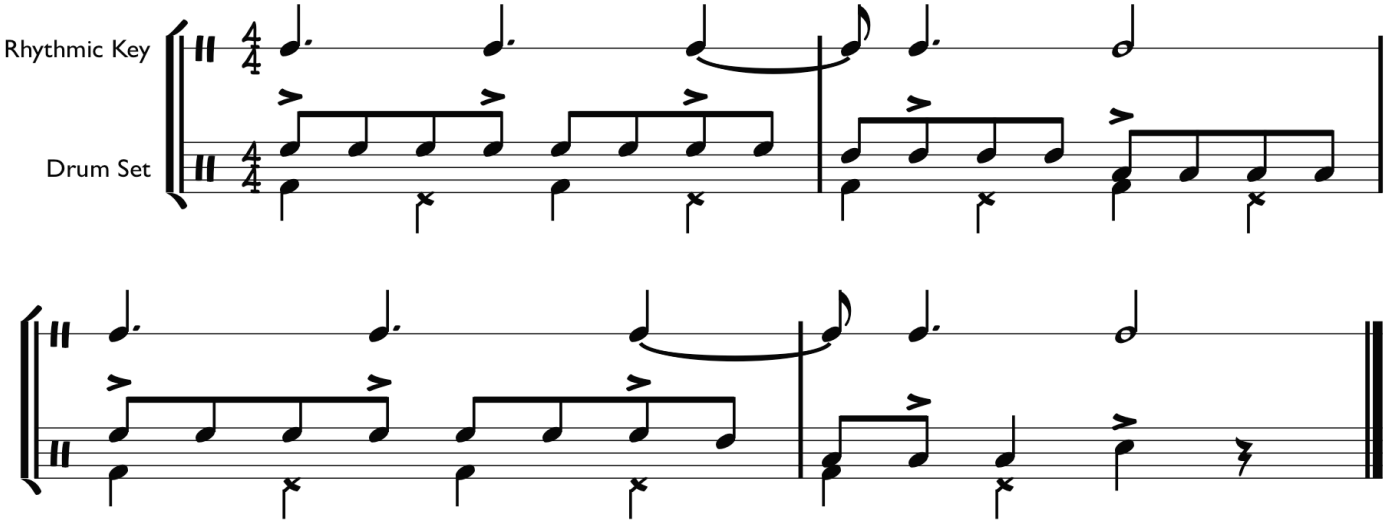
Comparing these two rhythms, it can be seen that the rhythmic key aligns with the first five accents of the cross-rhythmic cycle; however the sixth accent is delayed by one quaver to fall on the downbeat, in doing so beginning the next cycle of the key (Figure 2.5).

Figure 2.5. Comparison of rhythmic key to dotted-crotchet cross-rhythmic cycle



As well as informing the improvisational process, the rhythmic key also underlays the notated material within Simmonds' compositions. The rhythmic key is accented throughout the notated drumset groove of *The Spotted Dog*; which comprises quaver rhythms orchestrated between the toms and snare drum, overlaid onto a simple bass drum and hi-hat ostinato (Figure 2.6, adapted from Barker 2015, 15).

Figure 2.6. Drumset groove from *The Spotted Dog*



To be clear, the drumset part for *The Spotted Dog* was not expected to be repeated ad nauseam in performance. Rather, the notated material (such as this drumset part) would be intensively rehearsed[12] so that all band members would develop an embodied knowledge of both the rhythmic key and the dotted-crotchet cross-rhythmic cycle; and through this process any improvisational variation would be imbued with these characteristics (Barker 2015, 15). This can be heard in the opening measures of the recording, as Barker improvisationally deviates from the drumset groove, whilst adhering to the underlying rhythmic key (Audio 2.2).

Audio 2.2. Excerpt from *The Spotted Dog*

Simmonds himself was insistent that rhythmic forms, such as rhythmic keys and cross-rhythmic cycles, must be embodied rather than simply stated:

> *"We have the attitude that you don't make the rhythm happen by what you play. You feel the rhythm, and then anything you play is rhythmic. It's got to be felt first, before you actually play. I think that's a trap a lot of musicians fall into: they think they're going to make something happen by playing a certain way. It can appear to be happening, but it's on a very superficial level. The pulse has to be played as little as possible; it is something we should all feel rather than play, and it should be communicated to the audience through the ideas, and not because the bass drum's going 'boom, boom, boom'. So everything is on a feeling level rather than a sound level."* (Simmonds as cited in Shand 1994, 7-8)

While Simmonds' music prioritises salient groove in a manner eschewed by later Antripodean artists, his music features prototypical forms of many of the Antripodean characteristics outlined earlier. Devices such as rhythmic keys[13] foreground rhythm as a primary element of musical manipulation, while his dictum that "the pulse has to be played as little as possible" applies to much of the music that will follow (Shand 1994, 7-8). Furthermore, Simmonds' intensive rehearsal process seems likely born of a desire for these rhythmic processes and aesthetic considerations to form an improvisational language shared by all members of the ensemble, rather than solely informing his personal improvisational idiolect.

2.4.2 Early Works (1990s - mid-2000s)

During most of his time with Simmonds' *Freeboppers*, trumpeter Scott Tinkler was living in Melbourne, which meant frequently travelling to Sydney to rehearse and perform (Shand 2009, 128). In 1995, he moved to Sydney; in part to form a trio with drummer - and fellow Freebopper - Simon Barker, and bassist Adam Armstrong (Fiddes 2016, 18). The trio was active from 1995 until 1999, and in that time recorded three albums: *Dance of Delulian* (Origin, OR028, 1996), *Sofa King* (Origin, OR046, 1999) and *Shrike Like* (Origin, STT/1999SL, 2000) (Fiddes 2016, 18).

The trio played Tinkler's original compositions, which built on Tinkler and Barker's practical experience of Simmonds' rhythm devices and philosophies. Barker notes that rhythm was always foregrounded by

12 Simmonds was famous for his intensive rehearsals, which would often comprise a six to eight hour period focused entirely on a single piece (Barker 2015, 15).

13 Morphett also explores other rhythmic devices utilised by Simmonds, including pivot points and changes in rhythmic velocity (2010, 12, 26-27).

Tinkler:

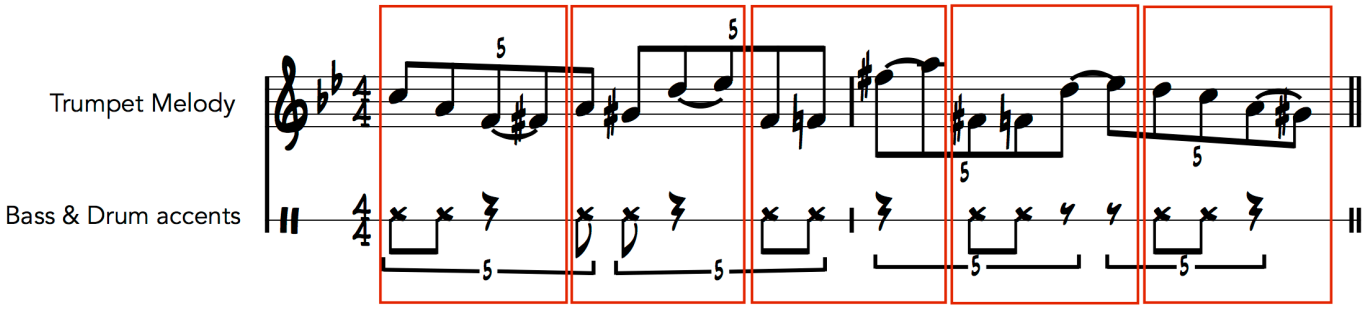
> *(Tinkler would)"… write a composition… and say, 'This is what I want to explore when we improvise', and it would always be a rhythmic concept. I think with him the idea of improvising is you manipulate a rhythmic vocabulary. So we practised rhythmic ideas, developing them and improvising on them, until we had this rhythmic language: a conversational language that we could bring to every new composition…"* (Barker as cited in Shand 2009, 129)

Tinkler's composition *Positively Glowing*, from the trio's final album *Shrike Like*, can be seen as a case study in the elements of this shared rhythmic language, as well as the overall aesthetic of the group. In some ways, *Positively Glowing* is constructed in the tradition of a jazz standard: it features a composed melody and chord progression (with a simple written bass line delineating said chord progression); the melody and chord progression adhere to a repeated sixteen bar form; and the melody is stated at the beginning and end of the composition, with improvisation occurring in between.

Nevertheless, the rhythmic content and approach is decidedly idiosyncratic, and removed from jazz conventions. The composed melody is almost entirely constructed in the subdivision of quaver-quintuplets (five notes in the space of a minim), rather than more common subdivisions such as quavers, swung quavers, or triplets. Tinkler integrates a further layer of rhythmic sophistication through his use of number grouping sequences to infer cross-rhythmic cycles. Barker himself has highlighted three specific phrases that create this effect (Barker 2015, 16-17).

In the first phrase the melody is grouped into recurring spans of four quaver-quintuplets (Figure 2.7). This grouping is manifest through a combination of trumpet articulation, melodic sequencing, and accents by the drumset and double bass (Audio 2.3).

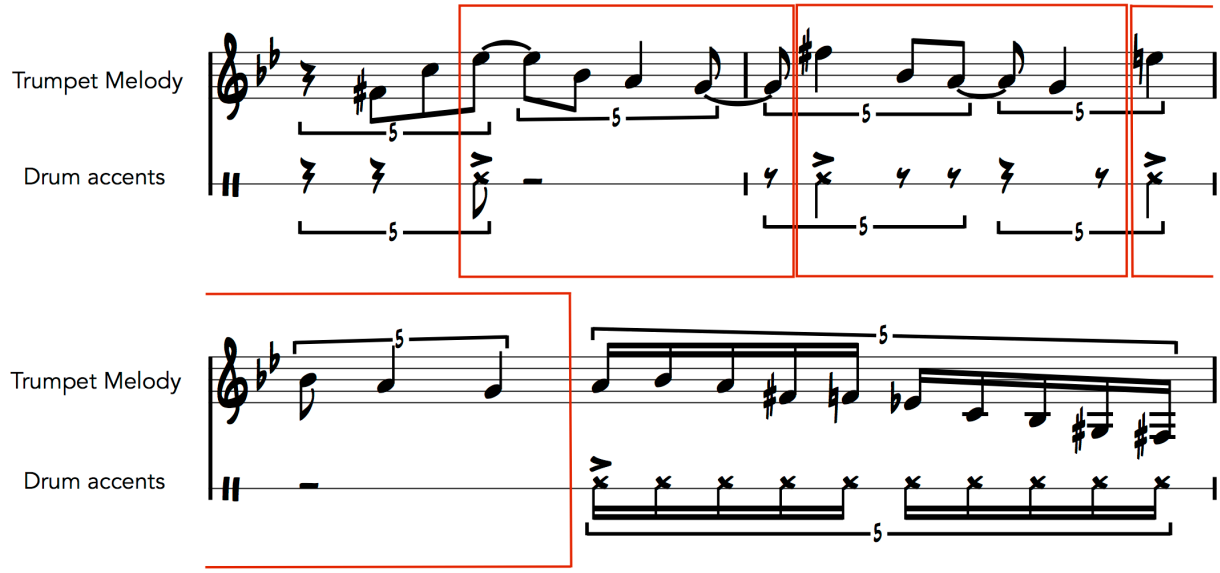
Figure 2.7. First phrase from *Positively Glowing*



Audio 2.3. First phrase from *Positively Glowing*

In the second phrase, the melody is grouped into recurring spans of seven quaver-quintuplets (Figure 2.8). This grouping is clearly articulated by the melody alone, which features a descending melodic pattern in a repeated 2-1-2-2 rhythmic organisation; it is further reinforced by drumset accents on the first note of each group (Audio 2.4). Also notable is that this phrase only generates a partial form of the complete cross-rhythmic cycle.

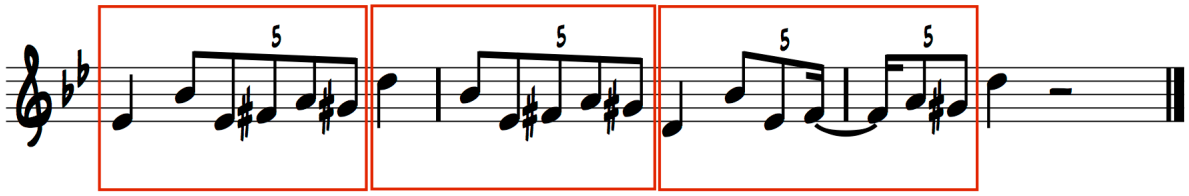
Figure 2.8. Second phrase from *Positively Glowing*



Audio 2.4. Second phrase from *Positively Glowing*

The third phrase identified by Barker is also the final phrase of the composed melody, and is slightly different as it combines different subdivisions within the grouping pattern. The phrase begins with a crotchet, followed by five-quaver quintuplets, creating a rhythmic fragment lasting three crotchet beats (Figure 2.9, Audio 2.5). This generates a cross-rhythmic cycle emphasising every dotted-minim; reminiscent of Simmonds' rhythmic keys emphasising dotted-crotchets.

Figure 2.9. Third phrase from *Positively Glowing*



Audio 2.5. Third phrase from *Positively Glowing*

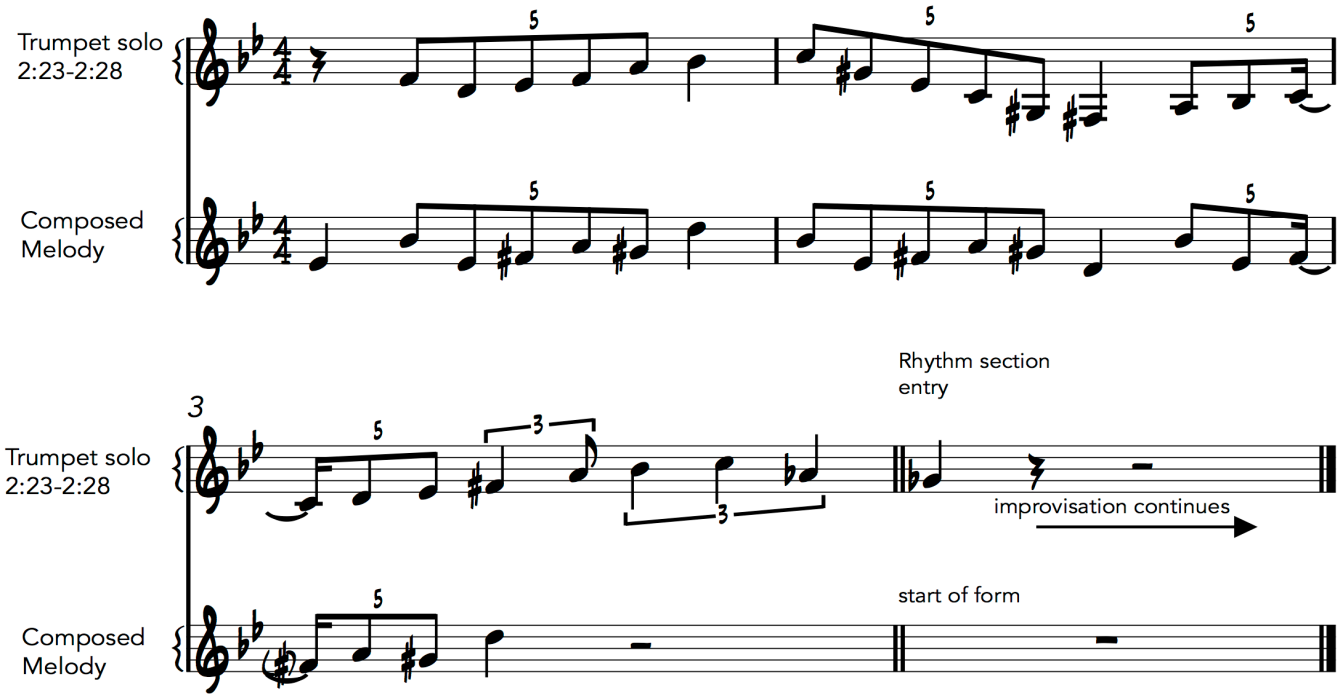
More than just complex composed material, these rhythmic figures also provided the ensemble with thematic material that can be drawn upon within improvisation (Barker 2015, 16). An example of this can be found between 2:23-2:28 (Audio 2.6); this occurs within Tinkler's solo, at a point where he has been unaccompanied for over a minute, and wishes to signal for Armstrong and Barker to begin playing.

Audio 2.6. Band cue from trumpet solo

Tinkler's cue is an improvised sequence of pitches aligned to the same rhythmic form as the third phrase (Figure 2.9); due to the trio's intimate knowledge of these rhythmic phrases, this (obtuse) cue is received, and Armstrong and Barker enter from the downbeat of the next bar. A comparison of the composed mel-

ody and Tinkler's improvisation[14] is shown in Figure 2.10.

Figure 2.10. Comparison of Tinkler's improvisation to composed melody



In summary, within *Positively Glowing* can be seen a highly developed, shared, rhythmic language (utilising number groupings and odd-subdivisions), as will become archetypal of Antripodean Improvising.

Contemporaneous with the activities of the Tinkler trio, another pair of Antripodean artists were exploring advanced rhythmic forms in Brisbane. Violinist/composer John Rodgers and drummer Ken Edie met through saxophonist Elliott Dalgleish in the early 1990s (Neil 2010, 25), and the three, with bassist Jonathon Dimond, soon formed the group Artisans Workshop (*Artisans Workshop*, Tall Poppies, TP028, 1993).

Rodgers eclectic musical background differed from the other three avant-jazz musicians: he had learnt flamenco music as a child, followed by a period of seven years studying to be a classical violinist, which he eventually decided against (Neil 2010, 20-23). He later remarked that interacting with Edie, Dalgleish and Dimond introduced him not only to a new aesthetic, but a whole new processual approach to music:

> *"What did strike me about the possibilities it presented to me was that, though I had learned to play the violin well, they were practising things I hadn't yet learned how to do. So there was a new game to play and understand and a new set of skills to learn. Improvisers of that quality are constructing a language while they train themselves, and it struck me that this was an interesting thing to do."* (Rodgers as cited in Neil 2010, 26)

14 The transcription of Tinkler's solo within this figure is adapted from the work of Andrew Fiddes, who transcribed the entire solo from *Positively Glowing* (Fiddes 2016, 83-93). Within his transcription Fiddes notates the rhythmic material of Tinkler's solo as occurring one crotchet earlier than I have positioned it. Primarily this discrepancy is due to the linear nature of producing a complete transcription (wherein every phrase has to fit with every preceding or subsequent phrase) compared to my use of this phrase in isolation. My re-interpretation of Fiddes' transcription was informed by my understanding of a) the grouping patterns and cross-rhythmic cycles of the composed melody and b) Tinkler's tendency to repurpose such patterns and cycles within his improvisations.

Following the release of *Artisans Workshop*[15], Rodgers and Edie established a close friendship and ongoing musical collaboration. During this time, they worked together (along with clarinetist Anthony Burr) intensely "trying to figure out how to use the compositional ideas of Elliott Carter in an improvised language" (Rodgers in Neil 2010, 26). Through this process they developed a highly specialised, shared rhythmic language that could be drawn on within improvisation.

In 1997, Rodgers released *A Rose is a Rose…*(Extreme, XLTD-007, 1997), a collection of compositions and improvisations informed by this period of collective development. Of particular interest are two duets performed by Rodgers and Edie, entitled *Speed* (Audio 2.7) and *Hit* (Audio 2.8). Whilst no academic analysis has been undertaken of these works, and no scores are publicly available to discern the specific relationship of composition to improvisation in or across the two works[16], a superficial examination nevertheless reveals many Antripodean qualities in these pieces.

Audio 2.7. Excerpt from *Speed*

Audio 2.8. Excerpt from *Hit*

Within both *Speed* and *Hit*, Edie and Rodgers utilise fine graduations in rhythmic speed, likely generated through virtuosic control of subdivision and polyrhythm[17]; while completely obfuscating any sense of regular pulse. The works also combine elements of various musical cultures; the influence of 20th century composer Elliott Carter has already been noted, but this is interwoven with improvisation; and the timbral qualities of Edie's drumset are reminiscent of 1980's-era jazz-fusion[18]. Perhaps unsurprisingly given these influences, there is no trace of soloist/accompanist duality throughout either duet, with the contributions of both violin and drumset equally featured.

Towards the end of the 1999, Tinkler moved from Sydney to Byron Bay; whilst living there, he established a connection with Rodgers and Edie, and would regularly commute to Brisbane to rehearse and perform with them (Fiddes 2016, 19). It is unclear exactly how this connection was made; possibly it was through the Australian Art Orchestra project *Into The Fire* (ABC Classics, 2000), in which both Tinkler and Rodgers took part[19]. This connection proved to be pivotal in the development of the Antripodean style, as the

15 While Artisans Workshop only released this one (self-titled) album, Dalgleish claims that numerous recording of the group, both as quartet and in collaboration with various other Australian artists, were recorded but never released (Hannaford 2009, 43-44).

16 I have been informally told by acquaintances of Rodgers' that one of the two duets is composed and the other is improvised. I have been unable to ascertain the veracity of this, however the compositional attribution for each work is perhaps revealing: *Speed* is attributed to Rodgers alone, whilst *Hit* is attributed to Rodgers and Edie.

17 This assumption is predicated on Hannaford's later research, which identifies manipulation of subdivision and polyrhythm as primary elements of both Elliott Carter's compositional language and Hannaford's own improvisational language (Hannaford 2012). He notes that his research was inspired in part by a need to "cultivate new skills in order to enter into the improvisational context [Rodgers and Edie] had already formulated together", suggesting that the ideas he explores in his research were informed by their earlier practice.

18 I am thinking here of drummers such as Dave Weckl or Vinnie Colaiuta.

19 Tinkler as performer, Rodgers as performer and composer. Both can be seen in this video about the project: https://www.youtube.com/watch?v=RKxwLwzpEEU (accessed 20/11/2017)

jazz informed ideas, processes and aesthetic values of Tinkler and Barker would begin to meld with those of Rodgers and Edie, which drew more heavily from Western art music.

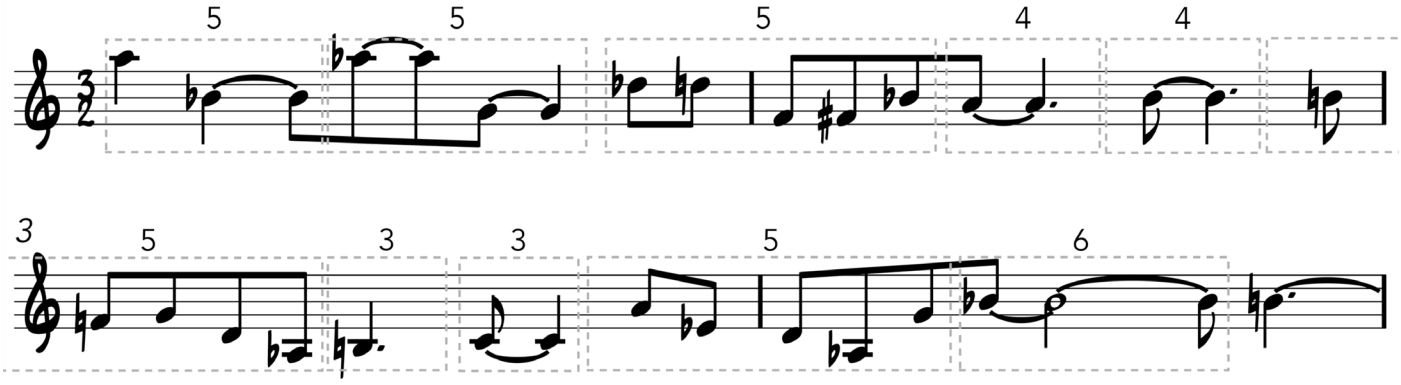
An early example of this cross pollination can be heard in Tinkler's composition *Oxygen Thief*. *Oxygen Thief* was recorded twice by two different ensembles; first in 2000 by the ensemble DRUB, featuring Tinkler, Barker, Dalgeish with bassist Brett First and guitarist Carl Dewhurst (*Drub*, Independent release, 2015), then in 2005 by a quartet featuring Tinkler and Edie with bassist Philip Rex and pianist Paul Grabowsky (*Live*, Origin, OR076, 2005). *Oxygen Thief*, while an original composition of Tinkler's, is constructed using a number grouping sequence developed by Rodgers[20] (Table 2.1) (Barker 2015, 16-17).

Table 2.1. Number grouping sequence from *Oxygen Thief*

5 5 5	4 4 5	3 3 5	(6)
4 4 5	5 5 5 5	6 6 5 5 5	(6)
(4 4 5) x3	(2 2 5) x3	5 5 5	

As Barker explains, each number within the sequence represents a corresponding amount of quavers; the melodic phrases are constructed so as to adhere to (and highlight) these rhythmic figures (Barker 2015, 17-18). Whereas in *Positively Glowing* Tinkler utilises number grouping to infer cross-rhythmic cycles, here the number sequencing generates alternating effects of musical expansion or contraction (Barker 2015, 18). An example of 'contraction' can be heard in the first line of the number sequence, which forms the first phrase of the melody (Figure 2.11).

Figure 2.11. First phrase from *Oxygen Thief*



This grouping sequence underlying this phrase is constructed of three 'chunks'; [5–5–5] then [4–4–5] then [3–3–5], which follow a pattern of [x—x—5] then [(x-1)—(x-1)—5] then [(x-2)—(x-2)—5], where x=5; the [6] at the end of the phrase is a gap between this phrase and the next. The incremental shortening of the first two groupings within each 'chunk' generates the feeling of melodic acceleration (as can be heard in Audio 2.9).

Audio 2.9. First phrase from *Oxygen Thief*

20 This number sequence is an example of a rhythmic structure called a magic square. It is my understanding that this structure is influenced by Indian Carnatic music, although I have been unable to find any literature to support or explicate this assertion.

Phrases such as this demonstrate the increasingly complex strategies Tinkler, Rodgers and other Antripodean artists were using in their manipulation of number grouping sequences. While this example is drawn from a composed melody, these grouping sequences were also wholly integrated into the performers improvisational lexicon as "springboards for a rhythmic dialogue" (Barker 2015, 18). Within performance the musicians were therefore able to abandon strict adherence to the metric/harmonic structure of the composition in favour of an unstructured improvisation - but nevertheless coordinate rhythmic interplay due to their shared knowledge of the number sequences underpinning *Oxygen Thief*.

2.4.3 Distilling a shared practice (mid-2000's to present day)

From 2007 onwards the amount of recordings released by Antripodean artists increased exponentially[21]. While the recency and complexity of this recorded output has thus far precluded any significant analysis from being undertaken, a cursory examination reveals significant trends and commonalities found across this body of work.

One such commonality is a shift towards entirely improvised works[22], and within that a tendency towards long-form improvisation. This can be observed in the recordings of The Antripodean Collective, an ensemble comprising Tinkler, Edie, Rodgers and pianist Marc Hannaford[23]. This quartet produced two recordings[24], both entirely improvised; the first, *Funcall*, includes six individual tracks ranging between 6:40 and 19:33 in length (Extreme, XCD066, 2008), whilst the second, *NTRPDN*, includes only two tracks, 32:20 and 38:55 long respectively (Marchon, MCH01, 2010). An extended excerpt from *Part Two* from *NTRPDN* can be heard in Audio 2.10.

Audio 2.10. Excerpt from *Part Two*

I consider the recordings of this quartet - for whom I have named the style of Antripodean improvising - to contain some of the purest examples of the Antripodean style recorded. Within these improvisations rhythmic manipulation is continually foregrounded, with virtuosic manipulation of subdivision and grouping sequences exhibited by all members. However, regular pulse is never explicitly stated, and rhythmic devices are stacked onto one another to generate complex relationships between musicians, rather than used to unify activity. Finally, all members interact democratically, and no soloist/accompanist relationship is ever assumed; indeed, the instrumental texture is most commonly a variety of duos or trios, rarely sustaining the full quartet for extended periods.

In the following years, fluid combinations of these artists and other collaborators produced numerous recordings in this long-form improvised style. *Shank* combines Tinkler, Hannaford and Edie with guitarist

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21 This increased output seems primarily due to the increasing ease and affordability of independent distribution that is afforded by the internet. The majority of releases between 2007 and the present have been independently released and distributed by the musicians themselves; in particular, the online distribution service Bandcamp has been favoured. To that end, the label "Kimnara" is run by Simon Barker, and the label "Marchon" by Marc Hannaford.

22 Rather than improvisation within a framework of a composed piece, such as is seen in *Oxygen Thief* or *Positively Glowing*.

23 Hannaford integrated himself into the Antripodean style and become an essential collaborator through the mid-2000s.

24 There have been four recordings released under the title of "The Antripodean Collective", with three slightly different ensembles. I am here focusing on the two recordings of this specific quartet as (1) their music is the most closely aligned with the Antripodean style I am delimiting here and (2) this specific quartet also performed live under this title, whereas the other formations of the collective existed for recording purposes only.

Carl Dewhurst[25] (Independent release, 2016); *Ordinary Madness* combines Hannaford, Tinkler and Barker with bassist Philip Rex and American saxophonist Tim Berne (Marchon, 2012); *Faceless Dullard* combines Hannaford, Tinkler and Barker (Marchon 2013); and *The Unpossibility of Language* combines Hannaford and Tinkler with violinist Erkki Veltheim (Marchon 2013). Each of these recordings is conducted within this long-form improvised style.

The only other consistent improvising ensemble through this time is duo of Tinkler and Barker, who maintained an ongoing collaboration after the dissolution of the Scott Tinkler Trio. They have released two improvised duo recordings, *Lost Thoughts* (Kimnara, 2007) and *Tides* (Kimnara, 2016). Throughout these improvisations, Tinkler and Barker reconfigure material from their previous trio repertoire, such as in *Glowing* (from *Lost Thoughts*), which draws from the melody of *Positively Glowing* (Audio 2.11). While by no means the dominant aesthetic, this duo displays a greater tendency towards moments of explicit pulse than can be heard in other ensembles; Tinkler identifies this as "groove-derivative" (Shand 2009, 132-133).

Audio 2.11. Excerpt from *Glowing*

A second trend emerging around this time is an increase in "solo" releases; by which I mean predominantly (if not entirely) unaccompanied. Specifically, each of Hannaford, Tinkler and Barker have released two solo albums through this period[26]. Whilst there is a rich tradition of solo piano performance and recording within the jazz tradition, examples of unaccompanied drumset or trumpet are exceeding rare.

While there is unfortunately no analysis of Tinkler's solo practice[27], insight into Hannaford and Barker's can be gleaned from their own practice-led research projects. Barker extensively details his process of adapting rhythmic forms and processes from shamanic Korean percussion music to the Western drumset, and cites some of his solo works as outcomes of this research (Barker 2015). Likewise, Hannaford addresses the adaptation of complex polyrhythmic devices found in Elliott Carter's composition *90+* to his improvisational language, as well as compositions for ensemble and solo performance (Hannaford 2012). Interestingly, both Hannaford and Barker cite the creative challenges posed by their immediate creative community as creating the need for their exploration of other musical cultures, as documented in their research (Barker 2015, 13-19; Hannaford 2012, 1).

From my position as an observer, and later colleague, of Antripodean artists including Hannaford, Tinkler and Barker, I interpret the two trends of long-form improvisation and solo performance as fundamentally intertwined. The practice of long-form democratic improvisation, while not requiring a prior knowledge of melodies, chord changes, compositional forms or the like, is extremely demanding in that the performers must consistently generate novel ideas that are interesting, interactive, and within the aesthetic bounds of the Antripodean style. In the event of a lack of inspiration within a given performance, ensemble members cannot fall back onto the tropes of their instrumental role or function[28] as they may when performing outside of this community. The process of developing (and then performing) a solo repertoire

25 This quartet comprising one of the alternate iterations of "The Antripodean Collective".

26 Hannaford has released *Polar* (Extreme, XCD-069, 2009) and *Liminal* (Marchon, 2013); Tinkler has released *Backwards* (Extreme, XCD-058, 2007) and *Whale* (Independent release, 2016); while Barker has released *Driftwood* (Kimnara, nara014, 2012) and *Dezcalzo* (Kimnara, 2014).

27 Fiddes' research addresses Tinkler's earlier work with The Scott Tinkler Trio (Fiddes 2016).

28 Such as the drummer keeping time, or the pianist outlining the chord changes.

involves developing material - be it specific motivic material or iterative improvisational processes - that is engaging in isolation, and over which the performer has complete control. In the case of Hannaford, Tinkler and Barker, I believe the material they individually developed for their solo performance practice is regularly reconfigured and re-contextualised within long-form ensemble improvisations, replacing in function the stylistic tropes that are devalued within Antripodean aesthetics.

As a final comment, I believe a significant factor inhibiting research into this music is a problem of rhythm transcription. As Clayton identifies, "transcription implies subjective interpretation of rhythm and thereby constrains and pre-empts analysis, and therefore analysis must somehow reach an advanced stage before meaningful representation becomes possible" (1996, 326-327). As the rhythmic methods of the Antripodean community developed to explore more complex rhythmic relationships between musicians within improvisation, they also became divorced from what is able to be notated using current methods. To attempt to fit these complex relationships within developed notational techniques for complex rhythms (e.g. irrational time signatures or nested tuplets) may provide one solution, but this would only make it seem as though those were the conceptual frameworks through which the music was created - in doing so obscuring the processual structures through which the performers actually conceived of and executed their ideas. Thus, analysis must not only address "What is happening here?" but also "How can this be faithfully represented?". Developing and applying such a suitable and novel method of transciption is a significant undertaking, and as such has unfortunately fallen beyond the scope of this research project.

2.5 Personal experiences and motivations

My personal connection to the Antripodean community begins in 2008, when I began undertaking private study with drummer Simon Barker. At this point in time I was primarily concerned with building to a professional level of skill within a mainstream jazz style; I was aware that Barker possessed an advanced rhythmic lexicon, however I had no idea of the specifics. It was through these lessons that Barker introduced me to many of the fundamental rhythmic principles and devices utilised by the Antripodean artists, including number grouping sequences, cross-rhythmic cycles, and a non-discriminatory approach to subdivision. Tinkler's compositions *Positively Glowing* and *Oxygen Thief* were presented as case studies in this rhythmic system. Through Barker I met Tinkler, and through 2009 I briefly studied with him - the lessons primarily consisting of partially improvised duets exploring number grouping sequences in the quintuplet or septuplet subdivision.

Whilst I was exploring these ideas in my private practice, my performance opportunities were nevertheless geared primarily towards more mainstream forms of modern jazz. Examples of active projects I was involved with at the time include Lightly Toasted (*Tim*, Independent release, 2013) and trumpeter Paul Williamson's quartet Inside Out (*In Cahoots*, Jazzhead, 2011); excerpts of which can be heard in Audio 2.12 and 2.13 respectively.

Audio 2.12. Excerpt of *Prayer* (J. Bowers), released by Lightly Toasted

Audio 2.13. Excerpt of *Green Land, Grey Skies* (P. Williamson), released by Inside Out

This changed in 2010, when Marc Hannaford (whom I had met through Tinkler) asked me to join a new trio he was forming. At first this trio comprised Hannaford, Tinkler and myself; after a time, Tinkler was replaced by double bassist Sam Pankhurst, forming the classic jazz "piano trio" instrumentation of piano, bass and drums. The trio performed regularly until late 2013, when Hannaford moved to New York City; in this time we released one album, *Sarcophile* (Marchon, 2012).

The Marc Hannaford Trio was my first ongoing professional engagement where control of Antripodean style rhythmic techniques was required, as these were found throughout Hannaford's compositions. The trio explored the rhythmic vocabulary developed by ensembles such as The Antripodean Collective, augmented by Hannaford's own developments arising from his personal research into the music of Elliott Carter (see Hannaford 2012). However, this was not a long-form improvising ensemble, and the aesthetic was still connected to the modern jazz tradition - that is, we played Hannaford's pieces, wherein the improvisation often (but not always) took place over compositionally dictated solo forms; the duality of soloist/accompanist was often in place; and the musical pulse would often be stated explicitly.

Despite my previous studies with Barker and Tinkler, I found Hannaford's compositions to be extremely challenging. In part this was due to my lack of previous performance experience - rhythmic devices such as odd-subdivisions or number grouping sequences are much harder to coordinate with an ensemble in real time than they are to align with a metronome in the practice room - but this was exacerbated by Hannaford's compositions, which were often much more complex than earlier precedents (such as the compositions of Tinkler briefly analysed earlier).

This complexity can be seen in Hannaford's composition *Something We Know,* from *Sarcophile*. The melody of *Something We Know* aligns to an extended number grouping sequence, similar to Tinkler's *Oxygen Thief*[29] (Table 2.2).

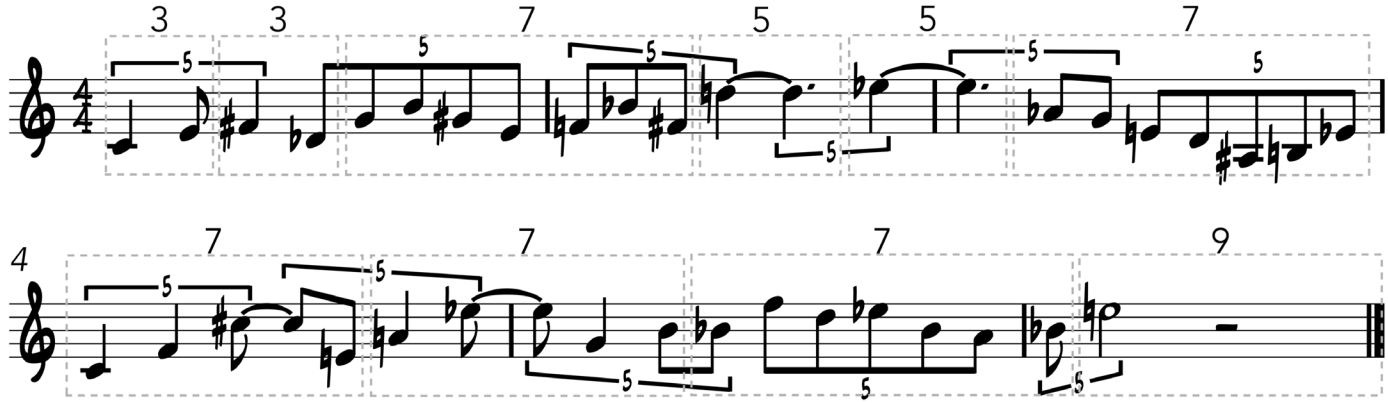
Table 2.2. Number grouping sequence from *Something We Know*

3 3 7	5 5 7	7 7 7	(9)
5 5 7	7 7 7 7	9 9 7 7 7	(9)
7 7 7	(3 3 7) x3	(6 6 7) x3	

Unlike *Oxygen Thief*, Hannaford here iterates this grouping sequence in the quaver-quintuplet subdivision. The first phrase of the melody from *Something We Know* - annotated with grouping structure - is shown in Figure 2.12.

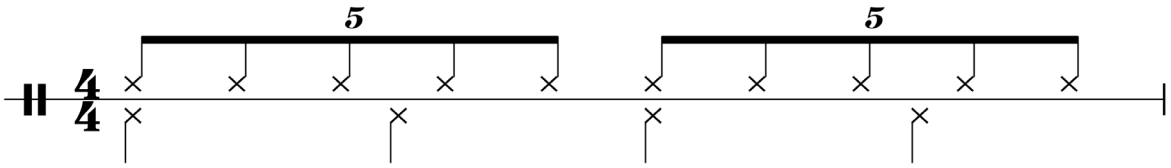
29 Indeed, the rhythmic cycle of *Something We Know* is also a magic square.

Figure 2.12. First phrase from *Something We Know*



This melody is layered onto a twenty-eight bar chord progression, which is primarily articulated through a walking bass line articulating every crotchet pulse. This interaction between the quaver-quintuplet subdivision and the crotchet pulse forms a short cross-rhythmic cycle (Figure 2.13).

Figure 2.13. Cross-rhythmic cycle of quaver-quintuplets and crotchets



Thus, *Something We Know* contains multiple interacting layers of rhythmic complexity: first, the use of quaver-quintuplets (which were still a relatively unfamiliar rhythmic subdivision for me); second, the extended number grouping sequence; and third, the complex and consistent cross-rhythmic cycle between bass line and melody. These layers of complexity can be heard in Audio 2.14, which isolates the first phrase of the melody.

Audio 2.14. First phrase from *Something We Know*

Whilst my ability to navigate these layers of complexity improved throughout the lifespan of the Hannaford trio, at the time of recording *Sarcophile* I did not possess the virtuosic control exhibited by Hannaford himself, or displayed elsewhere by other Antripodean artists. Developing a personal language for manipulating complex rhythmic material such as this has become an ongoing professional goal.

Furthermore, it was during this period that I became aware of the broader aesthetics guiding Antripodean Improvising, beyond just number grouping and odd-subdivision. In part this was through a slowly growing awareness of Antripodean recordings (such as those documented in this chapter); concurrent with which I was beginning to engage in long-form improvisation as a mode of music making, on occasion with Hannaford and/or Tinkler.

Similar to my observations earlier in this chapter, I did not find long-form improvisation demanding in the same way that performing Hannaford's compositions were; however, the requirement to consistently generate novel ideas that are interesting, interactive, and within the aesthetic bounds of the style was fre-

quently beyond my abilities. In particular, I often noted that when manipulating rhythmic forms (such as number groupings or cross-rhythmic cycles) within this context, my expression of these ideas would be imbued with stylistic markers that created a clear link to jazz drumming tropes. While this quality was suitable within the context of the Marc Hannaford Trio, I did not think it appropriate for these long-form improvisations; yet, I found these markers were so deeply embedded that I could not consciously avoid them. Developing personal improvisational processes that are devoid of these stylistic signifiers, whilst aligned with Antripodean methods and aesthetics, forms a primary motivation for this research.

As sociologist Howard S. Becker notes:

> *"Conventions… do not exist in isolation, but come in complexly interdependent systems, so that one small change may require a variety of other changes. A system of conventions gets embodied in equipment, materials, training, available facilities and sites, systems of notation, and the like, all of which must be changed if any one component is."* (Becker 2008, 32)

Over time I came to realise that my approach to embodying the Antripodean rhythmic lexicon was cached within a "complexly interdependent" web of conventions associated with jazz drumming pedagogy and performance; I was making one small change without any others. Within this research I repurpose academic findings from the field of embodied musical cognition to reveal insight into one further element of this web of conventions - the physical relationship between body and instrument - and affect processual transformation within my improvisational practice.

Chapter Three
Embodied Music Cognition and The Drumset

3.1 Embodied music cognition

Embodied cognition is a paradigm within cognitive science research that treats the sensorimotor systems of the body as integral to the processes of cognition and perception. In the words of Wilson, "proponents of embodied cognition take as their theoretical starting point not a mind working on abstract problems, but a body that requires a mind to make it function" (2002, 625). Research within the field also frequently foregrounds the relationship between the body and environment, viewing cognition as an activity situated physically, temporally, and culturally. Understandably, these broad ideas can underlie a wide array of research, stretching across many distinct fields[1].

Embodied music cognition is the study of music through this paradigm. Most influential to this project have been a number of studies of music performance examining the relationship of the body to the musical instrument, and showing the subsequent musical effect of this interaction (eg. Iyer 1998, 2002; Bailey and Driver, 1992; Rockwell, 2009). By correlating theoretical principles found in these texts to principles found in drumset pedagogy and related research, I have re-conceptualised elements of my personal relationship to the drumset, which has manifested in transformational change within my creative practice (as documented in the recorded works, and explicated in Chapter Four of this dissertation).

3.2 Review of previous research

As highlighted, embodied music cognition is primarily a paradigm underpinning research, rather than a cleanly defined research field. As such, not all of the following resources self identify as being within the field, but rather are linked by their similar focus on the situated relationship between the body and the instrument.

Vijay Iyer argues for the complementary paradigms of embodied mind and situated cognition as an alternative to the theories and models, usually focused on "pitch organization in the large-scale time domain", developed for the study of Western tonal musics (Iyer 2002, 387). He considers these "linguistics-derived musical grammars" unsuitable for the study of other musical cultures, notably African-American musical traditions such as jazz and hip-hop, as they cannot account for desirable musical features such as groove (Iyer 2002, 388).

Once these principles are established, Iyer turns his attention to studying microtiming variation (Iyer 2002, 396-411). Iyer discusses this both in terms of general phenomena (such as swing) and specific examples (such as a short transcription of a Thelonious Monk excerpt (Iyer 2002, 404-405, 407-409).

1 See Wilson (2002) for a succinct summary (and critique) of six distinct claims found throughout embodied cognition research.

Particularly interesting is when Iyer links inherent physical qualities of the body to microtiming variations that have become aesthetically valued; such as the minor delay of a backbeat pattern[2] that sits "in the pocket" being a reflection of the tendency for fingers and feet to anticipate a pulse by differing amounts (Iyer 2002, 405-407).

Preceding Iyer's research is that of Bailey and Driver, who make an argument for spatio-motor thinking as both a "central component in music cognition" and as a "legitimate and commonly used mode of musical thought" (1992, 57, 59). Their specific focus is guitar stylings, and they provide numerous examples of music structure arising from spatio-motor thinking; one such example is a chord progression from the Bob Dylan piece *Lay Lady, Lay*, which, when shown in tablature, can be seen to clearly result from the same hand position being shifted to different positions along the neck of the guitar (1992, 67).

While these specific outcomes are not highly relevant to this research, some of the theoretical frameworks Bailey and Driver develop are adaptable. First, their identification of distinct modes for musical thought and creativity, namely the spatio-motor mode and the auditory mode, which they contend are of equal importance (1992, 59). Second, their conception of the "motor structure", being the characteristic bodily positions (postures, hand positions) and motor patterns which "lie behind" a style of music (1992, 63).

Providing an interesting parallel to Bailey and Driver's theories is Wendy Hargreaves' discussion of idea generation in jazz improvisation (2012). Drawing primarily from jazz literature, Hargreaves proposes three distinct sources for improvised ideas, namely: audiation-generated ideas, that are "heard" internally but unconsciously formulated (2012, 360); motor-generated ideas, that "originate from the position or movement of the body rather than conscious direction" (2012, 362); and strategy-generated ideas that are "consciously formulated… specific plans of behaviour" (2012, 359). One interesting aspect of Hargreaves' classifications is her insistence of categorical differences between conscious ideas (which are all strategy-generated) and unconscious ideas (which may be motor- or audiation-generated)[3]; a distinction which is not present in Bailey and Driver's otherwise analogous concepts of the spatio-motor and auditory modes. Hargreaves' interest in unconscious/conscious duality is perhaps due to her focus on pedagogical applications of her theory; nevertheless, I consider it unnecessary for this research.

Joti Rockwell examines bluegrass banjo music through the prism of transformational theory (Rockwell 2009). In doing so he develops an analytical model that considers banjo music as being created through the combination of situated factors emerging from relationship of the hand to the instrument (Rockwell 2009, 139). Through analysis using this model, Rockwell links the the interaction of the banjo and the hand to musically desirable aesthetics, in particular the rhythmic 'drive' of bluegrass banjo music (Rockwell 2009, 158-161). As evidence, he shows how specific picking patterns of the right hand generate the duple or triple grouping structures that work with or against the music's duple meter, generating rhythmic interest (Rockwell 2009, 146, 153, 156, 160).

Resources regarding the drumset will be drawn from both academic research and pedagogical texts. I will begin by addressing the academic literature. Whilst it is beyond the scope of this research to provide

2 A 'backbeat' is a modern drumset pattern, where a regular pulse is articulated with alternations of the bass drum and snare drum.

3 Hargreaves reinforces this difference by insisting that motor-generated ideas are distinct from "strategy-generated ideas with a motor directive" (Hargreaves 2012, 362).

an in-depth history of the drumset, I am fortunate to draw upon other research tracing the development of the instrument, and the styles and techniques associated with it. Theodore Dennis Brown's mammoth study covers a period beginning with 19th century military drumming styles and ending in 1942, at the beginning of the bop era (Brown 1976). This time period includes many of examples of interaction between technical invention and instrumental technique, such the early practice of "double drumming" (playing the snare drum and bass drum at the same time with drumsticks) being superseded due to the invention and refinement of the bass drum pedal (Brown 1976, 98-107). Eric Chandler's research is even broader in timeframe (spanning back to the American revolutionary war of the late 18th-century), but hones in on the "rudimental" style drumming commonly found in military contexts (Chandler 1990).

Anthony Brown focuses on mid-20th century jazz drummers Kenny Clarke and Max Roach, considering them as innovators essential to the establishment of modern jazz drumming stylings (Brown 1990). In particular, Brown highlights Clarke's innovations of, first, moving the primary timekeeping voice from the snare drum to the ride cymbal, and second, developing the skill of "creative coordination" (sounding different rhythms with each limb on distinct elements of the drumset), as providing "the definitive distinction between modern jazz drumming and its antecedents" (1990, 43-44).

Three recent practice-led studies address the drumset within the context of an individual's creative practice. Simon Barker's research has already been discussed for its insight into Antripodean rhythmic practices, but also details his process of adapting Korean rhythmic forms and orchestrations to the Western drumset (2015). Notable is his identification of *rhythm/sticking cells* ("RS cells") as a primary resource in this process, and his development of personal RS cell combinations (Barker 2015, 28-31,94).

Grant Collins' project is directed towards the development of composed solo drumset works (2014). Despite the overt similarity to my own research, Collins' research parameters are distinct from mine, prioritizing four areas of discovery: (1) composed works for the drumset, (2) the extension and expansion of the drumset, (3) notational techniques for drumset composition, and (4) physical performance techniques (2014, 3). Of the four, only Collins' interest in physical performance techniques overlaps with this research project; to that end, Collins' use of "independent thinking" and it's "isorhythmic applications" are somewhat analagous with my own conceptions of concomitant rhythms and somatic parameter layering respectively (Collins 2014, 87-92). Furthermore, Collins forms an analytical model from his areas of discovery, using it to examine both his own works and those of other artists (2014, 26-32). This was a primary motivation for the development of my own analytical model (detailed in Chapter Five), despite the analytical parameters comprising it being entirely my own.

Andrew Gander examines his own practice as an improvising drummer, and the procedures underlying a deliberate transformation of his musical idiolect (2017). Notable is his identification of two procedures - *Transitional Synthesis* and the *Iterative Loop Cycle* - which he applies to a variety of developmental areas in order to effect transformational change (2017, 57-73). In explicating these procedures, Gander reveals not only the content of his improvisational language, but also the highly personal processes undertaken to arrive at "a unique sonic voice discernable across a variety of musical settings" (2017, 24).

Turning to pedagogical resources, the video masterclass of Dan Weiss (2013) details specific procedural exercises he has himself developed, or augmented from others. Relevant to this research is Weiss' original developmental exercise for embodying unusual physical motions. Whilst Weiss presents this as simply an exercise to develop efficient technique for moving around the drumset (in service of aurally-generated

ideas), I have repurposed and expanded upon these ideas for generative purposes; this will be explored in later in this chapter.

Gary Chaffee's *Sticking Patterns* (1976a) is a part of his influential four-part *Patterns* series, which are intended to form a comprehensive drum method when used in combination. I have isolated *Sticking Patterns* as it is within this text that Chaffee outlines his system of compound stickings (1976a, 34). This system is addressed as a procedural intermediate in the development of my own sticking cells.

A variety of other resources are selected primarily due to their widespread influence within the drumming community rather than due to their specific idiosyncracies. These include the snare drum focused texts of Wilcoxon (1941) and Blackley (2010b), and the coordination focused texts of Ramsey (1997), Chaffee (1976b), and Dahlgren and Fine (1963).

3.3 Embodied music cognition as a paradigm for creative instrumental practice

Put broadly, embodied musical cognition has provided me with a new paradigm through which to conceptualise my relationship to the drumset, with significant repercussions for my entire creative process. Previously, I had considered the physical minutiae of drumset technique to be categorically distinct from the creative musical considerations. Exercises to develop aspects of physical technique were a regular part of my instrumental practice routine, but they were separate from exercises or work with creative intent. This divide was generally only crossed when creative exercises required pushing physical limits, which necessitated more active focus on those elements of performance. Bailey and Driver identify this attitude as widespread, wherein motor skill is "regarded simply as a means to an end, a way to achieve… ideas couched in terms of aural images" (1992, 58).

As I began to explore research that foregrounds the embodied, situated nature of music cognition, this gradually led me to consider the creative and physical aspects of instrumental practice as more closely intertwined. This was predicated by finding a number of the theories that resonated with my own professional experiences, and at times provided a theoretical explanation for performance strategies I had devised.

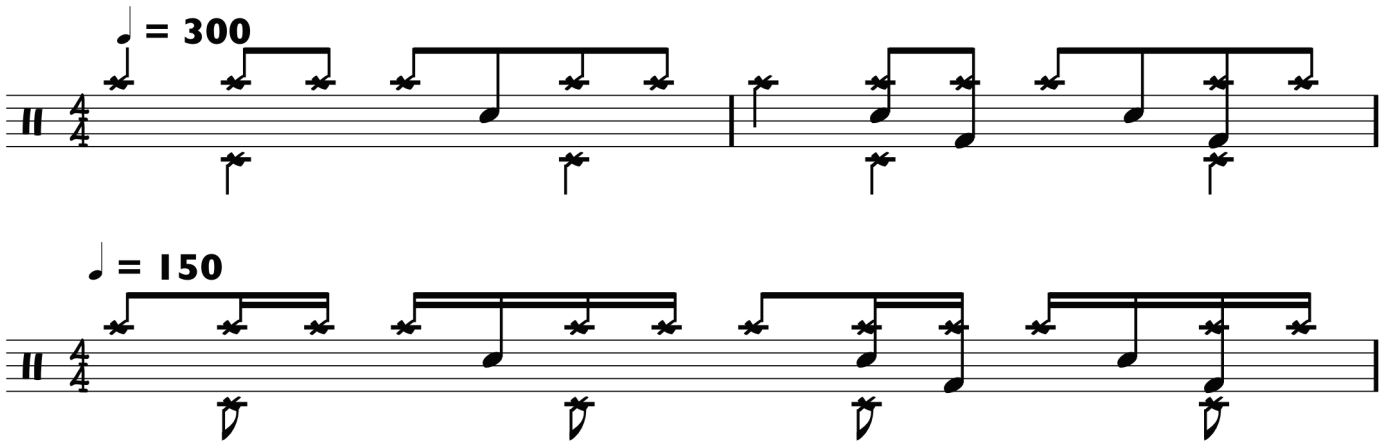
One illustrative example of this regards my experiences learning to play at fast tempos. As a young jazz drummer building my skill level to a professional standard, a major challenge I faced was maintaining tempo consistency throughout performances at notably fast speeds. Playing fast pieces at the limits of my technical abilities often led to a gradual decrease in tempo - unconscious to me yet salient to listeners[4] - as I settled into a speed I could maintain more easily. Over time I improved my hand technique, which allowed me to more consistently articulate and maintain musical figures at fast tempos - however, I was still prone to decelerating.

Noting these experiences, I trialled different strategies to reduce these tempo fluctuations. Upon recommendation of a teacher, I began to mentally reframe such fast tempos at half their speed, without altering the musical material that I play. Figure 3.1 shows a notated example of this kind of mental reframing. The first line presents an example of two bars of up-tempo jazz drumming, which is metrically reframed at half speed in the second line. As the subdivisions are simultaneously doubled (quavers in the first line

4 While I was not aware of this at the time, I may have another band member comment about the tempo fluctuation later, or if the performance was recorded, notice it myself upon later listening.

become semiquavers in the second line), the sonic outcome is identical.

Figure 3.1. Uptempo jazz drumming at full and half tempos



While this reframing may seem inconsequential, I found it had a notable effect on my ability to maintain a consistent tempo throughout a performance. I realised that, previously, I had been reliant on the physical articulation of musical figures by my hands to set and maintain tempos - and, as muscle fatigue set in, inevitably the tempo would fluctuate and decrease. This new approach was a mental reframing, but I noticed it led me to feel the tempo differently throughout my body, focused more in my torso and legs (manifest in actions like foot tapping or head bobbing) while my hands articulated complex figures over this feeling. As such, even when fatigue set in, my sense of pulse was stable, and I could alter or simplify the figures with little deviation of overall tempo.

Some years later I encountered the research of pianist Vijay Iyer, in which he proposes correlations between body motions and types of musical activity that exist at similar rates of frequency (2002, 393). Iyer draws upon neuropsychological studies showing that "neural systems involved with motor activity" are activated in the perception of rhythm (Caroll-Phelan & Hampson 1996, quoted in Iyer 2002, 392) to support his claim that perception and cognition of musical activity may exploit the sensorimotor systems of bodily actions that occur at similar timescales (Iyer 2002, 392-393). Table 3.1 shows these ranges of correlation.

Table 3.1. Body motion to musical activity correlates, adapted from Iyer (2002, 393)

Body Motion	**Musical Correlate**	**Approx. Frequency Range (Hz)**	**Approx. Frequency Range (bpm)**
Breathing, body sway	Musical phrase	0.1-1	10-60
Heartbeat, walking, head nod	Musical pulse (tactus)	1-3	60-180
Speech, finger motion	Smallest subdivision of musical pulse	3-10	180-600
Rapid flam between fingers or limbs	Grace notes, microtiming variation	10-60	600-3,600

In evaluating these correlations, I considered my own experiences. Taking the example presented in Figure 3.1, the first tempo of 300 bpm falls within the range Iyer associates with speech, finger motion, and subdivision of musical pulse. The second tempo of 150 bpm falls within the range associated with musical pulse, and bodily motions such as heartbeat, walking, and head nodding. Perhaps my experience of feeling the half-speed pulse differently throughout my body was due to different pathways within my

sensorimotor system becoming engaged? Furthermore, perhaps my ability to maintain tempo benefited from these pathways, which are inherently more able to maintain a consistent pulse, being activated?

Whilst it is not within the scope of this research to scientifically assess these questions, I have taken them to be my own personal explanation for my experiences. In doing so, these ideas provided an early example of how theories from embodied music cognition research could enrich my own creative practice. Whilst this example is of theory retrospectively explaining my experiences, I also saw that theories associated with embodied cognition could create frameworks for new directions within my creative practice. The following subchapters will address two such examples of theory begetting action.

3.4 Bluegrass banjo and sticking cells

3.4.1 Bluegrass banjo picking patterns

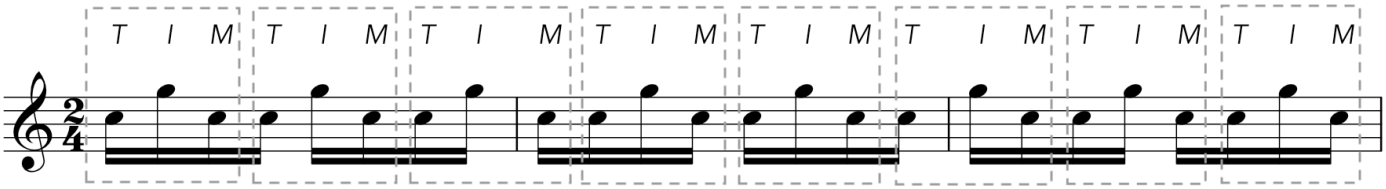
The first correlation I have drawn between academic theory and practice-based knowledge is between Joti Rockwell's analysis of bluegrass banjo stylings (2009) and the pedagogical conception of 'stickings' as applied to the drumset.

Rockwell's analysis stems from a paradigm conceiving of bluegrass banjo music as a "product of the physical motions made upon the instrument", rather than "the musical notes as they would be represented on the score" (2009, 139). Applying this philosophical position to analysis, he suggests modelling five-string banjo music as being created through the interaction of four component parts: (1) The fret being pressed down, (2) the string being played, (3) the finger-pick - thumb, index or middle - that is plucking the string and (4) the time at which these events occur (2009, 139).

Most relevant to my research is Rockwell's modelling of picking permutations, which are the specific sequences of thumb (T), index (I) and middle (M) finger-picks used to pluck the strings in a rhythmic stream (2009, 142-144). He identifies six primary permutations, from which more complex variations are constructed: The forward roll (T I M), the backward roll (T M I), alternating thumb-index (T I), alternating thumb-middle (T M), alternating index-middle (I M), and the repetition of each individual pick (T) (I) (M) - which is only used when playing slower rhythms (2009, 142). Rockwell then links these primary picking permutations to specific rhythmic outcomes that are considered essential to the characteristic "drive" of bluegrass music (2009, 142-144, 153-154).

One specific example Rockwell gives of this draws from Flatt and Scrugg's *Earl's Breakdown* (2009, 150, 153). The excerpt contains a stream of almost unbroken semiquavers, through which the second of every three-note group is sounded in a higher register (producing an emergent dotted-quaver cross-rhythmic cycle). Rockwell's analysis of picking permutations shows that this musical effect is created by a "forward roll" pattern (T I M); Figure 3.2 shows a simplified form of this relationship.

Figure 3.2. Rhythmic expression of 'forward roll' picking permutation, adapted from Rockwell (2009, 153)



What I found to be most creatively inspiring about Rockwell's analysis was that it supported a two-way relationship between physical technique and musical ideas. He does not link the forward roll picking permutation to a dotted-quaver rhythm simply to explain *how* the performer executed that passage, but rather suggests that the possibility of sounding the dotted-quaver rhythm in that form *is enabled by* the forward roll picking permutation. As such, physical technique is not only in service of musical ideas, but also enables them; as Rockwell describes it "… the "drive" of bluegrass… can be heard to be powered by the banjoist's right hand, the motions of which generate rhythms…" (2009, 160).

3.4.2 Sticking cells and rudiments

I immediately recognised a parallel between banjo picking permutations and "stickings", as applied to the drumset or other percussion instruments. Whilst the term "stickings" is often used informally, and as such is rarely defined, it generally refers to the pattern of right- and left-hand strokes used to articulate a given musical passage[5] . Within drumset pedagogy short cellular sticking combinations are also a common style of technical exercise, that I will henceforth refer to as *sticking cells*.

Examining sticking cells through the paradigm that technical patterns enable musical ideas - as advanced by Rockwell - I began to consider whether sticking cell derivative developmental exercises were enabling, and indeed encoding, certain musical features that I would later reproduce during improvisation. Like many drummers, I had spent extensive time through my formative years studying and practicing the 'rudiments', a collection of short sticking cells that pervade drumming pedagogy.

The rudiments are arguably the oldest and most widespread systemic collection of sticking cells. They developed from military snare drumming traditions of the Swiss, British and American armies, stretching back as far as 1386 (Chandler 1990, 7, 9-11). Modern codification primarily occurred in America in the early 20th century, particularly with the establishment of the 26 "Standard American" rudiments in 1932 (Chandler 1990, 81). The most recent official collection of rudiments, published by the Percussive Arts Society, has expanded to a set of 40[6].

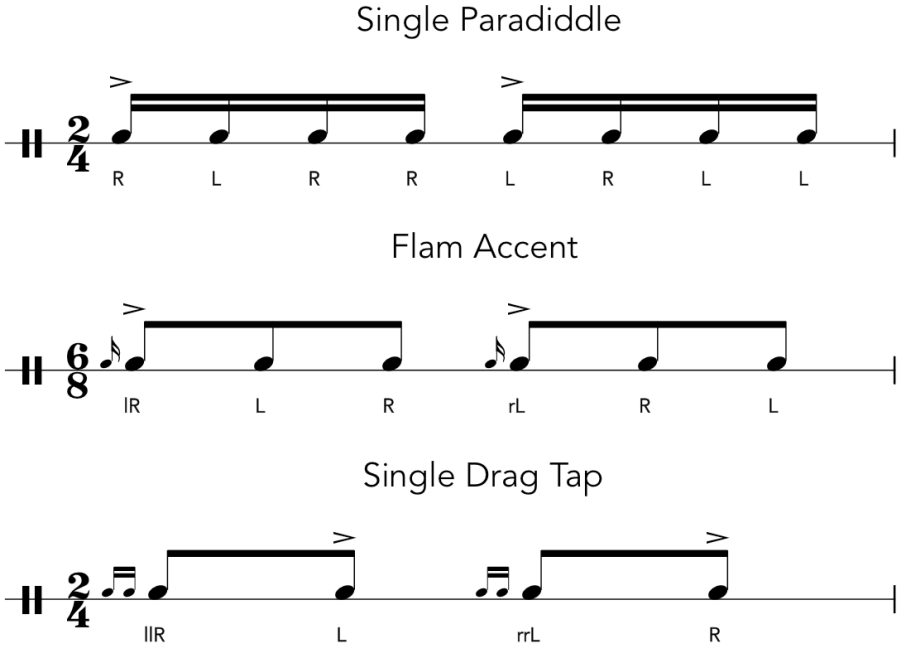
Removed from their original function as military calls, the rudiments are frequently featured in pedagogical texts as technical exercises that isolate, build and refine physical ability. Whilst the physical motions and hand order are usually considered the primary features of the rudiments, there are nevertheless other characteristics intrinsic to their construction. One feature is the rhythmic construction of the rudiments, which utilise simple subdivision (quavers, triplets or semiquavers) within simple meters (such as 2/4, 3/4, 4/4 or 6/8), and minimise syncopation. Another is the use of ornamentation (in the form of flams or drags) in preference to unison strokes; likely a result of being being developed for performance on a

5 This definition can expand to also includes right- and left-foot strokes, if required..

6 See http://www.pas.org/resources/rudiments (accessed December 2, 2017) for notation and audio demonstrations of all 40 rudiments.

single surface of a single (snare) drum[7]. These qualities can be seen and heard in the three rudiments - the Single Paradiddle, the Flam Accent, and the Single Drag Tap - shown in Figure 3.3 and demonstrated in Video 3.1.

Figure 3.3. Three rudiments



Video 3.1. Demonstration of three rudiments

There is a strong tradition within jazz drumming to treat the study of the rudiments as an essential step in developing improvisational vocabulary. This is sometimes attributed to indirect skill development (epitomised by drummer Charli Persip's belief that "a good knowledge of rudiments will provide the physical ability to play just about anything that comes to your mind" (Persip 2003, 16)), but a more direct application of rudimental forms to the drumset can often be found in instructional texts. Examples of rudiments applied to the drumset can also be found in transcription and analysis of numerous influential jazz drummers, including Tony Williams (Brown 2006) and Alan Dawson (McBride 2014, 21-26).

Taking together this tradition and Rockwell's paradigm of technical patterns enabling musical ideas, it

7 Hitting a single drumhead with two sticks in unison produces an undesirablely dull, muted sound.

seems plausible that the constituent features of the rudiments directly effect the improvisational output of a drummer who has extensively practiced them. At times this is due to a deliberate choice to apply the rudiments to the drumset; but I also suggest that the embodiment, through practice, of the rudiments (or any sticking cell) encodes characteristic ornamentations and rhythmic forms into the typical motions through which a drummer plays their instrument, and as these motions are drawn upon in improvisation, these characteristics that are then unavoidably manifest.

This hypothesis aligns with my own professional experience, having studied the rudiments extensively[8] as part of building the requisite skills to play jazz at a high level. However upon joining the Marc Hannaford trio, I found that I was unable to fluently articulate rhythmic vocabulary encoded in his compositions – which included numeric grouping sequences and odd subdivisions such as quintuplets and septuplets – let alone improvise using similar rhythmic principles as desired. Over the lifespan of the trio I worked hard to develop the ability to aurally recognise and audiate these rhythms, however I found this only marginally improved my abilities when it came to performance. Eventually I realised that this was because I did not have the requisite fluency with sticking cells that are constructed so as to articulate and develop the Antripodean rhythmic forms found through Hannaford's music.

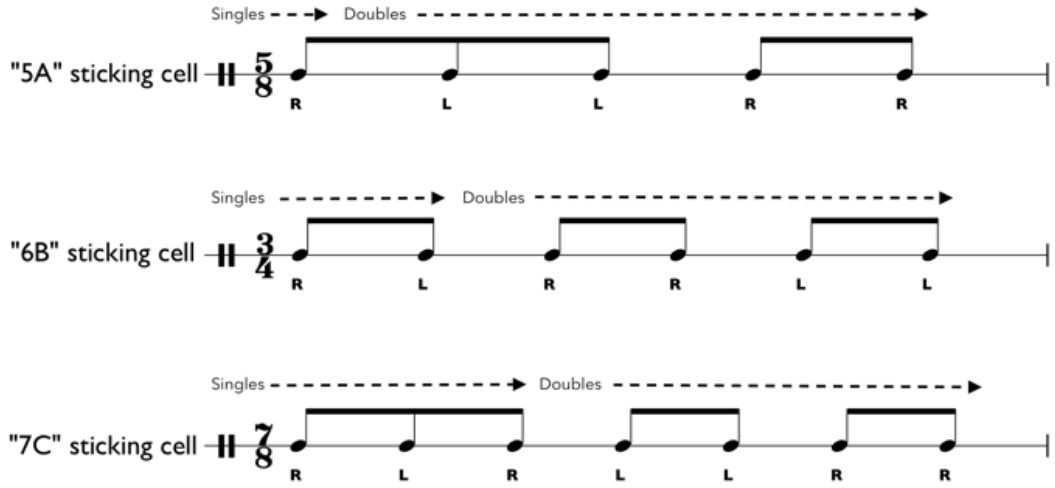
3.4.3 Alternate sticking systems

In attempting to remedy this creative problem, I aimed to develop fluency with sticking cells that conformed to number grouping derived rhythmic form, such as were utilised compositionally and improvisationally throughout Hannaford's music. As part of this research project I have developed an original collection of sticking cells that conform to Antripodean-style rhythmic forms, encoding my improvisations with those elements. My collection has been influenced by other systematically constructed sets of sticking cells I have encountered in my creative practice, namely Chaffee's *Compound Stickings* and Barker's East-coast Korean-inspired *Rhythm/Sticking Cells*. I will briefly comment upon their constituent features so as to clarify their influence upon my own collection - and by dint clarify the original elements of my sticking cells.

Gary Chaffee first outlined his system of "compound stickings" in his method book *Sticking Patterns* (1976a), which has gone on to be a widespread resource in modern drumset pedagogy and practice. The fundamental premise of these sticking cells is that they contain a compound of both single and double strokes - and that they *only* contain single and double strokes, without ornamentation such as flams or drags (Chaffee 1976a, 34). Each sticking cell is constructed using a formula: [an amount of single strokes] followed by [an amount of double strokes]. Figure 3.4 shows three example compound sticking cells, with the single strokes and double strokes noted; these are demonstrated in Video 3.2.

8 Either through direct practice of the rudiments themselves, or other pedagogical materials built from them, such as Wilocoxon's rudimental solos (Wilcoxon 1941) or Dawson's Rudimental Ritual (Ramsey 1997, 11-23).

Figure 3.4. Selected Chaffee compound sticking cells



Video 3.2. Demonstration of three Chaffee compound sticking cells

While sticking cells within this system could theoretically extend as long as necessary, Chaffee only addresses those between a length of three and eight notes. He organises the cells into groups based on how many single strokes appear at the start of the sticking: any cell beginning with one single stroke is a Group A sticking; any cell beginning with two single strokes is a Group B sticking, and so forth[9] (Chaffee 1976a, 35, 40, 47, 50, 53). Within each group, the cells are then identified by the amount of notes they contain; in Figure 3.4, the five-note sticking beginning with one single stroke is the 5A sticking, the six-note sticking beginning with two single strokes is the 6B sticking, and the seven note sticking beginning with three single strokes is the 7C sticking.

One interesting byproduct of this categorisation is that each group always form either odd or even length sticking cells; this is because the double strokes will always increase the cell length by an even amount. That is, any Group A sticking - beginning with one single stroke followed by an even amount of double strokes - will always feature an odd amount of notes; while any Group B sticking - beginning with two single strokes followed by an even amount of double strokes - will always feature an even amount of notes; and so forth,

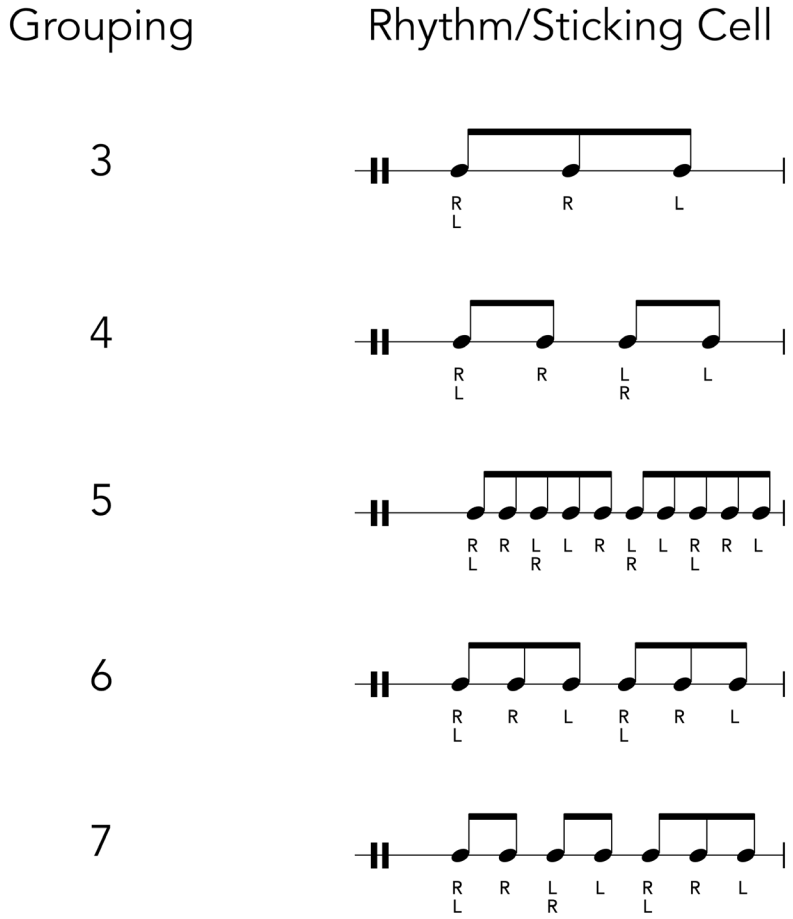
9 Chaffee only discusses up to group 'E' stickings, being stickings beginning with five single strokes.

I experimented with Chaffee's compound sticking cells as a possible sticking through which to articulate numerical grouping derived rhythms, such as I was encountering in the music of the Marc Hannaford trio. Initially I found this to be a success, as the systematic construction of the cells provided options for any length of number grouping; these options were then relatively easy to stream in any sequence required. However, as I pursued this further I found myself unhappy with the musical results.

My unhappiness primarily stemmed from the linear and dense nature of the compound sticking cells. The cells are linear in that they include no unison strokes, a quality which is further emphasised by the lack of ornamentation such as flams or drags; and they are dense in that they are constructed of an unbroken stream of equidistant notes, with rhythmic forms only emerging from accents or creative application to the drumset. Combined I felt that these qualities resulted in a very explicit rendering of rhythmic forms, as the subdivision pulse was being constantly sounded. This did not align with the Antripodean tendency towards obfuscation, nor my own personal artistic aesthetic. Furthermore, when performing at faster speeds (be it pieces at faster tempos, or higher order subdivisions such as septuplets), this constantly sounded subdivision equated to an excessive amount of individual attacks, which I found to often overwhelm my fellow band members. In summary, while the compound sticking cells provided a solution to my problem of articulating rhythms constructed from numerical grouping sequences, the musical result was not in line with my broader aesthetics.

Another collection of sticking cells I experimented with were Simon Barker's "East Coast inspired RS cells", which are shown in Figure 3.5, and demonstrated in Video 3.3 (Barker 2015, 94).

Figure 3.5. Barker's East Coast inspired RS cells (reproduced from Barker 2015)



Video 3.3. Barker's East Coast inspired RS cells

This collection of sticking cells emerged from Barker's research into traditional Korean percussion music. Interestingly, he chooses to use the unusual nomenclature of "rhythm/sticking cells" (RS cells), so as to:

> *"…maintain an equal focus on both the resultant rhythmic expression produced by the use of given variants, and the melodic or conversational effects produced by performing stick pattern variants on the high and low tones of a single drum"*(Barker 2015, 25)

The importance of rhythmic expression is evident in Barker's choice to arrange the cells by number grouping, with the set containing cells that articulate each grouping from three through seven in length. As such, these cells provide a set of variants with which to articulate number group sequences; as Barker is himself an Antripodean artist, this is clearly a deliberate choice.

A closer analysis of the RS cells reveals that they are constructed in a modular fashion; there are binary and ternary "subcells", which are chained together to form longer groupings. These subcells are shown in Figure 3.6; and the RS cells for groups of five and seven are parsed into the subcells in Figure 3.7.

Figure 3.6. Binary and ternary subcells of Barker's RS cells

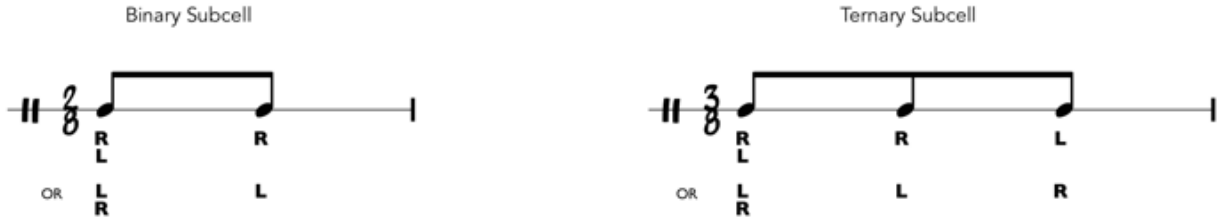
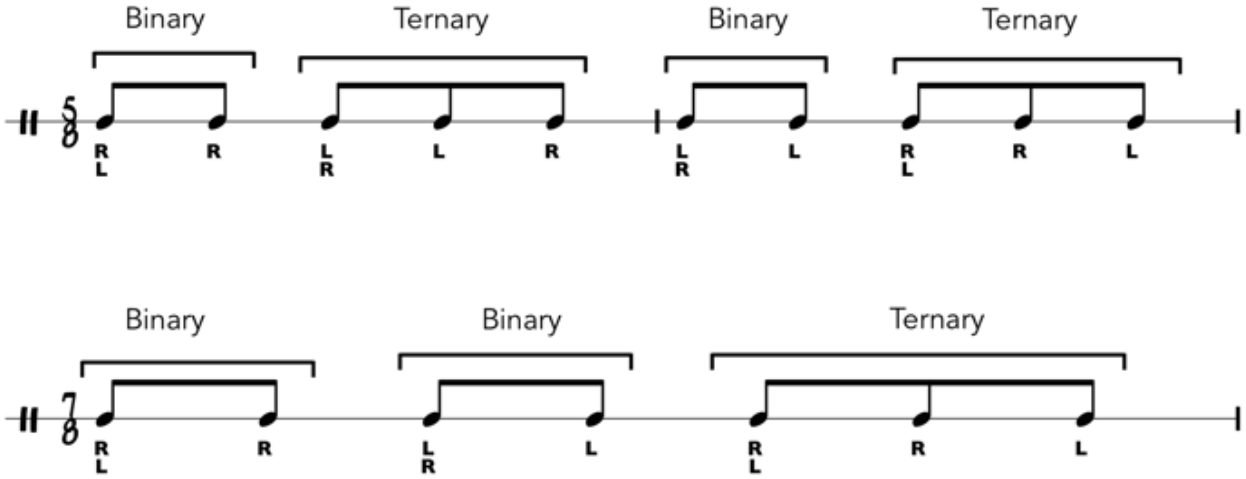


Figure 3.7. Five and seven note RS cells parsed in binary and ternary subcells



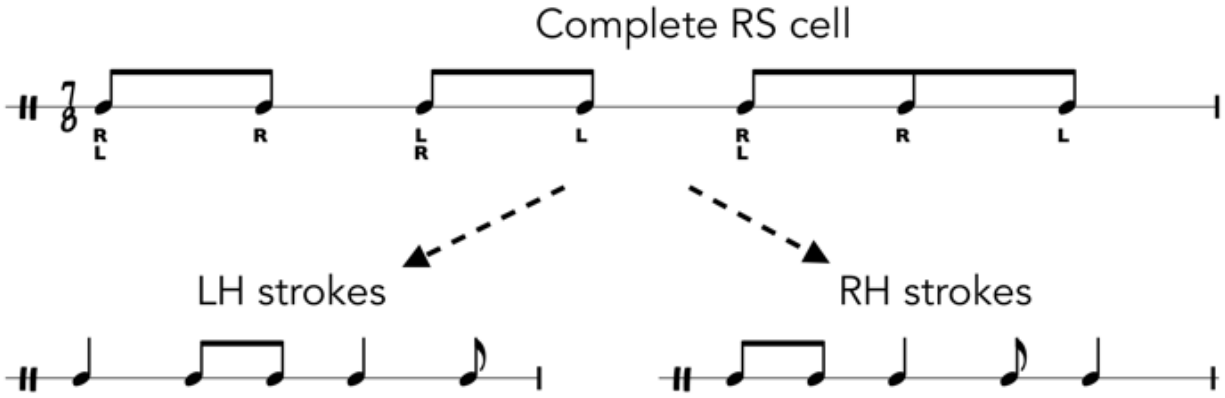
I found that, through practice of Barker's sticking cells, I developed an embodied ability to stream not only those cells, but also the two subcells, in different combinations. Over time I was also able to re-order the binary and ternary subcells to articulate other rhythmic forms – number grouping sequences or notated rhythms – that did not conform to the exact combinations notated by Barker.

Interestingly, Barker chooses to notate these cells as a single pitch, despite his stated interest in the "conversational effect" of performing sticking patterns with high and low tones (2015, 25). A notable feature of the cells is the recurrence of unison strokes, which produce a dull sound when performed on a single surface; this implies that the cells are designed to be split across two surfaces, and therefore two tones.

This two-tone conception of sticking cells likely emerges from Barker's study of the Korean *changgo*, a double-headed hourglass shaped drum (Barker 2015, 24). In performance, the *changgo* is positioned horizontally, so that both heads are accessible; furthermore, the left side of the drum produces a low tone, while the right side produces a high tone (Barker 2015, 24). As Barker's cells are designed for the drumset, within which all drums are positioned so that only one head is easily struck, their performance requires a different strategy to produce distinct tones. Within my practice of these cells, my solution was to sound a different drum with each hand.

While this may seem a mere practicality, seperating each hand onto a discrete sound source inherently accentuated the repeating rhythms created by the attacks of each individual hand; I have come to call these the *concomitant rhythms* of a sticking cell. Figure 3.8 shows Barker's seven-note RS cell, and the two concomitant rhythms that emerge from it; these are demonstrated in Video 3.4.

Figure 3.8. Seven-note RS cell and resultant concomitant rhythms



Video 3.4. Concomitant rhythms of seven-note RS cell

The accentuation of these concomitant rhythms imbues the cells with an inherently polyphonic character, distinct from other sticking cells that sound as a monophonic stream of notes, with rhythmic form created through accent.

While these cells provided me with another set of sticking variants through which to articulate numerical grouping sequences, and I was aesthetically drawn to their polyphonic character, I nevertheless found them unsatifacatory for my specific musical purposes. My first problem was purely technical, in that a byproduct of the recurring unison strokes is a frequent need to perform a "triple" stroke (that is, three sequential strokes by a single hand). I found the physical requirement of playing this stroke greater than single or double strokes, which limited the upper speeds at which I could articulate these patterns. My second problem was contextual. As Barker himself is an Antripodean artist, I was performing with other musicians who knew Barker's style intimately, and in some cases performed frequently with him themselves. As such, when I utilised these sticking cells in performance, I felt my style to be overtly imitative, and of a considerably lower quality than Barker himself. As I personally consider individuality as a desirable trait within improvising musicians, this imitative style was an undesirable result.

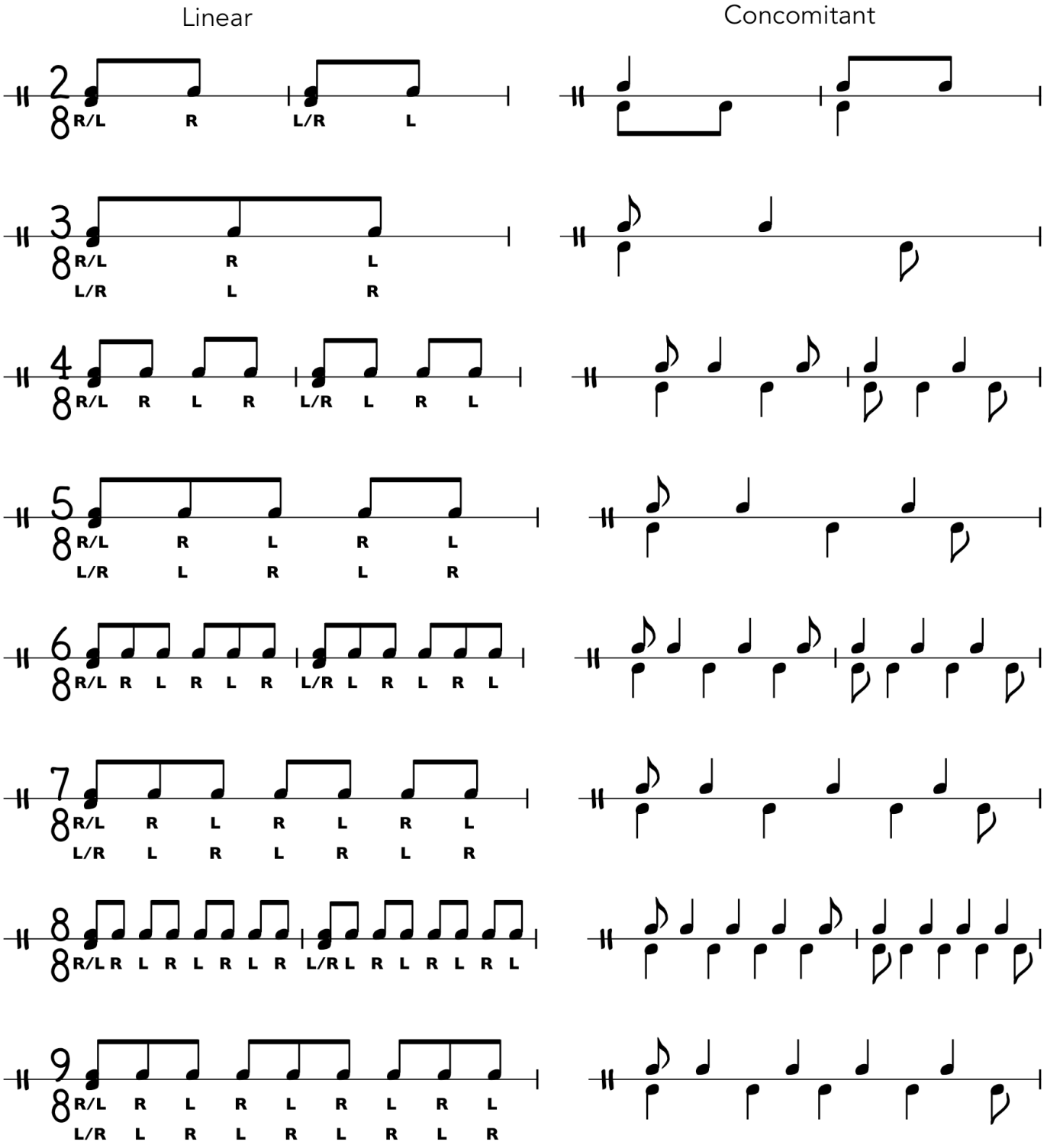
3.4.4 Developing original sticking cells

Informed by these periods of experimental practice and reflection, I decided to develop my own collection of sticking cells that conformed to my specific demands and aesthetics. In brief summary, my collection of sticking cells needed to:

1. Be constructed and organised so as to allow for direct application to numeric grouping sequences;
2. Avoid triple strokes, or other similar ornamentations, that significantly inhibit performance speed;
3. Be inherently designed for application to the drumset, being a modular and multi-timbral instrument, rather than for a single surface.

I also concluded that I would need to develop strategies for utilising these sticking cells at multiple densities, enabling their use in a wider variety of performance situations. Furthermore, my desire for originality in performance would be inherently addressed through the creation of a personal collection of sticking cells. The cells that I have developed, which I refer to as the *concurrent sticking scheme*, are displayed in Figure 3.9.

Figure 3.9. Concurrent sticking scheme



Each cell is presented twice; first as in "linear" form, with the rhythm notated monophonically and hand order dictated underneath, and then as a "concomitant" form, with the attacks of one hand notated above the stave and the other below. Where the hand order is consistent upon repeat, I have notated the cell as a one bar figure; where the hand order is inverted upon repeat, I have notated the cell as a two bar figure. The desire to avoid triple strokes dictates whether the hand order is constant or inverted upon repeat of a cell - in practice, all odd-length cells retain a constant sticking and all even-length cells invert on repeat. All of these features can be observed in Video 3.5, wherein I demonstrate each sticking cell in both forms.

Video 3.5. Concurrent sticking scheme

Each cell is constructed from a simple formula: the first note is a unison stroke, followed by a series of single strokes. While I originally conceived of the scheme including all groupings from two through nine, I quickly elided the two-note cell as the performance of it requires triple strokes be performed by both hands. As such, I pursued developmental exercises combining cells from lengths three through nine; I found this range manageable for developing an improvisational vocabulary.

Similar to Barker's RS cells, the regular use of unison strokes is evidence of multi-surface application being intrinsic to these cells. Similarly, concomitant rhythms, which emerged during my practice of Barker's cells, are here explicitly notated. As I undertook developmental exercises that focused on these concomitant rhythms, I developed an understanding of these sticking cells equally as both embodied hand orders and as short phrases of rhythmic polyphony.

Deliberate practice isolating each concomitant rhythm also developed an understanding of each hand's individual motions and rhythms, which I found helpful when these cells interacted with other creative parameters I was exploring, such as those exploring the manipulation of movement on the drumset. My performance strategies with regard to movement cycles is outlined in the following subchapter, and examples of the musical outcomes of the interaction between sticking cells and movement cycles are outlined in Chapter 4.

3.4.5. Terminology

As well as the practical developments documented, during the research process I identified that my method of parsing sticking cells into concomitant rhythms could illuminate how the embodiment of such cells can shape the selection and development of musical ideas within drumset improvisation. For the commentary and analysis undertaken in Chapters Four and Five, I will be using the following definitions of core sticking cell terminology:

Hand Order

Hand order refers to the series of right- and left-hand strokes used in articulating a musical figure.

Sticking Cell

A sticking cell is a hand order sequence aligned to a fixed rhythmic form.

Concomitant Rhythm

A concomitant rhythm is the rhythm derived by isolating the attacks of one hand within a sticking cell. There are therefore two concomitant rhythms – the left-hand and right-hand concomitant rhythms - contained within each sticking cell.

3.5 Motor structures and movement cycles

3.5.1 Motor structures

The second correlation I have drawn between academic theory and practice-based knowledge addresses the situated nature of improvising at a modular instrument such as the drumset, and the movement patterns that mediate the relationship between the body and the drumset. Specifically, engaging with Bailey and Driver's conception of "motor structures" (1992) inspired me to reconsider the role of movement within my creative practice, leading to the development of generative processes that foreground cycles of movement as a primary manipulable parameter.

Bailey and Driver's research examines the relationship between body movement and musical structure within folk blues guitar practice (1992, 57). While the instrument-specific details of their research are not relevant to this project, the theory and terminology they propose has both clarified my own thinking in this area, and inspired new avenues of creative exploration.

One broad theoretical construct I have found useful is the distinction between auditory and spatio-motor modes of musical cognition (1992, 58-59). Bailey and Driver's definition of the 'spatio-motor mode' appears to be largely analogous with what I am here calling embodied music cognition, although their research predates the widespread usage of that term. They identify a widespread tendency to dismiss the spatio-motor mode as a source of musical creativity, and as such feel a need to argue for its value as a "legitimate and commonly used mode of musical thought" (1992, 58-59).

Reflecting on my musical values prior to undertaking this research project, I realised that I too had valued improvisational ideas born of the auditory mode as being inherently more musical than those born of the spatio-motor mode. Although I cannot attribute this attitude to any one text or occasion, I suspect that it was a product of the broader musical community in which I worked and studied, wherein it would be colloquially expressed as something along the lines of "only play what you hear". As I began to consider the potential of a more conscious engagement with the spatio-motor mode, Bailey and Driver's open-ended suggestion that "creativity in music may consist of finding new ways to move on the instrument" became a guiding principle for the experimental practice undertaken within this research project (1992, 59).

A second, more specific concept drawn from Bailey and Driver's work is that of the "motor structure" (1992, 63). The motor structure of a given style comprises both bodily positions (such as postures or hand positions) and patterns of movement that are specific to the performance of that style (1992, 63). These positions and movements then "set the parameters of what will develop as a motor grammar", and

so can be understood to "lie behind the music" (1992, 63).

I found the idea of motor structures consonant with my own experiences as a performer. I had often observed that successfully performing within different genre conventions required not only conscious decisions to articulate the associated grooves or patterns, but also the embodiment of alternative physical relationships with the instrument - the minutiae of which occurred automatically as I recalled and attempted to replicate the physical sensation of previous successful performances. Examples of such minutiae include alteration of stick grip, the subtle shift in arm muscle movement required play at a lower or higher dynamic level, or changes in posture as different elements of the drumset are hit more or less frequently. The combination of these changes subsequently causes a similar shift in kinesthetic feedback, which further reaffirmed the feeling of playing in the style (or not!). While their focus is analytical rather than experiential, Bailey and Driver's conception of motor structures seemed to be analogous with my own embodied knowledge of style.

Having learnt to play the drums primarily through a pedagogical framework associated with jazz-style drumming, I felt these materials directly shaped my personal physical relationship with the instrument. While the development of a rigorous, tested, motor structure of jazz drumming would constitute a research project in its own right, in order to contextualise this discussion I will provide some brief observations of what I consider such a motor structure to be[10] .

The basic posture seats the drummer at the drumset with the left-foot positioned at the hi-hat pedal, the right-foot positioned at the bass drum pedal, the left-hand positioned so that the end of the stick hovers over the snare drum (which is situated between the legs), and the right-hand positioned so that the end of the stick hovers over the ride cymbal (situated to the right-side of the body)[11]. My observations here are reinforced by Brown (1990, 43-44).

I generally associate two major sets of movement patterns with playing in a jazz style. The first is associated with timekeeping and accompaniment; it retains this posture, articulates a repetitive rhythmic figure with the right hand, whilst strikes of the other three limbs are simultaneously layered using different syncopated rhythms. A second set of movement patterns, that I associate with soloing or more interactive playing, involves the hands articulating sticking cells (particularly those derived from the rudiments) whilst moving between the snare drum, toms and cymbals, during which time the right-hand undertakes a wider range of movement than the left. Within my general performance these two sets of movements are interchangeable and constantly interwoven, however they are frequently addressed distinctly within pedagogical texts[12] (such as Blackley 2010a, 2010b; Chaffee 1976a, 1976b; Ramsey 1997; Wilcoxon 1941).

I constructed this simple definition of a jazz drumming motor structure for myself early in the research period, and in doing so I began to realise how pervasively this motor structure underpinned my perfor-

10 This is the motor structure of jazz drumming with sticks; the motor structure of jazz drumming with brushes would be significantly different.

11 This posture is common for right-handed drummers such as myself. Many left-handed drummers exactly invert these positions, while some have a mixed set-up (such as inverting the feet but not the hands, or vice versa).

12 The distinction between timekeeping and soloing is also supported by the research of drummer Andrew Gander (2017). Whilst not concerned with the underlying motor structure, Gander identifies time functioning and soloing as two "discrete modes of drum-set vocabulary" (2017, 57). He goes on to utilize a process of "transitional synthesis" between these two modes as a primary practice-led methodology (2017, 57-58).

mance style, even outside of explicitly jazz performances. I observed that my attempts thus far to develop an idiosyncratic approach to Antripodean improvising had all taken the form of slight variations within the motor structure of jazz drumming. For instance, as I worked to develop rhythmic fluency in the quintuplet subdivision, I pursued numerous exercises that not only conformed to the standard jazz posture, and also the types of movements I associated with timekeeping - wherein the right-hand articulates a rhythmic ostinato, onto which the other three limbs layer syncopated combinations. While I successfully furthered my skills with quintuplet rhythmic forms outside of common jazz rhythmic lexicon, by associating them with the motor structure of jazz drumming I was also unintentionally imbuing these ideas with other musical characteristics that are explicitly associated with jazz. While this was not inherently negative, it was not in line with my aim of developing a unique improvisational idiolect with which to interact with the Antripodean musical community.

As such I began to make conscious attempts to avoid this motor structure within my practice and performance. My initial attempts were both challenging and musically unsatisfying, as I did not have another deeply embodied motor structure that I could draw on within the time-pressured environment of live improvisation.

3.5.2 Developing a personal motor structure

Concurrent to my engagement with Bailey and Driver's research I encountered a pedagogical video presenting exercises and concepts developed by contemporary American jazz drummer Dan Weiss (2013). In one segment of the video, entitled *Motions*, he demonstrates and explains an original developmental exercise derived from combining complex motions with each hand. The exercise is constructed of five steps:

1. For each hand, select a "motion" to follow. These motions - which I will henceforth refer to as *movement cycles* - are an ordered series of points on the drumset (that is, the individual cymbals or drums) that are repeated. Weiss states that selection of movement cycles is arbitrary, suggesting following common figures such as circles or figure eight patterns.
2. Once selected, the left- and right-hand movement cycles are performed as isochronous pulses sounded in unison.
3. When fluency with the combined movement cycle is attained, the feet are added to articulate an underlying pulse. In his demonstrations, this pulse occurs in unison with the first of every two hand-strokes, rhythmically implying that the pulses of the hands are occurring at a quaver rate.
4. The two hands are then rhythmically split, and producing an even stream of alternating strokes (that is, single strokes). The speed of each movement cycle is unchanged, with the interlaced cycles creating an unbroken semiquaver rhythm.
5. Finally, the movement cycles are sped up, while the feet maintain a steady pulse. This is achieved by shifting the alternating strokes of the two hands from semiquavers to sextuplets.

In Video 3.6, I demonstrate the first four steps of this exercise, using one of the examples given by Weiss (2013).

Video 3.6. Demonstration of Weiss' "Motions" exercise

For me, the salient feature of Weiss' exercise was the utilisation of patterns of movement as the primary variable. That is to say, through each iteration of the exercise, the variable element is the selection of movement cycles (step one), after which each step is followed as a closed procedure. In 15 years as a drummer, this exercise was the first I had encountered that utilised movement in this way. Usually, if movement was a part of the exercise (which it frequently was not), then it was a fixed parameter through which another variable - such as rhythms or sticking cells - were expressed. Weiss' exercise inverted this relationship.

I integrated this exercise into my own instrumental practice regime, and over time not only improved my technical skill but also began embodying alternate strategies of movement, which I was also drawing on in performance. As this practice was occurring simultaneously as my engagement with the theory of motor structures (and embodied cognition literature more broadly), I was deliberately selecting many combinations of movement cycles that were distinct from the typical movements of the jazz drumming motor structure I was attempting to escape from. As I spent many hours repeating these novel movement cycles (and combinations thereof), I was embodying these new motor patterns; I was also becoming familiar with the novel aural result thereof.

Early on in this process I began to create my own derivations of Weiss' exercise. Generally, I pursued the steps outlined by Weiss as a preparatory phase, to gain basic familiarity with the movement cycles, before adding complexity through my own variations. The most fruitful methods of variation fell into two, often interacting, categories:

1. Expressing the combined movement cycles through more complex sticking cells, such as the concurrent sticking cells outlined in the previous subchapter, and,
2. Expressing these combined movement cycles through all subdivisions from quaver through nontuplet.

Through practical experimentation with the first category of variations - those created through the interaction of movement cycles and sticking cells - I developed the process of *somatic parameter layering*, which has become the primary generative methodology for the recorded solo works accompanying this thesis. This will be adressed in Chapter Four.

3.5.3 Terminology and taxonomy of movement cycles

A major theoretical outcome from my research into this area is the development of a taxonomy for both individual and combined movement cycles. The underlying principles of this classification system emerged from my kinesthetic experience of these cycles. As I experimented with many different movement cycles I found that certain cycles, or combinations thereof, had commonalities such that they felt almost identical to play. I observed that this was due to similarities in the underlying motions of the arms, despite how those motions were applied to the elements of the drumset. For example, I noted that all cycles that moved in a consistent clockwise direction felt remarkably similar to perform - even if they were applied to completely different parts of the drumset, and consequently sounded nothing alike.

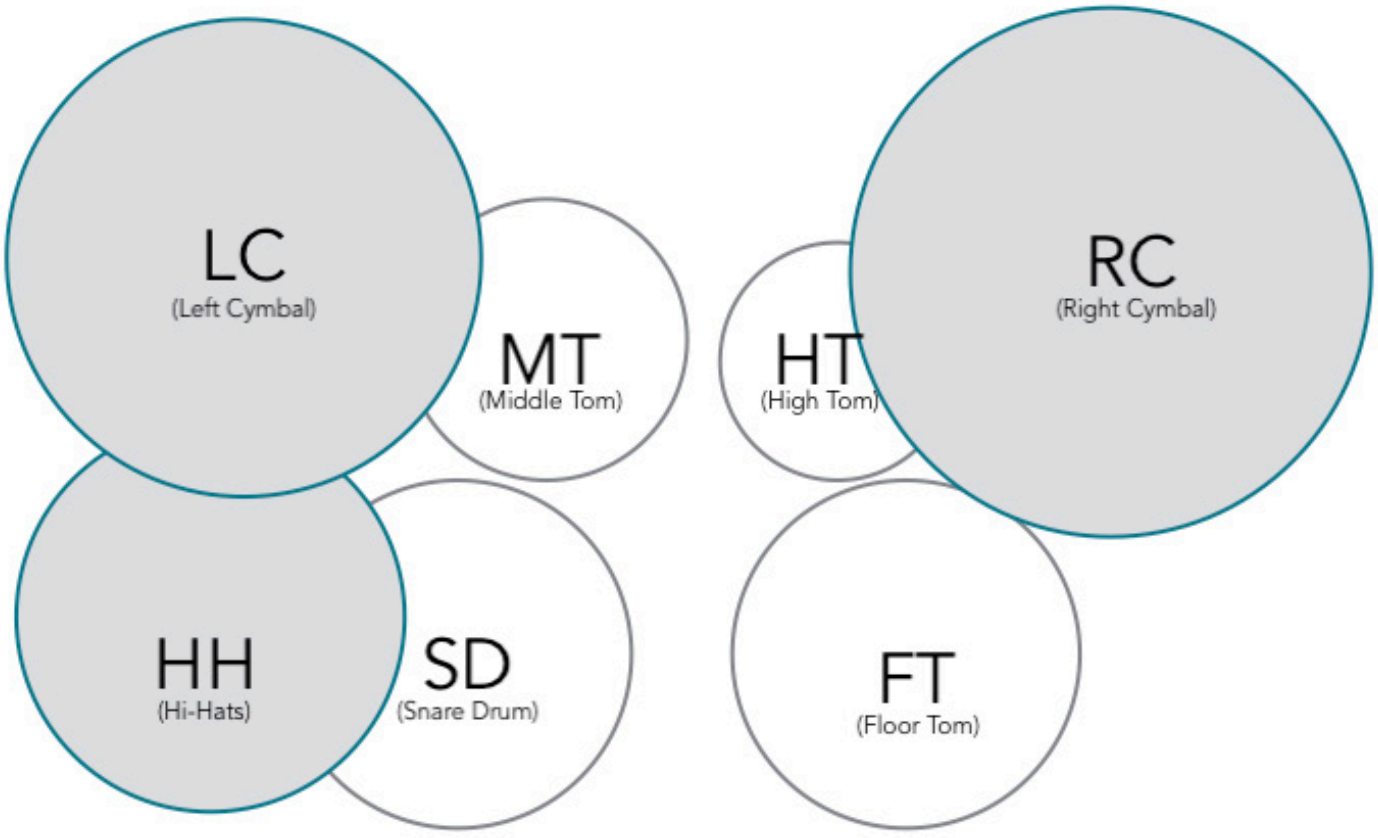
By the first recording session, undertaken approximately 15 months into the research period, I had identified a series of different classes of movement, such as the clockwise or anticlockwise. At this time, however, I viewed these classes as entirely distinct from one another; they informed my improvisations, but did not form any overarching theory. Some time later, as I began to analyse the data gathered during that recording session, I determined that a systematic approach to organising these movement classes was required to facilitate clear description and analysis.

I collated the movement classes I had identified, and isolated primary characteristics common to multiple classes. By assessing these primary characteristics, a rational system for organizing the classifications of movement became apparent. Once I had determined a systematic approach for classifying individual movement cycles, the possible classifications of combined movement cycles logically followed. The following not only documents these classifications, but also defines terminology and serves as analytical framework for the commentary and analysis undertaken in Chapters Four and Five.

To communicate this taxonomy, I have developed a system of visually representing these movements. The first step is to form a simplified representation of a drumset as viewed from above, mapping the spatial position of each element. As the drumset is a variable, modular instrument, I have modelled this visualisation on my own drumset, rather than attempt to determine a standard form of the instrument. To clarify this relationship, Figure 3.10 is a photo of my own drumset, with Figure 3.11 showing the simplified template representation thereof.

Figure 3.10. Top-down photo of my own drumset

Figure 3.11. Simplified visualisation of my own drumset



All cymbals are shaded grey, whilst all drums are shaded white. The exact size and spatial positioning of each drum and cymbal, whilst approximated, is generally correct. The bass drum is elided from this visualisation, as it is only sounded via foot pedal (similarly, the foot pedal of the hi-hat is not included).

This visualisation is then used as a template, onto which movement cycles are mapped. Movements of the right-hand are mapped with a solid red line, whilst movements of the left-hand are mapped by a broken green line.

Classification of Movement Cycles

Hit Points

Hit points are the elements of the drumset that are struck to make sounds. The most common form of a hit point is a cymbal or the skin of a drum, but can be any sound source with a unique spatial location. Other potential hit points include other sound sources within a conventional drumset (such as the rim or side of a drum, or the bell of a cymbal) or auxiliary elements of an expanded drumset (such as mounted cowbells or tambourines).

Individual Movement Cycles

Individual Movement Cycle

An individual movement cycle is the pattern of motions undertaken in sounding a repeating series of hit points with one hand[13] . Each individual movement cycle is defined by two attributes: the amount of hit-points contained in the cycle, and the type and direction of the movement cycle.

The amount of hit-points is the number of points that are sounded within each repeat of the movement cycle; if any hit-point is sounded twice then both are counted towards the total amount.

The type of the movement cycle refers to underlying motion, and is described as if viewed from above. There are three possible types: circular, linear, and compound.

The direction of the movement cycle is a subset of the movement type; that is, each movement type contains a unique set of possible movement directions. Circular type movement cycles can move in either a clockwise or anticlockwise direction; linear type movement cycles can move in an oscillating, right-to-left, or left-to-right direction; compound type movement cycles require direction to be determined in-situ.

During analysis, individual movement cycles are primarily identified by the amount of hit points and the direction of movement; the movement type is often unstated as it is implied by the direction. For example, a three-point oscillating movement cycle must be of a linear type, and a four-point clockwise movement cycle must be of a circular type.

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13 Throughout this work I am using "hand" as a synecdoche for the combination of hand, arm and stick/mallet/brush.

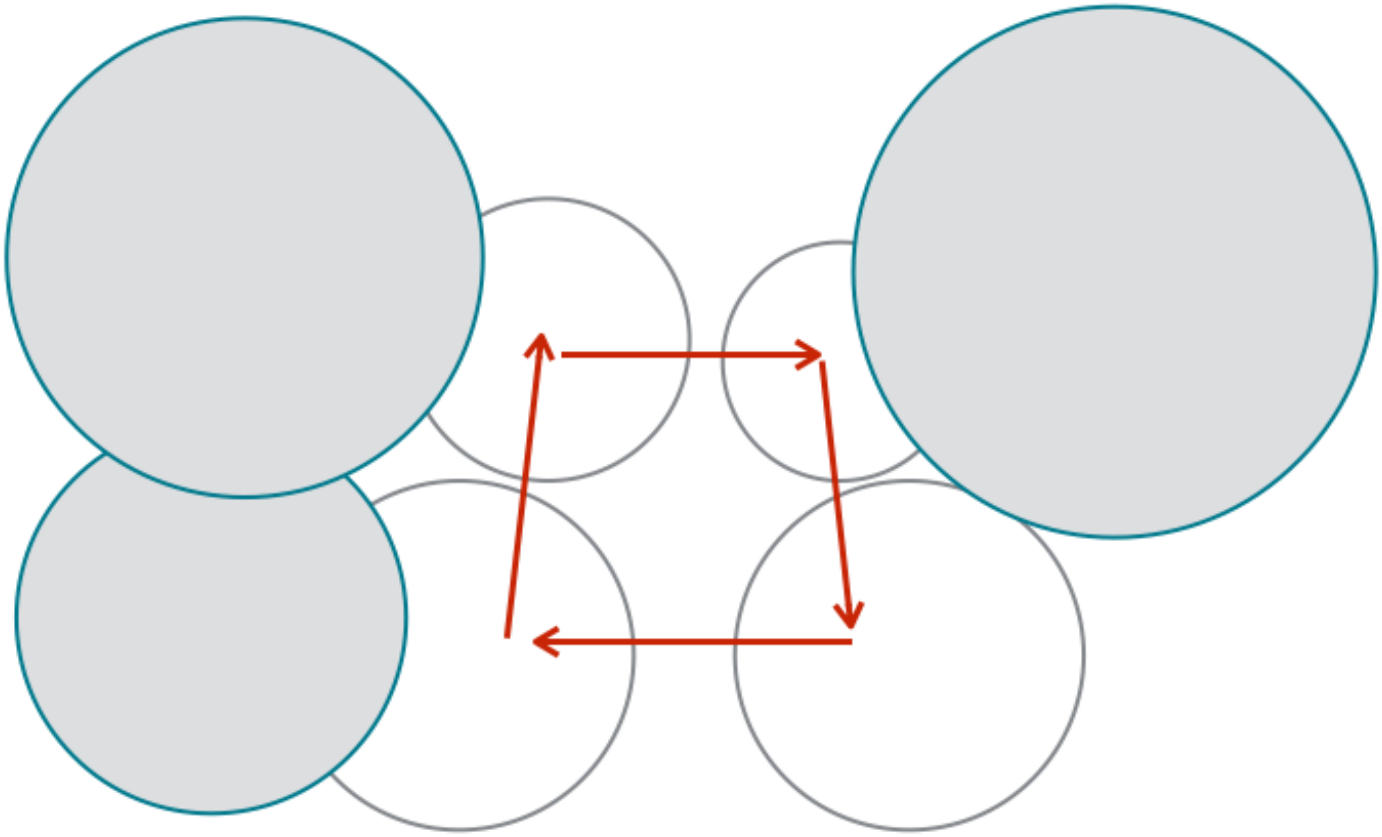
Circular Type Individual Movement Cycles

Circular type movement cycles are characterized by the continuous, looping motion of the hand. This occurs if hit points are arranged such that the specific orientation of motion is gradually altered between each hit point, never requiring a complete cessation of movement (however brief); that no hit point is repeated within each cycle; and that the path of movement also never overlaps.

Note that circular type movements do not necessarily resemble circles; as rounded motions of the hand are represented visually by straight lines, diagrams of circular type movements actually resemble other geometric shapes. Thus three-point cycles will resemble a triangle, four-point cycles will resemble a square or trapezoid, and so forth. The possible directions of a circular movement cycle are:

- **Clockwise** --- wherein the hand moves between the hit points in a clockwise direction. A four-point clockwise movement cycle is shown in Figure 3.12 and demonstrated in Video 3.7.

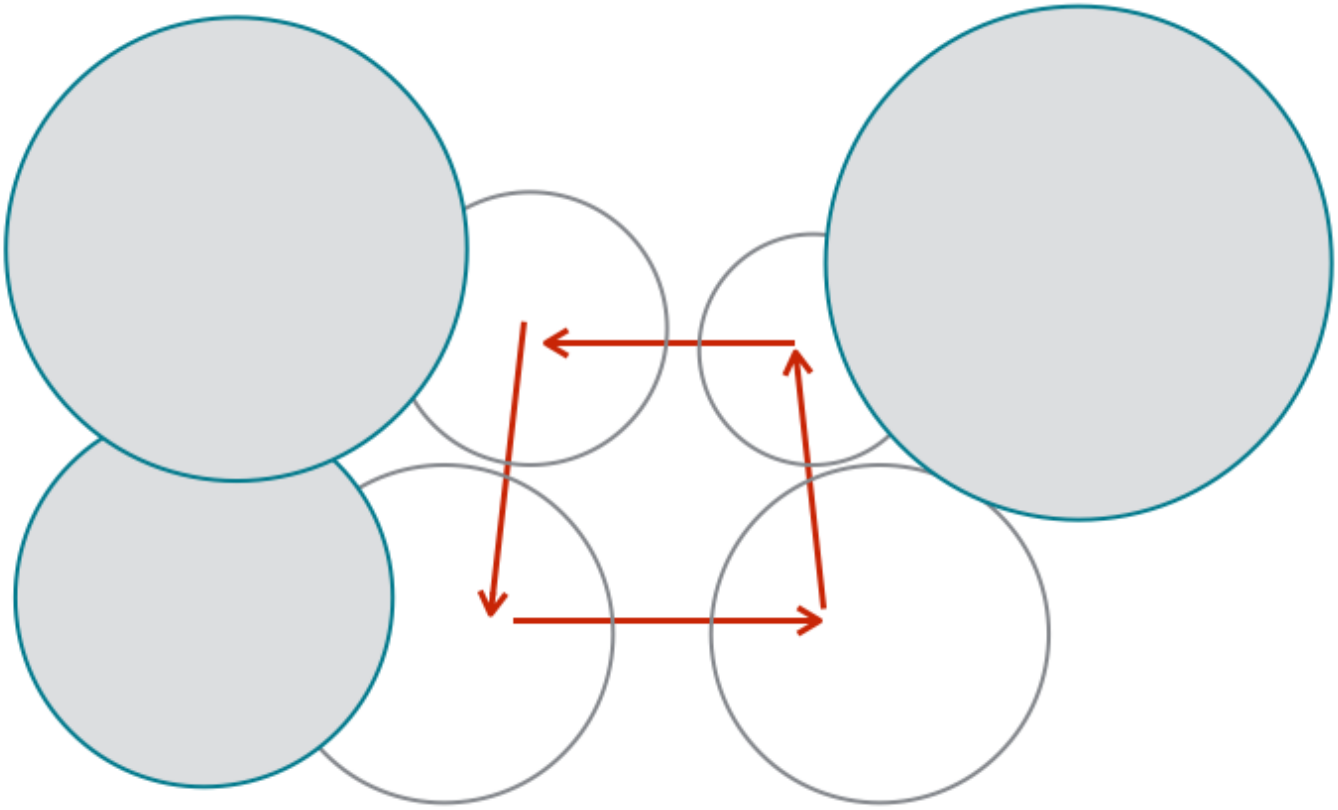
Figure 3.12. Four-point clockwise movement cycle



Video 3.7. Four-point clockwise movement cycle

- **Anticlockwise** --- wherein the hand moves between the hit points in an anticlockwise direction. A four-point anticlockwise movement cycle is shown in Figure 3.13, and demonstrated in Video 3.8.

Figure 3.13. Four-point anticlockwise movement cycle



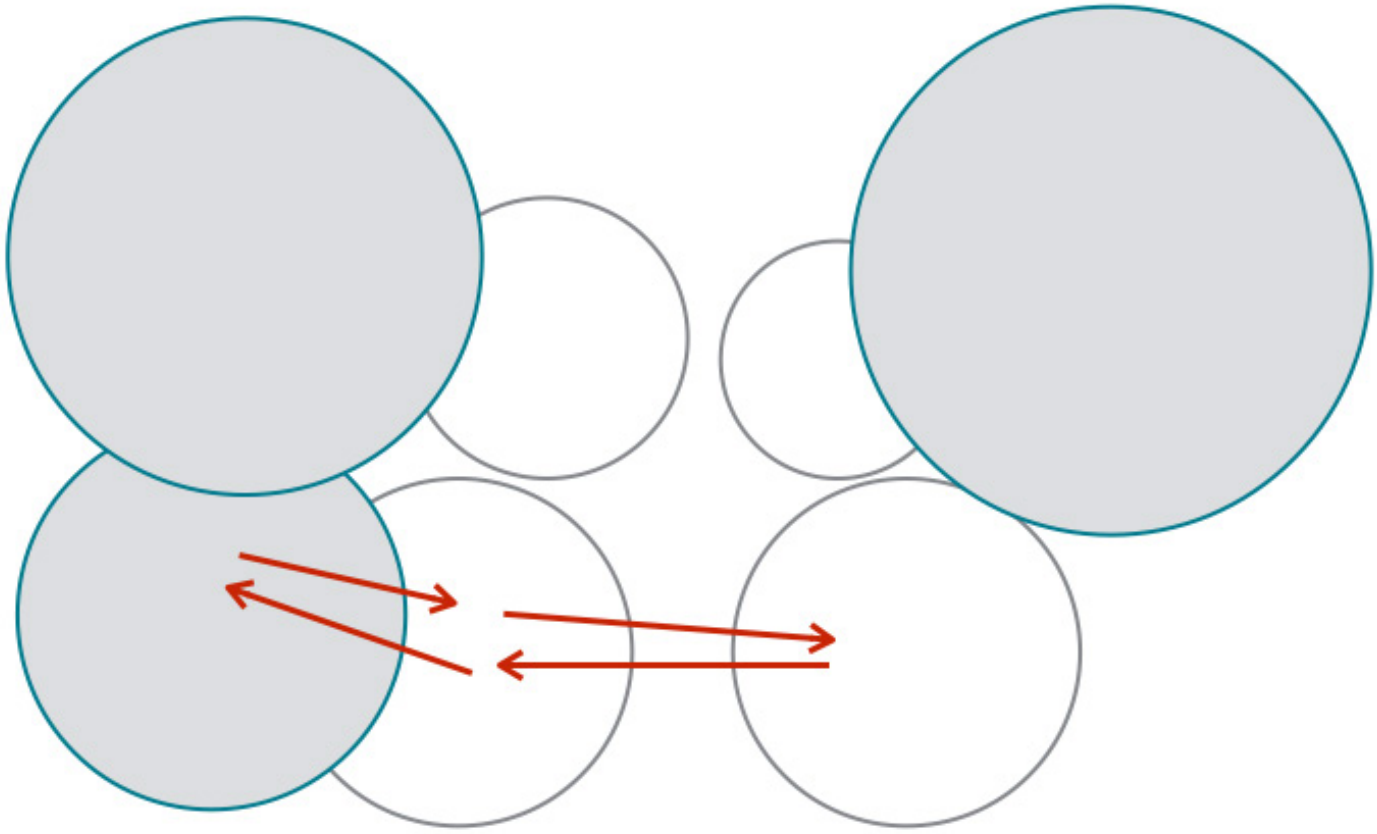
Video 3.8. Four-point anticlockwise movement cycle

Linear Type Individual Movement Cycles

Linear type movement cycles are those where the movement occurs along a straight line. In order to repeat, linear type movement cycles reverse direction at both ends; this requires a brief but complete stop, before moving in the reverse direction. The possible directions of a linear type movement cycle are:

- **Oscillating** --- wherein the hand oscillates back-and-forth from one end of the movement cycle to the other, sounding each hit-point on every pass. As a result of this motion the internal hit points are sounded twice in each complete cycle; a byproduct of which is that oscillating cycles will always have an even amount of hit-points sounded within each cycle. Note that oscillating cycles are named by the complete amount of hit points sounded in each cycle, not the (lesser) amount of unique hit points. Also notable is that any two-point cycle will be oscillating, as that is the only possible motion between only two hit points. A four-point oscillating movement cycle is shown in Figure 3.14, and demonstrated in Video 3.9.

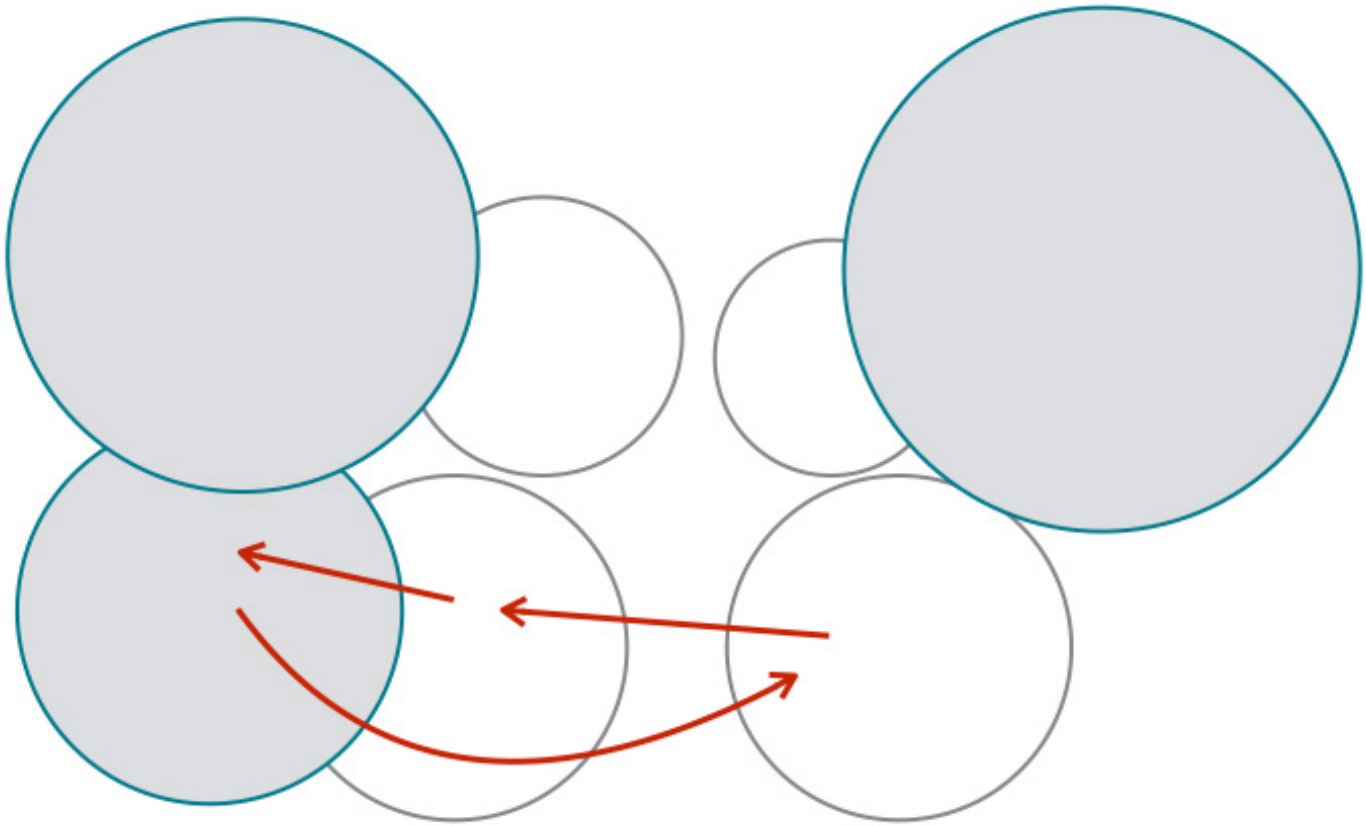
Figure 3.14. Four-point oscillating movement cycle



Video 3.9. Four-point oscillating movement cycle

- **Right-to-left** --- wherein the hand sounds every hit point whilst moving to the left, but then immediately returns to the rightmost hit point; not re-sounding the internal hit points. A three-point right-to-left movement cycle is shown in Figure 3.15, and demonstrated in Video 3.10.

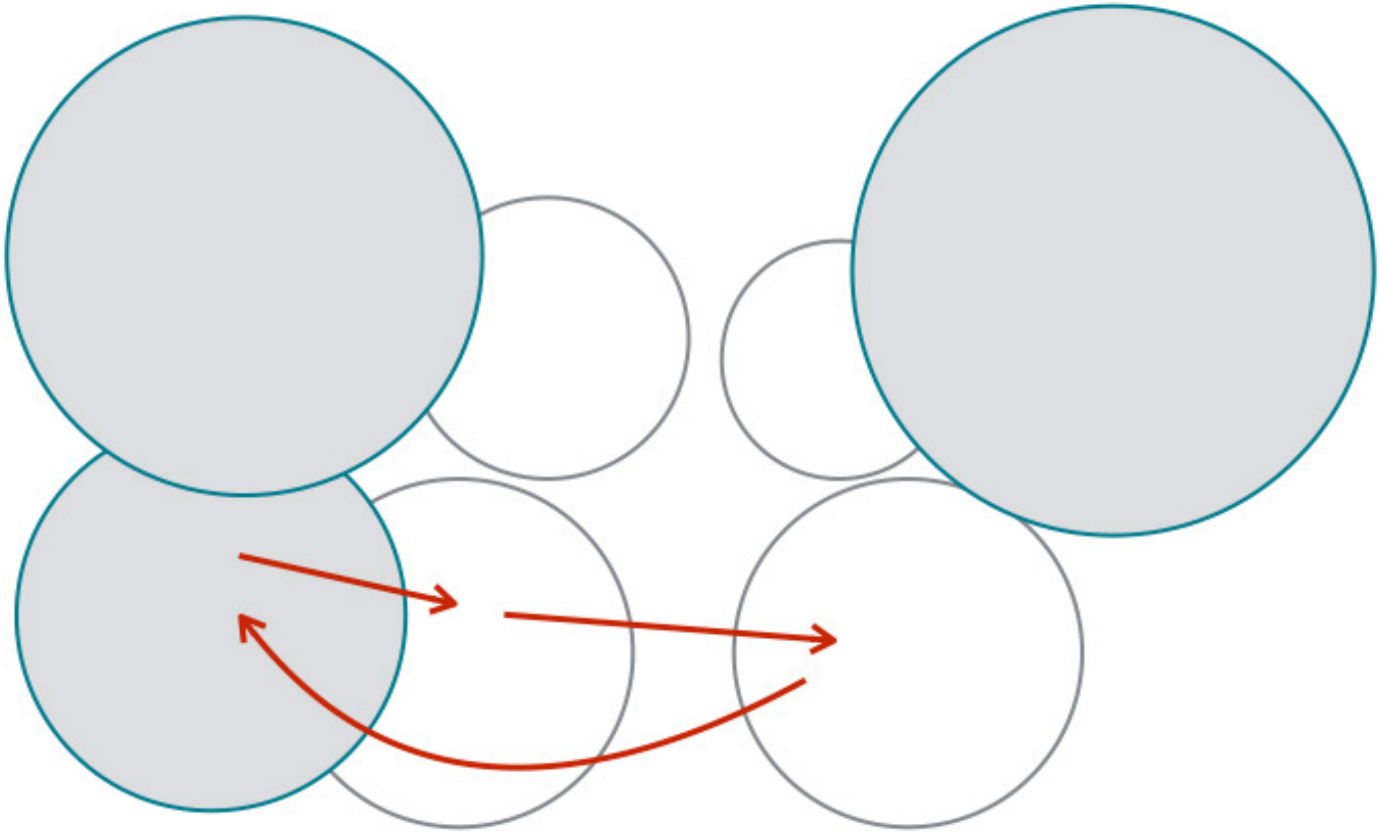
Figure 3.15. Three-point right-to-left movement cycle



Video 3.10. Three-point right-to-left movement cycle

- **Left-to-right** --- wherein the hand sounds every hit point whilst moving to the right, but then immediately returns to the leftmost hit point; not re-sounding the internal hit points. A three-point left-to-right movement cycle is shown in Figure 3.16, and demonstrated in Video 3.11.

Figure 3.16. Three-point left-to-right movement cycle



Video 3.11. Three-point left-to-right movement cycle

Compound Type Individual Movement Cycles

Compound type movement cycles comprise all other motions that do not conform to either circular or linear types. As they are not characterized by a particular underlying motion, the potential directions of

a compound movement cycle cannot be generalized.

Examples of compound movement cycles include "figure-eight" (Figure 3.17) or "hook" (Figure 3.18) shapes; note these are descriptive titles rather than analytic terminology.

Figure 3.17. Four-point figure-eight movement cycle

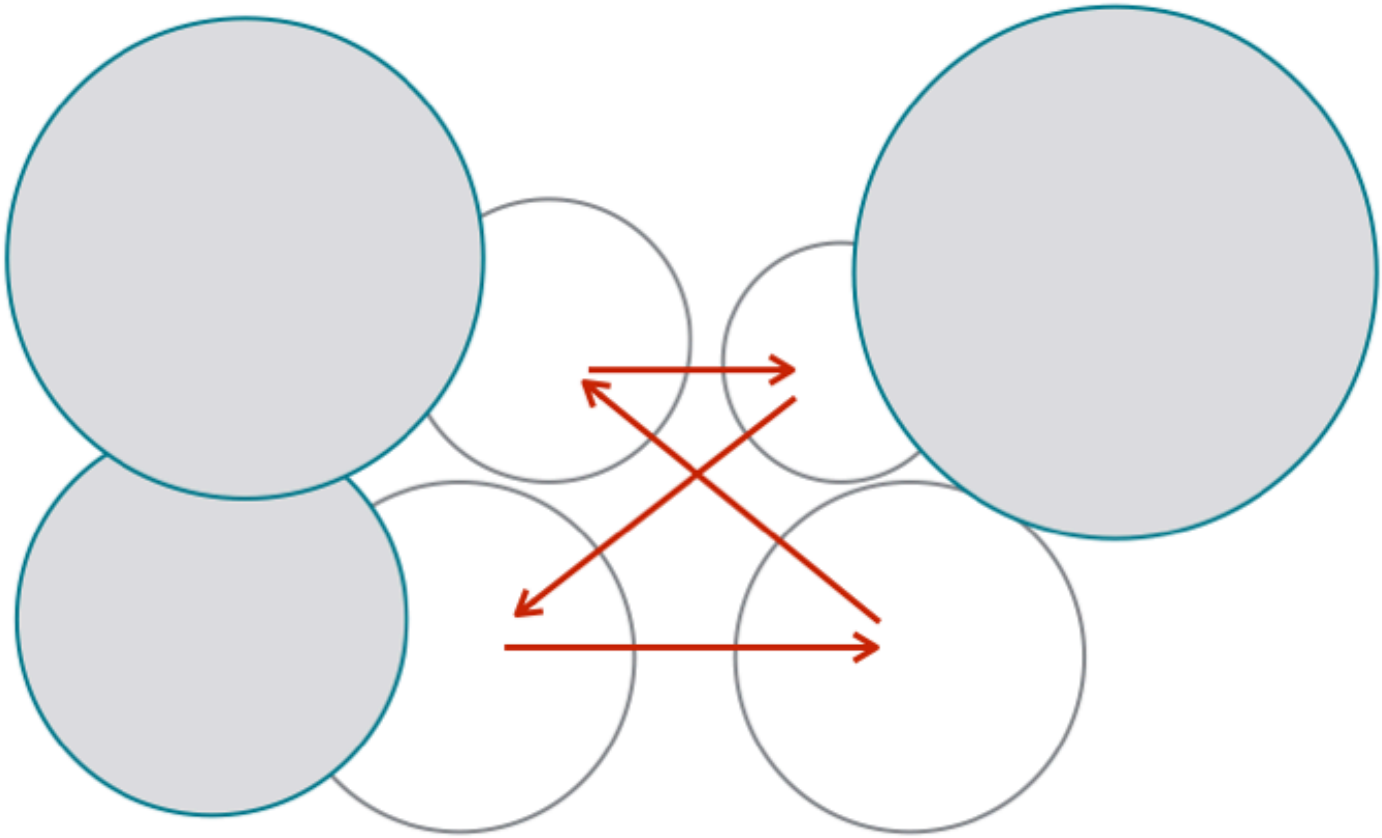
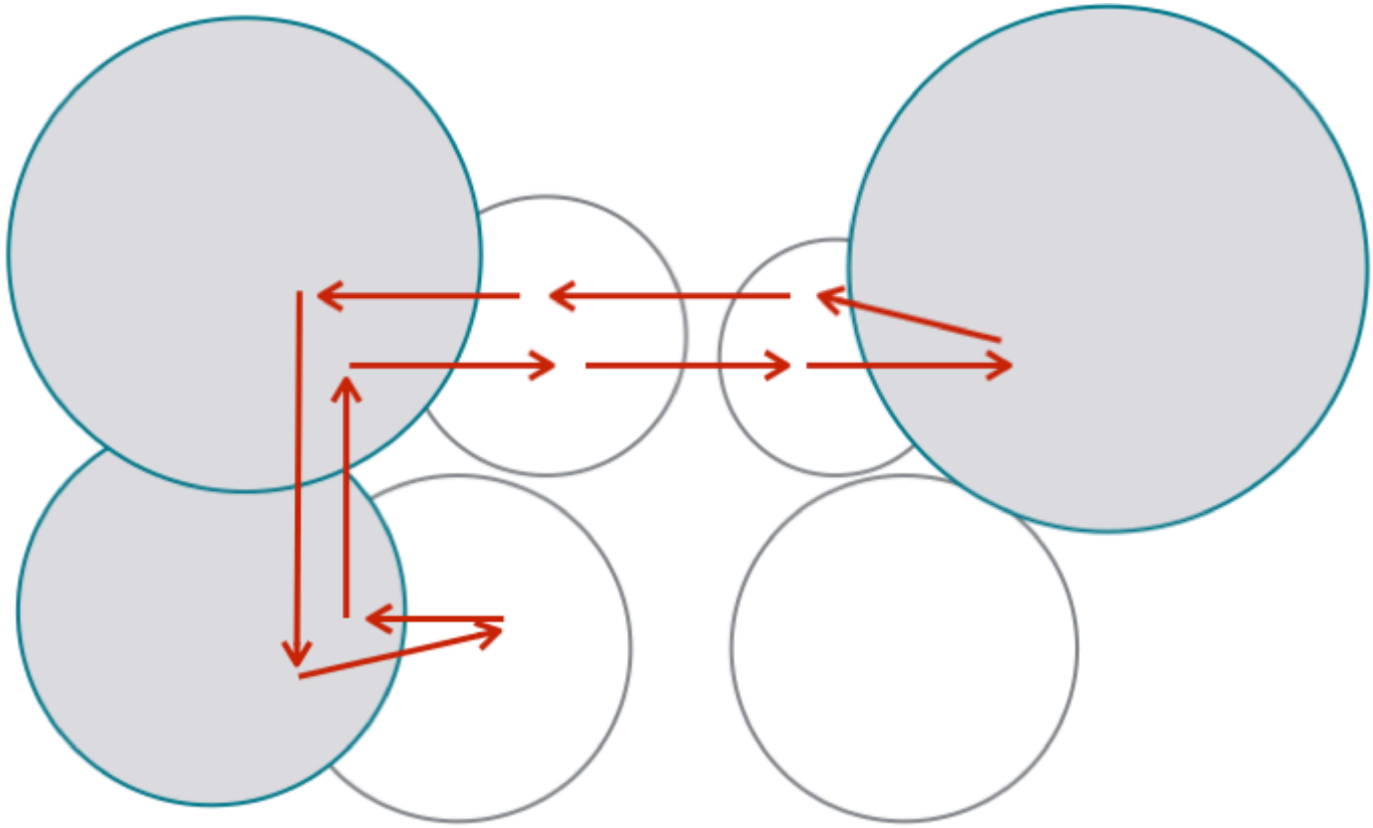


Figure 3.18. Ten-point hook movement cycle



Combined Movement Cycles

Combined Movement Cycles

A combined movement cycle is the pattern of motions undertaken as the right and left-hands simultaneously sound individual movement cycles. The relationship between the two individual movement cycles can generate a wide range of complex physical interactions; combined movement cycles are classified by whether primary characteristics of the individual movement cycles are shared or disparate. These primary characteristics are the same as those used for classifying individual movement cycles: amount of hit points, type of movement, and direction of movement. From the possible relationships between these characteristics, I have identified seven classes of combined movement cycles, which I have grouped into four sets.

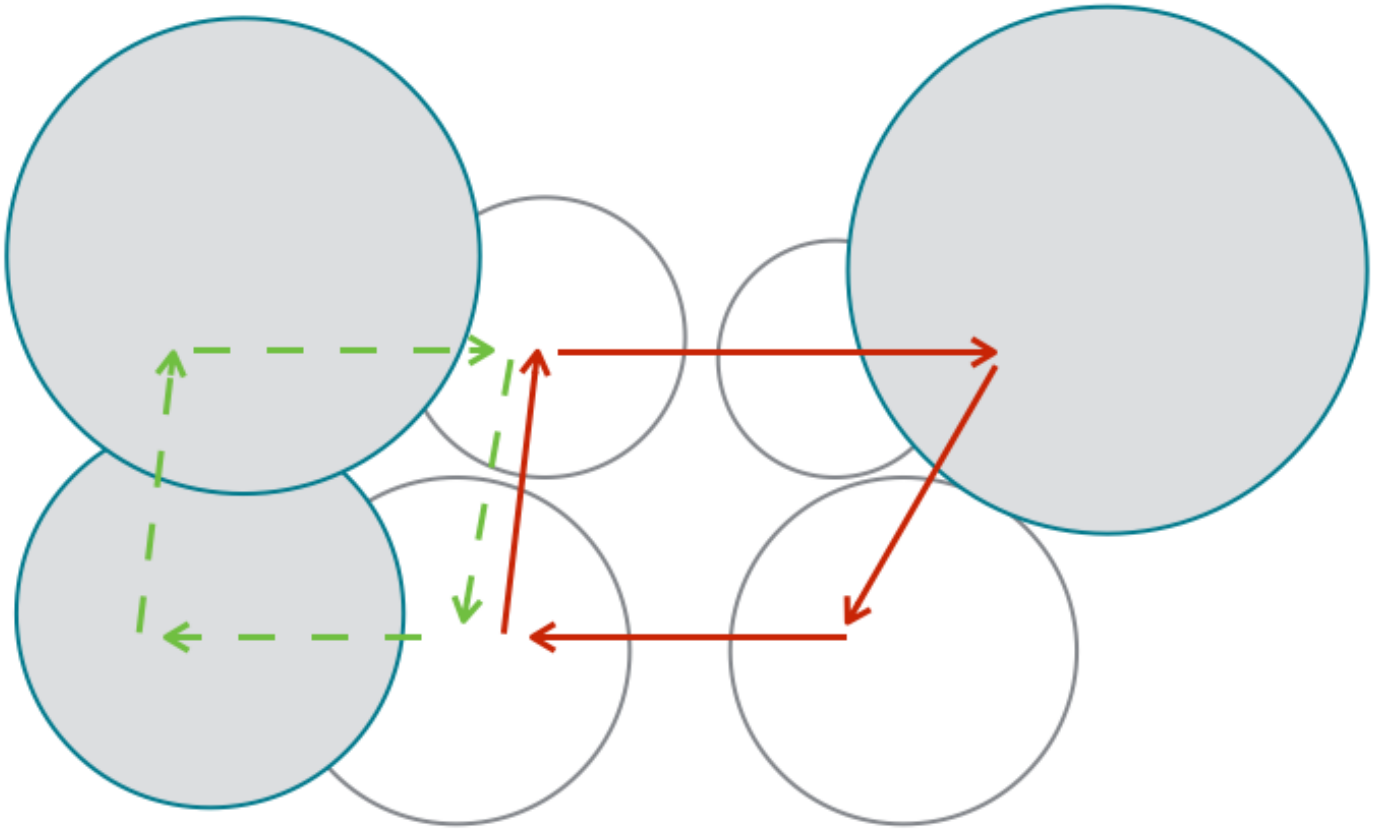
Entrained Set of Combined Movement Cycles

The entrained[14] set of combined movement cycles encompasses those wherein both individual movement cycles are of the same type, and move in the same direction. There are thus two classes with these characteristics:

14 My use of the term "entrained" throughout the following classifications is derived from the broader concept of "entrainment", being "the interaction and consequent synchronization of two or more rhythmic processes" (Clayton, Sager, and Will 2004, 2).

- **Entrained** --- wherein the individual movement cycles are of the same type, move in the same direction, and have an equal amount of hit points. An example is shown in Figure 3.19 and demonstrated in Video 3.12; wherein both individual cycles are of a circular type, move in a clockwise direction, and contain four hit points.

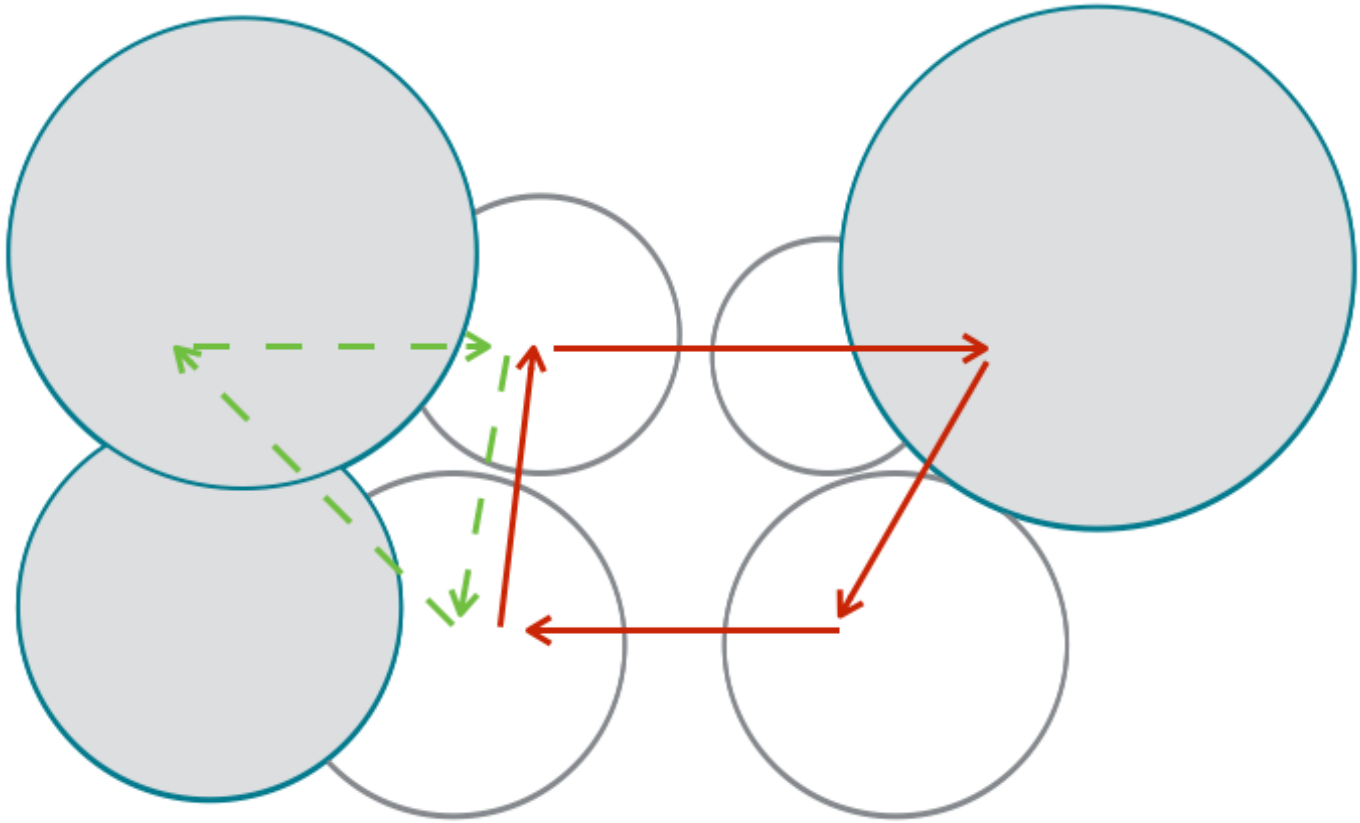
Figure 3.19. Entrained class combined movement cycle



Video 3.12. Entrained class combined movement cycle

- **Phasing** --- wherein the individual movement cycles are of the same type, and move in the same direction, but have an unequal amount of hit points. An example is shown in Figure 3.20 and demonstrated in Video 3.13, wherein both individual movement cycles are of a circular type and move in a clockwise direction, but the left-hand cycle has three hit points whilst the right-hand cycle have four.

Figure 3.20. Phasing class combined movement cycle



Video 3.13. Phasing class combined movement cycle

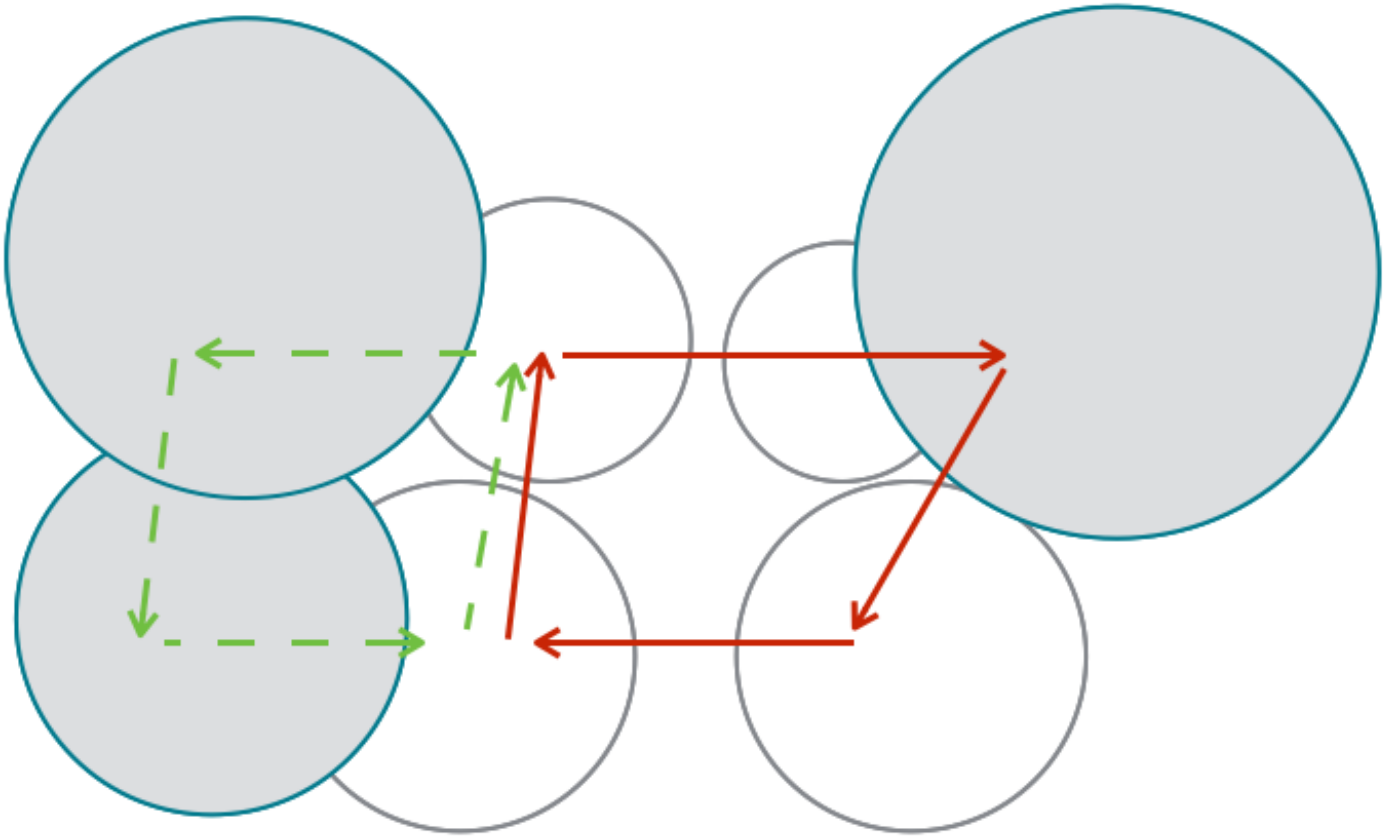
Opposing Set of Combined Movement Cycles

The opposing set of combined movement cycles encompasses those wherein both individual movement

cycles are of the same type, but move in different directions. There are thus two classes with these characteristics:

- **Entrained in Opposition** --- wherein the individual movement cycles are of the same type, move in opposite directions, and have an equal amount of hit points. An example of this is shown in Figure 3.21 and demonstrated in Video 3.14, wherein both individual cycles are of a circular type, and contain four hit-points, but the left-hand moves in an anticlockwise direction whilst the right-hand moves in a clockwise direction.

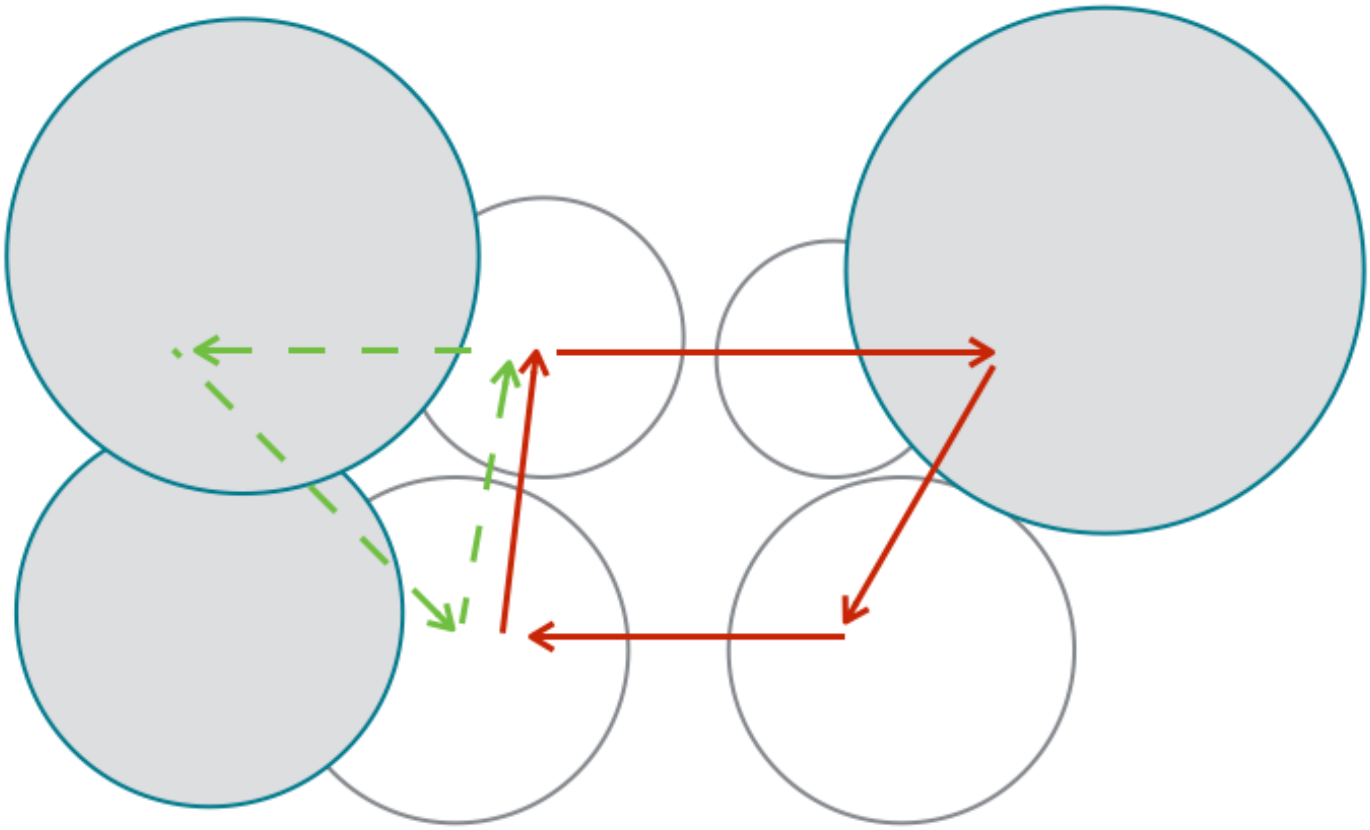
Figure 3.21. Entrained in opposition class combined movement cycle



Video 3.14. Entrained in opposition class combined movement cycle

- **Phasing in Opposition** --- wherein the individual movement cycles are of the same type, but move in opposite directions, and have an unequal amount of hit points. An example is shown in Figure 3.22 and demonstrated in Video 3.15, wherein both movement cycles are of a circular type, but the left-hand cycle has three hit points and moves in an anticlockwise direction, whilst the right-hand cycle has four hit points and moves in a clockwise direction.

Figure 3.22. Phasing in opposition class combined movement cycle



Video 3.15. Phasing in opposition class combined movement cycle

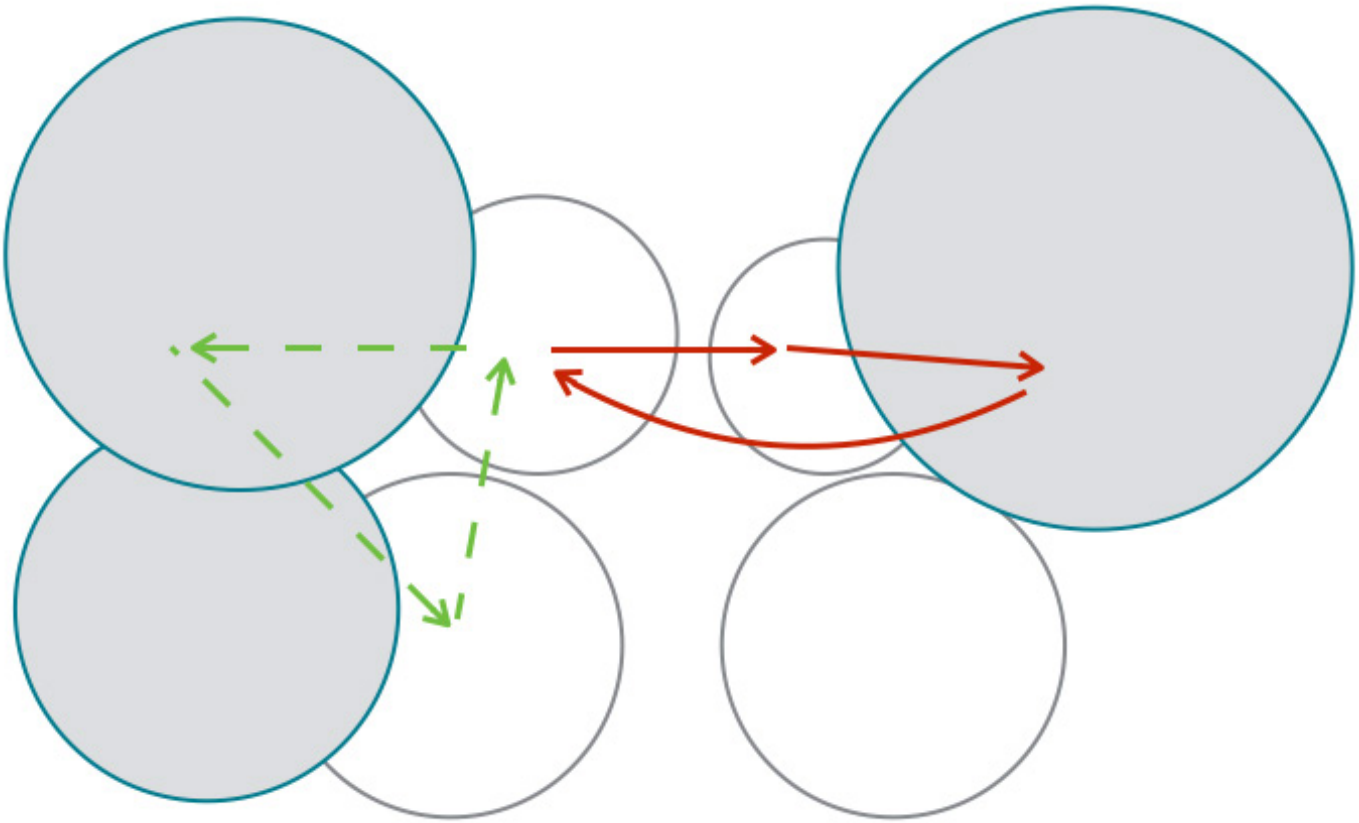
Divergent Set of Combined Movement Cycles

The divergent set of combined movement cycles encompasses those wherein the individual movement cycles are of different types. Direction therefore cannot be shared, and as such is an irrelevance for the

purposes of classification. There are two classes with these characteristics:

- **Entrained in Divergence** --- wherein the individual movement cycles are of different types, but have an equal amount of hit points. An example is shown in Figure 3.23 and demonstrated in Video 3.16, wherein the right-hand sounds a linear cycle, whilst the left-hand sounds a circular cycle; however, both individual cycles contain three hit points.

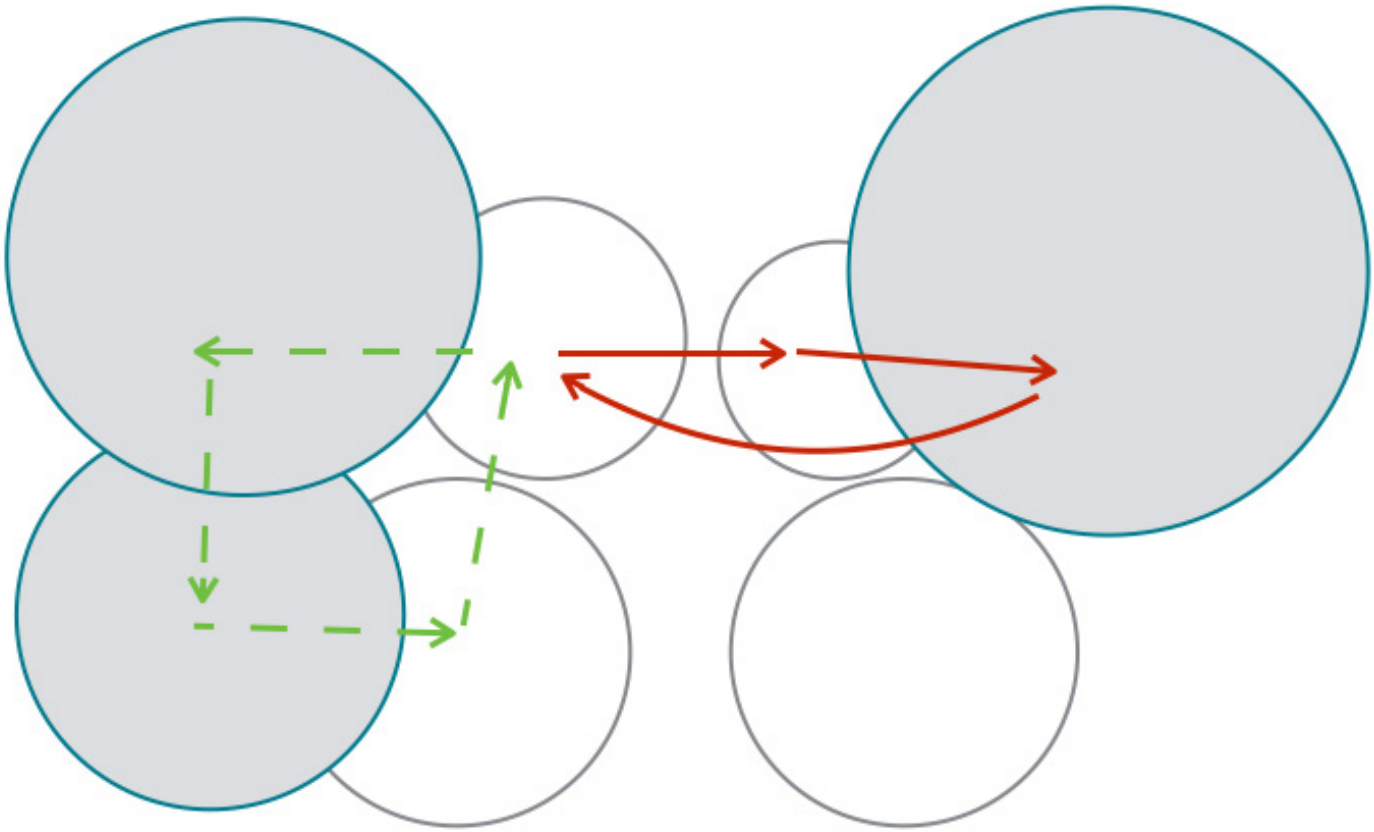
Figure 3.23. Entrained in divergence class combined movement cycle



Video 3.16. Entrained in divergence class combined movement cycle

- **Phasing in Divergence** --- wherein the individual movement cycles are of different types, and have an unequal amount of hit points. An example is shown in Figure 3.24 and demonstrated in Video 3.17 wherein the left hand sounds a four-point circular movement cycle, whilst the right-hand sounds a three-point linear cycle.

Figure 3.24. Phasing in divergence class combined movement cycle



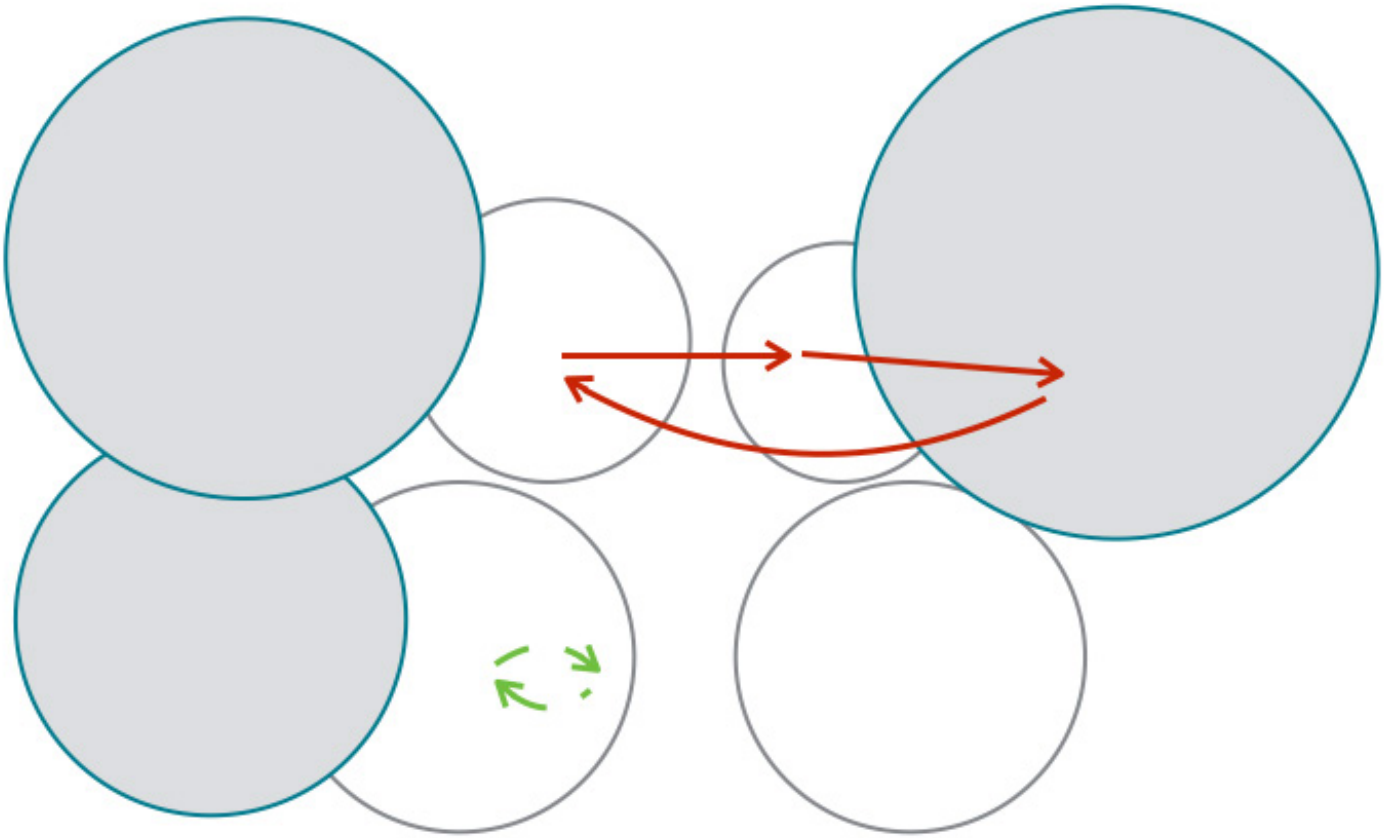
Video 3.17. Phasing in divergence class combined movement cycles

Oblique Set of Combined Movement Cycles

The oblique set of combined movement cycles encompasses those wherein one hand is following any individual movement cycle, whilst the second hand is sounding only one hit point, and is therefore stationary. There is only one class with these characteristics:

- **Oblique** --- wherein one hand is following an individual movement cycle, whilst the other is stationary. An example is shown in Figure 3.25 and demonstrated in Video 3.18, wherein the right-hand sounds a three-point left-to-right movement cycle, whilst the left-hand sounds only the snare drum.

Figure 3.25. Oblique class combined movement cycle



Video 3.18. Oblique class combined movement cycle

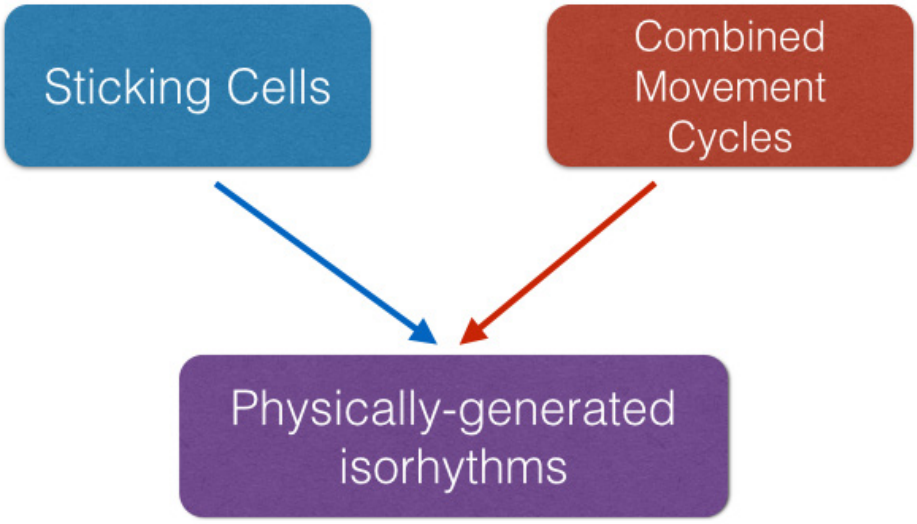
Chapter Four
Strategies for Solo Performance

4.1 Somatic Parameter Layering

In the previous chapter I explored two correlations between embodied music cognition literature and my professional practice as a drummer. In doing so I identified, and then developed practical and theoretical outcomes relevant to two areas of drumset practice, namely sticking cells and movement cycles. Through this process I came to understand both of these concepts as discrete caches of embodied knowledge, embedded within my performance practice; and as such spent significant time exploring the creative potential of deliberately manipulating these parameters within my experimental practice.

During this experimentation I initially treated sticking cells and movement cycles as discrete areas of focus. However I quickly realised they were able to be layered onto one another (that is, a sticking cell occurring simultaneously with a combined movement cycle), and I found that the interaction of the two parameters generated outcomes far removed from my existing musical lexicon. This emergent process, that I have termed *somatic parameter layering* (Figure 4.1), has become the primary generative methodology used in creating the recorded works that are an outcome of this research.

Figure 4.1. Somatic parameter layering

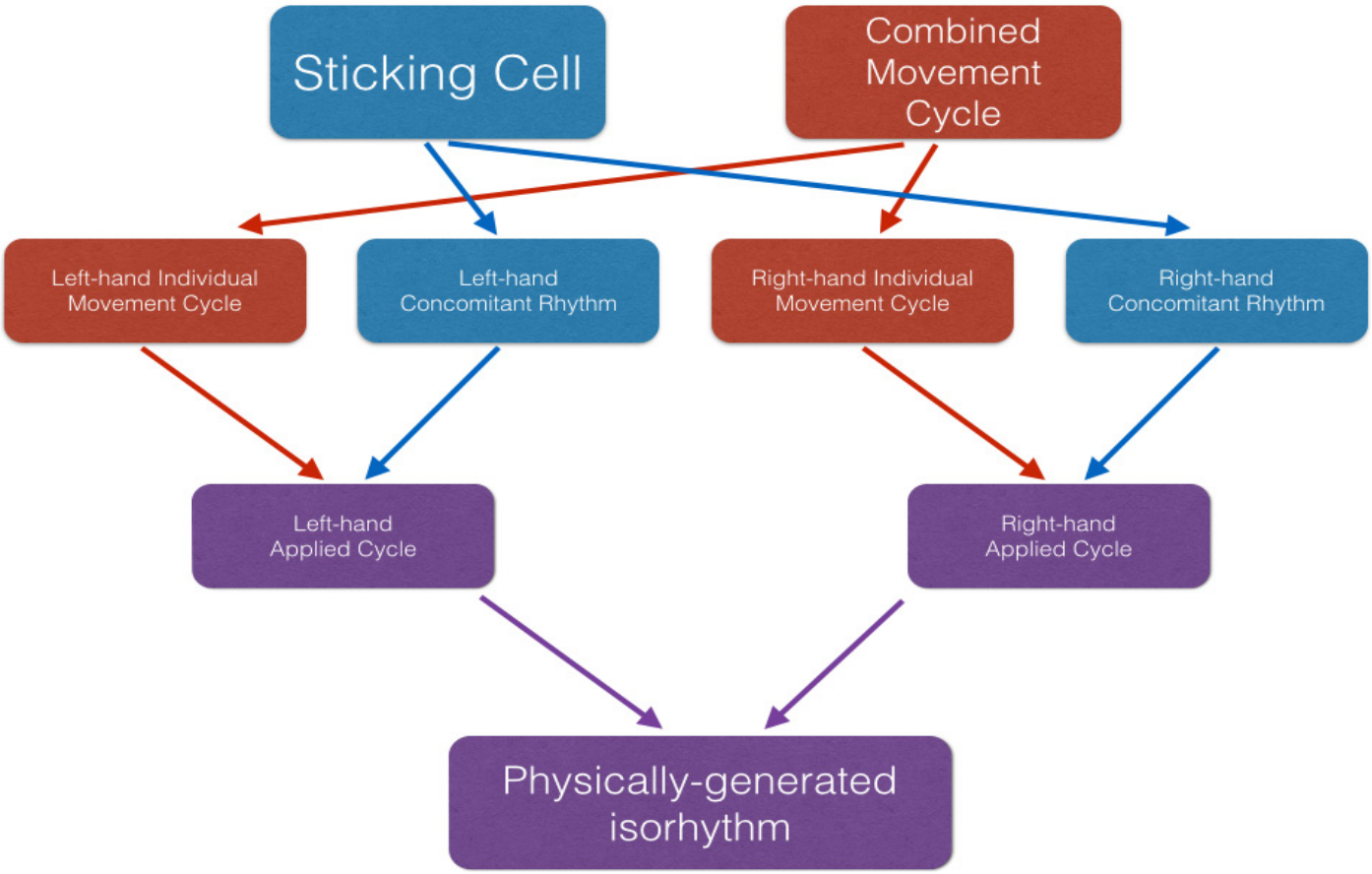


Within this process, sticking cells and combined movement cycles are synthesised to generate musical outputs, that I refer to as *physically-generated isorhythms* (henceforth "PGIs"). Variation of either parameter, or both, results in unique PGIs. Through this process I have been able to produce extensive musical content, which is embedded throughout the solo musical works. I have also developed a series of transformational processes guided by methods of parameter variation, which I utilise both in solo works and in improvisational settings.

The macro-structure of somatic parameter layering, shown above in Figure 4.1, denotes the interaction of sticking cells with combined movement cycles. Whilst this is a true conceptual representation of the process, it necessarily elides the minutiae of how interaction between the two parameters occurs. More

precisely, the locus of interaction is situated within the activity of each hand; there are therefore two independent yet simultaneously occurring interactions within each iteration of the process. This is more clearly depicted by an expanded representation of somatic parameter layering that explicates the individual actions of each hand (Figure 4.2).

Figure 4.2. Expanded structure of somatic parameter layering



This expanded representation begins with the same parameters (a sticking cell and a combined movement cycle), but immediately divides each of these into their left- and right-handed components. Therefore, the sticking cell is divided into two concomitant rhythms, whilst the combined movement cycle is divided into two individual movement cycles. These values for each hand are then combined, with the interaction of a concomitant rhythm with an individual movement cycle creating a single-hand figure I have termed an *applied cycle*. The simultaneous occurrence of both the left- and right-hand applied cycles forms the physically-generated isorhythm.

At this point I would like to emphasise that these models do not show a sequence of events. Rather, I am here unpacking the component parts of a process undertaken in real time whilst situated at the instrument.

Hit points and movement spans

An even finer degree of detail can be revealed by focusing on the locus of interaction: the relationship between a concomitant rhythm and an individual movement cycle. Essentially, the hit points contained within the individual movement cycle are mapped onto the rhythmic attacks of the concomitant rhythm. However, through my experimentation I found that it was not always appropriate to allocate hit points to rhythmic attacks in a direct 1-to-1 relationship, such that each attack sounds the next hit point in se-

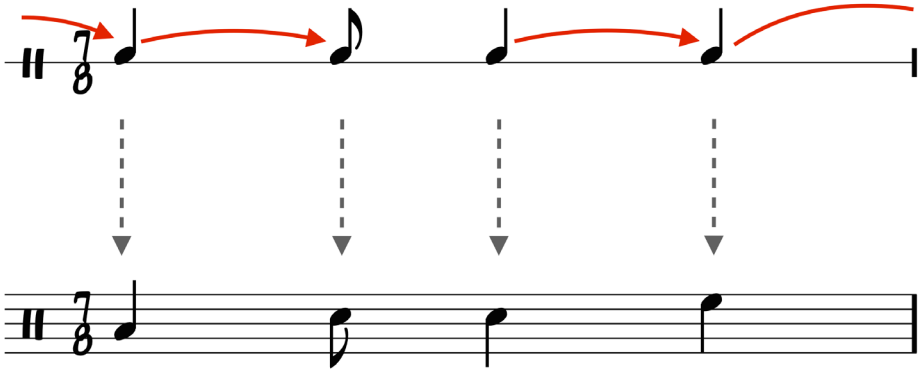
quence. This approach was suitable when utilising simple sticking cells (such as interlaced single strokes), but as I introduced more complex sticking cells it became musically prohibitive - as it both restricted the speed at which I could articulate the applied cycle, and led to more frequent errors due to physical and cognitive strain. I found that in certain instances it was easier - both physically and mentally - to articulate two or more rhythmic attacks on the same hit point before continuing the movement cycle[1]; and that I was organising these movements in regular, definable patterns.

In order to describe the patterns of movement, I identified another characteristic of concomitant rhythms: *movement spans*. Movement spans are the timespans between rhythmic attacks during which the physical motion of the hand from one hit point to another is executed. Whilst unsounded, I consider movement spans an intrinsic part of any sticking cell utilised for somatic parameter layering. Within notation of concomitant rhythms (or complete sticking cells) they are represented by a curved arrow between two attacks, as can be seen in Figure 4.3.[2]

Figure 4.3. Example of movement span notation

As such, the identification of a movement span denotes that the subsequent attack will sound a different hit point; whilst the absence of a movement span indicates that the subsequent attack will sound the same hit point. Figure 4.4 presents an example concomitant rhythm containing four rhythmic attacks but only three movement spans (one of which extends across the repeat, between the last attack and the first attack). Thus, the second and third attacks - between which there is not a movement span - will sound the same hit point.

Figure 4.4. Example of relationship between movement span notation and musical example



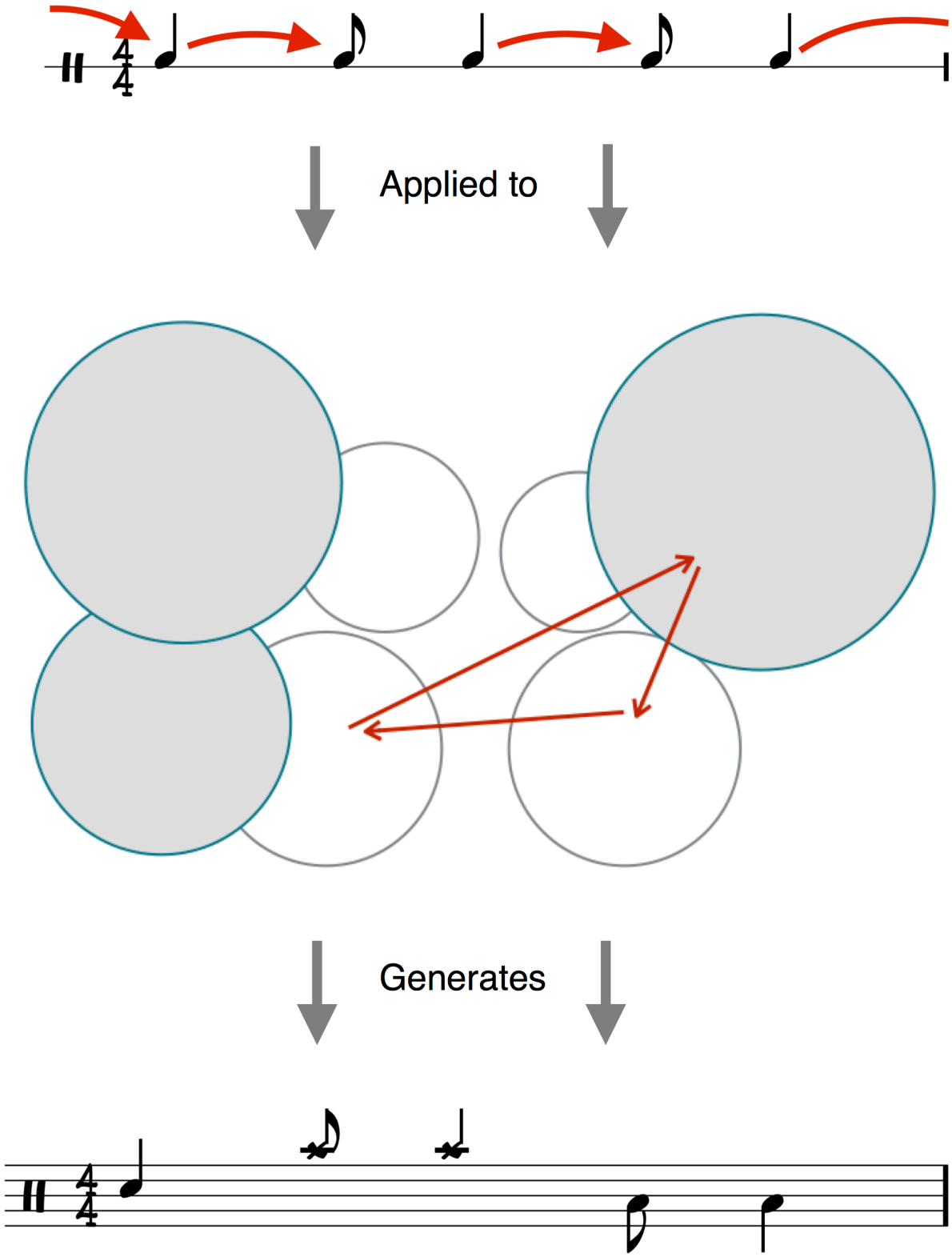
Even though they are unsounded, I have found that being cognisant of the movement spans within a given concomitant rhythm is valuable for both analytical and musical purposes. Specifically, this is because manipulating the relationship between the amount of movement spans (of the concomitant rhythm) and the amount of hit points (of the movement cycle) allows me to control the rhythmic form of the applied cycle. I have identified two primary forms of this relationship:

1. This is particularly the case when executing double stroke figures at higher tempos, as the sequential strokes are achieved through manipulation of sticking rebound by the (small) finger muscles, rather than requiring another set of movements by the (larger) muscles of the wrist and forearm.

2 In keeping with the convention I established in mapping movement cycles, movement spans of the right hand are represented by a red arrow, whilst those of the left hand are represented by a green arrow.

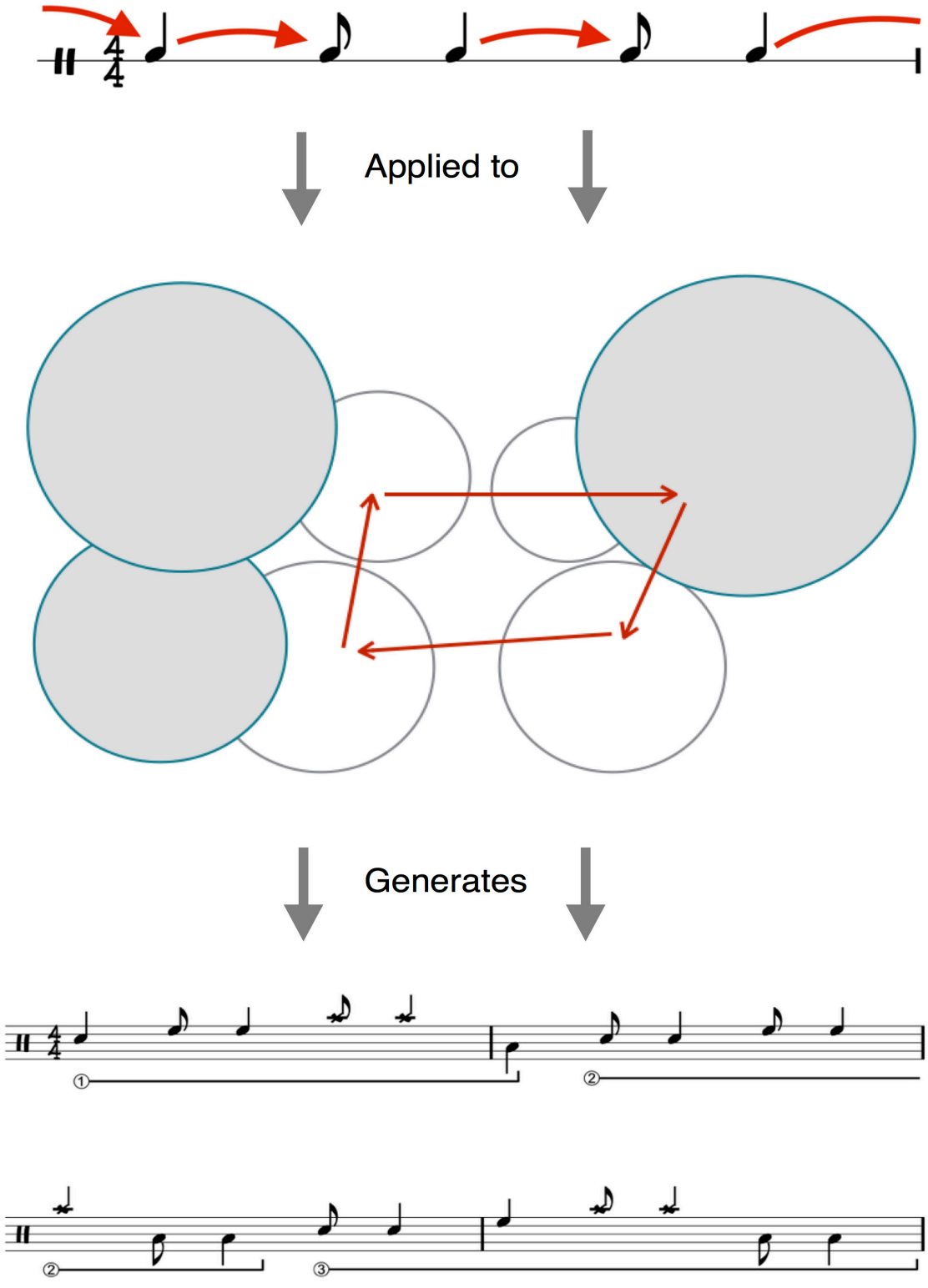
- A **direct relationship** occurs when the amount of movement spans is equal to the amount of hit points. As such, the repetition of the concomitant rhythm and movement cycle is synchronised; resulting in an applied cycle comprising a single iteration of both the concomitant rhythm and movement cycle. Figure 4.5 shows a concomitant rhythm containing three movement spans applied to a movement cycle containing three hit points, and the resulting applied cycle.

Figure 4.5. Example of direct relationship between concomitant rhythm and individual movement cycle



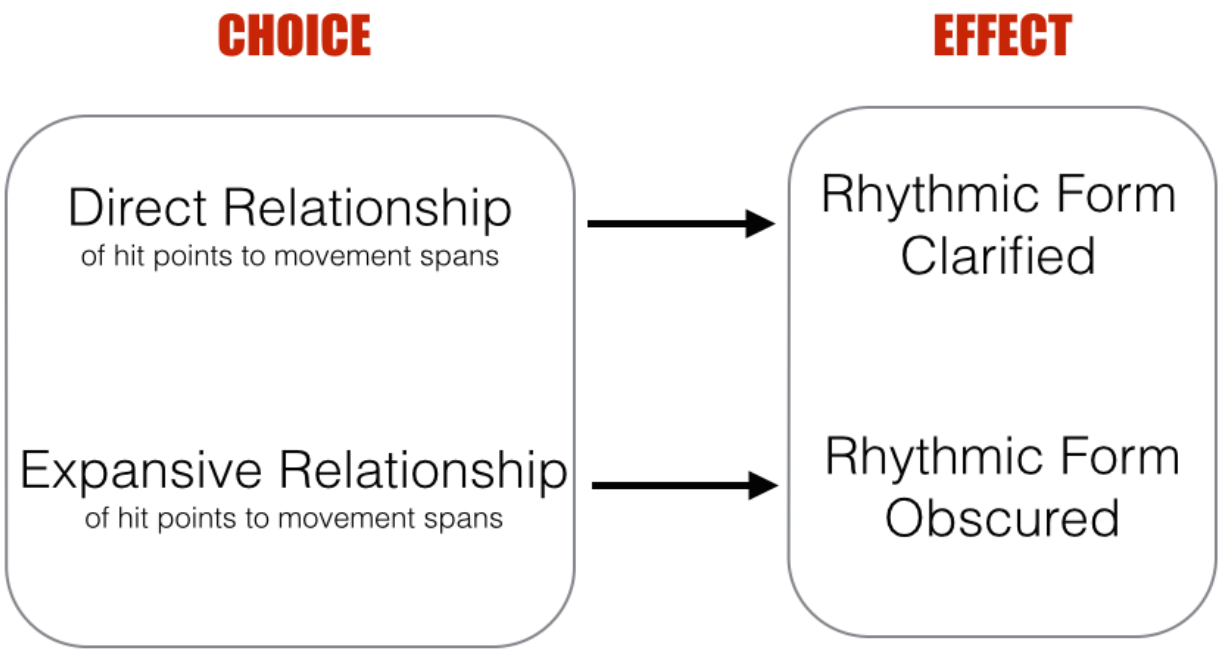
- An **expansive relationship** occurs when the amount of movement spans is different to the amount of hit points. As such, the repetition of the concomitant rhythm and movement cycle is asynchronous; resulting in an extended applied cycle comprising multiple iterations of both the concomitant rhythm and movement cycle. Furthermore, each iteration of the sticking cell will contain a different sequence of hit points; and each iteration of the movement cycle will contain a different rhythmic form. Figure 4.6 shows a concomitant rhythm containing three movement spans applied to a movement cycle containing four hit points, and the resulting applied cycle. The applied cycle generated by this expansive relationship contains four repeats of the concomitant rhythm (bounded by bar lines) and three repeats of the movement cycle (denoted by the numbered brackets).

Figure 4.6. Example of expansive relationship between concomitant rhythm and individual movement cycle



Practically, I have come to understand these relationships as producing the following effects: applied cycles constructed in a direct relationship create short, recognisable musical figures that accentuate repetition of the concomitant rhythms, whilst applied cycle constructed in an expansive relationship create extended figures that obfuscate rhythmic forms. This generalised understanding of the relationship between movement spans and hit points forms a heuristic I have termed the *relationship heuristic*, that I utilise to guide my choices during the time-pressured environment of improvisation (Figure 4.7).

Figure 4.7. Relationship heuristic



Whilst I have found it to be eminently useful, the relationship heuristic only concerns the character of the applied cycle generated by one hand; whereas the physically-generated isorhythm - being the complete musical outcome of somatic parameter layering - comprises the applied cycles of both the left- and right-hands. In performance, I am able to consider the relationship heuristic as it applies to both hands concurrently, however the further interaction of each applied cycle has something of a multiplier effect, whereby a deliberate change of a controllable input (such as the individual movement cycle of one hand) causes significant, and often unexpected, changes in form of the final output (that is, the PGI). In particular, it is often hard to anticipate the length and character of the PGI if both applied cycles are formed with an expansive relationship between hit points and movement spans.

The level of complexity in this process, and the multitude of outputs it can generate, has inhibited my ability to develop a similar holistic heuristic for the relationship between applied cycles and PGI. Instead, I have developed a series of strategies I can employ to a) generate PGIs with certain characteristics (such as short or long, simple or complex), and/or b) affect a particular kind of musical development (such as melodic augmentation or metric modulation). These strategies are not only utilised within my solo works, but are often embedded as core compositional devices.

The remainder of this chapter will detail five such strategies: *Hide/Reveal, Modulation Obfuscation, Unison/Interlace, Fragmentation,* and *Expansion/Contraction*. Each of these strategies will be detailed through analysis of their use in one of the recorded works.

4.2 Strategy One: Hide/Reveal

The first strategy, *Hide/Reveal,* emphasises the isolated applied cycle of one hand as a musical and physical ostinato. The concomitant rhythm of the other hand is applied to several movement cycles to generate various discrete applied cycles that, when combined with the applied cycle of the first hand, form a series of PGI variants. These PGI variants either have the effect of foregrounding the ostinato figure as a distinct musical voice, or of obscuring it within a dense musical texture; alternating between these different effects can therefore "hide" or "reveal" the ostinato figure.

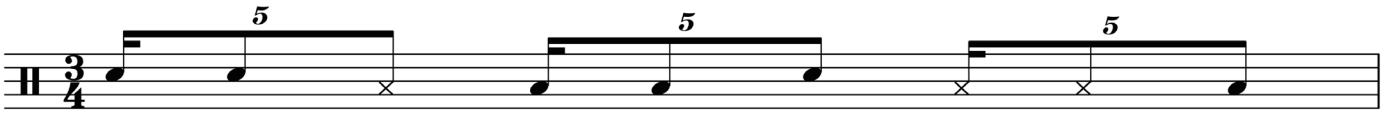
Whilst the specific effect of each PGI can only be assessed through performance, I have found certain characteristics influence whether that effect will be to hide or reveal the ostinato. One characteristic is if hit points overlap; that is, if the ostinato figure and the second applied cycle share one or more hit points (for instance, both sound the snare drum), then the extra articulations of that hit point obscure the ostinato figure. Another is the classification of the combined movement cycles; oblique class cycles tend to foreground the ostinato figure whereas any entrained class cycle (eg. one of *entrained*, *entrained in opposition* or *entrained in divergence*) obscure it.

A clear example of the *Hide/Reveal* strategy can be heard in the recorded work *(you never did) The Kenosha Kid* (Audio 4.1.)

Audio 4.1. (*you never did) The Kenosha Kid*, complete work

(you never did) The Kenosha Kid opens with an ostinato figure played by the right-hand, sounding the snare drum (with snare wires disengaged so they sit off the bottom head), the rim of the floor tom, and the floor tom itself (Figure 4.8). This figure is demonstrated in Video 4.1.

Figure 4.8. Right-hand ostinato from *(you never did) The Kenosha Kid*



Video 4.1. Right-hand ostinato from *(you never did) The Kenosha Kid*

Whilst this ostinato is presented in isolation as the beginning of the piece, procedurally this figure was generated through somatic parameter layering. Specifically, this ostinato is produced by isolating the right hand concomitant rhythm derived from a five-note sticking cell (drawn from my concurrent sticking scheme) sounded in quintuplets (Figure 4.9), and then applying it to a three-point clockwise cycle (Figure 4.10).

Figure 4.9. Five-note "concurrent" sticking cell, in quintuplet subdivision

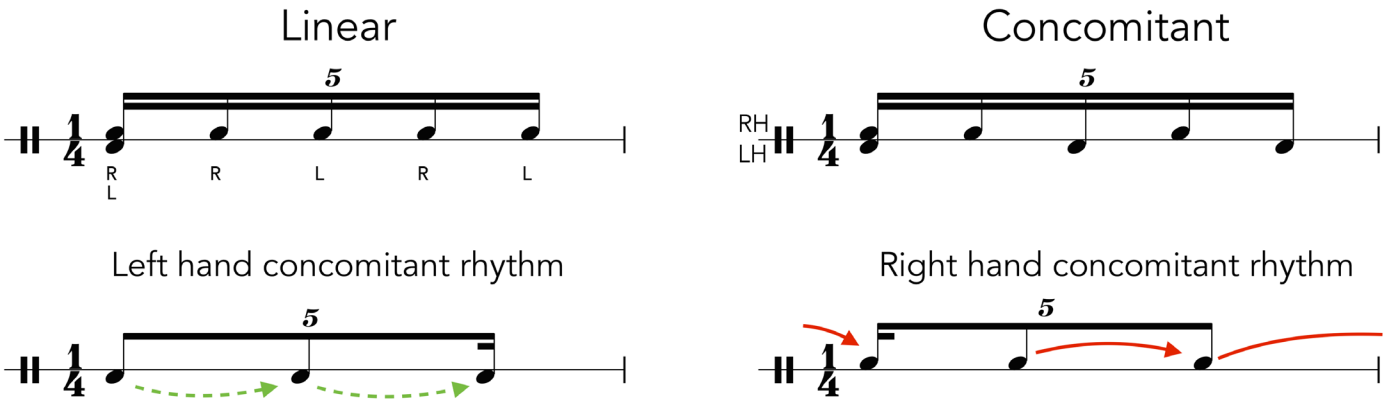
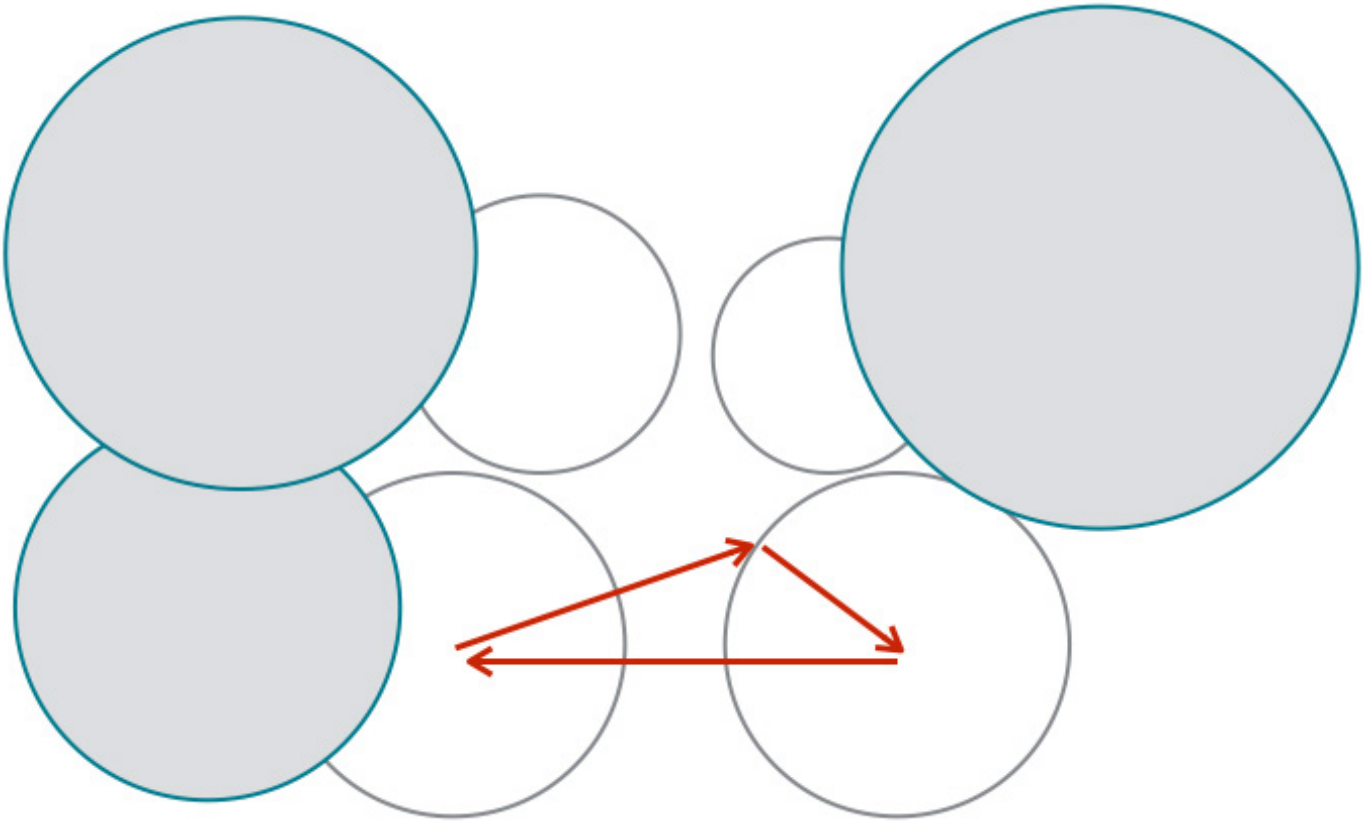
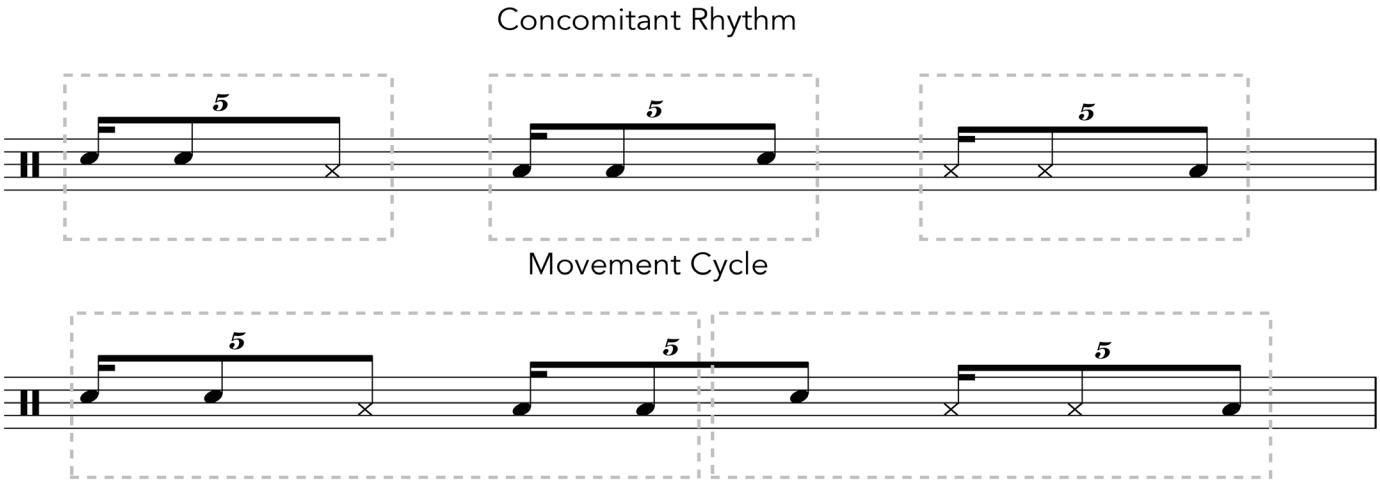


Figure 4.10. Three-point clockwise individual movement cycle of right-hand



Within this figure there is an expansive relationship between movement spans of the concomitant rhythm and the hit-points of the individual movement cycle; hence the hit point sequence [snare drum] to [rim] to [floor tom] is repeated twice within the applied cycle, whilst the concomitant rhythm recurs thrice (Figure 4.11).

Figure 4.11. Annotated right-hand ostinato

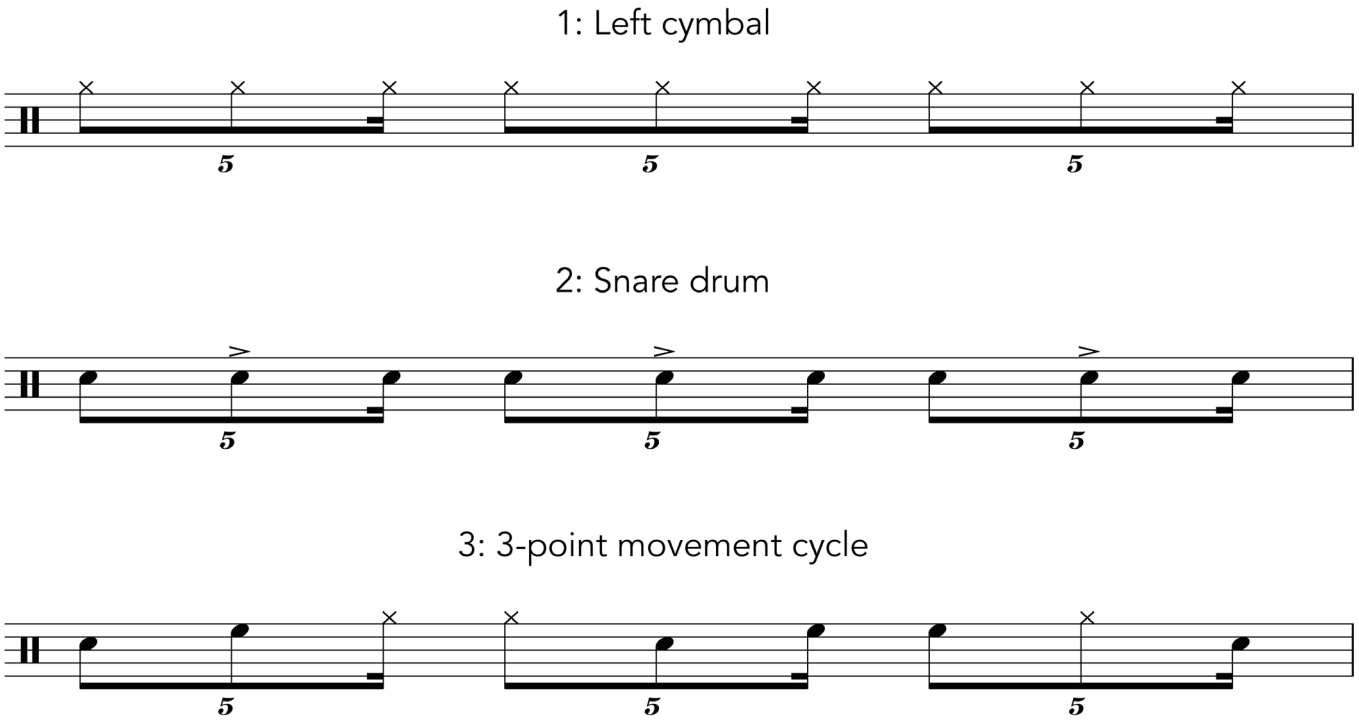


I employ *Hide/Reveal* as an improvisational strategy throughout the opening minutes of this piece, maintaining the right hand ostinato whilst layering the other three limbs. This analysis will focus on the application of *Hide/Reveal* between 1:35 and 2:40, a period shown in Video 4.2.

Video 4.2. Excerpt from *(you never did) The Kenosha Kid*

Through this timespan, I maintain the right hand ostinato in an almost unbroken sequence, and use the left and right feet for simple rhythmic accents on the hi-hats and bass drum. The musical variation and development is driven by the activity of the left hand, with which I employ various figures to either foreground or obscure the ostinato figure. The two preliminary options are either to tacet the left hand or to sound the left-hand concomitant rhythm of the five-note concurrent sticking cell (see Figure 4.9), thereby completing the sticking cell. When I do sound the left-hand concomitant rhythm, I have further options to orchestrate it in three different configurations: the first is to sound the rhythm solely on the left cymbal; the second is to sound the rhythm only on the snare drum; and the third is to apply the rhythm to a three-point anticlockwise movement cycle, moving from the snare drum to the middle tom to the left cymbal (Figure 4.12). These variations are demonstrated in Video 4.3.

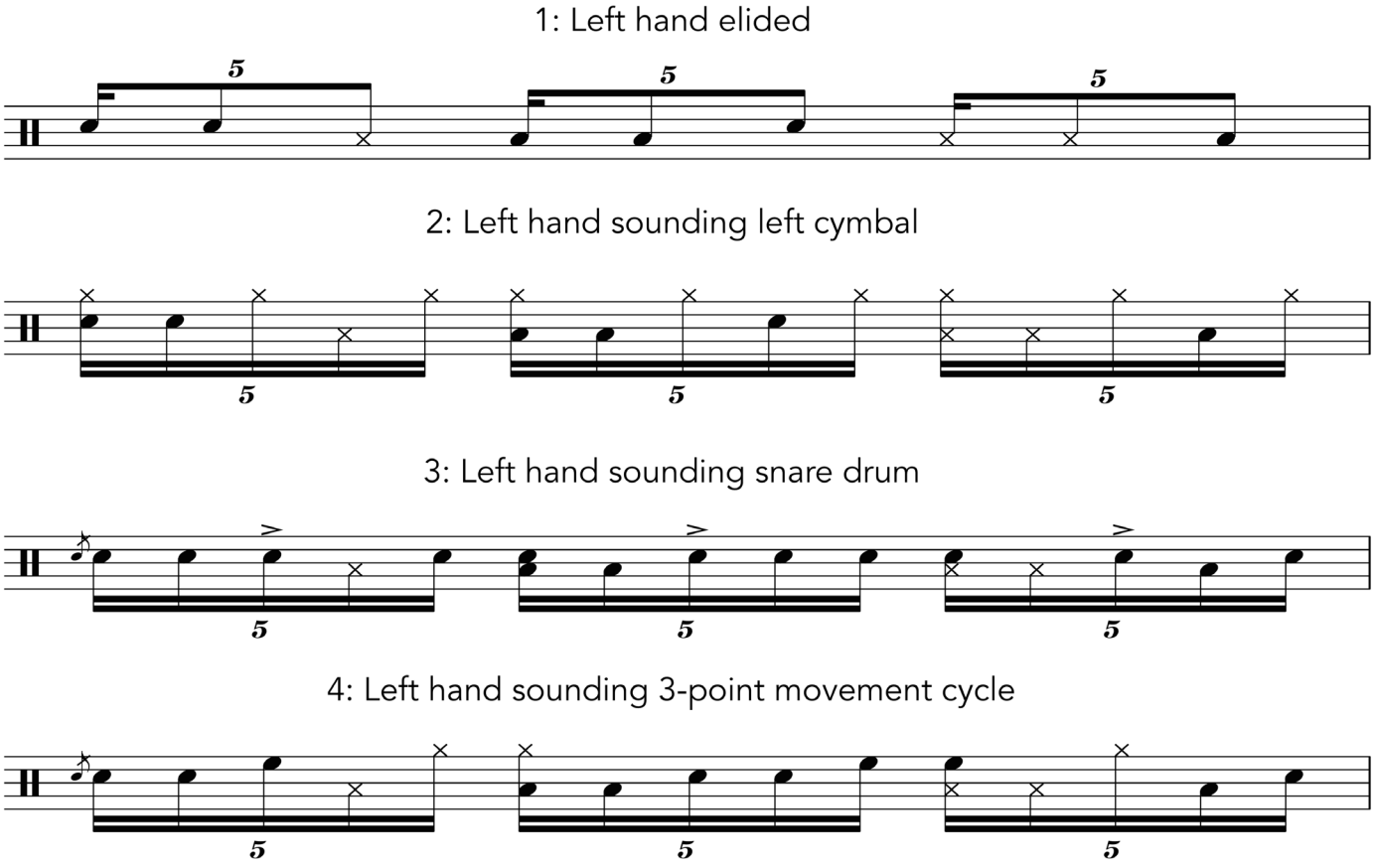
Figure 4.12. Left-hand applied cycle variants



Video 4.3. Left-hand applied cycle variants

These orchestrations combine with the right-hand ostinato to form three discrete PGIs. When also including the option to elide the left hand completely, this totals four PGI variants, which are employed throughout this excerpt (Figure 4.13, Video 4.4).

Figure 4.13. PGI variants



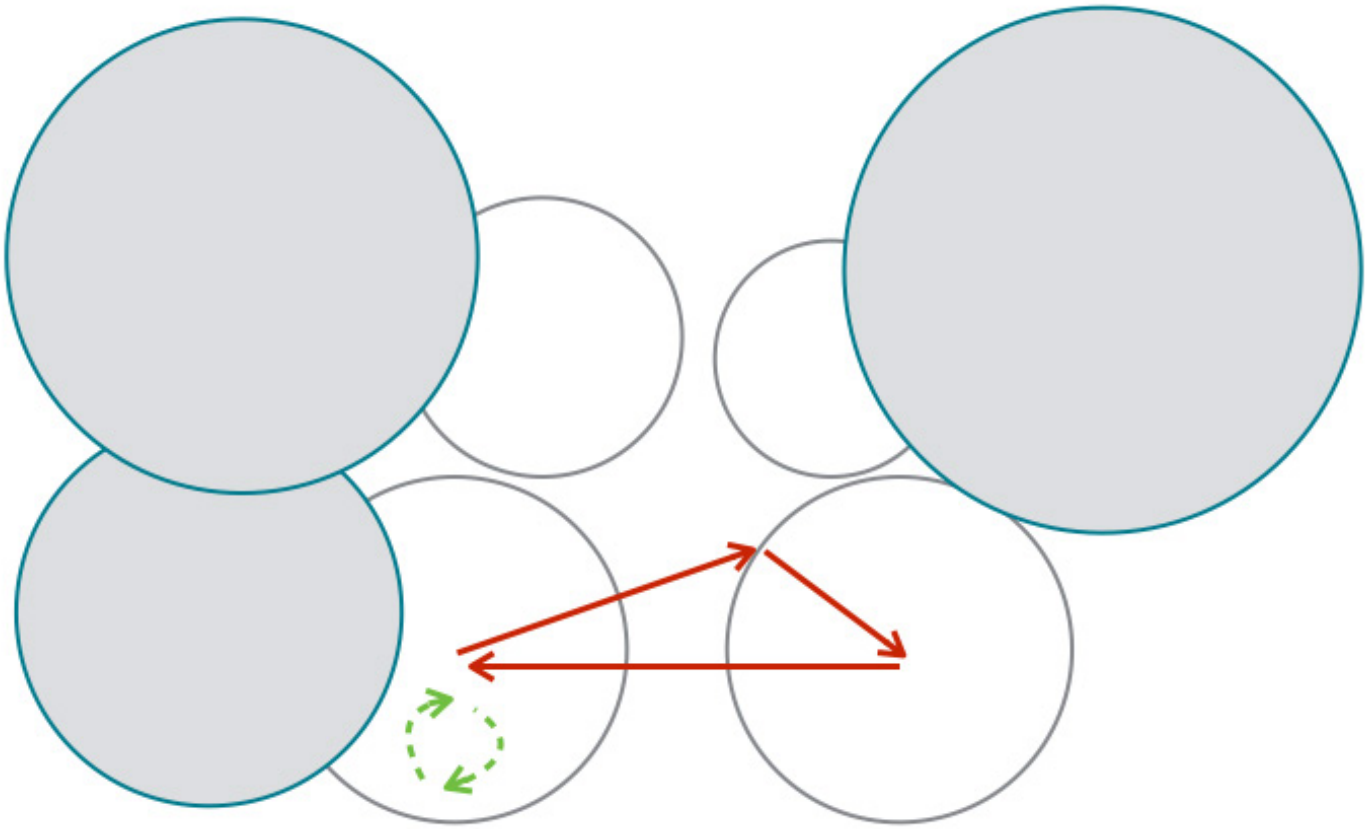
Video 4.4. PGI variants

These four variants provide graduations of obfuscation of the ostinato pattern; I have here organised them in order from clearest to most obscured. The first variant, wherein the left hand is completely elided, provides the clearest statement of the right-hand ostinato - as it is left unaccompanied. The second variant, wherein the left hand sounds the left cymbal, creates a dense polyrhythmic texture. However, due to the timbral distinction of the left cymbal from the hit points of the right hand ostinato, this variation creates an effect of two discrete musical voices, leaving the ostinato aurally distinct.

The third and fourth variants begin to obscure the ostinato figure. Within the third variant the left hand sounds the snare drum, overlapping with the right-hand ostinato to form an oblique class combined

movement cycle (Figure 4.14). The left-hand concomitant rhythm combines with the snare drum accents of the right-hand ostinato to form a compound rhythmic figure that obscures the rhythmic form of the ostinato[3].

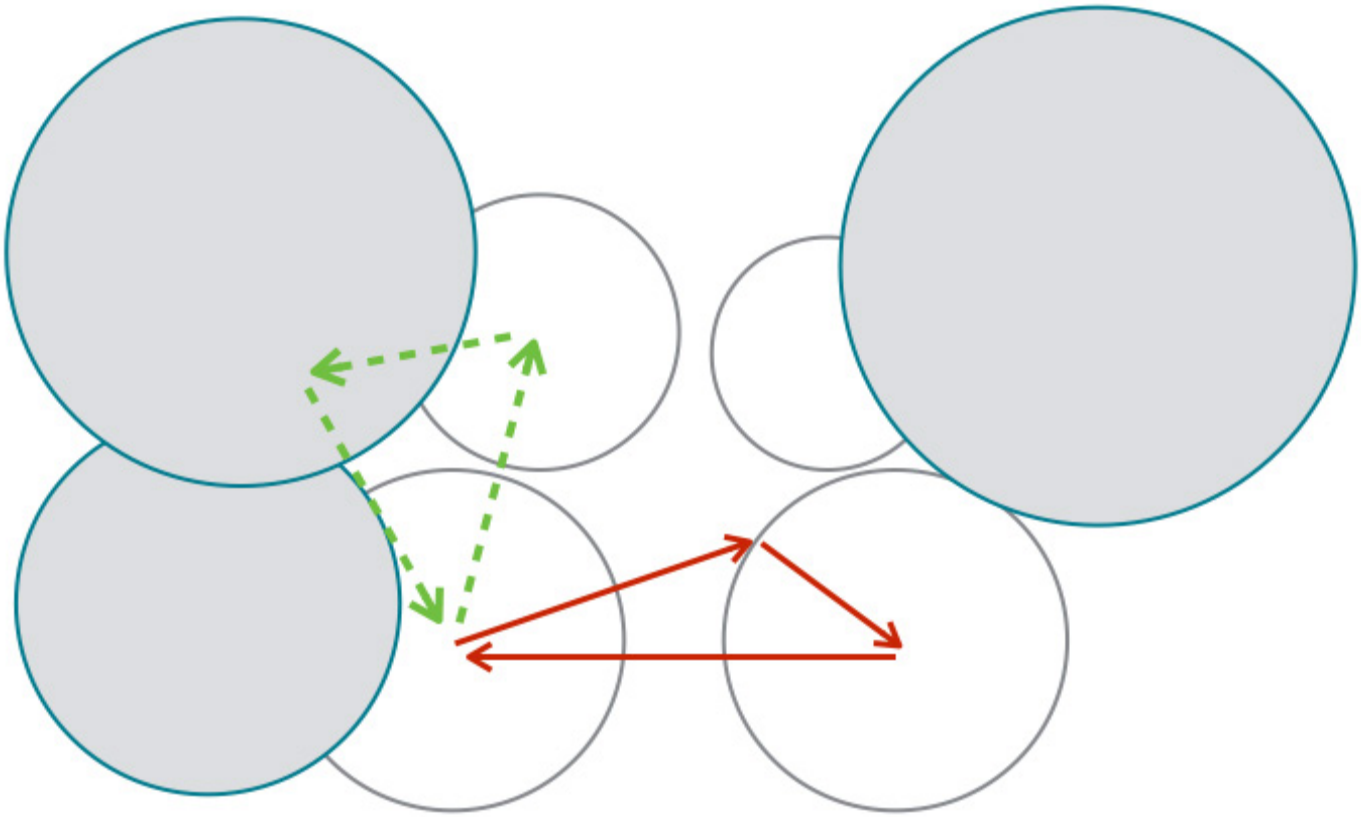
Figure 4.14. Oblique class combined movement cycle of third PGI variant



The fourth variant, wherein the the left-hand concomitant rhythm is applied to a three-point anticlockwise movement cycle, completely obfuscates the ostinato figure. The movement cycles of both hands form an entrained in opposition class combined movement cycle (Figure 4.15); this entrained nature of this classification meaning that both movement cycles repeat isochronously.

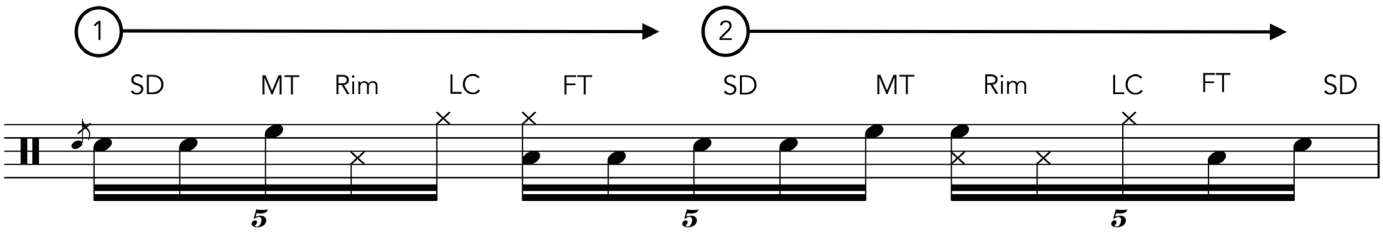
3 This combination also creates instances of both hands sounding the snare drum in rhythmic unison - in which instance a flam stroke is substituted for the unison. This substitution can be seen in both the third and fourth variants.

Figure 4.15. Entrained in opposition class combined movement cycle of fourth PGI variant



Due to their isochronous repetition, these movement cycles both generate sequences of hit points that repeat in synchrony; as such, they intertwine and are aurally perceived as a single, dense musical voice. This combined sequence moves from the snare drum, to the middle tom, to the rim of the floor tom, to the left cymbal, to the floor tom; this sequence repeats twice within the PGI[4] (as shown in Figure 4.16). As this variant not only overlays another voice onto the right-hand ostinato, but intertwines with it to create an entirely new pattern, it completely obfuscates the right-hand ostinato.

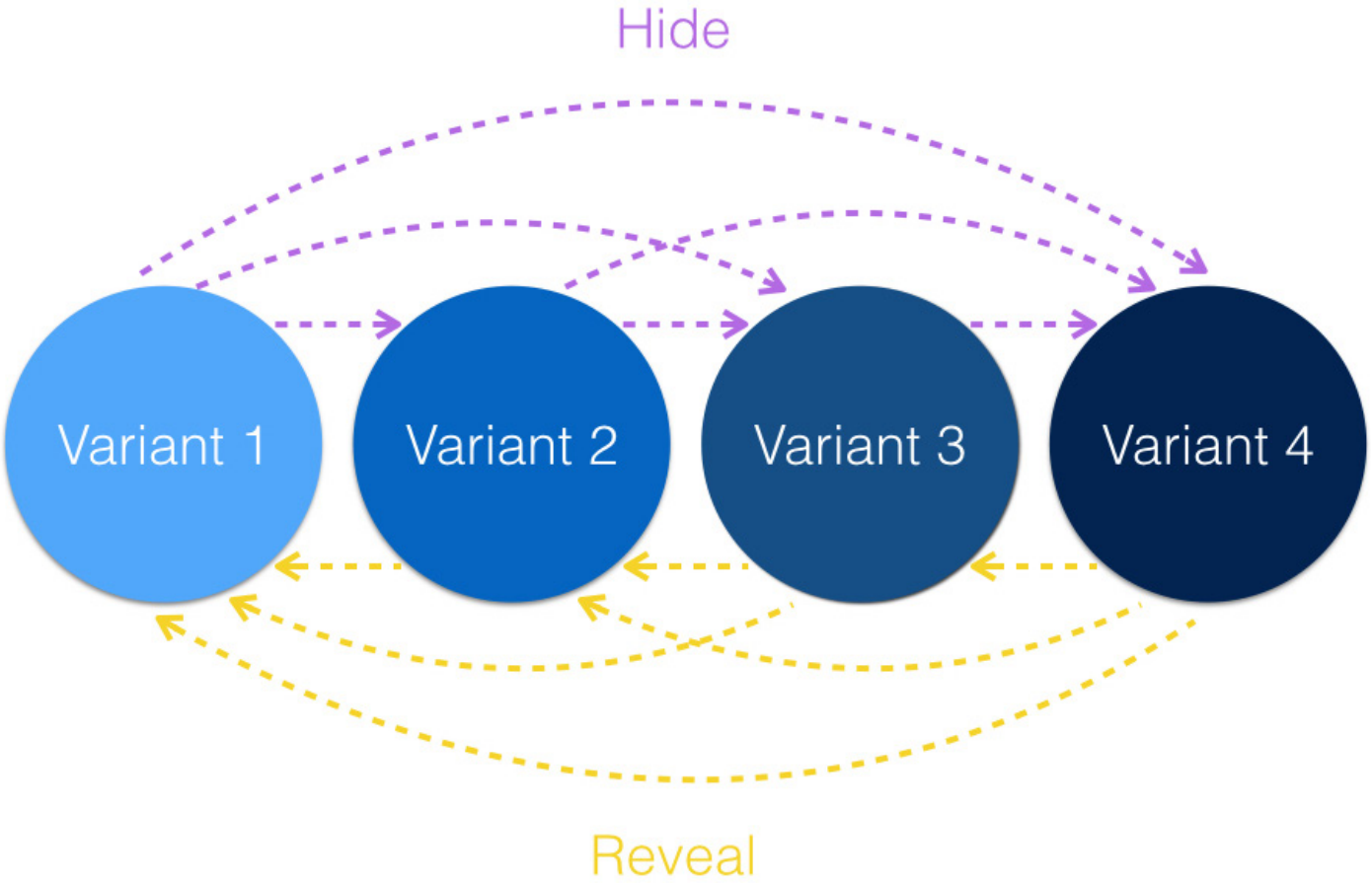
Figure 4.16. Repetition of hit point sequence in fourth PGI variant



As these variants provide graduations of obfuscation, transforming one variant into another can either have an effect of hiding the ostinato (e.g. transforming variant two into variant four) or revealing it (e.g. transforming variant four into variant one). By understanding the relationship between each pairing of variants, I am thus able to deliberately implement the *Hide/Reveal* strategy during improvisation. Figure 4.17 visualises all possible transformational pairings of these variants, and groups them by their "hide" or "reveal" effect.

4 The final snare drum in the PGI is part of the beginning of the next sequence

Figure 4.17. *Hide / Reveal* pairings of PGI variants



These pairings can thus be used to classify my improvisational choices during the excerpt spanning 1:35-2:40. My implementation of these variants through this time period, and the "hide" or "reveal" effect of their sequencing, is summarised in Table 4.1.

Table 4.1. Implementation of PGI variants through excerpt of *(you never did) The Kenosha Kid*

Time	Bars	Variant	Effect
1:35-1:51	1-12	3	Hide
1:52-1:57	13-16	1	Reveal
1:57-2:08	17-24	2	Hide (minimal effect)
2:08-2:13	25-28	4	Hide
2:14-2:18	29-32	1	Reveal
2:19-2:24	33-36	4	Hide
2:25-2:29	37-40	1	Reveal
2:30-2:35	41-44	4	Hide
2:36-2:40	45-48	2	Reveal

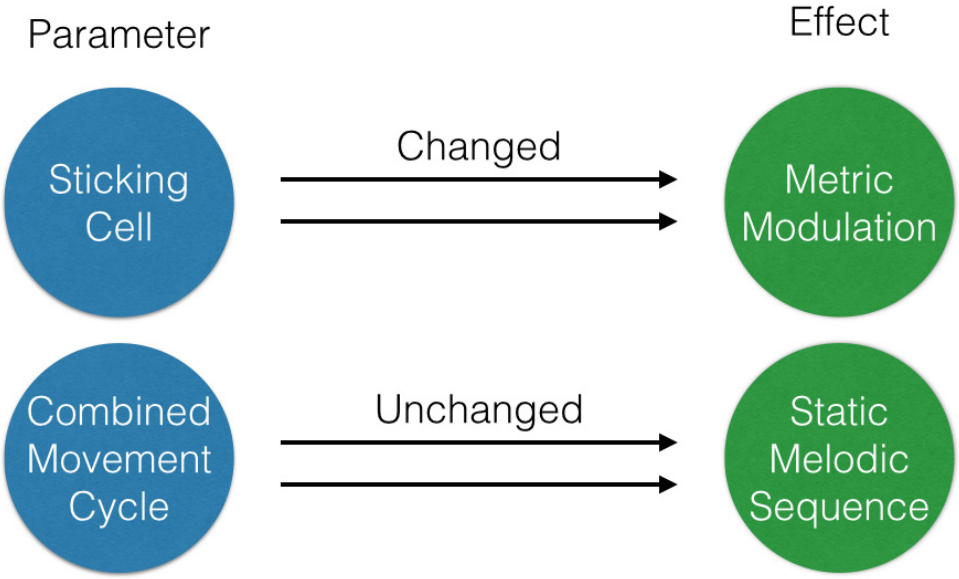
Video 4.5. again presents the excerpt spanning 1:35-2:40 (as in Video 4.2), but is now annotated with text to identify the PGI variant in use, and the "hide" or "reveal" effect caused by each transformational pairing.

Video 4.5. Annotated excerpt from *(you never did) The Kenosha Kid*

4.3 Strategy Two: Modulation Obfuscation

Modulation Obfuscation is a strategy whereby I use somatic parameter layering to affect - but simultaneously conceal - a metric modulation. Specifically, I use sticking cells organised through cross-rhythmic number grouping to affect a metric modulation; but apply them to a static combined movement cycle, which generates a recurring melodic sequence that aurally disguises the modulation (Figure 4.18).

Figure 4.18. *Modulation Obfuscation*



This strategy grew from my experimental practice, where I found that a series of variable stickings cells applied to a static movement cycle generates a set of PGIs for which the sequencing of hit points is shared, but their internal rhythmic morphology is altered. Furthermore, if these movement cycles are applied to pitched hit points (e.g. drums rather than rims or cymbal), then this shared sequence of hit points is imbued with an identifiable melodic contour. Thus, when these PGIs are performed in sequence, the effect is one of melodic transformation; even as my conscious attention is focused on the rhythmic characteristics of the sticking cells.

Initially I applied this technique to a variety of movement cycles and sticking cell combinations; particularly, I utilised the set of concurrent sticking cells (discussed in Chapter Three) to articulate number grouping sequences. This developed complex melodic sequences, however through an awareness of the underlying number grouping patterns I was always in control of the underlying rhythmic structure. As I began to implement this technique in performance, I realised that the potential musical effect was governed by the performance situation. If utilised within a performance situation wherein meter is fixed and/or predetermined - such as performing a jazz standard with an ensemble - this strategy can create interesting polyrhythmic melodies that may imply a cross-rhythmic cycle (or polymeter). However, within performance situations wherein meter is flexible – such as a free improvisation with an ensemble, or an unaccompanied improvisation – the melodic transformation organised by number grouping not only suggests a countermetrical pulsation, but can be used to affect a modulation in meter.

Upon realising the potential of this strategy within a solo setting, I began implementing it as a transitional device within the solo works I was then developing; one such work is *Boubacar* (Audio 4.2).

Audio 4.2. *Boubacar*, complete work

Boubacar emerged from the first half of this research project; being developed during the first period of creative development and recorded at the first recording session in July 2015. The title is homage to Senegalese percussionist Boubacar Diagne, the leader of a Sufi drumming troupe whose music was documented and released by American label Village Pulse (*Tabala Wolof - Sufi Drumming of Senegal,* Village Pulse, VP-1002, 1992). I have been deeply inspired by these recordings over a number of years, and while *Boubacar* is not directly imitative, I was attempting to integrate certain characteristics of their music into my own practice. Specifically, I was striving to emulate the dense polyphony created by the overlapping of four or five intertwined drum rhythms, the melodic figures that would emerge from these intertwining parts, and the sudden shifts in time feel that demarcate sections within each piece.

Boubacar was also inspired by the American 20th century jazz drummer Ed Blackwell, who is renowned for bringing a distinctly African influence to his drum soloing; a forceful example of which can be heard in *Togo*, a drum feature recorded with the ensemble Old and New Dreams (*Old and New Dreams,* ECM, 1154, 1979). While Blackwell was inspired by African music, and visited Africa numerous times through the 1960s, he did not simply copy specific rhythms and patterns (Schmalenberger 2000, 55-97). Instead he developed an understanding of "…the overall effect of… how the rhythms would affect an individual"; an effect he would then attempt to capture using his own rhythmic vocabulary (Fish 1981). Rather than precisely imitate exact patterns or styles, he instead devised strategies to manipulate his existing drumming skill set to emulate and integrate desired characteristics into his own improvisational language; in his words, "you have to get the overall concept of what they're doing and relate it to whatever you have to play with" (Fish 1981). The development of *Boubacar* was approached with the same creative philosophy of attempting to emulate the desired effect without directly imitating specific styles or works. To that end, I utilised my original process of somatic parameter layering, in combination with rhythmic devices (such as number grouping patterns, odd subdivision and metric modulation) developed during my time as a member of the Marc Hannaford trio, to create *Boubacar*[5].

5 When recording *Boubacar* I also prepared the drumset in two ways: the first was to remove both suspended cymbals, leaving only the drums and hi-hats (which are played only via foot); and the second was to rest a layer of paper on each

Whilst I have never created a notated score for *Boubacar*, to allow for improvisational flexibility, there is an underlying structure that I adhere to within each performance. Essentially, the piece comprises a series of discrete sections performed in a fixed order, with each section delimited by a small pool of movement cycle and sticking cell variants[6]. Each section, however, employs a different rate of rhythmic activity, which is related to the preceding and succeeding sections through various metric relationships; therefore transitioning between each section of *Boubacar* also requires executing a rhythmic shift. In some instances a transition only requires a simple change in primary subdivision - one example of this can be heard between :52 and 1:11, wherein the subdivision changes from quaver triplets to quintuplets (Audio 4.3).

Audio 4.3. Subdivision change from *Boubacar*

However many of these transitional shifts require a more complex metric modulation. As I developed these transitions I found that the simultaneous occurrence of both the metric modulation and the changing sticking cell/movement cycle variants produced an effect that was too pronounced; overtly signposting the change from one section to the next. It is in executing these transitional metric modulations that I employ *Modulation Obfuscation*, as a way of smoothing sectional transitions.

One such transitional metric modulation occurs between 1:48-2:03 in *Boubacar*, a time span which is isolated in Video 4.6.

Video 4.6. *Modulation Obfuscation* in *Boubacar*

Within this excerpt, I begin at a slower tempo (approximately 128bpm) wherein quintuplets are the primary subdivision; and modulate to a faster tempo (approximately 222bpm) wherein triplets are the primary subdivision. The metric relationship between these tempi is such that a cross rhythmic cycle occurring every third quintuplet at the first tempo becomes the beat at the second tempo. Notably, through the modulation the speed of primary subdivision remains unchanged - that is, the quintuplets of the first tempo become the triplets of the second.

drum, slightly dampening the high frequencies produced with each strike.

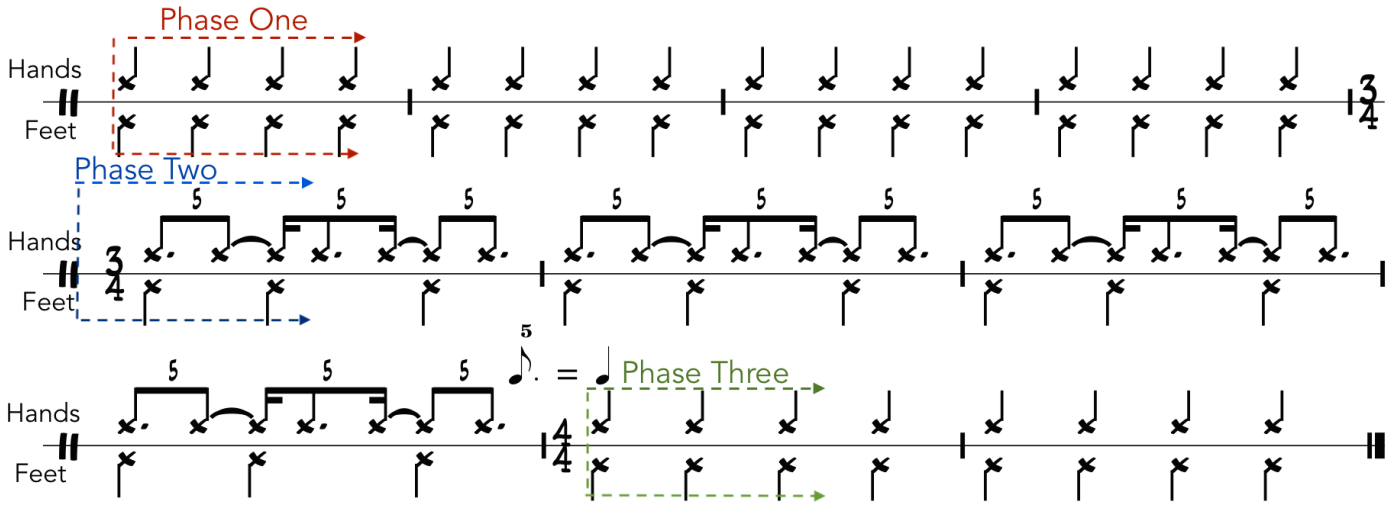
6 The sequencing of these variants is improvised in performance, similar to the *Hide/Reveal* process discussed previously.

Structurally, the rhythmic activity of this excerpt is organised through two interacting pulse streams[7], one activated by the rhythmic activity of the hands and a second by the feet, which move in and out of synchrony. Executing the metric modulation requires both pulse streams to shift from the old tempo (tempo 1) to the new tempo (tempo 2). For aesthetic reasons, I do not shift both streams simultaneously, but rather anticipate the modulation with one stream, creating a transient moment of polypulse.

Thus, this excerpt can be then parsed into three phases (Figure 4.19):

1. Wherein both pulse streams articulate tempo 1. Occurs between 1:48-1:55, at an approximate speed of 128bpm, within which quintuplets are the primary subdivision.
2. Wherein tempo 2 is overlaid on tempo 1, forming a cross-rhythmic cycle. Occurs between 1:48-1:55, when the feet remain at tempo 1, whilst the hands overlay tempo 2. This polyrhythm is executed by emphasising every third quintuplet, creating the new pulse at a ratio of 5:3.
3. Wherein both pulse streams articulate tempo 2. Occurs between 1:48-1:55, when the feet shift into synchrony with the hands, meaning both pulse streams are once again isochronous. This completes the metric modulation, settling into a speed of 222bpm wherein triplets are the primary subdivision.

Figure 4.19. Pulse streams of *Boubacar* excerpt



These pulse streams and their relationship can be heard in Audio 4.4, wherein the pulse associated with the hands is sounded by a rim-click, and the pulse associated with the feet is sounded by a tom.

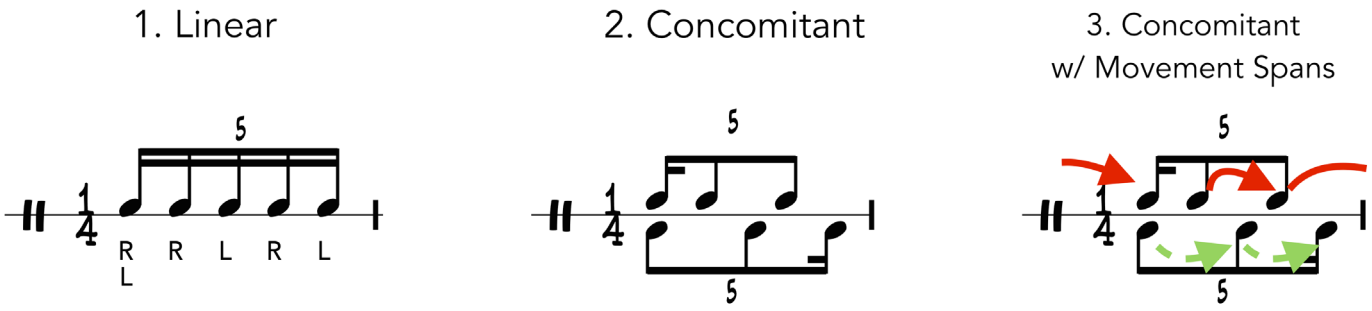
Audio 4.4. Pulse streams of *Boubacar* excerpt

Within this structure, the RS cells I use to activate and fill in the pulse stream of the hands[8] are selected from my set of concurrent sticking cells. Through the first phase I use the five-note sticking cell from my concurrent sticking scheme in the quintuplet subdivision (Figure 4.20).

7 See Roeder (1994, 233-234) for further discussion of interacting pulse streams.

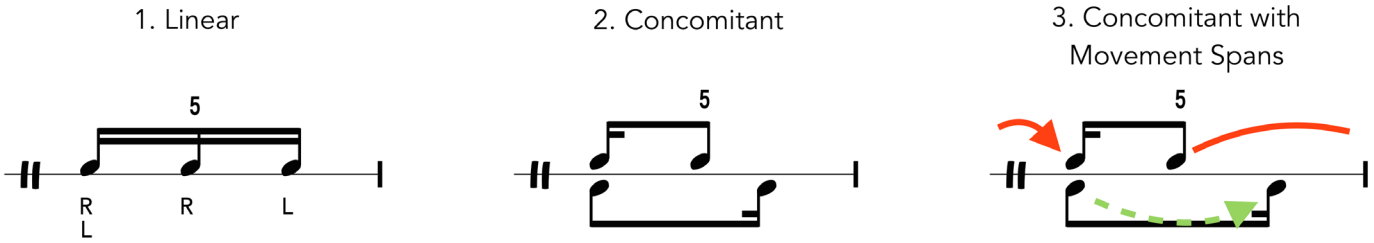
8 The pulse stream of the feet is activated in a simpler fashion, either by direct statement of that pulse or by simple ostinato.

Figure 4.20. Five-note "concurrent" sticking cell in quintuplet subdivision



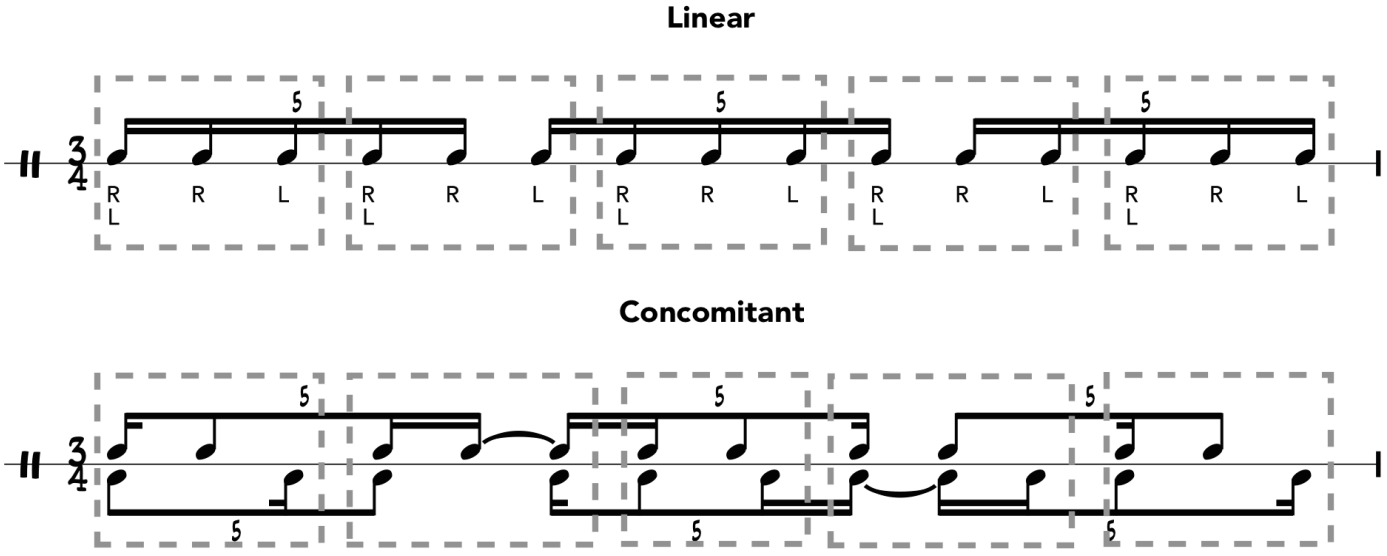
During the second phase I use the three-note sticking cell of my concurrent sticking scheme in the quintuplet subdivision (Figure 4.21).

Figure 4.21. Three-note "concurrent" sticking cell in the quintuplet subdivision



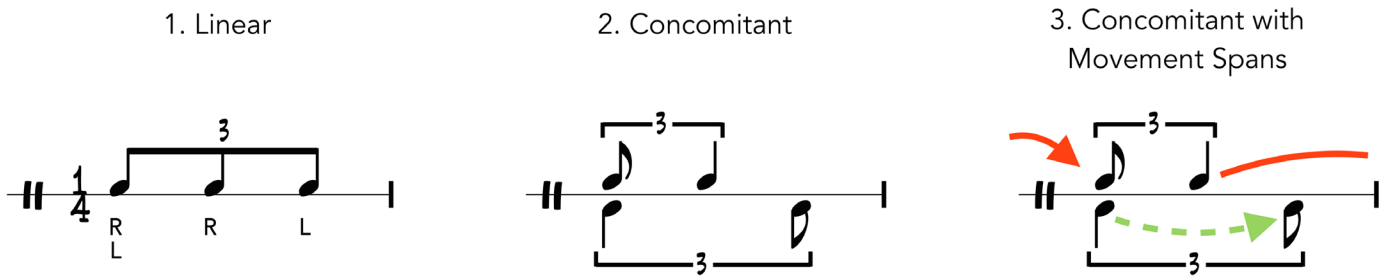
The cross-rhythmic nature of this three-quintuplet grouping causes each subsequent iteration of the sticking cell to sound in a new rhythmic relationship to the metric pulse (which is being articulated through accents of the bass drum and hi-hat); in total, this cell repeats five times in the space of three metric pulsations. Figure 4.22 shows the complete cross-rhythmic cycle of this sticking cell through phase two, in both the linear and concomitant notation schemes, with each iteration of the cell 'boxed' in grey (note that movement spans have been elided for clarity).

Figure 4.22. Cross-rhythmic cycle of three-note sticking cell in quintuplet subdivision



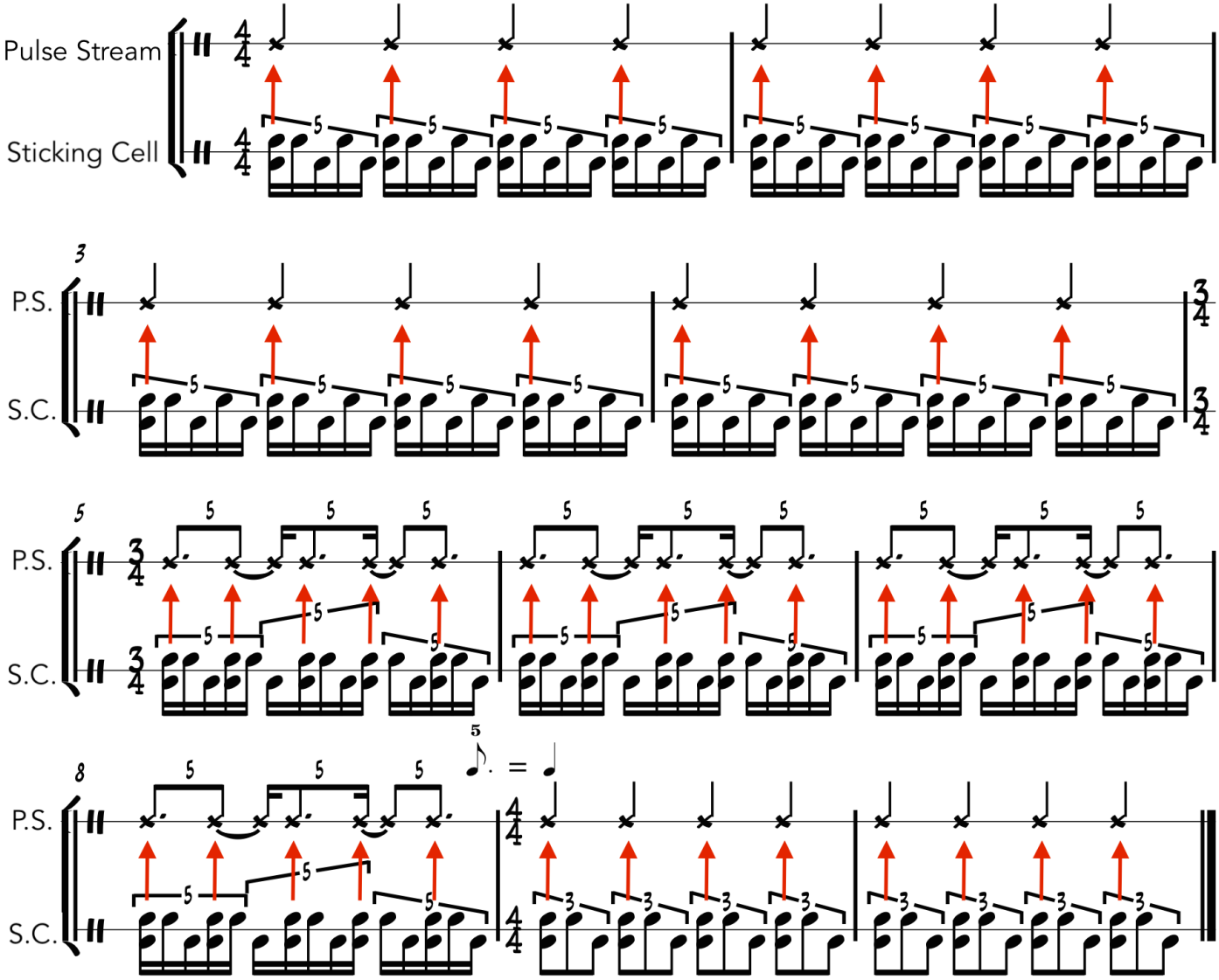
During the third phase I continue using the same three-note sticking. Even though a consistent speed is maintained, the metric modulation reframes the subdivision as triplets (Figure 4.23).

Figure 4.23. Three-note "concurrent" sticking cell in triplet subdivision.



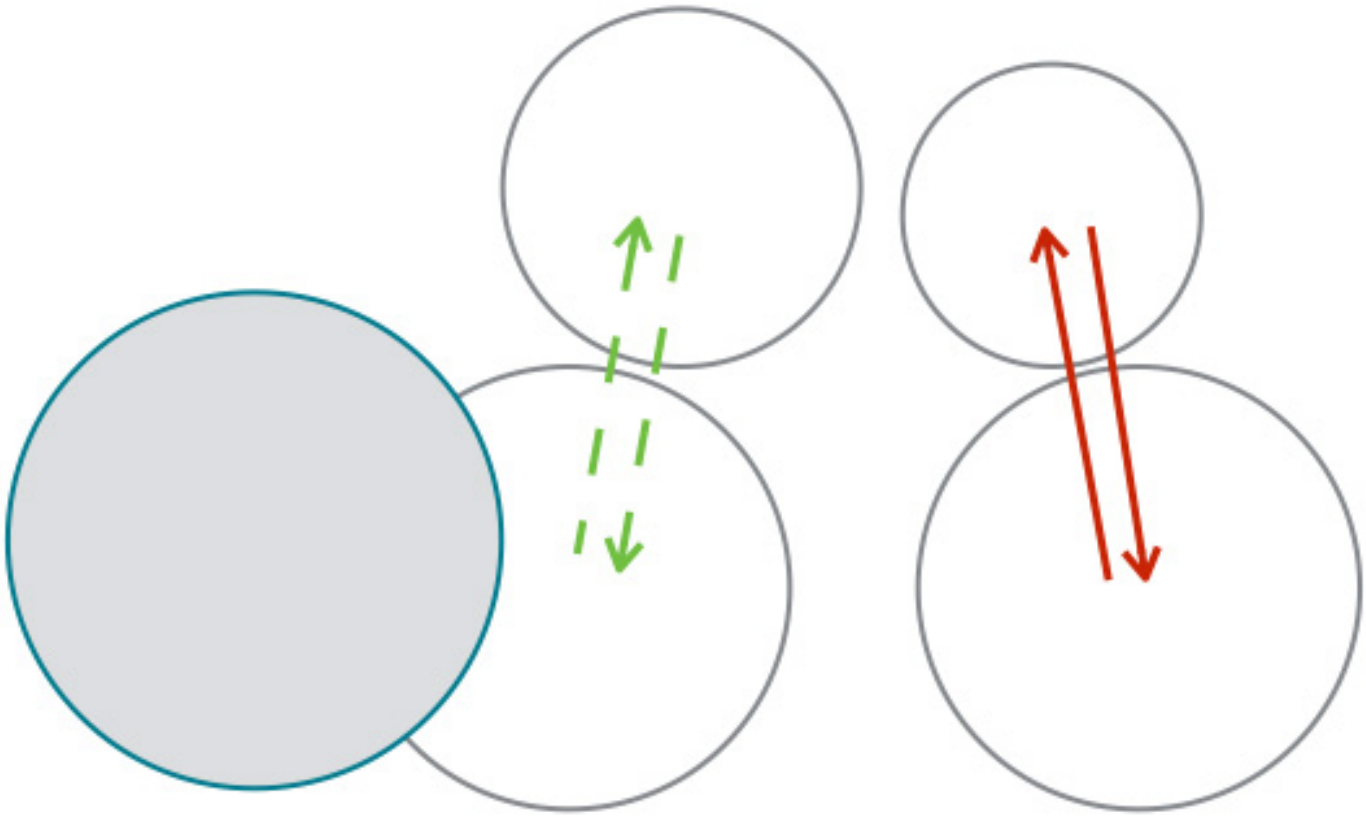
The grouping of these sticking cells, and the change thereof, activates the pulse stream associated with the hands; but by sounding all internal subdivisions, there is also a consistent rate of rhythmic activity. I emphasise the pulse stream by ensuring it consistently aligns with the unison stroke of each sticking cell (Figure 4.24).

Figure 4.24. Alignment of sticking cells to pulse stream



Thus, the selection and sequencing of RS cells is primarily fulfilling a structural rhythmic function. In contrast, the selection of the movement cycles is based on aesthetic criteria: first, to create interlocking drum melodies reminiscent of the Sufi drum music that inspired the work, and second to create the consistent melodic contour that is central to the *Modulation Obfuscation* strategy. The combined movement cycle consistently utilised through this excerpt fulfils both those criteria (Figure 4.25).

Figure 4.25. Combined movement cycle from *Boubacar* excerpt

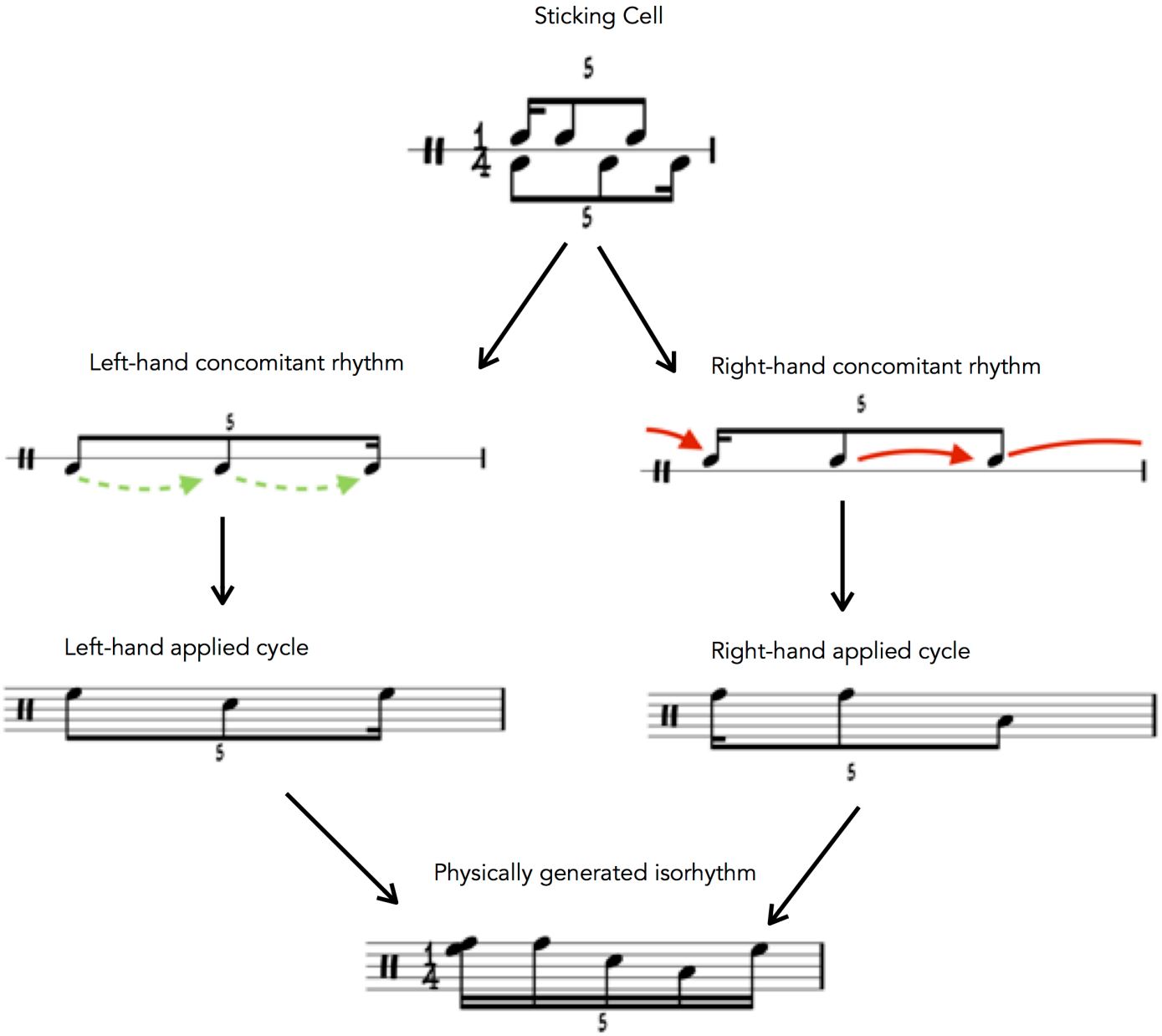


The left-hand follows a two-point oscillating movement cycle between the snare drum and middle tom; while the right-hand follows a two-point oscillating movement cycle between floor tom and high tom. As these cycles are both of the same type, direction, and amount of hit points, they form an entrained class combined movement cycle. It is this entrained relationship that, when applied to sticking cells, generates PGIs that are short and melodically identifiable.

To explicate how and why the PGIs are short and identifiable, I will "unpack" the somatic parameter layering process as it occurs throughout this excerpt[9]. Figure 4.26 shows the process as it occurs during phase one, when the movement cycles interact with the five-note concurrent sticking.

9 While not inspired by it, this unpacking process bears some resemblance to Blacking's analysis of kalimba music, in which he identifies melodies as emerging from interlocking parts sounded by the right- and left-thumbs (1973, 12-15).

Figure 4.26. Unpacked somatic parameter layering process from phase one of *Boubacar* excerpt



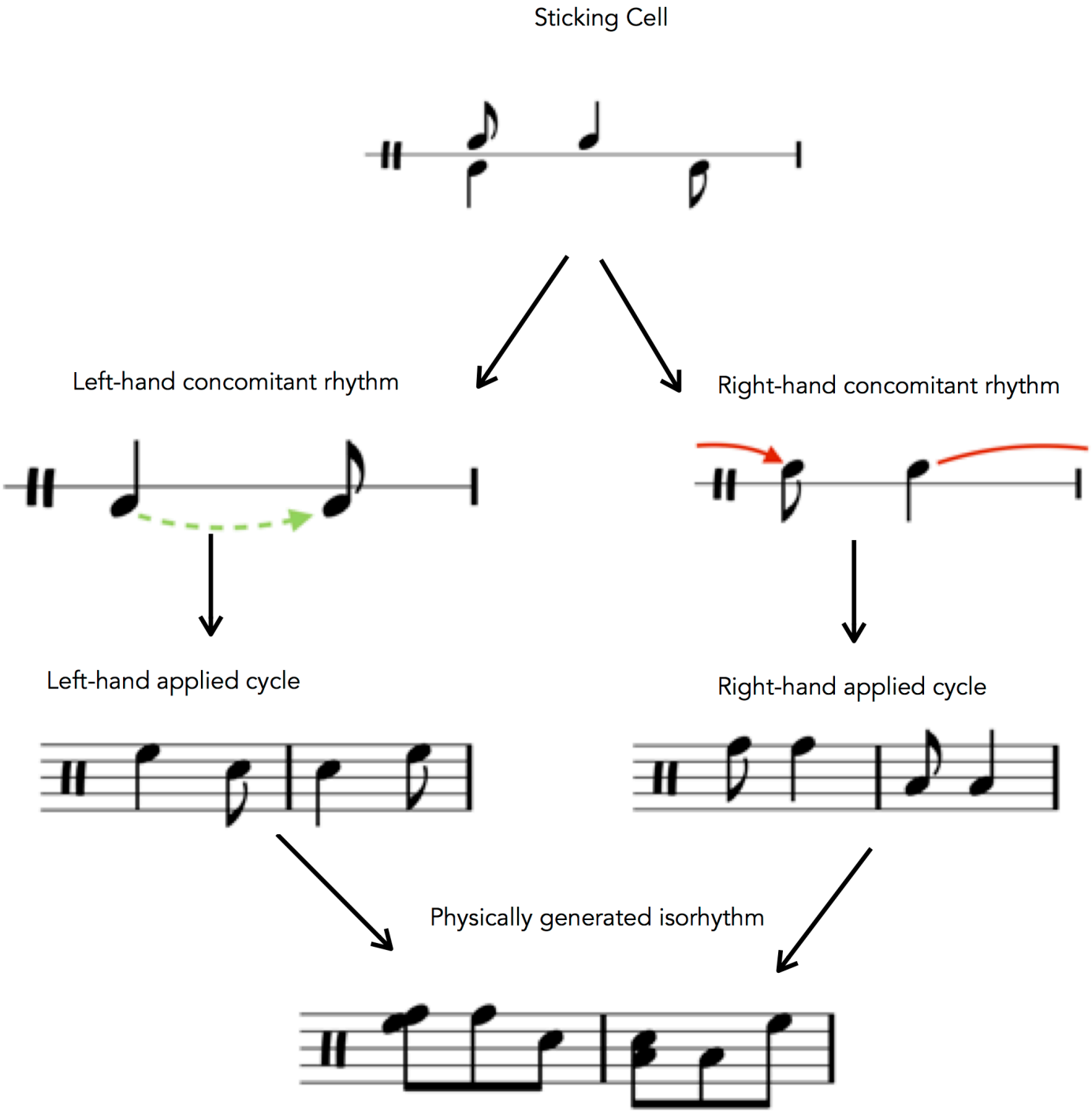
Working from the top down, the sticking cell is split into the left- and right-hand concomitant rhythms; notably both concomitant rhythms contain two movement spans. These concomitant rhythms interact with the individual movement cycles to generate the left- and right-hand applied cycles. In both cases, the two movement spans of the concomitant rhythm form a direct relationship with the two hit-points of the individual movement cycles; this generates applied cycles which are isochronous with the sticking cell. Finally, the applied cycles are combined to form the PGI; as both applied cycles were formed through a direct relationship, the PGI also repeats isochronously with the sticking cell itself. These figures are demonstrated in Video 4.7.

Video 4.7. Unpacked somatic parameter layering from phase one of *Boubacar* excerpt

I must re-emphasise here that this form of unpacking is not a set of procedural steps undertaken independently; but rather a notational and visual representation of the real-time physical intermediaries linking the inputs (movement cycles and sticking cells) and outputs (PGIs) of somatic parameter layering.

As the second and third phase of this excerpt both utilise the same physical sticking cell - the three-note concurrent sticking - within different metric hierarchies, I will first unpack the layering of this cell with the movement cycles in an abstracted (that is, non-metrical) form. I will then examine the application of the generated PGI to the metrical context of both phases. This non-metrical unpacking is shown in Figure 4.27.

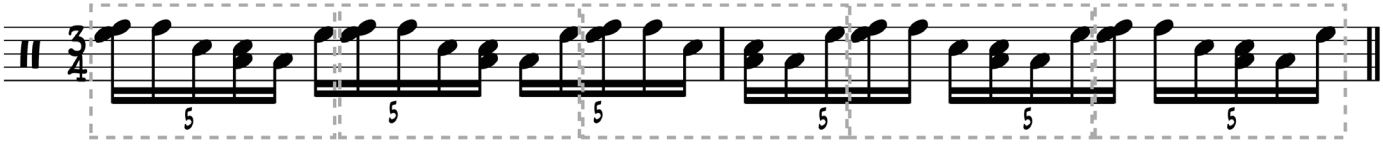
Figure 4.27. Unpacked somatic parameter layering process from phases two and three of *Boubacar* excerpt



Again, the sticking cell is split into the concomitant rhythms; notably, each concomitant rhythm here only contains one movement span. As such, these rhythms interact with the two-point individual movement cycles in an expansive relationship; generating applied cycles that are twice as long. However, as this double length is a shared quality of both applied cycles, they combine to form a PGI of that same length, rather than expanding again. The final PGI is a six note pattern.

Through phase two, this six note PGI is contextualised as quintuplets (against a metrical pulsation stated by the bass drum and hi-hats). As such, it creates a six-quintuplet grouping, which repeats five times within a span of six beats - represented in Figure 4.28 as two measures of 3/4 time. The isolated figures of the unpacked somatic parameter layering process leading to this PGI are demonstrated in Video 4.8.

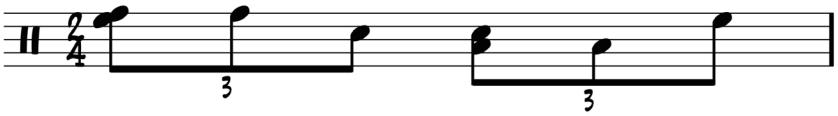
Figure 4.28. PGI from phase two of *Boubacar* excerpt



Video 4.8. Unpacked somatic parameter layering from phase two of *Boubacar* excerpt

This sticking cell is maintained through phase two into phase three, where it is metrically re-contextualised. Therefore the same is true of this PGI, which retains its six-note form through the transition, but is now contextualised as triplets. Thus, within phase three the six-note PGI recurs every two beats (Figure 4.29). The isolated figures of the unpacked somatic parameter layering process leading to this PGI are demonstrated in Video 4.9.

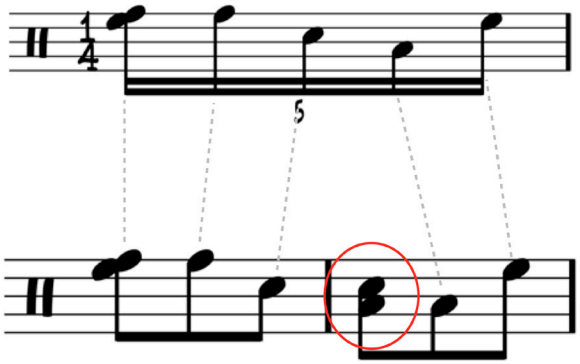
Figure 4.29. PGI from phase three of *Boubacar* excerpt



Video 4.9. Unpacked somatic parameter layering from phase three of *Boubacar* excerpt

All three PGIs follow a similar sequence of hit points; whilst slightly complicated by unison strokes, the sequence is essentially [high tom] to [snare drum] to [floor tom] to [middle tom]. As all of these hit points are tuned drums[10], this generates an identifiable melodic cell. When the five-note PGI of phase one is compared to the six-note PGI of phases two and three, it can be seen that the two are almost identical; the only difference being an extra unison stroke (sounding the floor tom and snare drum) found in the six-note PGI (Figure 4.30).

Figure 4.30. PGI transformation

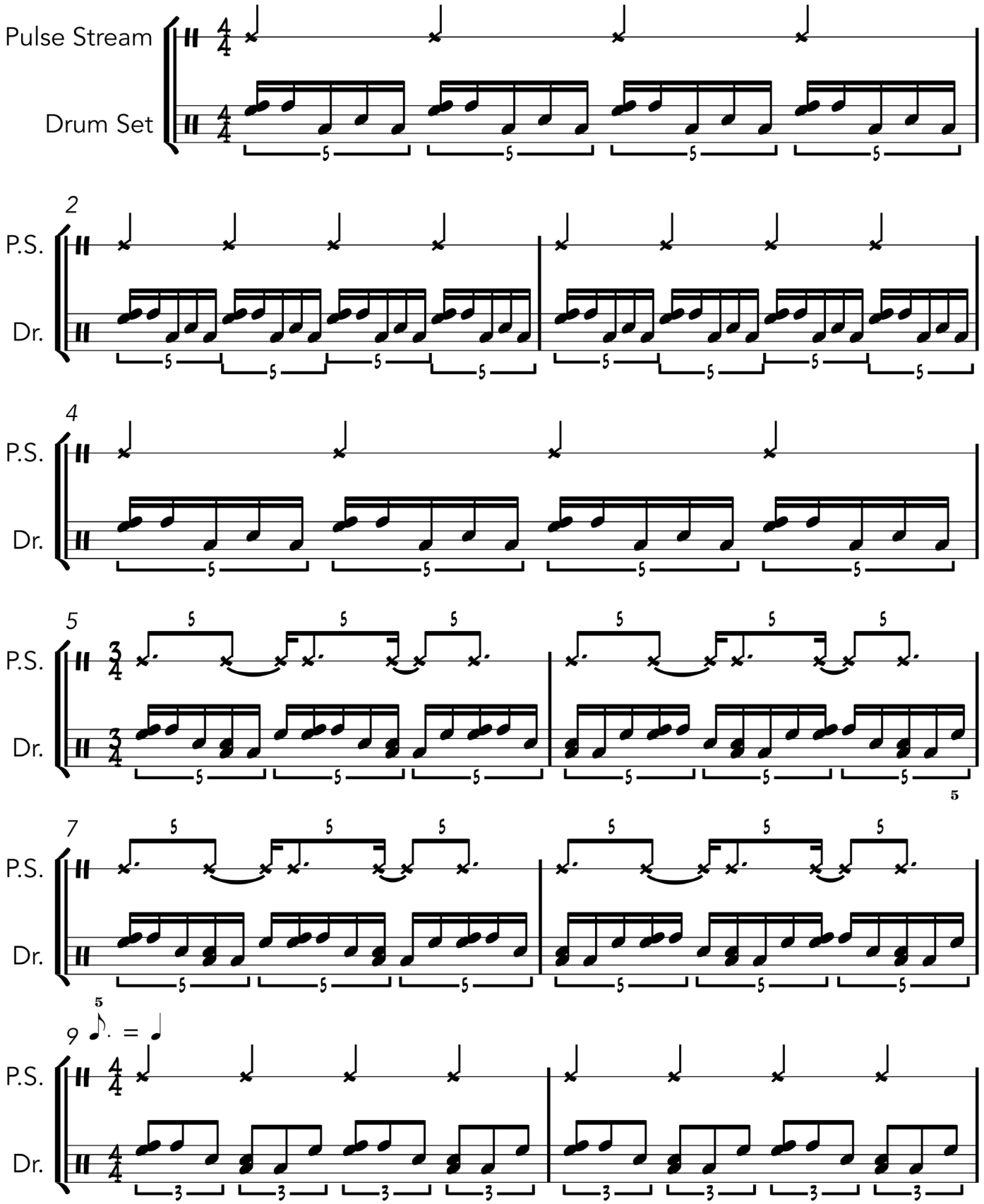


Thus, while the shift from the five-note concurrent sticking cell to the three-note concurrent sticking cell (which occurs at the beginning of phase two) fulfils the structural function of activating a cross-rhythmic cycle at a different tempo, the salient musical change at this point is the melodic augmentation from a five-note cell to an almost identical six-note cell. As this new six-note sequence continues and seems to set the new tempo (at phase three, once the metric modulation is completed), the musical effect is of the tempo change emerging out of the drum melody; rather than the drum melody being altered to fit a pre-determined tempo change. Figure 4.31 shows the alignment of the pulse stream and the complete PGIs; Video 4.10 presents a top-down perspective as I demonstrate this excerpt (with the bass drum elided for aural clarity).

Video 4.10. Top down view of *Boubacar* excerpt (demonstration)

10 The snare drum is played with the snare wires disengaged to further emphasise this effect.

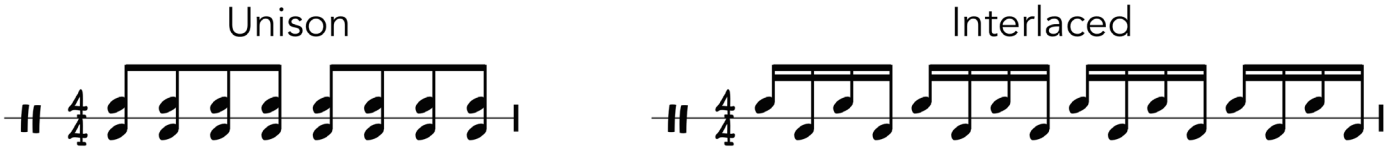
Figure 4.31. Alignment of PGIs to pulse stream



4.4 Strategy Three: Unison / Interlace

The strategy *Unison / Interlace* entails alternating the sticking cell between unison strokes and interlaced strokes[11] (Figure 4.32), whilst maintaining a consistent combined movement cycle.

Figure 4.32. Unison and interlaced sticking cells



When changing between these sticking cells, the speed of each applied cycle is unchanged - with the cycle of the one hand simply displaced - but their relationship shifts from sounding in unison to creating an interlaced pattern. The resulting shift in PGI is significant, as this interlaced pattern audibly moves at double speed; this also creates a unique melodic sequence from the intertwining of hit points.

This strategy is derived from Dan Weiss' original developmental exercises (as detailed in Chapter Three), specifically the shift from unison strokes to interlaced (single) strokes. As I experimented with Weiss' exercise, I felt that the PGIs generated through the intermediate stages of the exercise had great potential for musical application, rather than simply being discarded as procedural waypoints.

Furthermore, both unison strokes and single strokes are relatively simplistic sticking cells, which I have found I am more readily able to combine with particularly complex or unfamiliar combined movement cycles; that is to say, the simplicity of the sticking cells balances the complexity of the movement cycles in regards to the physical and cognitive demands of executing somatic parameter layering. Thus, *Unison / Interlace* is a strategy from which I can generate interesting musical development with even the most demanding combined movement cycles.

A clear example of *Unison / Interlace* can be found in the recorded work *Oscillator* (Audio 4.5).

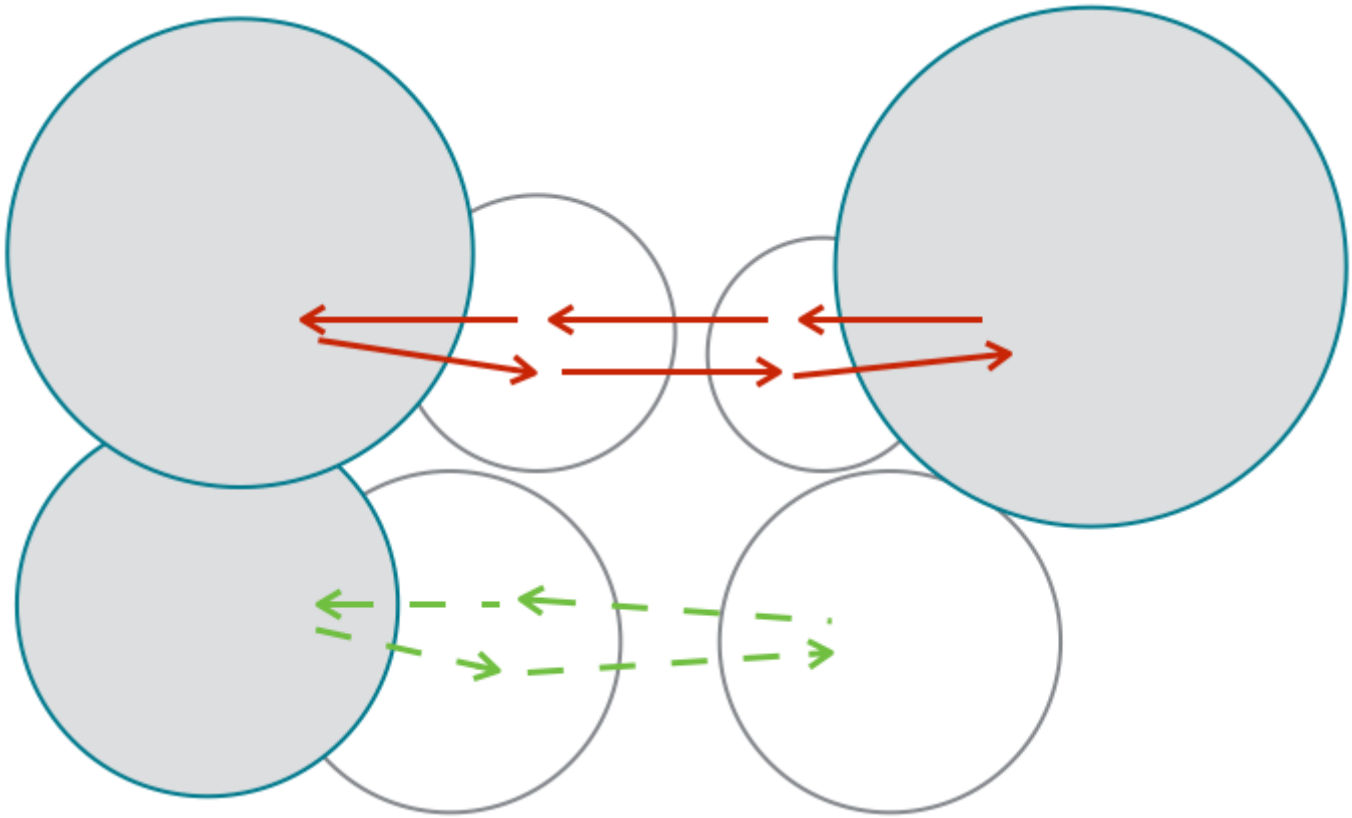
Audio 4.5. *Oscillator*, complete work

As referenced by the title, much of the musical material within *Oscillator* is produced through various applications and combinations of oscillating movement cycles. As I analysed the outputs from the first recording session, undertaken in June 2015, I realised that my choices of individual movement cycles to that point were limited to circular type cycles or oscillating cycles of only two-hit points. This led me to deliberately experiment with three- or four-point oscillating movement cycles as inputs for somatic parameter layering. From that experimentation I developed a series of motifs that both direct the improvisation and form the compositional structure of *Oscillator*.

The first two of these motifs are related through a direct application of the *Unison / Interlace* strategy. Both motifs share an identical phasing class combined movement cycle, comprised of a six-point oscillating right-hand movement cycle and a four-point oscillating left-hand movement cycle (Figure 4.33).

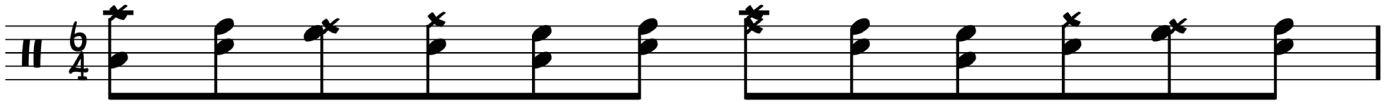
11 Known pedagogically as single strokes.

Figure 4.33. Combined movement cycle from *Oscillator*



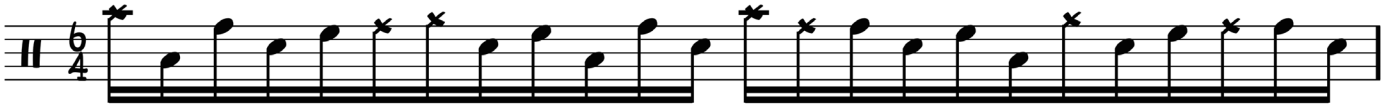
The first motif is the PGI generated when this movement cycle is applied to consistent unison strokes, which in this case I perceive as quavers (Figure 4.34). I will call this the *unison motif*.

Figure 4.34. Unison motif



The second motif is the PGI generated when this movement cycle is applied to consistent alternating strokes, which in this case I perceive as semiquavers (Figure 4.35). I will call this the *interlaced motif*.

Figure 4.35. Iterlaced motif

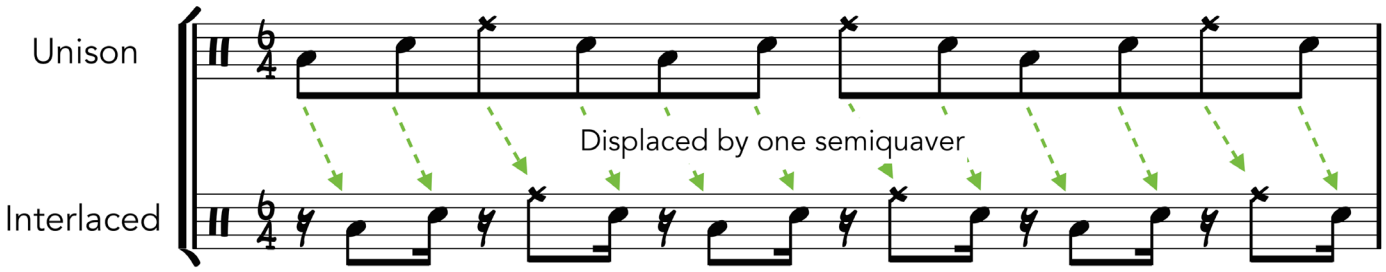


Both the unison motif and he interlaced motif is demonstrated in Video 4.11.

Video 4.11. Unison and interlaced motifs

Whilst the unison and interlaced motifs are aurally and notational drastically different, they are produced by a very slight physical adjustment - the left-hand applied cycle is rhythmically displaced by one semiquaver. Figure 4.36 shows the left-hand applied cycle of both motifs, to explicate this minor adjustment.

Figure 4.36. Relationship between left-hand applied cycle of unison motif and interlaced motif



Within *Oscillator*, the use of the *Unison / Interlace* strategy can be most clearly observed between 3:38-4:42 - a timespan shown in Video 4.12. During this period, I frequently alternate between the unison and interlaced motifs whilst concurrently improvising rhythmic figures on the hi-hat and bass drum. This excerpt also includes an example of *Fragmentation*, the next strategic implementation of somatic parameter layering I will address.

Video 4.12. Excerpt of *Oscillator* containing use of *Unison / Interlace* strategy

4.5 Strategy Four: Fragmentation

Fragmentation is a strategy wherein I deconstruct a PGI to generate multiple unique musical "fragments". These fragments can take three forms: they can be an isolated segment of the complete PGI; they can be the applied cycle of either hand; or they can be an isolated segment of either applied cycle. These fragments can then be utilised as melodic material, related to but aurally distinct from the PGI itself.

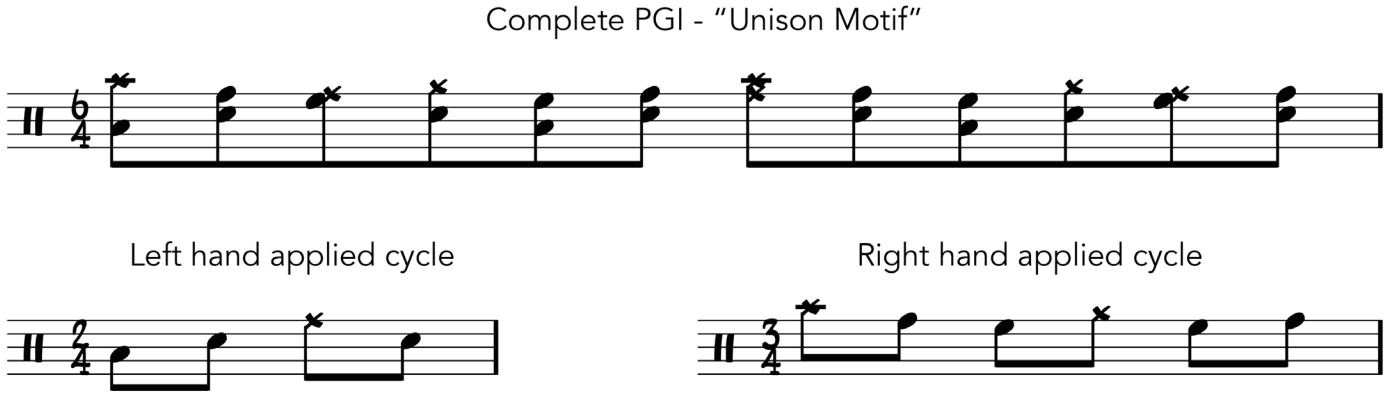
A primary benefit of *Fragmentation* is that any and all fragments are constructed from the same combination of movement cycles and sticking cells as the PGI they are derived from; I therefore already possess the technical ability to play these sequences. For this reason, I am able to utilise *Fragmentation* not only within instrumental practice sessions but also as a real-time improvisational strategy.

Fragmentation as an improvisational performance strategy can be seen in the piece *Oscillator* (see Audio 4.5). Two examples are found within or directly preceding the same timespan as addressed through the analysis of *Unison / Interlace*; as such I will be referring here to the unison and interlaced motifs generated through the *Unison / Interlace* process.

The first example of *Fragmentation* occurs between 3:31-3:42 (Video 4.13), and musically is constructed through a combination of the unison motif PGI, both the right- and left-hand applied cycles, and fragments thereof (Figure 4.37).

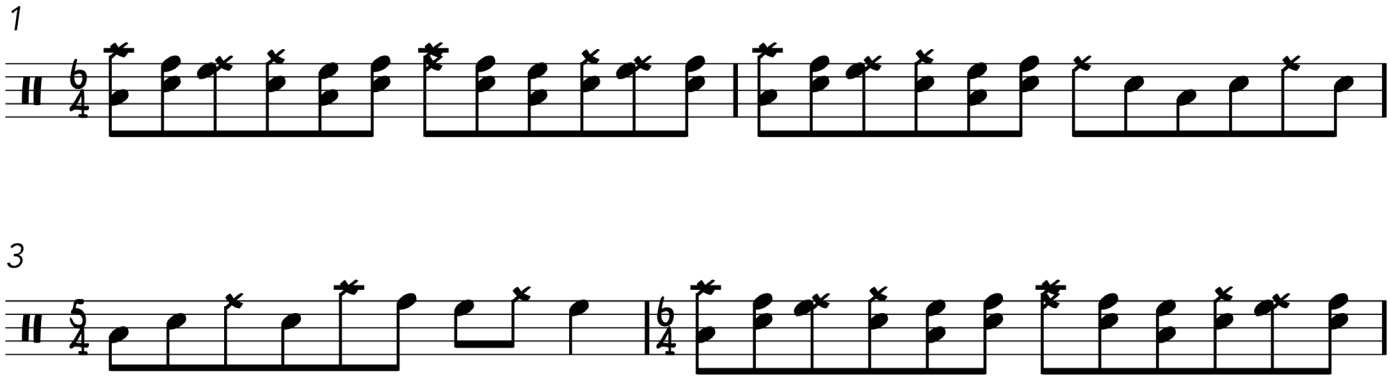
Video 4.13. First example of *Fragmentation*

Figure 4.37. Full PGI (unison motif) and applied cycles



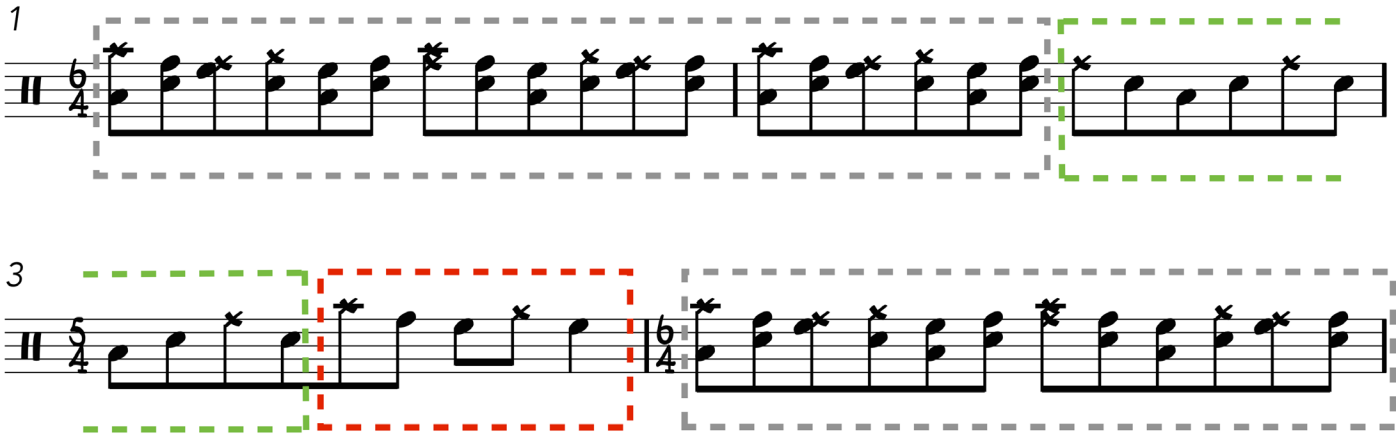
This excerpt spans four bars when notated (Figure 4.38).

Figure 4.38. Transcription of first example of *Fragmentation*



The first and fourth bars comprisee full statements of the unison motif; it is through the second and third bars that fragmentation occurs. The first three beats of bar two are a continuation of the unison motif. This is followed by a fragment constructed of two-and-a-half repeats of the left-hand applied cycle, spanning five beats in total. Directly following this is a fragment consisting of a partial sounding the right-hand applied cycle (wherein the final hit-point is elided). The elision of this final hit-point also provides the only interruption to the constant quaver pulse within this excerpt. Figure 4.39 parses the transcription into these fragments: those notes enclosed in a grey box are the unison motif; those enclosed in a green box are the left-hand applied cycle fragment; and those enclosed in red are the right-hand applied cycle fragment.

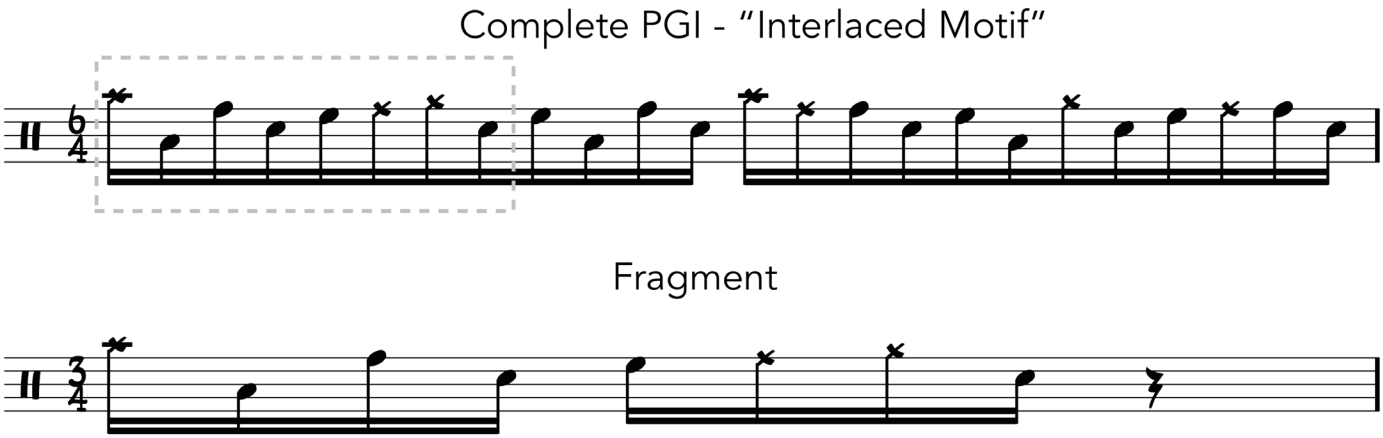
Figure 4.39. Annotated transcription of first example of *Fragmentation*



The second example of *Fragmentation* occurs between 4:05-4:17 (Video 4.14), wherein the fragment comprises an eight note sequence drawn from the interlaced motif PGI (Figure 4.40).

Video 4.14. Second example of *Fragmentation*

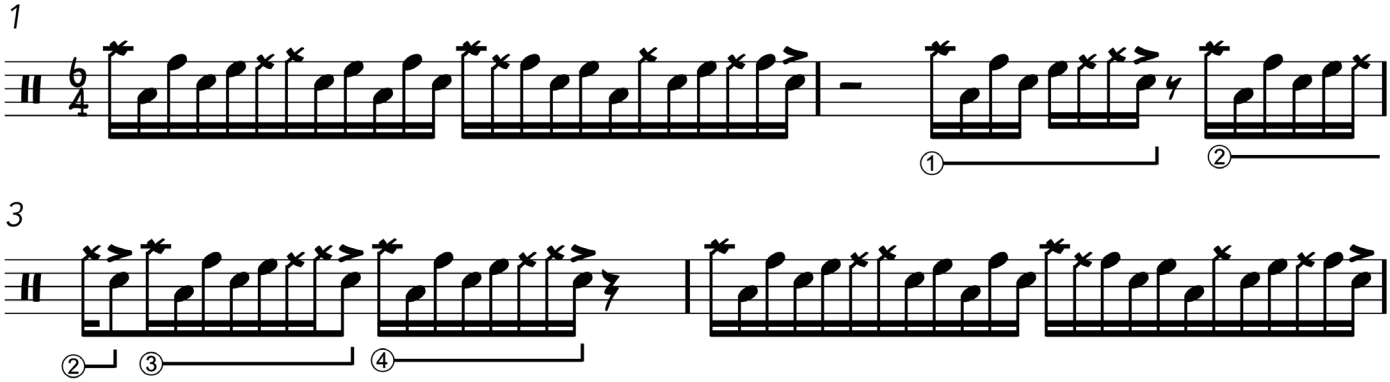
Figure 4.40. PGI (interlaced motif) and fragment thereof



The partial fragment used in this excerpt comprises the opening sequence of eight hit-points found in the complete PGI (these are enclosed within the grey box of the PGI in Figure 4.40). Within this figure I have notated the fragment in 3/4 meter; this is fixed only for notational purposes, and the rhythmic space after the final stroke is flexible.

This excerpt spans four bars when notated (Figure 4.41).

Figure 4.41. Transcription of second example of *Fragmentation*

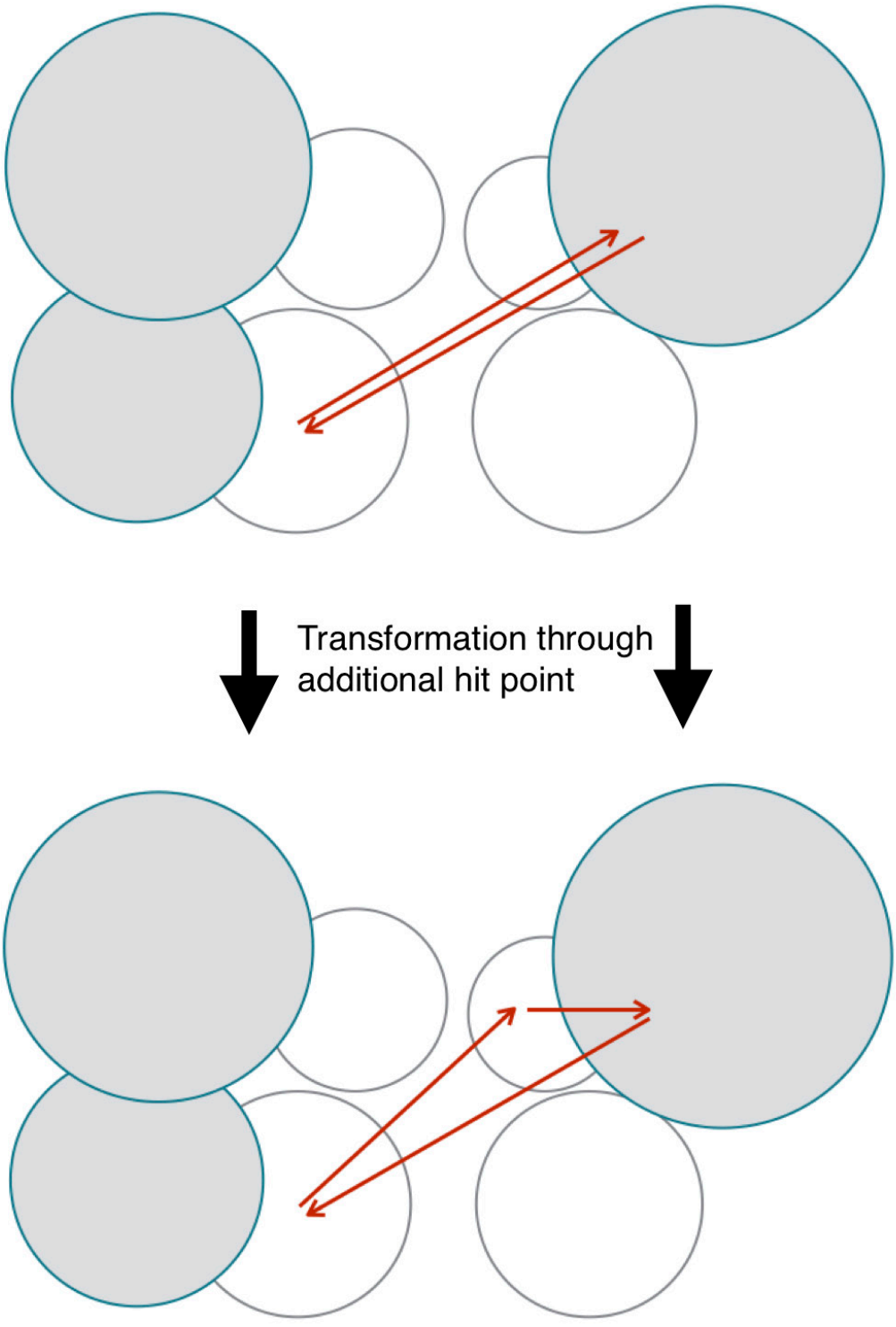


Similar in structure to the first example, the first and fourth bars comprise full statements of the interlaced motif, whilst the fragment is utilised through the second and third bars. The partial fragment is repeated four times through the second and third bars; these are noted by the numbered brackets. Note that the transcribed rhythmic expression through the second bar is an approximation; the rests are deliberately slightly lengthened or contracted to disrupt the established metric flow. Throughout the third bar the meter is re-established (if obfuscated through syncopation) in preparation for the restatement of the full PGI in bar four.

4.6 Strategy Five: Expansion/Contraction

The final strategy is *Expansion/Contraction*, which I have developed as a method to transform PGIs during extended improvised applications of somatic parameter layering, whilst also maintaining an unbroken dense texture. When implementing *Expansion/Contraction*, I maintain a constant sticking cell, but vary the movement cycles of either one or both hands. The transformation of individual movement cycles occurs through the addition or subtraction of a single hit point. For example, a movement cycle oscillating between the ride cymbal and snare drum is transformed into a clockwise movement cycle through the addition of the high tom (Figure 4.42).

Figure 4.42. Example of transformation of individual movement cycle



Whilst these changes are small, and thus manageable during improvisation, their impact is amplified by the interaction of the right- and left-hand applied cycles. My primary focus during *Expansion / Contraction* is to shift the combined movement cycle between entrained classifications (that is: *entrained*, *entrained in opposition*, or *entrained in divergence*) and phasing classifications (that is: *phasing*, *phasing in opposition*, or *phasing in divergence*). When adhering to any of the entrained classifications, the resulting PGI is characterised by a short recurring melodic sequence; in contrast, any phasing classifications will result in a PGI with a longer, intertwined melodic sequence. By alternating between these two characteristics of the PGIs - but still sounding almost identical sets of hit points - I aim to create the feeling of expansion and contraction for which I have named this strategy.

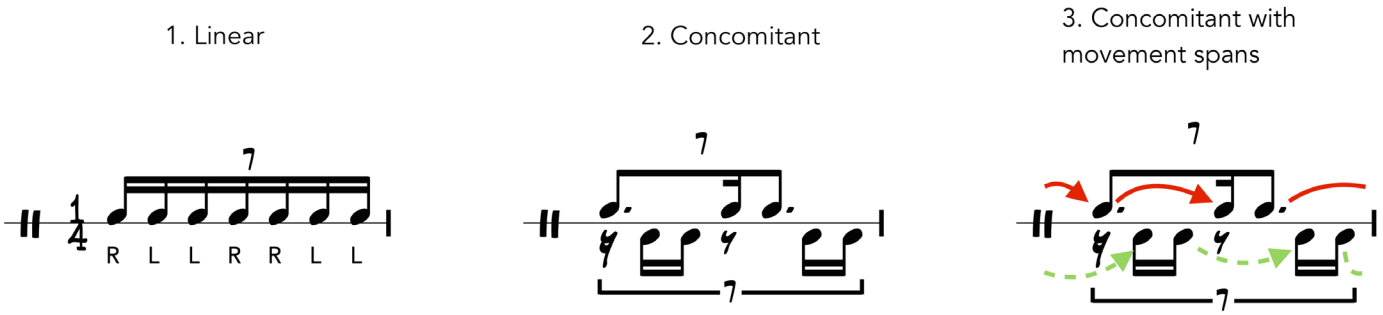
A clear example of *Expansion / Contraction* can be found in the recorded work *Isolator* (Audio 4.6).

Audio 4.6. *Isolator*, complete work

Isolator is compositionally constructed of three sections. The first, introductory section, features the sparse use of chimes, shells and bells in different textural combinations. This builds into the middle section, wherein I layer complex rhythmic figures across a quintuplet high tom ostinato[12]. The third section sees the musical texture build to a peak of density and volume; which is then deconstructed to conclude the piece.

It is during the final section that I utilise *Expansion / Contraction*, by applying a consistent sticking cell to a series of improvised, often complex, movement cycles. The sticking cell is a one-beat septuplet figure[13] (Figure 4.43).

Figure 4.43. Sticking cell from *Isolator* excerpt



Between approximately 7:30 and 9:30 in *Isolator*, I sound this sticking cell in an largely unbroken sequence, punctuated only by accented pauses and some fragmentation occurring towards the end of that timeframe. Through this period I am regularly changing the individual movement cycles of both hands, generating PGIs that, while consistently dense, create gestural melodies that repeat with varying frequency. When viewed from a top-down perspective, the relationship of these movement cycles to the resulting melodic figures can be observed; this is shown in Video 4.15.

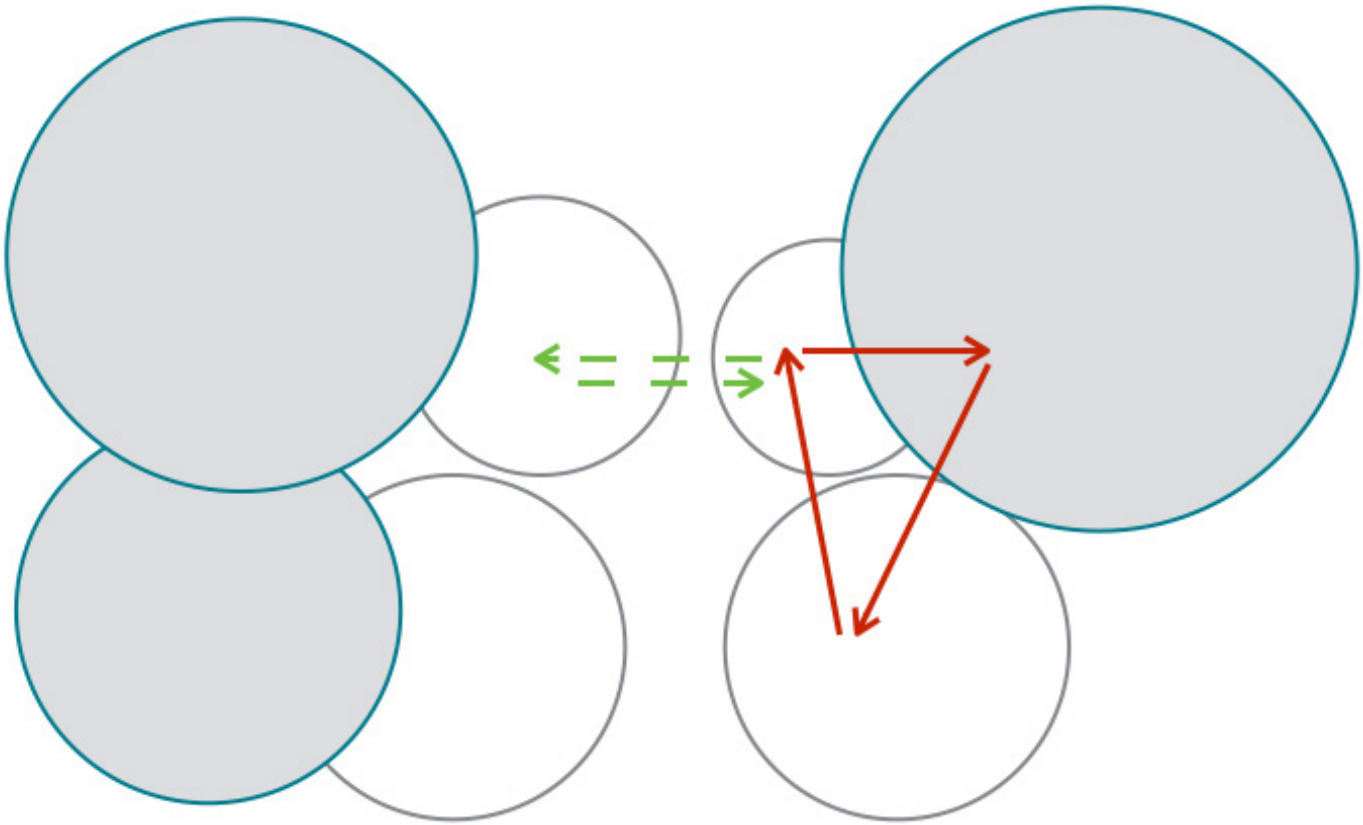
12 The complex rhythmic figures used in this section are derived from a number diamond, a technique for arranging number grouping sequences developed by Australian percussionist Greg Sheehan (see O'Neill 2013).

13 Interestingly, this sticking cell is identical to the 7A sticking of the Chaffee compound sticking system discussed in Chapter Three. Although I arrived at this sticking through a separate creative process, I cannot rule out the potential that my earlier experimentation with Chaffee's stickings encoded a predisposition towards this cell.

Video 4.15. Top-down perspective of *Expansion / Contraction* in *Isolator*

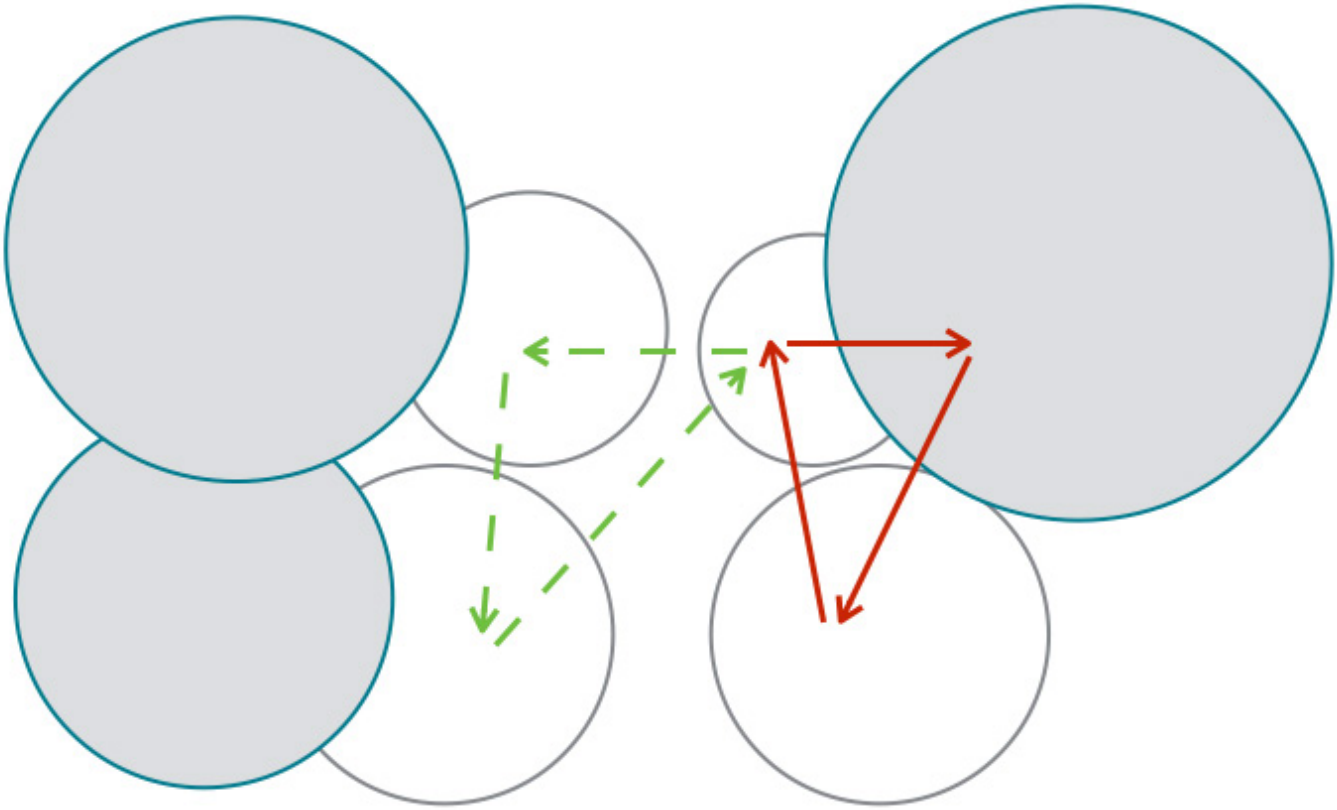
The *Expansion / Contraction* strategy is most evident in the relationship between three combined movement cycles found in this excerpt. All three share an identical right hand individual movement cycle - a three-point clockwise cycle from right cymbal to floor tom to high tom - which is combined with differing left hand individual movement cycles. Within the first combined cycle, the left hand is sounding a two-point oscillating cycle between the middle and high toms; therefore the resulting combined movement cycle is classed as phasing in divergence (Figure 4.44). I will refer to this as *phasing combination #1*.

Figure 4.44. Combined movement cycle of phasing comination #1



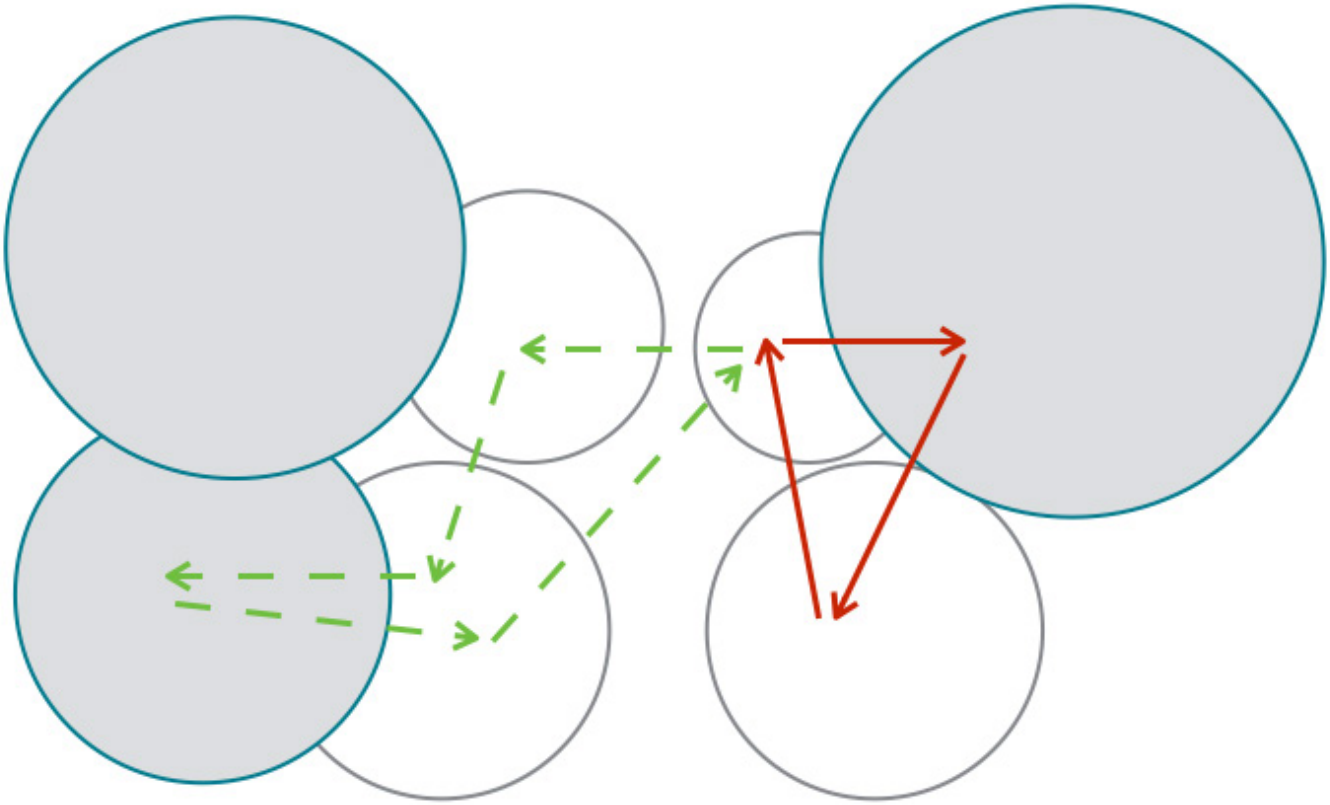
The second combined cycle is created through the addition of a hit point - the snare drum - to the left hand individual cycle. This addition creaties a three-point anticlockwise individual cycle, and the combined movement cycle is therefore classed as entrained in opposition (Figure 4.45). I will refer to this as the *entrained combination*.

Figure 4.45 Combined movement cycle of entrained combination



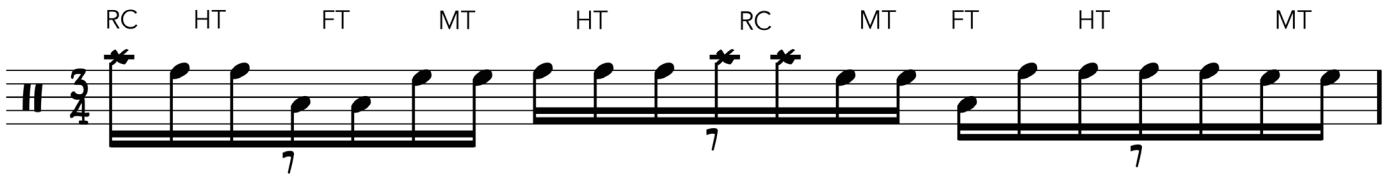
The third combined cycle is created through the addition of another hit point - the hi-hat - to the left hand individual cycle; to faciltate this motion, I also add a second articulation of the snare drum within each cycle. This results in a five-point compound cycle, and a combined movement cycle that is classed as phasing in divergence (Figure 4.46). I will refer to this as *phasing combination #2*.

Figure 4.46. Combined movement cycle of phasing combination #2



Within the excerpt presented in Video 4.15, phasing combination #1 is the first movement cycle followed. The interaction of the sticking cell with this combined movement cycle generates a three beat PGI (Figure 4.47).

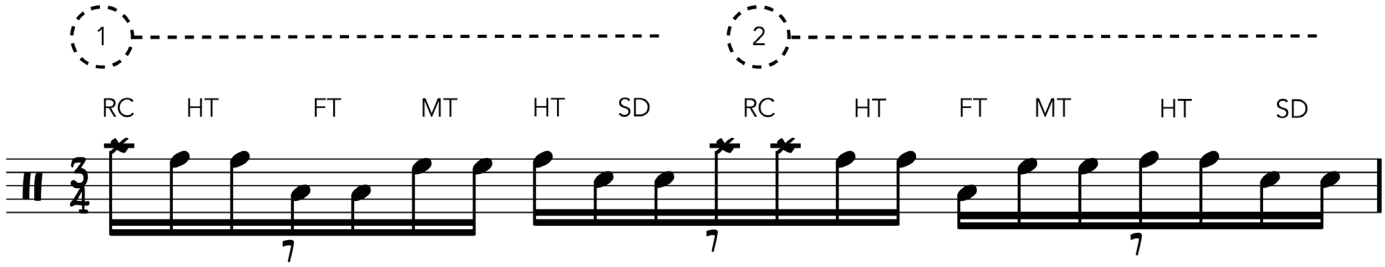
Figure 4.47. PGI of phasing combination #1



I have annotated this PGI with the melodic sequence of hit points, produced if the multiple sequential attacks on a single hit point are treated as one. Note that this sequence does not repeat within this PGI.

From phasing combination #1, I shift to the entrained combination. The interaction of sticking cell to this combined cycle also generates a three beat PGI (Figure 4.48).

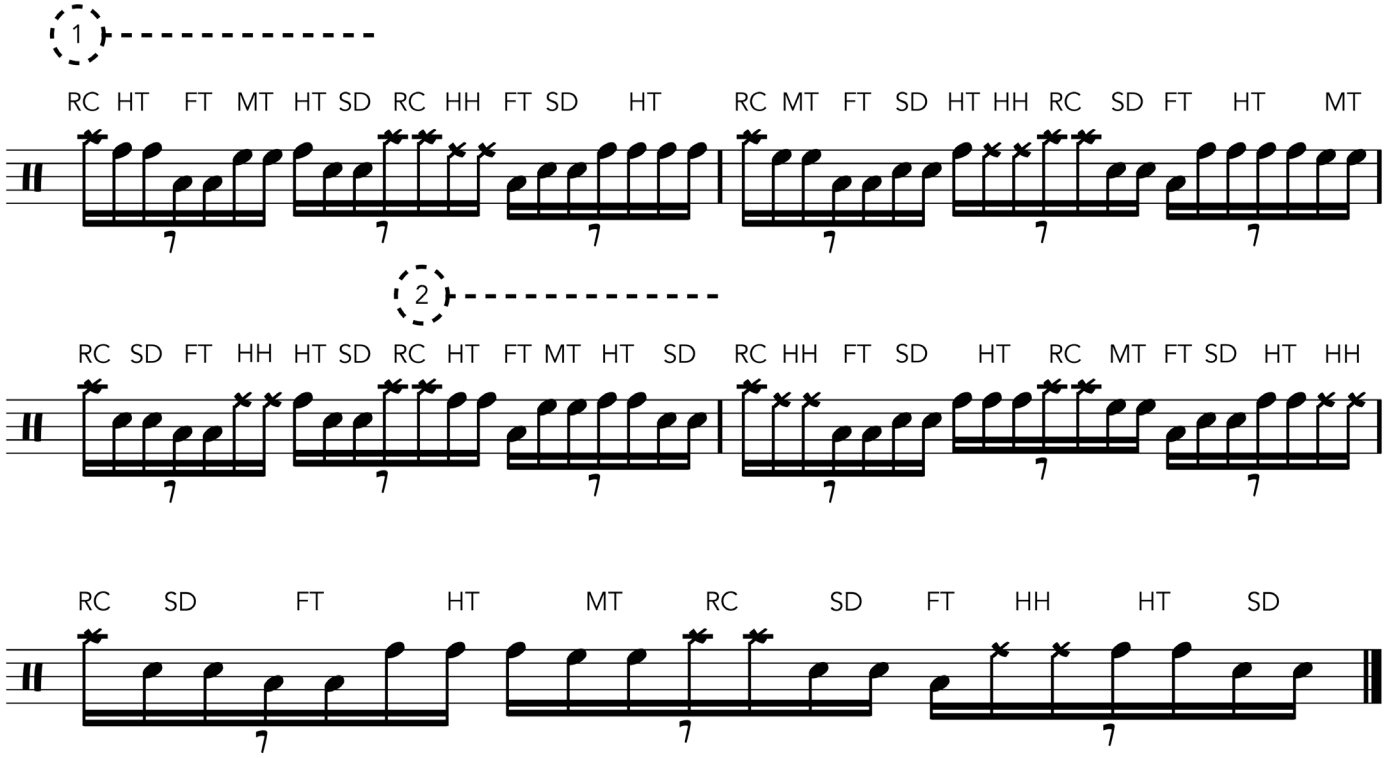
Figure 4.48. PGI of entrained combination



Again, this PGI is annotated with the melodic sequence of hit points. In this instance, whilst the entire PGI is three beats in length, the melodic sequence repeats twice within this timespan (noted above the stave). Given the extreme density of this figure, and the lack of any metric reference, the repetition of this sequence is clearly audible. For this reason, the shift from phasing combination 1 to the entrained combination, whilst technically producing PGIs of identical length, creates an effect of the gestural melodic pattern doubling in speed - that is, contracting.

I maintain the entrained combination, with some ornamental interruptions, for over twenty seconds. Following this, I transition to phasing combination #2; the interaction of this combined movement cycle with the sticking cell generates a considerably longer, fifteen beat PGI (Figure 4.49).

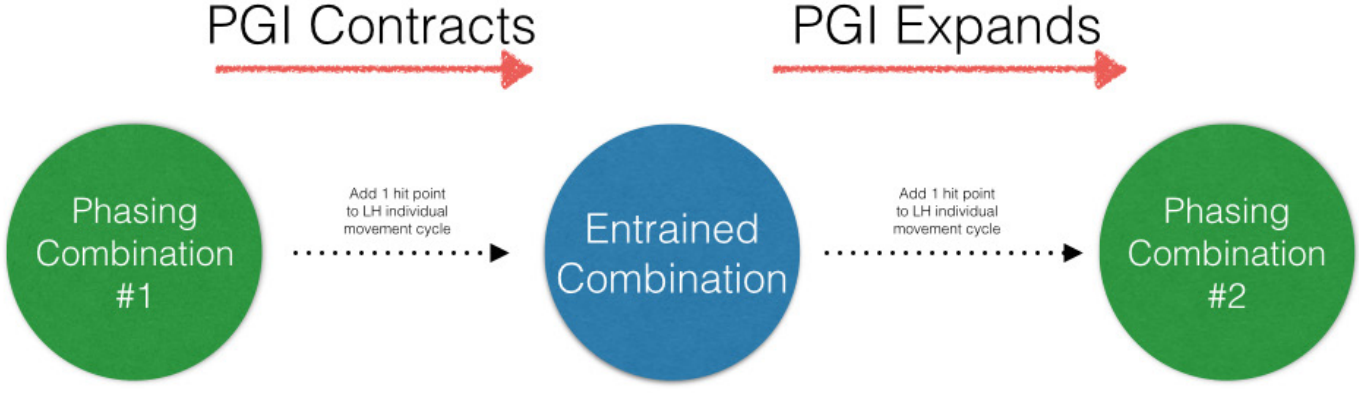
Figure 4.49. PGI of phasing combination #2



Similarly to the PGI produced by the entrained combination, the melodic sequence repeats twice within the complete PGI. However, the melodic sequence of phasing combination #2 lasts for five times the length of the sequence produced by the entrained combination. Furthermore, due to the length and complexity of this melodic sequence, I do not personally discern an audible emergent melodic figure; instead, I am aurally drawn to the hi-hat and snare drum - hit points that are both sounded comparatively infrequently and are timbrally distinct from the tom-heavy texture. Their (relative) sparseness creates a feeling of rhythmic and melodic expansion, even as the overall density is maintained. I maintain this PGI for approximately fifteen seconds.

In summary, over the course of one minute, I begin with a combined movement cycle and transform it twice, in both instances by the addition of a new hit point to the left hand individual movement cycle. The first transformation alters the class of the combined movement cycle from phasing in divergence to entrained in opposition; this change results in a new PGI that has a musical effect of melodic contraction. The second transformation returns the class of the combined movement cycle from entrained in opposition back to phasing in divergence; and this change results in a new PGI that has a musical effect of rhythmic and melodic expansion (Figure 4.50).

Figure 4.50. Summary of *Expansion / Contraction* within *Isolator* excerpt



Over the next forty-five seconds I continue this process; returning to the entrained combination for almost thirty seconds (with improvisational variation throughout), and then again to phasing combination #2 for almost twenty. Video 4.16 again presents the excerpt of *Isolator* (as in Video 4.15), but now includes text annotations identifying which PGI variation I am sounding throughout.

Video 4.16. *Expansion/Contraction* within *Isolator*, annotated.

4.7 Prototypical applications of somatic parameter layering

The following excerpts contain evidence of the intermediate stages in my development of somatic parameter layering; within these works, the process is applied in a more open-ended manner than the deliberate strategies explicated thus far. For these works I do not have top-down video footage from which to clearly analyse the specific movement cycles from moment to moment, but instead front-on footage, from which general observations can be made.

The first piece is *Code Switch* (Audio 4.7), a brief improvisation, documented during the first recording session in June 2015.

Audio 4.7. *Code Switch*, complete work

Two short segments of the piece - the first spanning 0:47-1:05 and the second 1:24-1:50 - are generated through somatic parameter layering. During these time spans, I utilise simple sticking cells (mostly single strokes with some double strokes) divorced from any metric context, allowing flexible accelerations and decelerations. I apply these sticking cells to a constantly shifting set of circular-type movement cycles, as can be seen in Video 4.17.

Video 4.17. Excerpts from *Code Switch*

Code Switch provides an early example of my use of somatic parameter layering within an entirely improvised context, rather than within a developed piece with improvisatory aspects. Here I simply employ the process to generate a dense polyphony, which is contrasted with the other thematic material; there is no particular strategy employed within the periods of somatic parameter layering.

The second piece is *Rolling Chant* (Audio 4.8), an extended work also recorded in June 2015.

Audio 4.8. *Rolling Chant*, complete work

Through the opening minutes of the piece, a gentle roll between bass drum and snare drum (sounded with a mallet, and with snare wires disengaged) underlays a variety of unusual timbres generated by extended techniques or drumset preparation - such as a chain being dragged across the drums, or a high screech emanating from a cymbal through a "stick cry"[14] technique. This texture slowly builds in both volume and density, reaching a point (at approximately 4:30) where these extended techniques can no longer maintain the requisite intensity. It is at this moment that I begin to utilise somatic parameter layering in order to generate the denser rate (and higher volume) of activity required. I continue building this to a peak, whereupon the recurring bass drum stops suddenly (thereby leaving a gap in the low frequencies); from here I maintain activity generated through somatic parameter layering but slowly deconstruct to end of the piece.

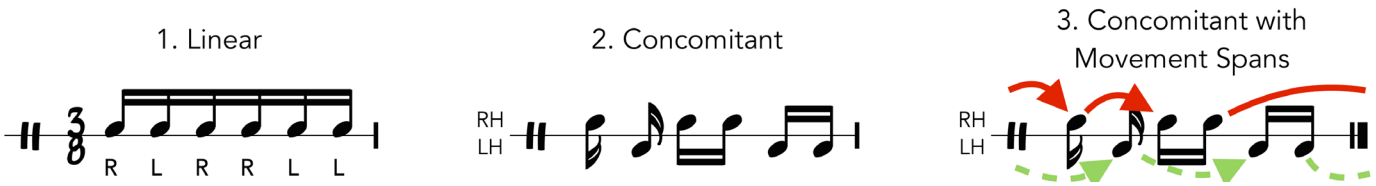
A partial excerpt spanning this peak of activity - between 5:00-7:00 of the recording - is shown in Video 4.18.

14 To a execute a stick cry, you hold the stick perpendicular to the surface of a cymbal, and run the point of the stick along the cymbal. If executed correctly, a high pitched screeching sound is created.

Video 4.18. Excerpt from *Rolling Chant*

Through the period shown in Video 4.18, I utilise the paradiddlediddle rudiment as the primary sticking cell, which I stream without a conscious metric context (Fig 4.51).

Figure 4.51. Paradiddlediddle rudiment as sticking cell



This is interspersed with other improvised sticking combinations that I use to execute musical events such as aligning cymbal crashes with bass drum accents. The movement cycles are constantly in flux, as I select and transform between a variety of oscillating, circular and compound movements. As the activity slowly dissipates, the movement cycles - particularly of the left hand - become simpler, and include less variety of hit points.

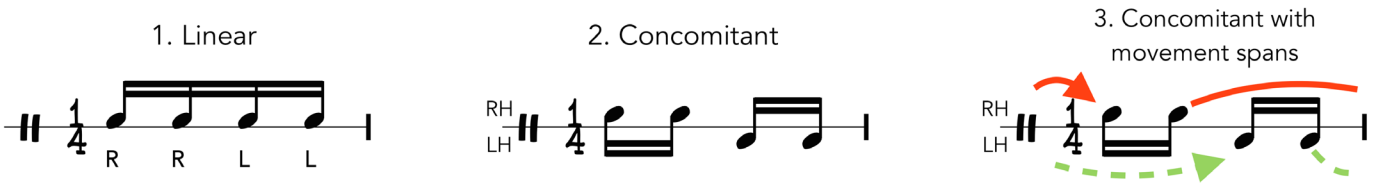
Rolling Chant provides an example of my earlier experimental application of somatic parameter layering; my aim here was simply to create an extended period of dense activity, with polyphony implied by the wide variety of hit points used. The strategy of *Expansion / Contraction* - as it appears in *Isolator* (recorded some two years later) - fulfils a similar musical function of density and implied polyphony, but with greater awareness of the possibilities within this domain, and the skills to control the musical variation.

The third example of prototypical somatic parameter layering comes from a live performance. In September 2015, some months after the first recording session, I was invited to perform a set of solo music at an event called Club Zho 121. There I performed an unbroken twenty-three minute long improvisation, interspersing motifs drawn from some of the recorded works (such *Rolling Chant* and *(you never did) The Kenosha Kid)* with fully improvised interludes. Unbeknownst to me at the time, this performance was filmed, and I received a copy of this video some time later. The excerpt of this performance shown in Video 4.19 comprises one of the improvised interludes; within this span can be found two periods of somatic parameter layering.

Video 4.19. Excerpts from Club Zho 121 live performance

Within the first period I utilise the double stroke roll[15] rudiment as the sticking cell (Figure 4.52).

Figure 4.52. Double stroke roll rudiment as sticking cell



Within the second period I utilise the paradiddle rudiment as the sticking cell - similar to *Rolling Chant* (see Figure 4.51). Within both periods there is no established metric context, and they are both performed at high speeds, generating a consistent density. Furthermore, both sticking cells are performed unbroken within their respective timespans.

During both periods I apply the sticking cells to a constantly varying array of movement cycles. During the first period I primarily draw from a pool of circular type movement cycles wherein the right-hand moves clockwise and the left-hand anticlockwise; some two-point oscillating cycles are interspersed. During the second period I draw from a similar pool of movements, however I had by that moment placed a cowbell on the head of the floor tom. This simple preparation creates two aurally distinct hit points (the cowbell and the partially muted head of the floor tom) where there is usually only one. I attempt to integrate these two spatially similar hit points into the movement cycles of the right hand, with mixed results.

Thus, both applications of somatic parameter layering feature unbroken sticking cells applied to dynamically varying movement cycles; similar to the *Expansion / Contraction* strategy. Indeed, this excerpt can be viewed as a prototypical application of that strategy, as the occasional transition from entrained combinations to phasing combinations (or vice versa) can be heard. At the time of this performance, however, I was not in control of these qualities - these were emergent musical characteristics that I was discovering through experimentation. This performance documents an intermediate step in the development of a strategy that I developed both the conscious awareness of, and the embodied skill to manipulate, between this point and the second recording session, almost two years later.

Other works documented during this research period, with brief commentary, can be found in Appendix A.

15 I here call it a double stroke 'roll' as the high performance speed makes the individual strokes imperceptible.

Chapter Five
The Analytical Model

5.1 Repurposing parameters

Thus far, this research has been primarily directed inwards - by which I mean focused on internal creative processes and paradigms within my practice. In this final chapter, I will pivot to focus outwards, examining if the theory developed throughout Chapter Three and Chapter Four can be used to reveal new insights into the drumming practice of others. For this purpose, I will again utilise sticking cells and movement cycles as primary areas of embodied knowledge. However, rather than manipulating these areas as variable parameters within a generative process (as documented in Chapter Four), I here repurporse them as analytical parameters within an investigate model.

As I proceeded through this research project, I found that the original theory I developed affected not only my practice, but also my processing and interpretation of the drumming of other artists. For instance, I began to intuitively identify different classes of movement cycles within the playing of others, even if the situation was casual and entirely removed from research context. At first, I did not think much of this. Some time later, I encountered the research of Grant Collins, another practitioner/researcher developing solo works for the drumset, who assembles personal creative concepts into a model for analysing works of both his own and others (2013). Whilst the parameters Collins investigates are almost entirely discrete from my own[1], the overarching idea of using theory developed for my own creative purposes to instead analyse the work of others appealed to me, as I had already begun to unintentionally do so in a haphazard fashion. Engaging with Collins' research encouraged me to formalise a model for undertaking this kind of analysis to a rigorous academic standard.

To clarify, I am *not* suggesting that other professional drummers share my exact conceptions of sticking cells and/or movement cycles, or that they are deliberately manipulating them within their own practice as I do. Rather, I am suggesting that the theoretical framework, terminology, and taxonomy I have developed for describing sticking cells, movement cycles, and somatic parameter layering can provide a codified system for identifying patterns of movement underlying musical ideas usually understood either sonically (as live sound or audio recordings) or symbolically (as music notation). Examining these patterns of movement, and comparing them to their sonic and symbolic equivalents, may reveal embodied forms of knowledge possessed by the performer, and generalisable to universal drumset practice. Whether, and to what extent, embodied parameters are consciously manipulated by the performer, or unconsciously followed in service of audiation-generated ideas[2], is unfortunately beyond the scope of this model.

1 For instance, Collins foregrounds the role of ostinato and notational conventions within his investigation (2013, 29-32).

2 See Hargreaves (2012, 360-362) for discussion of audiation-generated ideas.

5.2 The analytical model

The analytical model comprises five steps, organised into three discrete phases. Procedurally, the three phases must be completed in order; whilst the steps within each phase can be completed in any order.

Note that, as the model requires the identification of movement cycles and sticking cells, video of the musical excerpt to be analysed is required.

Preparatory phase

- **Step 1. Identify drumset configuration**

  Identify the specific constituent elements of the drumset in use, and their spatial configuration. Whilst exact sizing and/or positioning may be impossible to ascertain, enough detail is required to create a template on which to map movement cycles.

- **Step 2. Transcribe excerpt**

  Whilst the aim of this model is to understand physical processes, and producing a notated transcription is not essential, I have found that having a transcription of the excerpt speeds up the analytical process, and affords greater clarity of communication regarding outcomes.

Data gathering phase

- **Step 3. Identify movement cycles**

  - Step 3.1. Identify individual movement cycles of each hand
    (See taxonomy of individual movement cycles, Chapter 3.5.3)

  - Step 3.2. Identify classification of combined movement cycles
    (See taxonomy of combined movement cycles, Chapter 3.5.3)

- **Step 4. Identify sticking cells**

  - Step 4.1. Identify any repeated sticking cells within the excerpt
    This is easiest to achieve by annotating the transcription of the excerpt with hand orders, and then parsing into sections by repeated sticking patterns.

  - Step 4.2. Derive concomitant rhythms from identified sticking cells

  - Step 4.3. Identify movement spans within concomitant rhythms
    This requires comparison of sticking cells, movement cycles, and transcription.

- **Step 5. Discussion of musical effect and development arising from somatic parameter layering**

  Discussion of relationship between sticking cells and movement cycles identified in data gathering phase, and the musical effect of their interaction.

5.3 Testing the analytical model

To assess the usefulness of the model, I will present an analysis of a musical excerpt drawn from the work of another drummer. The analysed excerpt is performed by American drummer Bill Stewart. Stewart was selected for investigation due to his profile as a leading contemporary jazz drummer; he has been active since 1987, and in that time has performed and/or recorded with a wide variety of artists including John Scofield, Pat Metheny, Larry Goldings and Chris Potter (Micallef, 2004).

The specific excerpt is taken from a drum solo within the piece *Over Big Top,* performed by the John Scofield Trio (comprising Scofield (guitar), Steve Swallow (bass) and Stewart) (John Scofield Trio, 2013[3]). Throughout the drum solo Swallow maintains an ostinato figure; whilst the figure is not included in the transcription, it establishes a clear metric context. To contextualise this analysis, Video 5.1. presents a top-down perspective of the excerpt, performed by myself.

Video 5.1. Bill Stewart solo excerpt from *Over Big Top*

3 This excerpt is sourced from a video uploaded to popular video sharing website YouTube; whilst the video was uploaded in 2013, the performance itself is from 2004. If you wish to see Stewart's own performance, the excerpt can be heard by following this link: https://www.youtube.com/watch?v=KIMkmbxwpco&feature=youtu.be&t=53m34s (accessed May 30, 2017).

Step one: Identify drumset configuration

Within this performance, Stewart uses a drumset comprising a snare drum, one high/mounted tom, two floor toms, hi-hats, three cymbals (one to the left and two to the right of the high tom), and a bass drum (that is only played via foot-pedal and therefore elided from the visual modelling). The spatial arrangement of these elements can be seen in Figure 5.1. I also identify short codes for each hit-point, that will be referred to throughout the discussion.

Figure 5.1. Configuration of Bill Stewart's drumset.

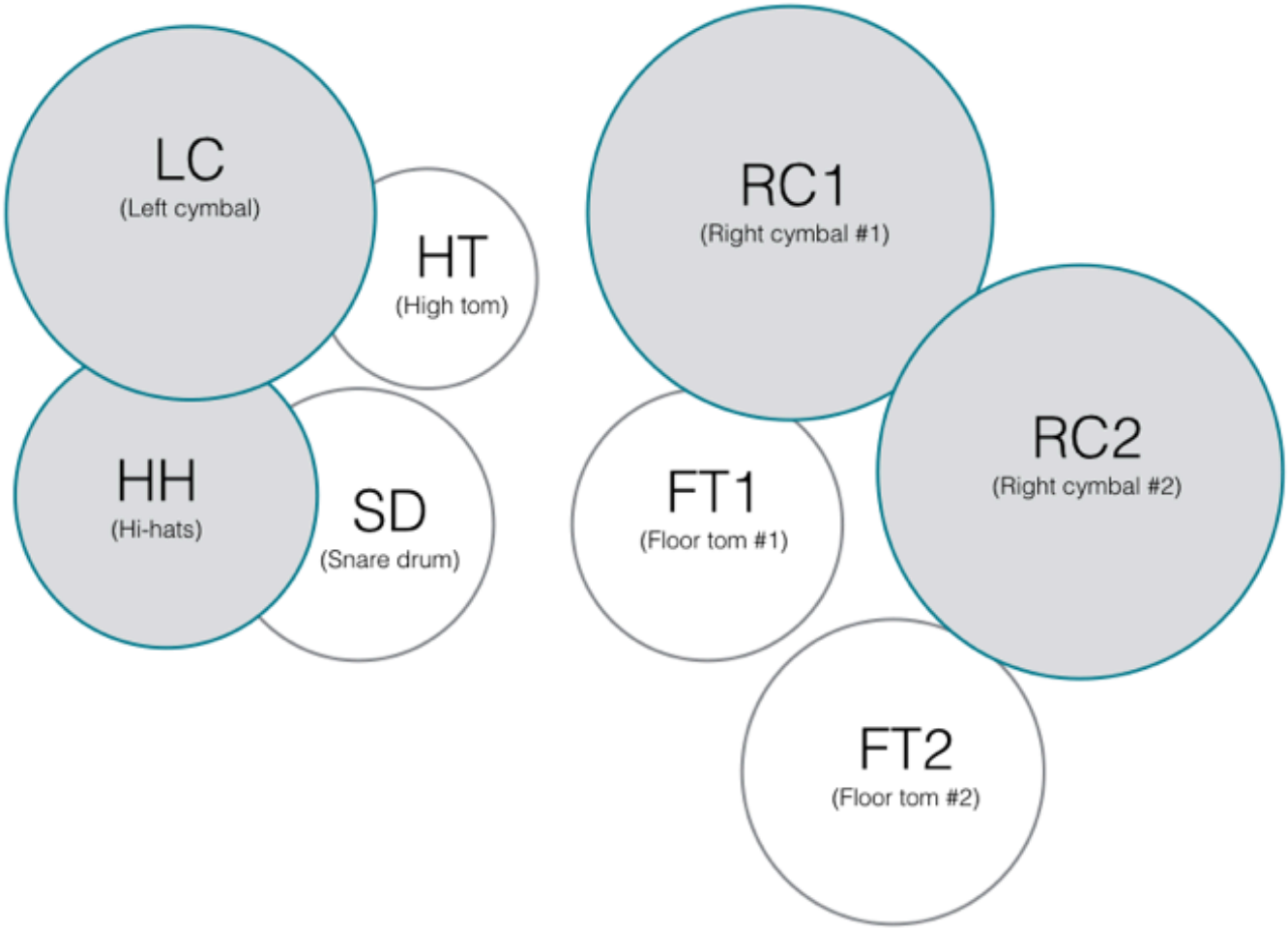
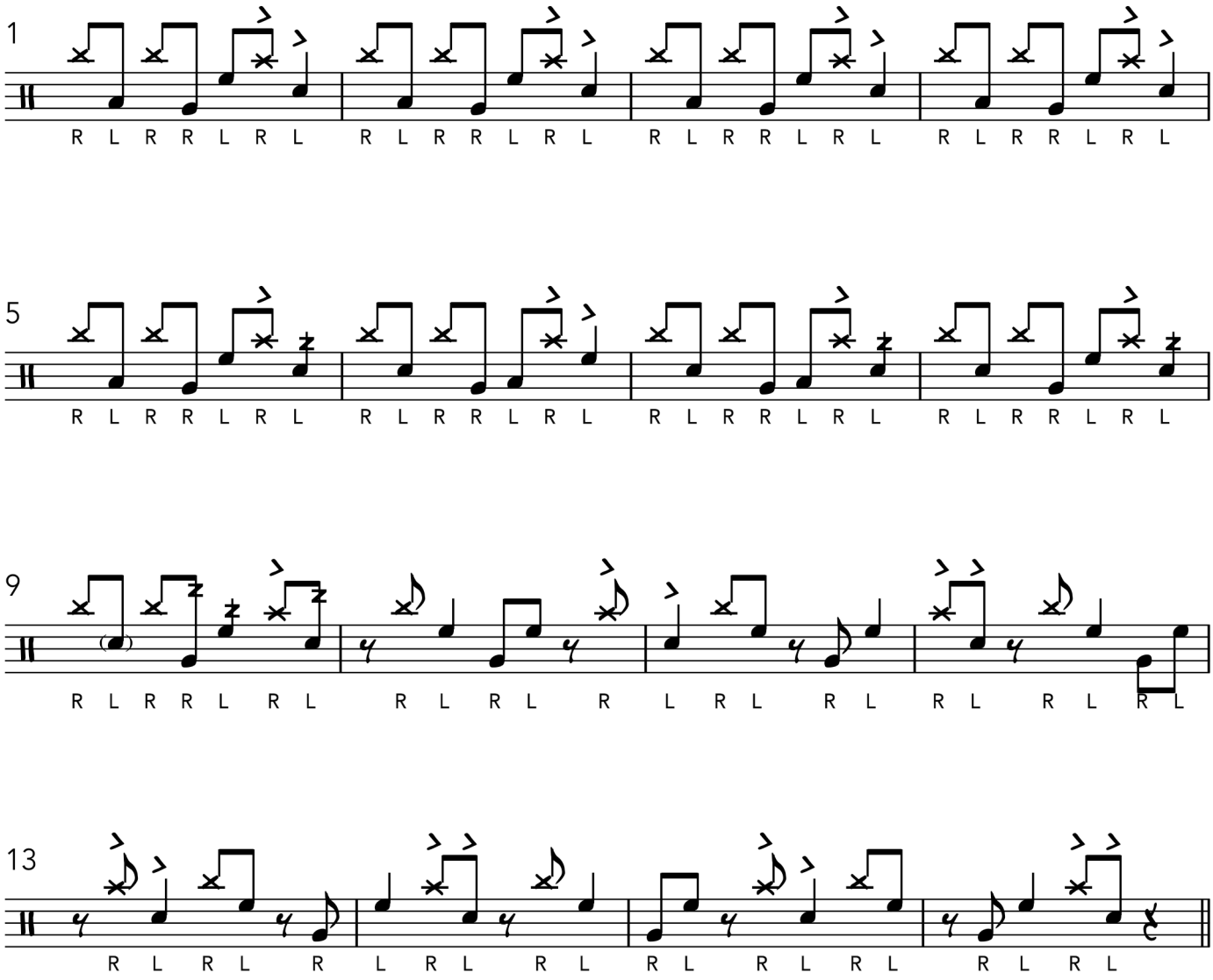


Figure 5.2. presents a transcription of this excerpt. Throughout the excerpt Stewart sounds the hi-hats with the left foot on beats two and four of each bar; these have been elided from the notation. This is to provide space below the stave for the transcription to be annotated with the hand order.

Figure 5.2. Transcription of Bill Stewart solo excerpt



Step three: Identify movement cycles

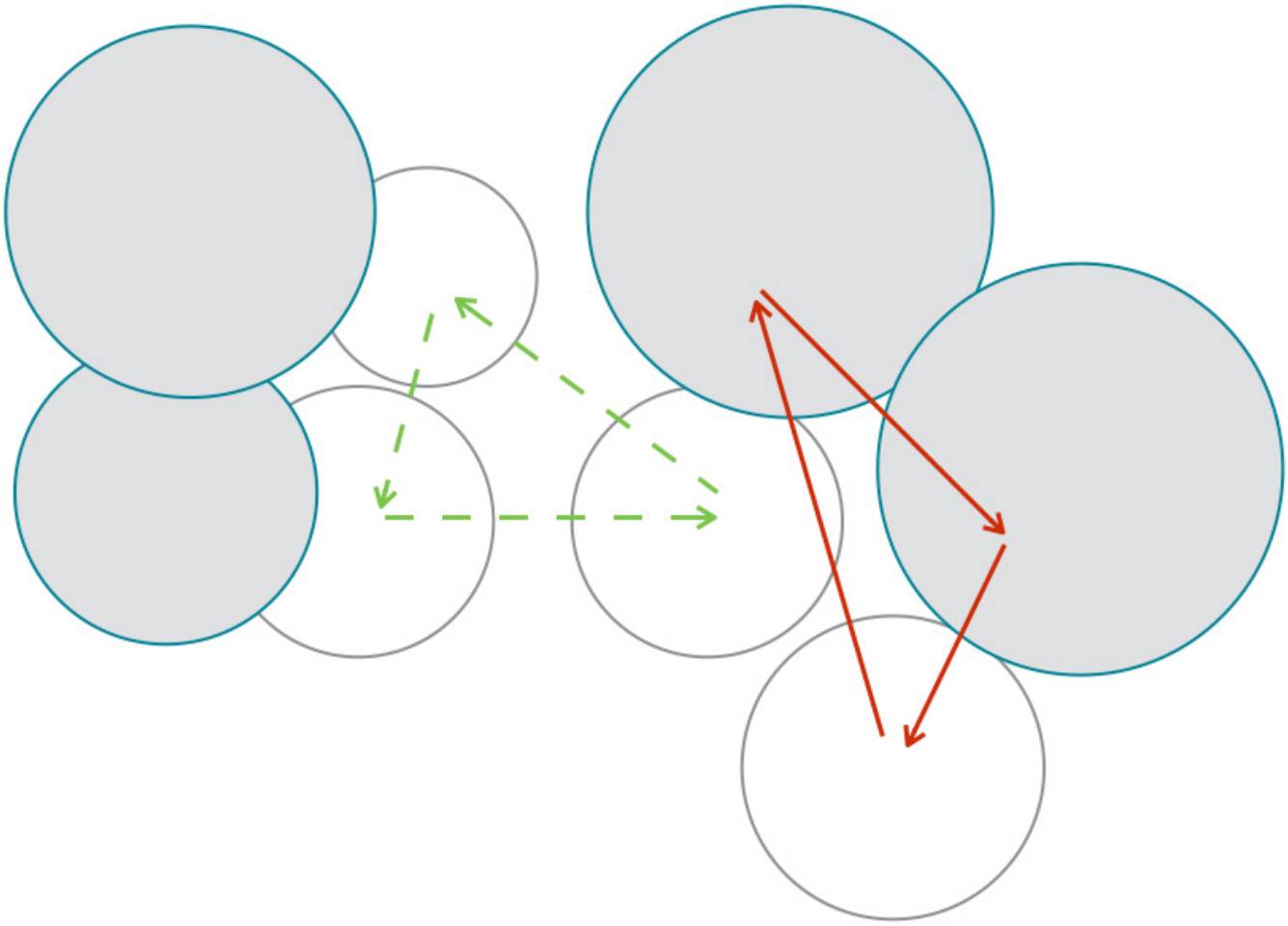
Stewart begins the excerpt following three-point circular-type individual movement cycles with both hands; the specific characteristics of these movement cycles are listed in Table 5.1.

Table 5.1. Characteristics of first set of individual movement cycles.

	Left-hand	*Right-hand*
Type	Circular	Circular
Direction	Anticlockwise	Clockwise
Amount of hit-points	Three	Three
Order of hit-points	FT1>HT>SD	RC2>FT2>RC1

Together these individual movement cycles form a combined movement cycle classed as entrained in opposition; this is visually mapped in Figure 5.3.

Figure 5.3. First combined movement cycle



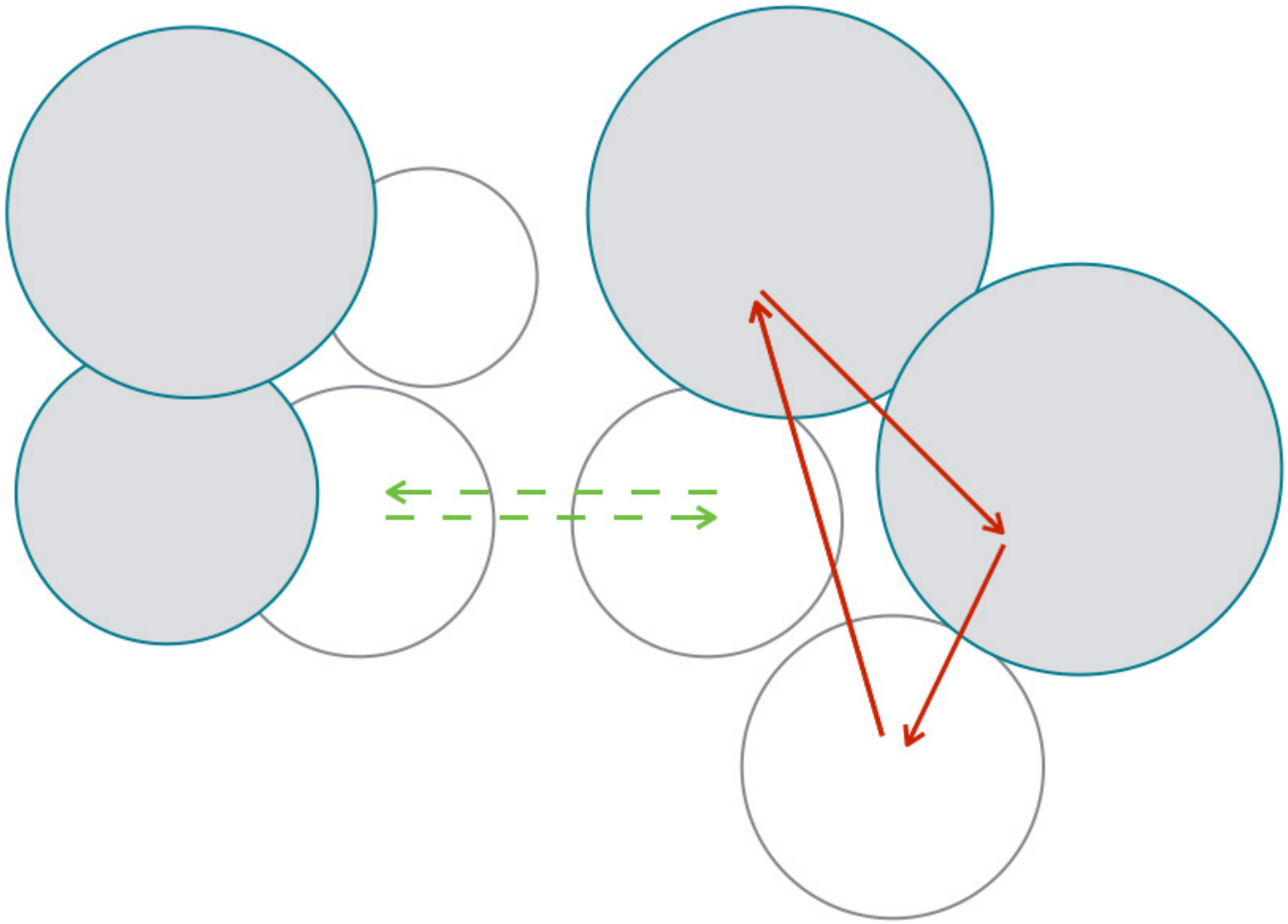
Stewart maintains this combination through the first six bars of the excerpt. At bar seven, he makes a minor alteration to the left-hand individual movement cycle; shifting to a two-point oscillating cycle between the snare drum and first floor tom, whilst the right hand cycle is unchanged. These characteristics are summarised in Table 5.2.

Table 5.2. Characteristics of second set of individual movement cycles.

	Left-hand	*Right-hand*
Type	Linear	Circular
Direction	Oscillating	Clockwise
Amount of hit-points	Two	Three
Order of hit-points	SD <> FT1	RC2>FT2>RC1

Together these individual movement cycles form a combined movement cycle classed as phasing in divergence; this is visually mapped in Figure 5.4.

Figure 5.4. Second combined movement cycle.



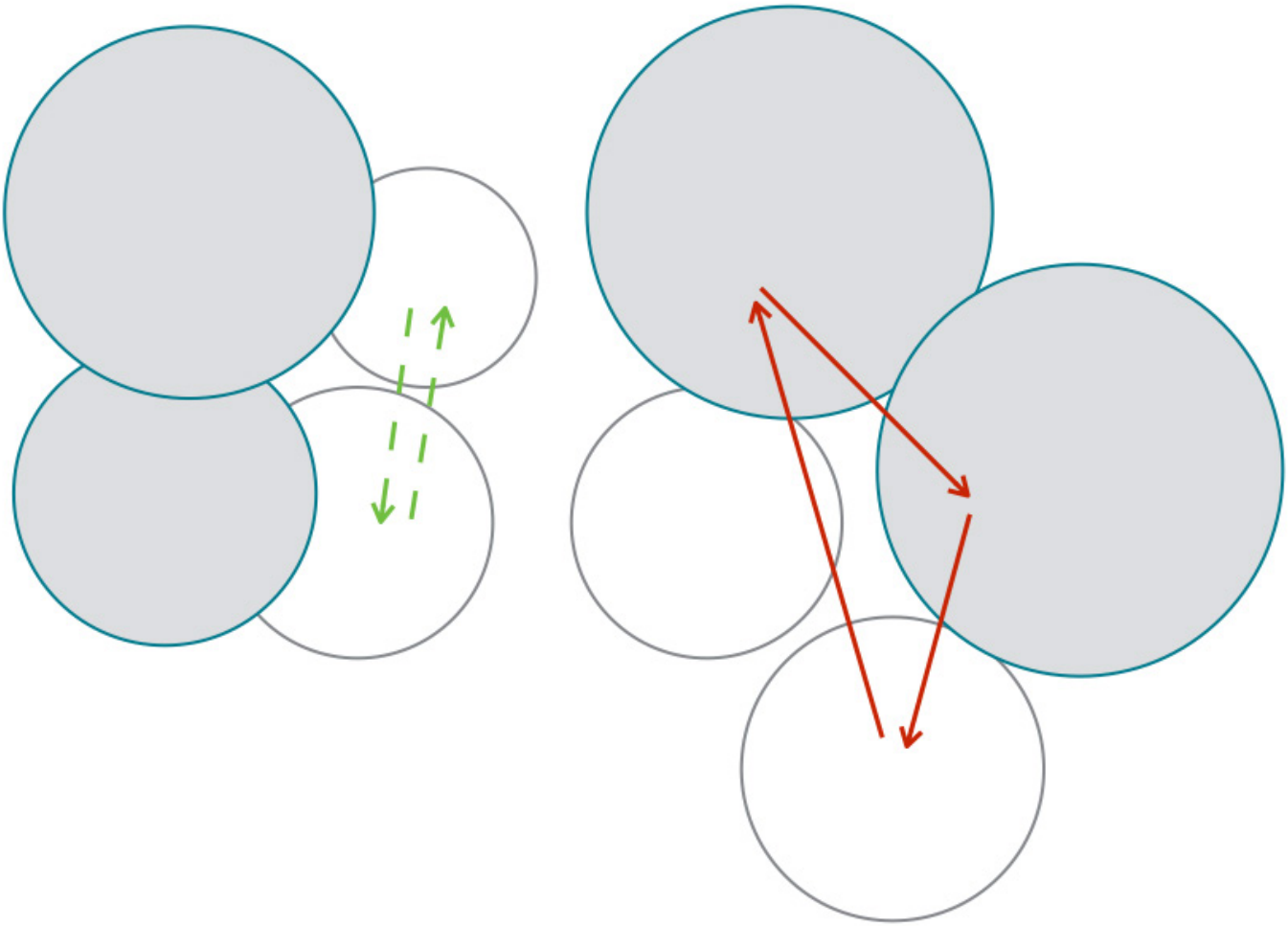
Stewart follows this combination only once, through bar seven. In bar eight, he again alters the left-hand individual movement cycle, whilst maintaining the right-hand unbroken. At this point, he changes the left-hand to a different two-point oscillating cycle, now between the snare drum and high tom. These characteristics are summarised in Table 5.3.

Table 5.3. Characteristics of third set of individual movement cycles.

	Left-hand	*Right-hand*
Type	Linear	Circular
Direction	Oscillating	Clockwise
Amount of hit-points	Two	Three
Order of hit-points	SD <> HT	RC2>FT2>RC1

Together these individual movement cycles form a combined movement cycle classed as phasing in divergence; this is visually mapped in Figure 5.5. Stewart maintains this third set of movement cycles until the end of the excerpt.

Figure 5.5. Third combined movement cycle



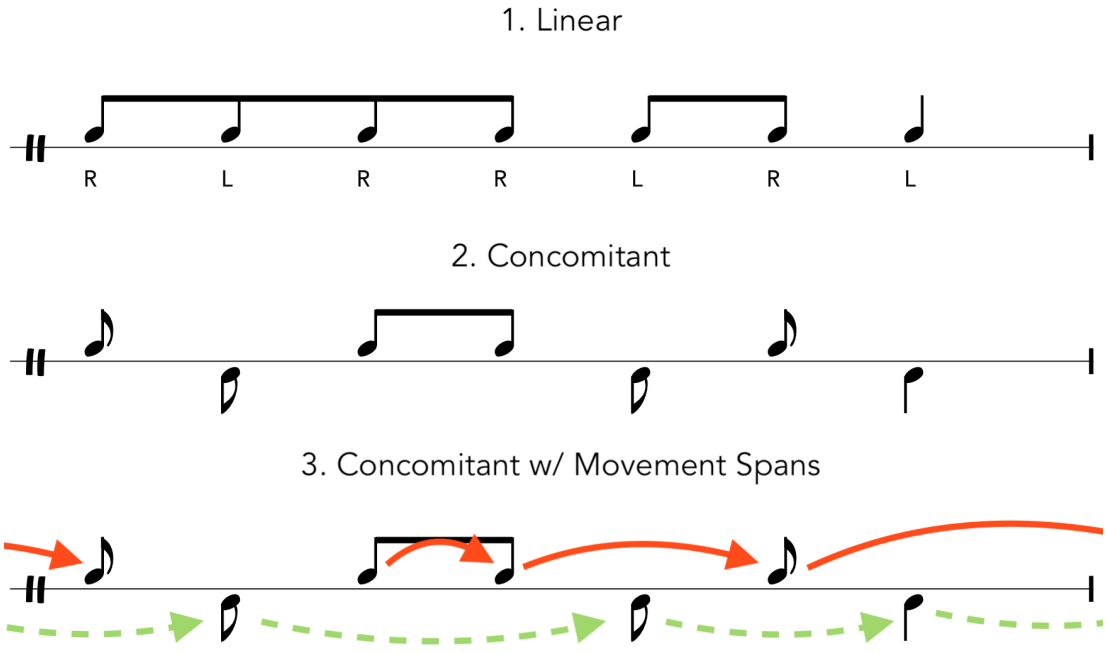
Having identified the three combined cycles Stewart uses through the excerpt, it can be seen that the right-hand follows an unchanged three-point clockwise cycle throughout the entire passage. The left-hand follows three distinct individual movement cycles; however, they all draw from the same set of hit-points - the snare drum, the high tom, and the first floor tom. These characteristics - a stable right-hand combined with an incrementally shifting left-hand - resemble my use of the *Expansion / Contraction* strategy within my piece *Oscillator* (see Chapter 4.6). Video 5.2 presents the excerpt in full again (as in Video 5.1), now annotated with text identifying when each of the three sets of movement cycles are being followed.

Video 5.2. Movement cycles within excerpt

Step four: Identify sticking cells

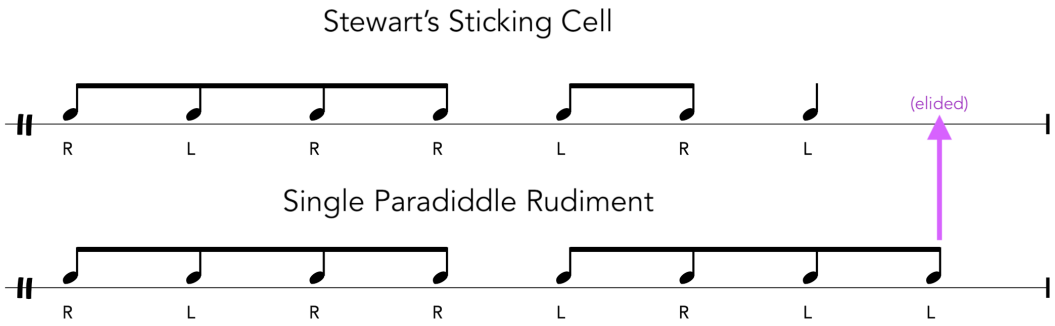
Stewart begins the excerpt articulating a bar-long sticking cell (Figure 5.6). I will call this the "first sticking cell" within this analysis.

Figure 5.6. First sticking cell



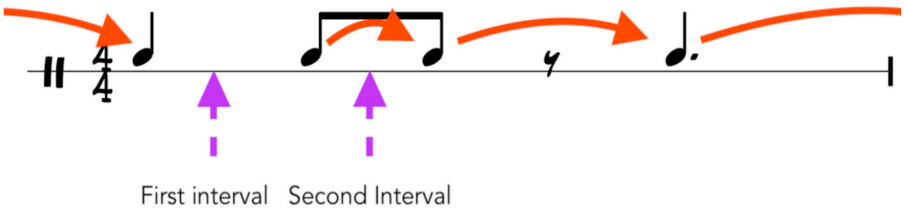
This cell appears to be derived from the *Single Paradiddle* drum rudiment. When compared, Stewart's sticking cell can be seen to follow an identical rhythmic form and hand order until the final note, which he elides (Figure 5.7).

Figure 5.7. Comparison of Stewart's sticking cell to single paradiddle rudiment



An interesting feature of Stewart's first sticking cell is the movement spans of the right hand concomitant rhythm. Between four notes he has only three movement spans, and he organises these movement spans in what I consider to be an unusual manner. Specifically, he chooses not to move between the first and second attacks in the rhythm, the interval between which is a crotchet; but then chooses to move between the second and third attacks, the interval between which is a quaver (Figure 5.8).

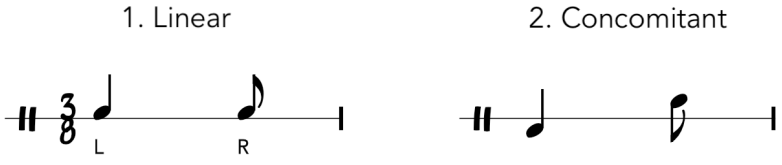
Figure 5.8. Right-hand concomitant rhythm



I find this unusual because Stewart has ample time to comfortably move to a new hit point during the first (crotchet-long) interval, but does not, and then must rush to fit in the next movement during the second (quaver-long) interval. Furthermore, at performance tempo, two consecutive quaver strokes are most easily executed by allowing (but controlling) the natural rebound of the drum stick off the surface. By inserting a movement betwen the two attacks, Stewart is unable to make use of this natural rebound in the same way, and therefore must physically manufacture the second stroke using the muscles of the wrist and forearm (as well using the muscles of the upper arm to position the stick over the next hit point). That Stewart chooses to arrange the movement spans in this physically-demanding manner suggests to me that this sticking cell (and the PGI he generates with it) is something he has devised through private instrumental practice (and then implemented within this solo), rather than completely improvised 'on the spot' in this performance.

Stewart maintains the first sticking cell for eight bars; in the ninth bar, he articulates a partial form of it for the first two beats of the bar, before changing to a second sticking cell, which he maintains for the rest of the excerpt. The second sticking cell recurs every three quavers (Figure 5.9); note that the underlying meter does not change, so this sticking cell forms a cross-rhythmic cycle.

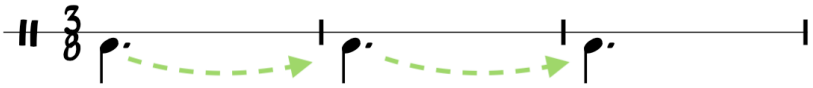
Figure 5.9. Second sticking cell



Whilst the internal morphology of this second sticking cell is simple - comprising only one attack of each hand - Stewart's application of movement spans is more complex (which is why they are not notated in

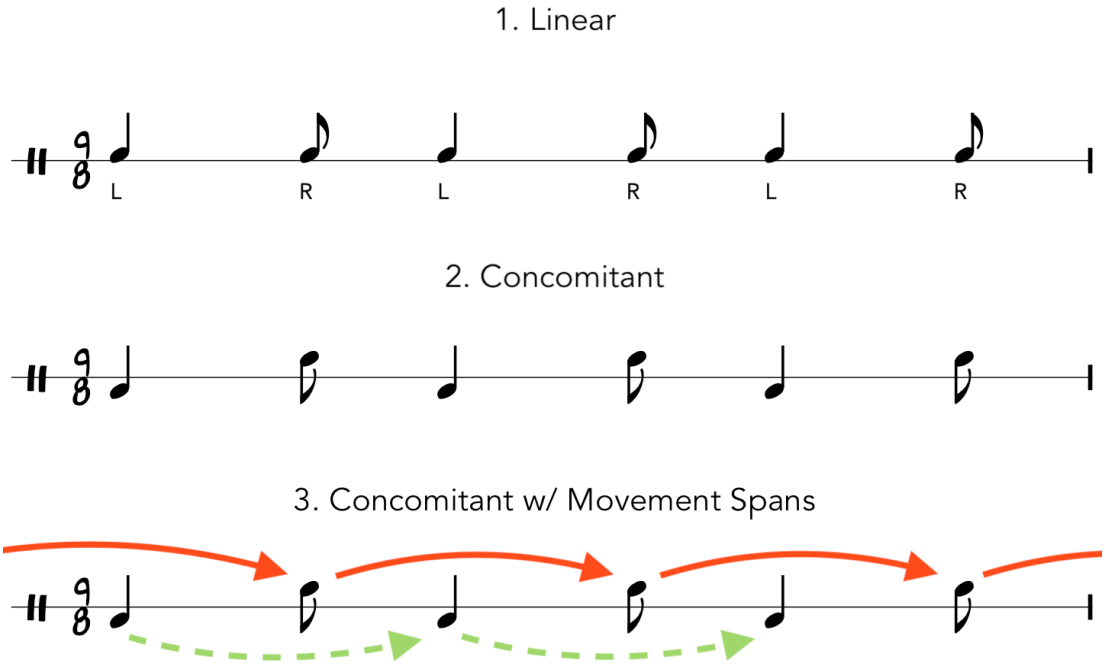
Figure 5.9). Whilst he inserts a movement span between each attack of the right-hand, he follows a repeating tripartite pattern of [movement] - [movement] - [stationary] within the intervals of the left-hand (Figure 5.10).

Figure 5.10. Pattern of movement spans within left-hand of second sticking cell



To accomodate this pattern of movement spans within the sticking cell, the cell can instead be notated as a nine-quaver long pattern (Figure 5.11).

Figure 5.11. Second sticking cell, extended notation



Video 5.3 presents again presents the excerpt in full (as in Videos 5.1 and 5.2), now annotated with text identifying which sticking cell is in use.

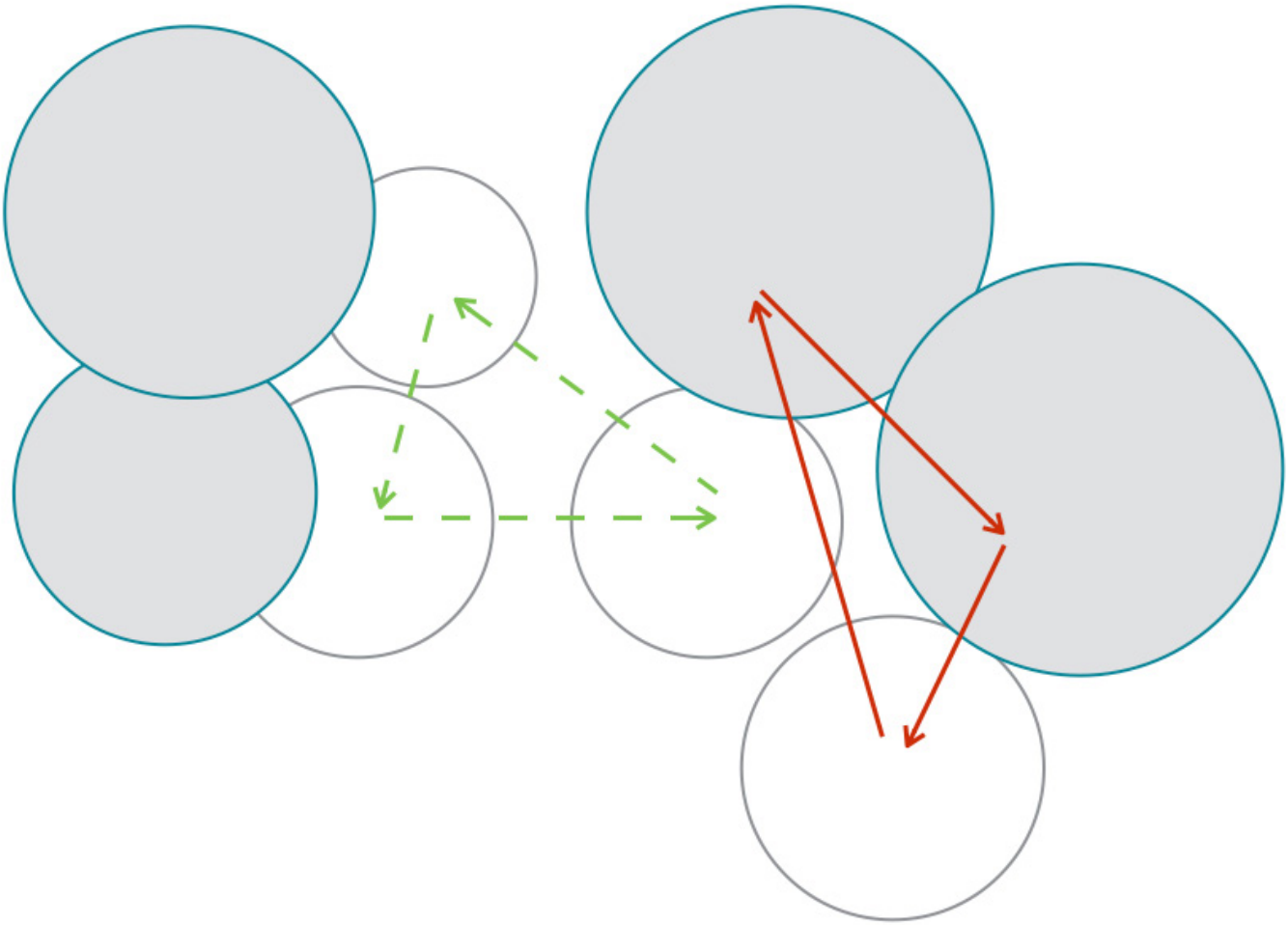
Video 5.3. Sticking cells within excerpt

Step five: Discussion of musical effect and development arising from somatic parameter layering

Through the first five bars, Stewart combines the first sticking cell (Figure 5.12) with the first combined movement cycle (Figure 5.13) in an unbroken passage.

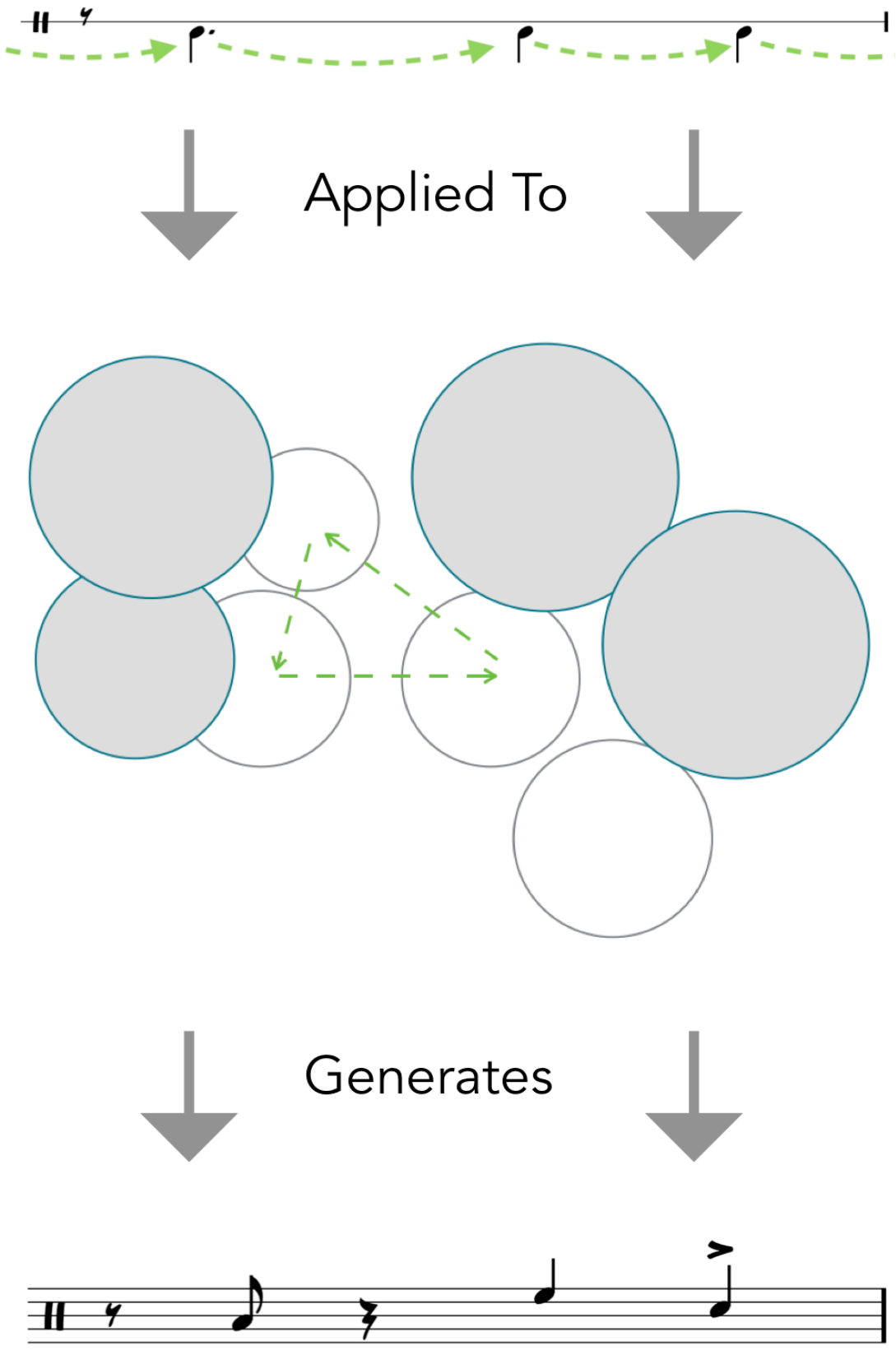
Figure 5.12. First sticking cell (reprise)

Figure 5.13. First combined movement cycle (reprise)



The left-hand concomitant rhythm contains three attacks and three movement spans; this is applied to a three-point anticlockwise movement cycle. As the relationship between the hit-points and movement spans is direct[4], this generates an applied cycle which is equal in length to the sticking cell, and within which the individual movement cycle and concomitant rhythm repeat isochronously (Figure 5.14).

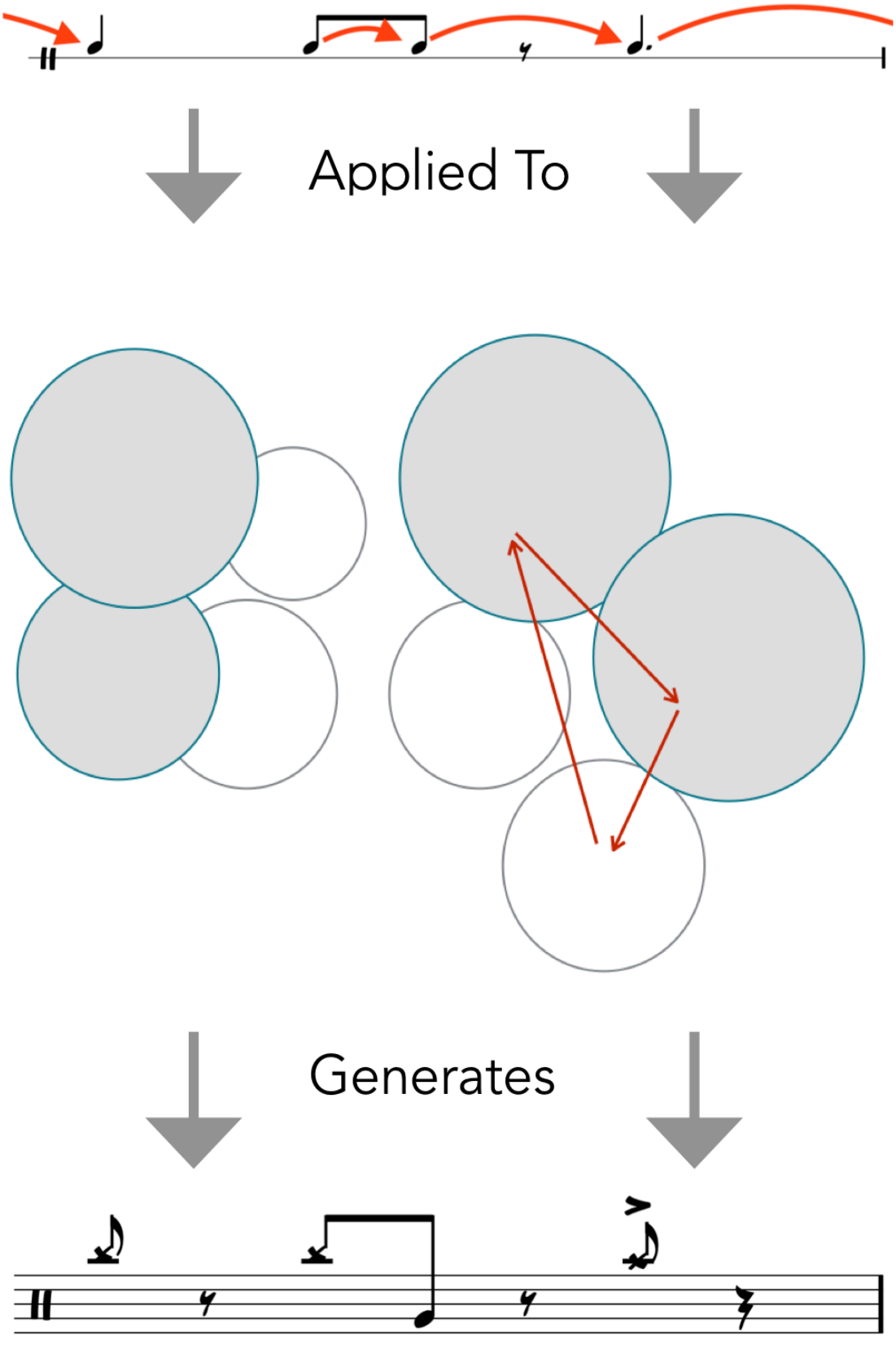
Figure 5.14. Generation of left-hand applied cycle (bars one - five)



4 For an explanation of 'direct' and 'expansive' relationships between hit points and movement spans, see my discussion of the relationship heuristic, Chapter 4.1.

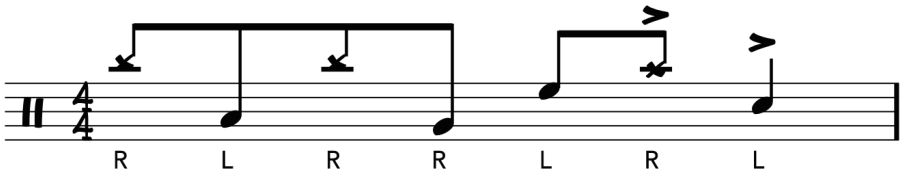
The right-hand concomitant rhythm contains four attacks, but only three movement spans (as noted previously); this is applied to a three-point clockwise individual movement cycle. As with the left-hand, the relationship between the hit-points and movement spans is direct, which generates an applied cycle equal in length to the sticking cell, and within which the individual movement cycle and concomitant rhythm repeat isochronously (Figure 5.15).

Figure 5.15. Generation of right-hand applied cycle (bars one - five)



Stewart's choice to only implement three movements between the four attacks of the right-hand concomitant rhythm can be now be contextualised; this aligns directly with the individual movement cycle to generate a direct, rather than expansive, applied cycle. Furthermore, this dictates that both the left- and right-hands generate direct applied cycles, which combine to form a similarly concise PGI (Figure 5.16).

Figure 5.16. First PGI (bars one-five)

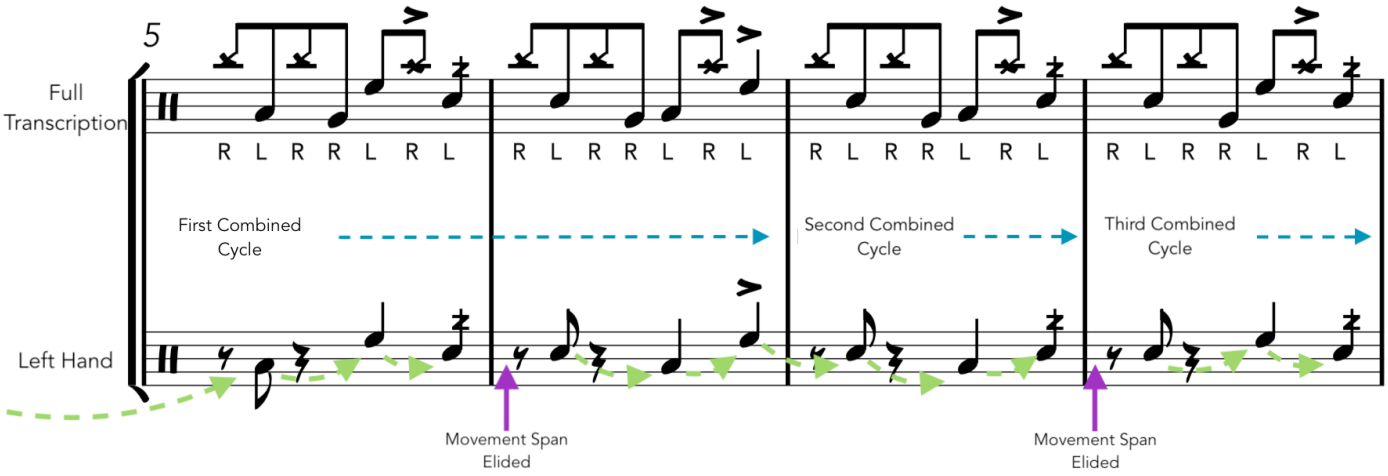


Both applied cycles, and the PGI, are demonstrated in Video 5.4; initially at half speed, and then at full speed.

Video 5.4. Applied cycles and PGI (bars one - five)

As noted, Stewart maintains this PGI through the first five bars without interruption. Bars six through eight mark a brief transitional passage, through which Stewart maintains the first sticking cell but (a) varies the movement cycles of the left-hand and (b) elides some movement spans within the left-hand concomitant rhythm. Figure 5.17 presents this passage of the transcription, and also isolates the left-hand so as to highlight these variations.

Figure 5.17. Bars five through eight, with variations annotated

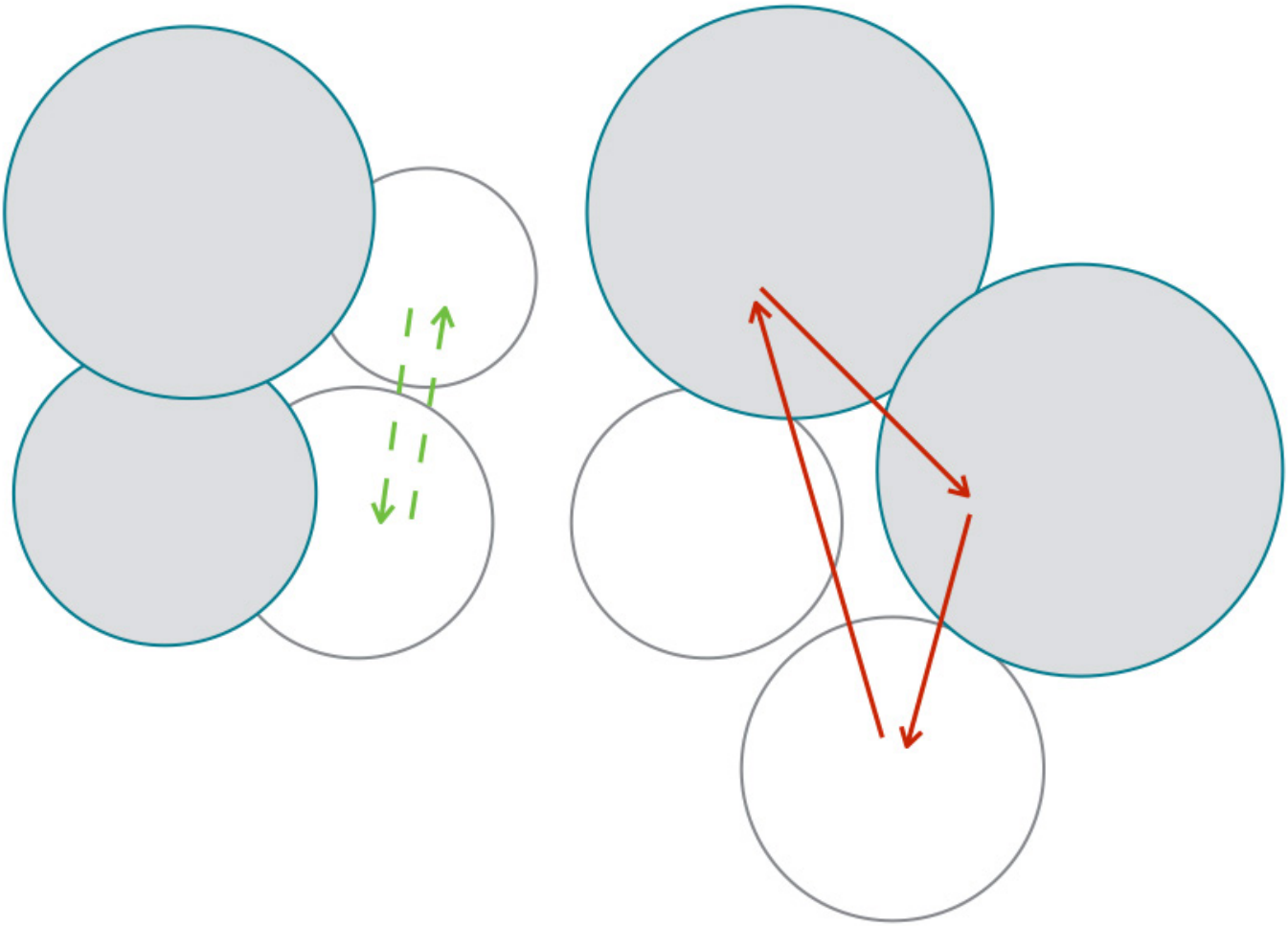


Through this passage Stewart maintains the right-hand applied cycle exactly, and maintains the concomitant rhythm of the left-hand; but improvisationally varies the movement cycles (and therefore hit points) of his left-hand. This creates a series of subtle variations on the first PGI, following the same rhythmic form but with different internal melodic patterns emerging. Interestingly, he only elides movement spans directly after a buzz stroke[5] played by the left hand; this stroke takes longer to execute than a single attack, and it is likely that Stewart simply did not have adequate time afterwards to execute the movement to the next hit point. Taking these observations together, I believe it most likely that the improvisational variants found through this passage are physically generated, rather than audiated.

5 A buzz stroke is achieved by maintaining a downward pressure with the drumstick into the drumhead after the initial stroke; the interaction of this pressure and the natural rebound generates many individual strokes within a brief timespan, creating a 'buzzing' sound.

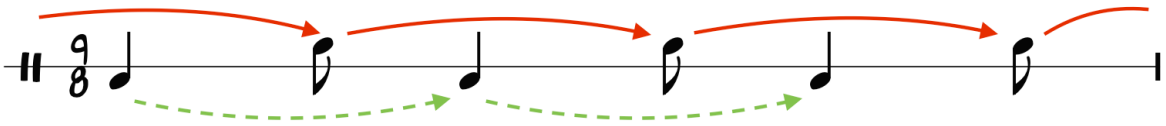
From bar eight Stewart settles into the third combined movement cycle, which he maintains until the end of the excerpt (Figure 5.18).

Figure 5.18. Third combined movement cycle (reprise)



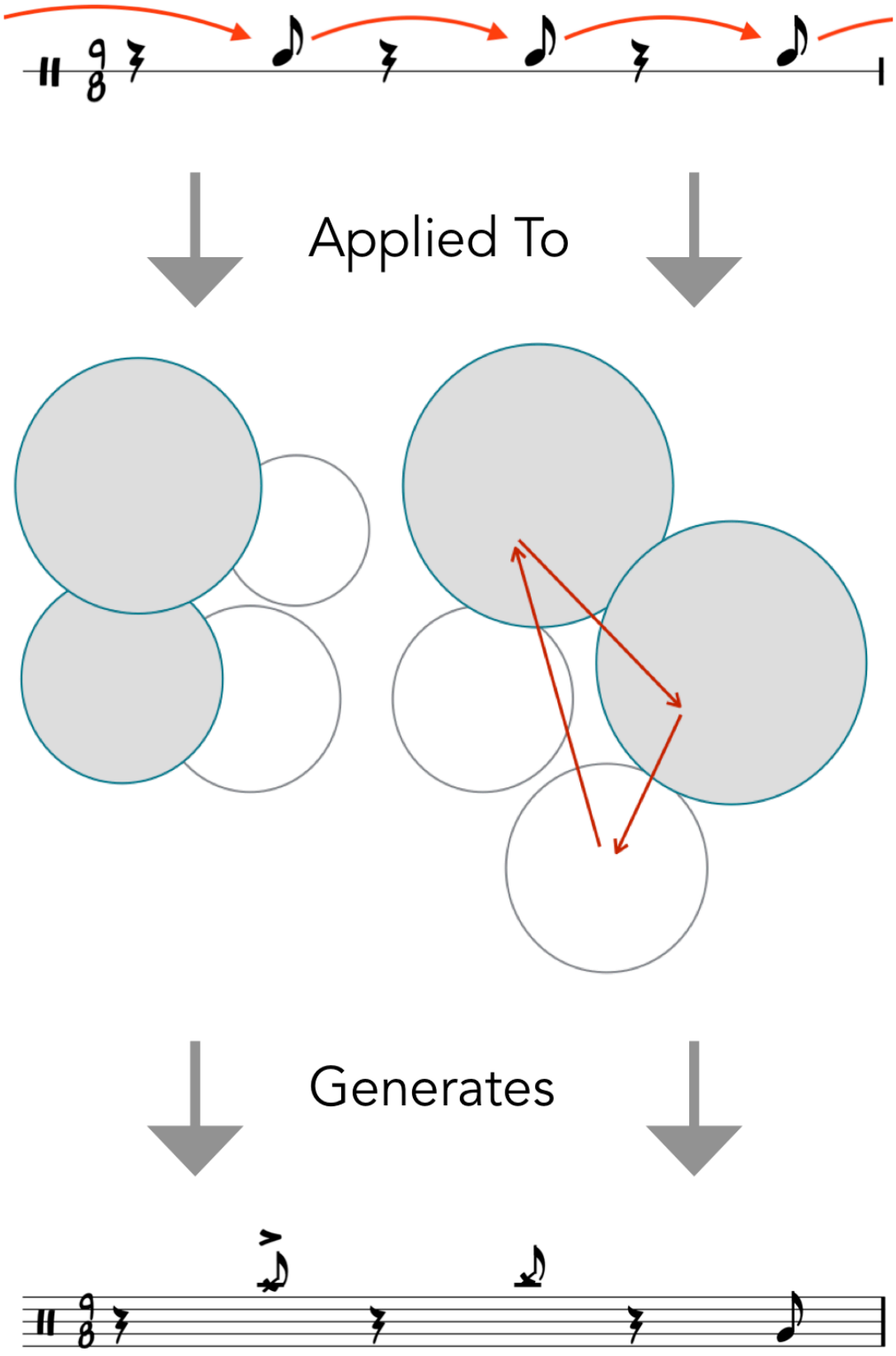
Six beats later – on beat three of bar nine – Stewart switches to the second sticking cell; for the purposes of this discussion, I will refer to the extended, 9/8 meter, iteration of this cell (Figure 5.19).

Figure 5.19. Second sticking cell (reprise)



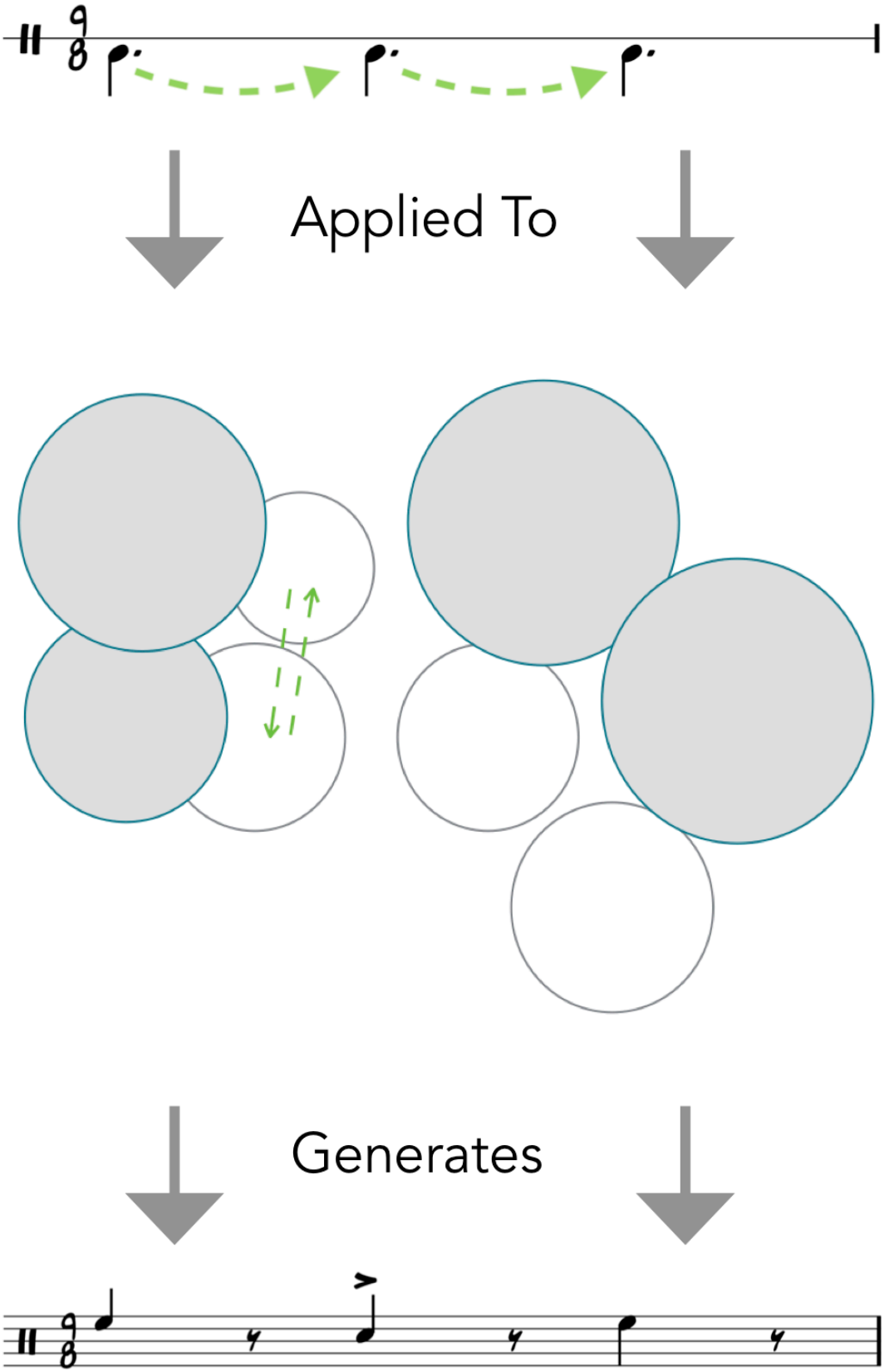
The right-hand concomitant rhythm contains three attacks and three movement spans; this is applied to the same three-point clockwise individual movement cycle as earlier. Again, the relationship of movement spans to hit points is direct, generating an applied cycle that conforms to the same 9/8 meter (Figure 5.20).

Figure 5.20. Generation of right-hand applied cycle (bars nine - sixteen)



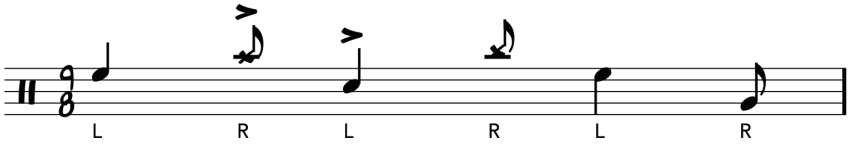
The left-hand concomitant rhythm contains three attacks and two movement spans; this is applied to a two-point oscillating movement cycle. Again the relationship between the hit-points and movement spans is direct, this generates an applied cycle which is equal in length to the sticking cell, and within which the individual movement cycle and concomitant rhythm repeat isochronously (Figure 5.21).

Figure 5.21. Generation of left-hand applied cycle (bars nine - sixteen)



Stewart's pattern of movement spans ([movement] [movement] [stationary]) within the left-hand concomitant rhythm is perhaps a deliberate choice to align the rhythm with the two-point oscillating movement cycle. In doing this Stewart generates an applied cycle that not only repeats isochronously with the sticking cell, but also with the right-hand applied cycle; this creates a PGI that is similarly concise (Figure 5.22).

Figure 5.22. Second PGI (bars nine - sixteen)

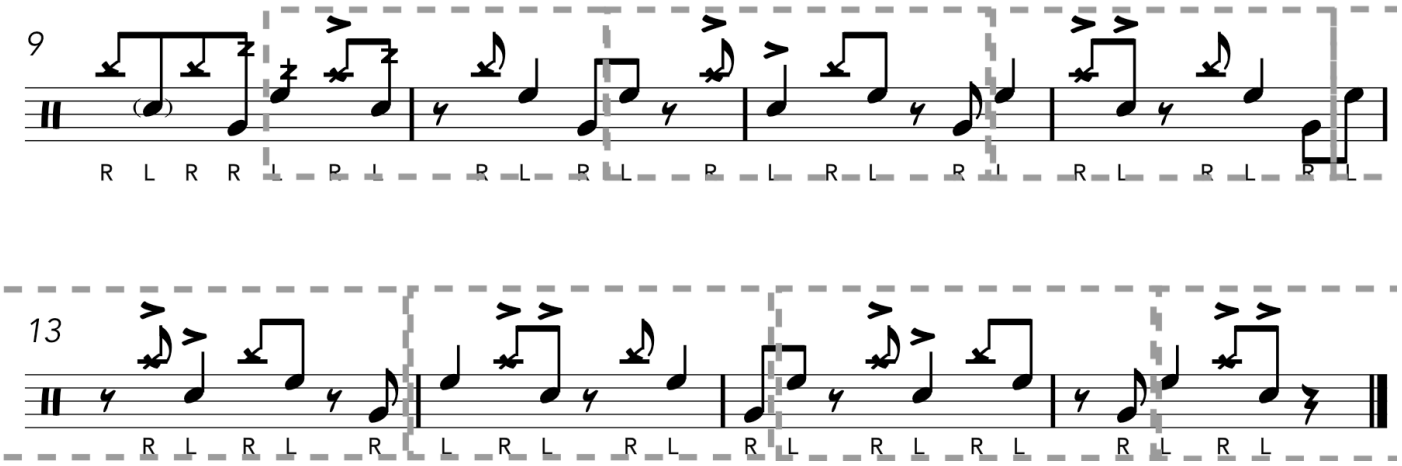


Both applied cycles, and the PGI, are demonstrated in Video 5.5.

Video 5.5. Applied cycles and PGI (bars nine - sixteen)

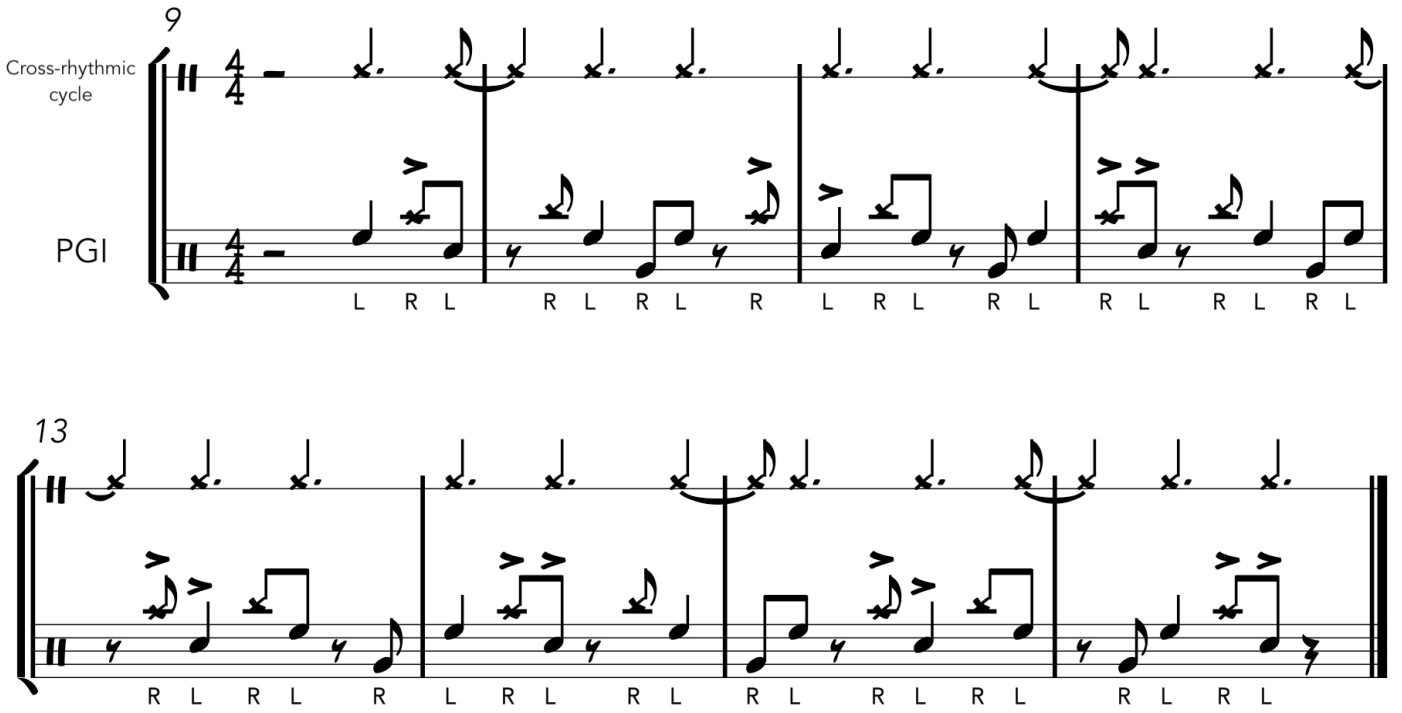
When heard in isolation (as in Video 5.5), the repeating rhythmic and melodic characteristics form a 9/8 meter; however, Stewart's performance was not an unaccompanied solo, but rather a drum solo across an electric bass ostinato outlining an underlying 4/4 meter. The relationship between the PGI and the underlying meter is such that each successive repetition of the PGI is displaced a quaver within the 4/4 meter (Figure 5.23).

Figure 5.23. Displaced repeats of second PGI (bars nine - sixteen)



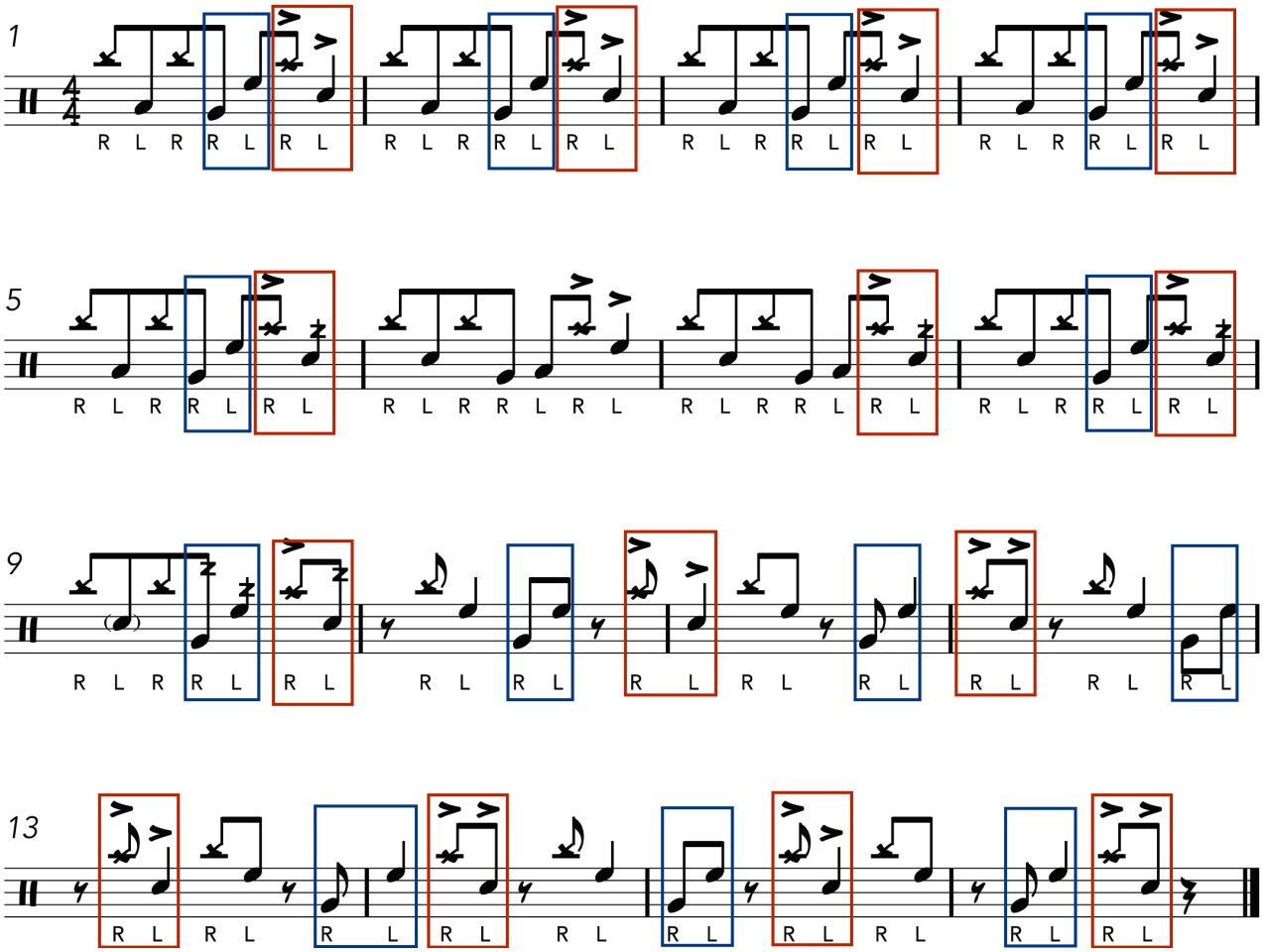
Furthermore, the internal rhythmic form of each PGI follows a repeating [crotchet]-[quaver] pattern; this generates a dotted crotchet cross-rhythmic cycle (Figure 5.24).

Figure 5.24. Dotted-crotchet cross rhythmic cycle (bars nine - sixteen)



In comparing the first PGI to the second PGI, some commonalities emerge. Specifically, both share two pairs of sequential notes: the first being the second floor tom followed by the high tom, the second being the first right cymbal followed by the snare drum. Every instance of these sequential note pairs throughout the excerpt is highlighted in Figure 5.25: the first pair is boxed in blue, the second in red.

Figure 5.25. Sequential note pairs



Through the first five bars of the excerpt - as the first PGI is unbroken - these note pairs repeat in the same position of each subsequent bar. Through bars six and seven they are partially or fully elided, before being restated in bar eight. From bar nine, once Stewart begins the second PGI, they are again repeated, but occur one quaver later in each subsequent bar (as the PGI itself does).

These note pairs highlight the relationship between the first and second PGIs: whilst they are built off entirely distinct sticking cells, the similarity between their movement cycles generates recurring melodic and timbral characteristics. Video 5.6 again presents the entire excerpt, now annotated to denote the first PGI, the variations of the first PGI, and the second PGI.

Video 5.6. PGIs and variants within excerpt

In summary, through this excerpt Stewart primarily articulates two repeating phrases, identified within this analysis as the first PGI and the second PGI; within both he manipulates movement spans to consistently manufacture a direct relationship between hit points and movement spans, resulting in short and identifiable PGIs. Stewart transitions between the two PGIs through improvised variants derived from the first PGI (seen in bars six through eight). Throughout the excerpt Stewart maintains an unbroken three-point clockwise individual movement cycle with the right hand, whilst altering the left-hand individual movement cycle (but drawing from the same pool of hit points); this creates recurring melodic sequences and a consistent timbre. The most notable development change occurs due to the change in sticking cell in bar nine, at which point Stewart switches from the first sticking cell - which recurs isochronously with the underlying 4/4 meter - to the second sticking cell - which recurs every nine quavers, causing a consistent displacement. Taking these observations together, it can clearly be seen that the somatic processes of sticking cells and movement cycles were essential to the generation and development of the musical material found within this excerpt.

Conclusion

In this research I set out to examine the role of embodied knowledge (in the form of situated body movement) within my practice as an improvising drummer. Within Chapter Two I contextualise my practice as occuring within a local creative community of improvising musicians, whom I dub *Antripodean* improvisers, and identify the alignment of my practice with their unique musical logic as a primary personal motivation for the research. In Chapter Three I explore academic research from the field of embodied music cognition, connecting academic theory to aspects of drumset pedagogy and practice. Here I correlate Rockwell's analysis of bluegrass banjo picking permutations (2009) to my own exploration of sticking cells; and Bailey and Driver's theory of motor structures (1992) to pedagogical approaches towards physical movement around the drums. From these correlations I develop significant new theory and terminology for understanding and describing situated physical processes at the drumset; the most extensive being a detailed taxonomy of both *individual* and *combined movement cycles*.

In Chapter Four I explicate the effect of this theory upon my own creative practice, identifying *somatic parameter layering* as the primary generative process within the recorded works. I provide exegetical commentary of some of those works, identifying five strategic implementations of somatic parameter layering - *Hide/Reveal, Modulation Obfuscation, Unison/Interlace, Fragmentation*, and *Expansion/Contraction*. Finally, within Chapter Five, I explore the potential for my original theoretical developments to be used for analytical - rather than creative - purposes. To this end I codify an analytical model wherein identifying sticking cells and movement cycles functions as the primary form of data gathering.

The recorded works embedded throughout this ebook represent a creative manifestation of these ideas. The works meld Antripodean rhythmic techniques and aesthetic considerations with the embodied cognition informed generative process of somatic parameter layering to create original works that I intend to function equally as experimental outputs and musical works.

There are numerous pathways for future research. Chapter Two presents, to my knowledge, the most in-depth compilation of resources and analyses regarding the Antripodean community of artists compiled. It is, nevertheless, only one chapter of a larger work, and the musicians and their works are deserving of further study. In particular, I feel the various long-form improvisations recorded between 2008 and 2013 are ripe for extensive analysis.

Another is additional applications of the analytical model presented in Chapter Five. Due to the scope of this work, I was only able to present one application of the model - from the work of American drummer Bill Stewart - despite producing three further analyses to draft stage; I hope to finalise and publish these analyses at a later date. Beyond those, I believe applying this model to a variety of performers with diverse characteristics - such as different genres of performance, pedagogical methods studied, body shapes and sizes, and so forth - could reveal much about the commonalities and differences of drumming as a universal practice.

It is my hope that the outcomes of this research can contribute to the understanding of drumming as an improvisational art form, by academics and practitioners alike. My experience of drumset related literature - be it academic or pedagogical - is that the physical aspects of performance are either elided

entirely, or sublimated in service of musical ideas cached purely in notational forms. As a practitioner I have long been aware of the importance of somatic knowledge to my own practice, and suspected that the same was true for other artists I admired. Through this process I have developed theoretical frameworks through which to explicitly communicate forms of drumset specific embodied knowledge, and shown how this pool of processual knowledge both shapes my own creative works and can be identified within the improvisation of other artists. While primarily focused internally, on my own practice, I nevertheless consider this research a first step towards explicating the role of embodied cognition within the universal practice of drumming.

Similarly, I see great potential for the materials I have developed to become part of the shared pool of knowledge utilised by drumset practitioners; this includes the concurrent sticking scheme, and the taxonomy for identifying and manipulating movement cycles at the drumset. I myself have begun developing pedagogical materials using these resources, and am excited to see the creative directions in which they may be furthered by other drummers.

Finally, I anticipate that The Practice/Research Cycle may provide a model for other practitioner-researchers aiming to deeply engage with both their creative practice and existing academic literature. Through my experiences I found a lack of actionable practice-led methodologies, with those I encountered being either so project-specific they were impossible to generalise, or so general and multi-directional they were difficult to iterate; in either case, it was unclear how to apply these methods directly to my own project. It is my aim that that The Practice/Reseach cycle begins to fill this gap, by being general enough to encompass a myriad of projects and practices, but specific enough to be directly followed. I hope this contribution can illuminate the path for other practitioner-researchers, and in doing so encourage and enable them in their own undertakings.

Appendix A: Supplementary Recorded Works

The following works were also created and documented as part of this research project, but were elided from the main thesis for various reasons.

Additional outputs from June 2015 recording session

The following pieces, *John Lennon Seven* (Audio A.1), *Romance Tourism* (Audio A.2), and *Shorter in Words but Longer in Meaning* (Audio A.3) are additional creative works emerging from the first period of creative development. Whilst these works are not directly a result of somatic parameter layering, they each engage with the primary parameters of sticking cells or movement cycles in some way.

Audio A.1. *John Lennon Seven*

Audio A.2. *Romance Tourism*

Audio A.3. *Shorter in Words but Longer in Meaning*

Alternate live performances

The following recordings of *(you never did) The Kenosha Kid* (Audio A.4) and *Boubacar* (Audio A.5) are taken from a live performance at Colbourne Ave. in Sydney in August, 2016. Documented over a year after the initial recording session, by the time of this performance I was much more in control of the pieces and the inbuilt improvisational strategies. Notably, this recording of *(you never did) The Kenosha Kid* is preceded by an extended improvisation directly exploring somatic parameter layer as a generative process.

Audio A.4. *(you never did) The Kenosha Kid (*Live at Colbourne Ave.)

Audio A.5. *Boubacar* (Live at Colbourne Ave.)

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Discography

The following discography lists recordings mentioned in the text, organised by their order of appearance therein. In cases where a citation is related to a musical example discussed and/or embedded in the text, the title of the work precedes release details. The original recorded works created as a part of this research, and embedded within this ebook, are not listed.

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