

PHENOMENOLOGICAL MECHANICS — AN INTERCULTURAL MUSICAL PERSPECTIVE

An inquiry into the experience of directional movement in
intercultural music, applying time and motion concepts from
physics

Michael Ward

ORCID 0000-0003-1816-4567

Doctor of Philosophy

The University of Melbourne
Faculty of Fine Arts and Music
Melbourne Conservatorium of Music

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DECLARATION

I declare this dissertation is approximately 80,000 words, exclusive of appendices and footnotes.

The submission also includes a major artefact and a minor artefact of approximately 1 hour 54 minutes and 6 minutes duration, respectively.

I declare that this work is my original work, except where otherwise stated.

Weighting

The ratio of written to artefact weighting in this dissertation is 85% to 15%.

Editing

In writing this dissertation, I have had copyediting assistance from The Expert Editor professional and academic editorial service, within the permitted guidelines.

COVID-19 disruptions

I wish to declare that, because of the extended multi-year lockdowns and state border closures during the pandemic, it was not possible for an extended period of time, to return to the recording studio where I had worked for more than three years. The disruption began shortly after the initial recording of the major artefact at the end of 2019. As a result, the original single-session recordings of the major artefact were the only recordings available to produce the major artefact.

I was also unable to freely access some research resources, including books and musical recordings, during this period of lockdowns and border closures.

This research and the music are dedicated to my family.

ABSTRACT

This study is an inquiry into the experience of “vectorial” (i.e., directional) motion in music. It proposes a conceptual model for the experience of directional motion. It then applies the model interculturally, examining the relationship between Western and Eastern linear and cyclic cultural representations of time and corresponding compositional organisation. In its conclusion, it proposes geometrical models of Western and Eastern musical forms as *helix* and *vortex*, respectively, presenting musical works that exemplify these concepts.

The major research question of the dissertation is “What is the nature of the experience of directional movement in music, and how can this experience be conceptually represented?”. It examines this question via the principal methodological process of a thought experiment.

There are four research areas — music as phenomenological mechanics, composition as intercultural metaphor, applications to musical performance and analysis, and newly imagined instruments and novel compositional processes — and 12 research propositions — three primary, three secondary (two exegetical), two tertiary, and four artefactual.

The **primary research propositions** examine the experience of vectorial motion in music, proposing a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field* model. Referencing this model, the dissertation proposes that the experience of directional motion in music can be compared to principles from mechanics, albeit at a purely phenomenological level — a proposition that gives rise to the concept of *phenomenological mechanics*.

In the application of the concept of phenomenological mechanics to composition, the dissertation proposes a novel characterisation of musical development as a phenomenological representation of the first and second laws of thermodynamics — as the phenomenological “organisation of sound” from low to high potential energy states, and from chaos to order.

The **secondary research propositions** present the idea that the experience of musical motion differs in Western and Eastern cultural contexts in accordance with contrasting Western *linear* and Eastern *cyclic* cultural representations of time — metaphorically apparent in their respective musical forms — and in accordance with the *dualism* and *monism* that characterise form-void representations and their paradigms more broadly. These secondary research propositions thus apply the concept of *music as phenomenological mechanics* to the concept of *composition as intercultural metaphor*.

The dissertation proposes that, whereas Western music develops vectorially and teleologically to achieve an overall linear form, Eastern music develops non-vectorially and non-teleologically to achieve an overall cyclic form — a process consistent with the concept of *intensification*, as coined by UK ethnomusicologist Martin Clayton to describe “non-teleological large-scale processes ... proceeding by a process of expansion”. As an application of the research to the performance and analysis of music, the dissertation’s **tertiary research propositions** thus propose the concept of Western and Eastern musical forms as *helix* and *vortex*.

Referencing the musical time concepts of Zuckerkandl, Clayton, Kramer, Cage and Fraser, and the musical improvisation concepts of Feisst, the **exegesis research propositions** and discussion analyse the major and minor artefacts — respectively, a composition and an improvisation, for a 12-drum harmonic tabla set and two variations of modified guitar — as exemplifications of the concepts contained in the written work.

Table of Contents

Declaration.....	ii
Abstract.....	iv
List of Tables	vii
List of Figures.....	viii
Acknowledgements	xi
New Instruments	xii
Glossary of Common Terms and Concepts	xiii
Preface.....	xix
Conceptual Map.....	xxxii
Overview — physics, phenomenology, and music.....	xxxii
Visual representation of research propositions	xxxiii
Aims and objectives.....	xxxv
Research questions, research areas, and research propositions	xxxv
Summary of findings.....	xxxviii
Structure of dissertation	xxxviii
Relationship between theoretical and creative work.....	xxxviii
Inquiry process.....	xxxix
Scope.....	xl
Summary of significance of research and applications	xlvi
Chapter 1: Introduction	1
Approach to the Research Questions.....	1
Section A: Linearity and Cyclicity in Compositional Form and Process	2
Linearity and cyclicity in the dissertation’s exposition of concepts.....	2
Linearity and cyclicity in standard academic and narrative curve form.....	2
Linearity and cyclicity in musical development processes	3
Linearity and cyclicity of time as alternative phenomenological mechanics	4
Linearity and cyclicity in musical time and motion	4
Linearity and cyclicity as concurrent themes of theory and artefact.....	5
Section B: Thought Experiment.....	5
Research Area 1: Music as Phenomenological Mechanics	6
Research Area 2: Composition as Intercultural Metaphor	49
Research Area 3: Applications of Theory to Music Performance and Analysis	64
Research Area 4: Newly Imagined Instruments and Novel Compositional Processes	65
Section C: Literature Review	65
Preliminary concepts.....	66
Phenomenological mechanics — Western and Eastern	72
Musical mechanics — Zuckerkandl.....	79
Musical phenomenologies — Cage	83
Musical interculturalities — Clayton.....	95
Musical processing — linear and cyclic — Kramer	100
Musical interdisciplinarity — Fraser	105
Conclusion.....	111
Chapter 2: Methodology.....	114
Thought Experiment	114
History of thought experiments as a methodology.....	115
Thought experiments in philosophy, science, and music	115
The advantages of thought experiments as a methodology.....	116
Types of thought experiments.....	116
Interpretative Phenomenological Analysis.....	118
Practice-led Research.....	120

Smith and Dean's Iterative Cyclic Web model	120
Origin of research — Clayton's analysis of Zuckerkandl's wave theory.....	121
Associated characteristics as proposed by Barrett and Bolt.....	122
Chapter 3: Discussion.....	125
Overview	125
Theoretical essay versus exegesis perspective	125
The artefacts as exemplars of theoretical concepts	126
The major artefact as exegesis — minimalism and intercultural symbiosis perspectives.....	126
Minimalism and intercultural symbiosis in the zeitgeist of the twentieth century	127
Application of concepts to the performance and analysis of music — composition and improvisation....	128
Summary of Findings.....	128
Aims and objectives.....	128
The Artefacts as Exemplars of the Theoretical Concepts.....	131
Exemplars of Fraser's canonical forms of human temporality	131
The tertiary research propositions — musical forms as helix and vortex	133
The Artefacts as Exemplars of the Dissertation's Tertiary RPs	134
The major artefact as an exemplar of RP 3A	134
The minor artefact as an exemplar of Tertiary RP 3B	134
Exegesis Perspective — Minimalism and Intercultural Symbiosis	136
Minimalism.....	136
Intercultural symbiotic minimalism — Secondary RP 2C.....	145
Intercultural Perspectives.....	145
Altermodernism	145
Intercultural symbiosis.....	147
Application of the Research to Music Performance and Analysis	159
Application to <i>analysis</i>	159
Application to <i>composition</i>	166
Application to <i>improvisation</i>	169
Phenomenological Mechanics — An Intercultural Musical Perspective.....	171
The phenomenology of physics	171
The mechanics of music.....	172
Phenomenological mechanics — further interdisciplinary applications	173
Chapter 4: Summary and Conclusion.....	174
Reprisal of Sources — Physics, Phenomenology, and Music.....	174
Scope and Processes	174
Major Findings and Applications	176
Conclusion.....	176
Final summarising concept — the known and the unknown	178
Appendices.....	179
Appendix 1: List of Artefacts	179
Appendix 2: Form and Void — Western and Eastern Perspectives — Dualism and Monism.....	180
Appendix 3: Time and Motion — Western and Eastern Perspectives — Train Journey as Allegory..	187
Appendix 4: Particle Stream and Wave Representations of the Experience of Metre.....	199
Appendix 5: Compositional Methods and Processes — Major and Minor Artefacts	211
Appendix 6: Background Information and Rationale for Guitar and Tabla.....	269
Appendix 7: <i>Oscillation 1</i> — Analysis of Phenomenological Vector Field from the Perspective of	
Primary RP 1A	296
Appendix 8: Historical Discography — Western and Eastern.....	304
Appendix 9: Fingerings for Chords of Lead Sheet for the 8-String Guitar	307
Bibliography	319

LIST OF TABLES

Table 1: Relationship of research propositions to areas of research	xxxvii
Table 2: The seven artefacts	xlvi
Table 3: Kramer's categorization of left and right hemispheric activities as they apply to music	104
Table 4: Fraser's canonical forms of time — summary of concepts	108
Table 5: Johnson's characterisations of minimalism	136
Table 6: Tunings for the bayan and tabla	223
Table 7: Tabla tunings used in <i>Oscillation 1</i>	295
Table 8: <i>Oscillation 1</i> — Summary of hierarchical vector structure	296

LIST OF FIGURES

Figure 1: Visual abstract — primary, secondary and tertiary research propositions 1A, 2A, 3A&3B	xxxiv
Figure 2: <i>Oscillation 1</i> (left) the contrasting linear and cycle global forms of the tabla and guitar; (right) equi-harmonic cycle portraying linear (short arrow) and cyclic (long arrow) modulation	xxxix
Figure 3: Brown's classification system for a TE (thought experiment)	xxxix
Figure 4: Multipliers of vectoriality	41
Figure 5: Western form versus void and Eastern form-void, represented as switch and taijitu, respectively	43
Figure 6: Metre as particle stream	56
Figure 7: Metre as wave	57
Figure 8: Metre as double phenomenological wave of fading memory and swelling anticipation of beats (memory represented by broken lines and anticipation by unbroken lines)	58
Figure 9: Primary RP 1A — the complex phenomenological machine as a phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field (Cartesian, particle stream and phenomenological wave representations)	60
Figure 10: The organisation of rhythm in music	77
Figure 11: The polar couplet cell as a simple machine	90
Figure 12: Musical development and resolution — form-to-void movements	90
Figure 13: Battery-of-cells representation of the experience of directional musical motion as a complex phenomenological machine	92
Figure 14: Conceptual representation of Western dualistic temporality as the arrow of time contrasted with Eastern monistic time	98
Figure 15: Proposed contribution of mechanics, phenomenologies, musical processing, interculturalities, and interdisciplinaries to the experience of directional motion in music	111
Figure 16: Fraser's five temporalities	113
Figure 17: Smith and Dean's Iterative Cyclic Web	121
Figure 18: (upper) Guitar part (l to r): equi-harmonic cycle, equi-harmonic cycles x 3, total of 36 cycles; (lower) Tabla part: Oscillation x 1	135
Figure 19: Application of the tertiary research propositions to musical analysis	136
Figure 20: Form-void equivalence as it applies to <i>Oscillation 1</i>	138
Figure 21: Comparison of form and void at start and middle of the composition	138
Figure 22: Three examples of patterns	140
Figure 23: Time = 0 mins: Bars 1 to 14 [after introduction] — the sound of void	142
Figure 24: Time = 54 mins: Bars 3025 to 3192 — the sound of form	143
Figure 25: Eastern representation of the form-void relationship	144
Figure 26: Liquid Crystal Environment as an example of altermodernist art	146
Figure 27: Kurokawa's office in a skyscraper (top); sixteenth-century Edo tearoom (bottom)	149
Figure 28: Melbourne Central	151
Figure 29: Standard classical guitar, my 8-string regular interval guitar, Indian lap guitar, Indian chaturangui	156
Figure 30: <i>Oscillation 1</i> showing retention of Western harmony and Eastern bols in guitar and tabla parts	156
Figure 31: Music for "Zen Meditation" album cover	158
Figure 32: Form-void vectors in the equi-harmonic cycle	159
Figure 33: Linear global form of the tabla part	160
Figure 34: Phenomenological mechanics analysis of 12-bar blues chord progression	163
Figure 35: Summary of models	177

Figure 36: 2/4 metre — representing <i>particle stream</i>	199
Figure 37: 2/4 metre as form-void particle stream — representing <i>demarcating events</i> (V = void; F = form)	200
Figure 38: 2/4 metre as form-void particle stream — representing <i>oscillation of states</i> (V = void; F = form)	200
Figure 39: 2/4 metre as analogy of quantum mechanics oscillation between stable and unstable states	201
Figure 40: Simple representation of metre as a phenomenological wave	203
Figure 41: Phenomenological fields of memory (broken line) and expectation (unbroken line) and memory of beat 1 and 2 over duration of 2/4 measure represented as <i>absolute</i> displacements	205
Figure 42: Phenomenological fields of expectation and memory over duration of 2/4 measure (memory is the broken line; anticipation is the unbroken line)	206
Figure 43: Phenomenological fields of expectation and memory over duration of 2/4 measure (memory is the broken line; expectation is the unbroken line; combined waveform is the line in the middle)	206
Figure 44: 2/4 metre as a combined wave of memory and expectation, where troughs correspond to the memory-dominant phase and crests correspond to the expectation-dominant phase (AB = troughs; BC = crests)	207
Figure 45: Memory (of preceding beat) and expectation (of forthcoming beat) represented as a phenomenological wave with transition from memory to expectation via <i>gated cut-offs</i>	208
Figure 46: Experience of 2/4 metre as phenomenological wave of oscillating form and void states	208
Figure 47: Primary RP 1A — Cartesian, particle stream, and phenomenological wave representations	210
Figure 48: Fretless octave guitar	212
Figure 49: Guitar part (upper, l to r): equi-harmonic cycle, equi-harmonic cycles x 3, total of 36 cycles; tabla part (lower): oscillation x 1	219
Figure 50: Contrasting cyclic and linear movement of the guitar and tabla	219
Figure 51: Tuning ranges	222
Figure 52: Lead-sheet notation	225
Figure 53: 8-string TAB notation	225
Figure 54: Hybrid notation example	226
Figure 55: Main combined guitar and tabla score notation of <i>Oscillation 1</i>	226
Figure 56: Top: Global form of the guitar part. Bottom: Representation of the global form of the whole composition as contrasting cyclic and linear global forms of guitar and tabla parts, respectively	228
Figure 57: Equi-harmonic cycle	228
Figure 58: Tabla-rhythmic density RD	229
Figure 59: Alternative graphical representation of tabla part	230
Figure 60: Compositional process that permits formulaic representation of the tabla part	231
Figure 61: Recording template	234
Figure 62: Mixing/assembly template — development phase	235
Figure 63: Combined mixing/assembly and recording template — development phase — 3D representation	236
Figure 64: Increasing and decreasing RD	239
Figure 65: Home-away movement in the equi-harmonic cycle	241
Figure 66: First 14 bars of the composition	243
Figure 67: Phrases	244
Figure 68: Melodic shape of the phrase	245
Figure 69: Intra-(AB)-sectional harmonic movement	246
Figure 70: Harmonic movement within the B-section	247
Figure 71: Entire AB-section harmonised	247
Figure 72: Continuous cyclic harmonic modulation	248
Figure 73: Linear modulation	249
Figure 74: Cyclic modulation	250

Figure 75: Combined <i>intra-AB-sectional</i> and <i>inter-AB-sectional</i> harmonic movement for a single equi-harmonic cycle.....	251
Figure 76: Chord chart of equi-harmonic lead sheet.....	252
Figure 77: Void-form vectors in the equi-harmonic cycle.....	255
Figure 78: Summary of controlled graded improvisation	257
Figure 79: Fifteen-second duration AB unit — improvisation values on Key, CPD, and RD	258
Figure 80: Three-dimensional representation of 15-second duration AB unit.....	258
Figure 81: First six AB units — improvisation values on Key, CDP, and RD.....	259
Figure 82: First six AB improvisation units in three dimensions	259
Figure 83: First 36 AB units — improvisation values on Key, CDP, and RD	260
Figure 84: First 36 AB-improvisation units in three dimensions.....	261
Figure 85: 216 AB units — improvisation values on Key, CPD, and RD.....	262
Figure 86: First 36 AB improvisation units in three dimensions.....	263
Figure 87: Summary of recording process.....	264
Figure 88: Summary of mixing/assembly process — development phase	265
Figure 89: 3D summary of recording and mixing/assembly process — development phase	266
Figure 90: Equi-harmonicity of musical composition as synonymous with white, unrefracted light	268
Figure 91: Yepes 10-string guitar tuning.....	269
Figure 92: Recommended fingering for playing A and B sections, marked in the fret space on right (upper) and left (lower) positions, respectively.....	276
Figure 93: Tabla wave forms.....	284
Figure 94: Examples of configurations for two, three, and four tabla (with one bayan)	285
Figure 95: Two-note melody in Evans's <i>The Valley of Vung</i> (3:50)	286
Figure 96: Three-note tabla melody in Evans's <i>Shifter</i> (0:5).....	287
Figure 97: Four-note melody in Evans's <i>In a Milky Way</i> (3:22) 62	288
Figure 98: Two harmonised tabla parts in Evans's <i>Blueprint</i> (2:16) 84	289
Figure 99: Three harmonised tabla parts in Evans's <i>Blueprint</i> (3:43)	290
Figure 100: Chordal tabla harmony in Evans's <i>While You Were Sleeping</i>	291
Figure 101: Metric groupings at the level of 3 + 3 + 4 + 3 + 3 - 4 + 4 beats	297
Figure 102: Metric groupings at the level of 10 + 10 + 4 beats (and 3 + 3 + 4 + 3 + 3 - 4 + 4 beats)	297
Figure 103: Metric groupings at the level of 24 beats ("R3" is 24-beat metric organisation)	297
Figure 104: Melodic organisation of phrases P1, P2 and P3, respectively, 4, 5 and 7 bars duration	298
Figure 105: Melodic organisation of 14-bar melodic phrases, functioning as call and response.....	299
Figure 106: Harmonic movement within a single key centre — perfect cadence	299
Figure 107: Harmonic movement within a single key centre — ii-V-1 harmonic progression	300
Figure 108: Linear modulation — bars 1 to 15.....	300
Figure 109: Cyclic modulation — bars 15 to 29.....	301
Figure 110: Combined harmonic movement within a single key centre and modulation, linear and cyclic.....	301
Figure 111: Form-void vectors in the equi-harmonic cycle.....	302
Figure 112: Linear global form of the tabla part.....	303

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From the emptiness of your flute comes the fullness of music.

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NEW INSTRUMENTS



12-drum harmonic tabla set

Tuning: F2 F4, E^b2 E^b4, D^b2 A^b4, B2 F#4, A2 A4, G2 G4



8-string regular interval guitar

Tuning: A1 D2 G2 C3 F3 B^b3 E^b4 A^b4



6-string fretless octave guitar

Tuning: C2 G2 C3 G3 C4 G4

GLOSSARY OF COMMON TERMS AND CONCEPTS

bayān	Left-hand drum played by a tabla player.
bols	Rhythmic figures, techniques, and patterns of North Indian classical music.
Copenhagen interpretation	The “orthodox” position of quantum mechanics that holds <i>an observation produces the phenomenon observed</i> . ¹
endothermic process	A process that consumes rather than releases (kinetic) energy, such as rolling a ball up an incline or a battery charging. Here, referencing phenomenological mechanics terminology, musical <i>development</i> is proposed as a phenomenologically endothermic process.
exothermic process	A process that releases rather than consumes (kinetic) energy, such as a ball rolling down an incline or a battery discharging. Here, referencing phenomenological mechanics terminology, musical <i>resolution</i> is proposed as a phenomenologically exothermic process.
entropy	The state of disorder or randomness of a system. As an application of phenomenological mechanics, the concept is introduced here to measure the extent to which a composition is experienced as being undeveloped or disorganised. The concept applied to phenomenological mechanics (i.e., <i>phenomenological entropy</i>) aligns with John Cage’s alternative description of music as “organisation of sound”. ² Thus, composition experienced as highly organised has low phenomenological entropy (disorder). The act of composition is proposed as conceptually representable as the imposition of order on a system, reducing its overall entropy or randomness.
entropic movement, positive	I use a nominal convention where the positive direction of energy and entropy transformation is the spontaneous direction for which (kinetic) energy input is not required. Positive energy and positive entropy movements are analogous to <i>downhill</i> movement or the <i>discharging</i> of a battery. They move the system from a high (potential) energy state to a lower (potential) energy state, and from order to chaos. Thus, positive phenomenological energy and entropy movements correspond with the phenomenological mechanics concept of <i>resolution</i> .

¹ Bruce Rosenblum and Fred Kuttner, *Quantum Enigma: Physics Encounters Consciousness* (Duckworth, London, 2007), 100.

² John Cage, “The Future of Music Credo.” Talk given in 1937, in John Cage, *Silence — Lectures and Writings* (London: Marion Boyers, 2022).

entropic movement, negative	Negative energy and entropy movements are analogous to <i>uphill</i> movement or the <i>charging</i> of a battery. They move the system from a <i>lower</i> (potential) energy state to a <i>higher</i> (potential) energy state and <i>from chaos to order</i> . Thus, positive energy and entropy movements correspond to the phenomenological mechanics concept of <i>development</i> .										
equi-harmonic	A composition that has equal harmonic distribution across all 12 major keys. The major artefact, <i>Oscillation 1</i> , is presented as an equi-harmonic composition.										
form-void couplet cell	The conceptual structure whose phenomenological representation permits the experience of movement between a form state and a void state. It is proposed that, conceptually, musical <i>form</i> is an <i>away</i> (or developed) state; conversely, musical <i>void</i> is a <i>home</i> (or undeveloped) state. A form-void couplet cell is a polarised couplet cell, where the poles of the cell have the attributional meanings of, and function as, form (or away) and void (or home) states.										
form-void vector	The subjective experience of directional movement between phenomenologically attributed form and void states within a polarised couplet cell.										
Fraser's canonical forms of time	(See Table 4.) Briefly, they are five hierarchical levels of the experience of time: <table> <tr> <td>Nootemporality</td><td>The time consciousness of man.</td></tr> <tr> <td>Biotemporality</td><td>Time characterized by a rudimentary consciousness which recognizes the present, distinguishes the past from the future and ... differentiates between beginnings and endings.</td></tr> <tr> <td>Eotemporality</td><td>Time where events are predictably linked by causation, and the principles of cause and effect.</td></tr> <tr> <td>Prototemporality</td><td>Time where events are related to one another not by causation but by statistical probability.</td></tr> <tr> <td>Atemporality</td><td>Time where the concepts of past, present and future do not exist, but the relationship between events is one of [monistic] simultaneity.³</td></tr> </table>	Nootemporality	The time consciousness of man.	Biotemporality	Time characterized by a rudimentary consciousness which recognizes the present, distinguishes the past from the future and ... differentiates between beginnings and endings.	Eotemporality	Time where events are predictably linked by causation, and the principles of cause and effect.	Prototemporality	Time where events are related to one another not by causation but by statistical probability.	Atemporality	Time where the concepts of past, present and future do not exist, but the relationship between events is one of [monistic] simultaneity. ³
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Prototemporality	Time where events are related to one another not by causation but by statistical probability.										
Atemporality	Time where the concepts of past, present and future do not exist, but the relationship between events is one of [monistic] simultaneity. ³										
harmonic tabla set	A set of tabla tunings that are physically durable and permit playing of the tabla in all 12 keys. Here, the tunings for the harmonic tabla set (tabla bayan) are as follows: F2 F4, E ^b 2 E ^b 4, D ^b 2 A ^b 4, B2 F#4, A2 A4, G2 G4.										
interval guitar	A guitar tuned in regular intervals. The terms “interval guitar” and “regular interval guitar” can be used interchangeably. In										

³ Julius Thomas, “Human Temporality in a Nowless Universe,” *Time and Society* 1, no. 2 (May 1992): 159–173.

	this dissertation, I use an 8-string interval guitar tuned in perfect 4ths: A¹ D² G² C³ F³ B^{b3} E^{b4} A^{b4}.
kinetic energy	Energy that derives from motion rather than position. <i>Phenomenological kinetic energy</i> is used here to describe “undeveloped” musical composition (i.e., in the process of developing).
laws of thermodynamics	The first and second laws of thermodynamics are used here to describe the contrary compositional movements of development and resolution as phenomenologically <i>endothermic</i> and phenomenologically <i>exothermic</i> processes, respectively. The first law of thermodynamics states that energy can neither be created nor destroyed, only converted from one form of energy to another (also known as the <i>law of conservation of energy</i>). The second law of thermodynamics states that the total entropy of a system either increases or remains constant in any spontaneous process. (In the dissertation, I also refer to this as <i>the law of order and chaos</i>.) Thus, development is proposed as a negative entropic process — a movement from chaos or randomness to order. Conversely, resolution is proposed as a positive entropic process — a movement from order to chaos or randomness.
machine	A structure that uses power to apply forces and control movement to perform an intended action.
Newton’s third law of motion	For every action there is an equal but opposite (in direction) reaction (also known as the <i>law of action and reaction</i>). Here, the complementary symmetry of imperfect and perfect cadence is proposed as analogous in structure to Newton’s third law of motion — V-I perfect cadence being the <i>equal but opposite</i> (in direction) of I-V imperfect cadence.
noema	In phenomenology, the <i>object pole</i>.
noesis	In phenomenology, the <i>i- pole</i>.
octave guitar	A guitar tuned (across two or more strings) in repeating octaves. The octave guitar used for the minor artefact is a 6-string fretless octave guitar tuned in alternating perfect fifths and perfect fourths, from C²: C² G² C³ G³ C⁴ G⁴.
oscillation	Completion of a movement and its equal and opposite (in direction) movement.
paradigm	A set of ideas or a way of seeing things.

penumbra	<i>A space of partial illumination (as in an eclipse) between the perfect shadow on all sides and the full light.</i> ⁴ The concept is used in Appendix 4 to describe the phenomenological experience of the form (as opposed to the void) of metre that occurs around the time of the sounding of the beat but not correlating exactly with it. It is proposed that the physical sound of the beats of metre has a phenomenological penumbra around them because the beats are phenomenologically experienced, before and after the physical sound, as expectation and memory.
phenomenological energy	Potential and kinetic phenomenological energy as it relates to the experience of compositional development and resolution. The dissertation proposes that development is characterizable as the experience of compositional transition from a kinetic to potential phenomenological energy state. Conversely, compositional resolution is the experience of compositional transition from potential to a kinetic phenomenological energy state. As an example of this, the experience of imperfect (I-V) cadence is proposed as a phenomenological transition from undeveloped (I) to developed (V) state, thus being experienced as development. Perfect (V-I) cadence is the converse — a transition from potential to kinetic energy, experienced as resolution.
phenomenological entropy	The experience of entropy is randomness or absence of organisation in an array of events, including a musical composition. The dissertation proposes that a reduction in phenomenological entropy, as it applies to music, corresponds to the experience of musical development, and conversely for musical resolution.
phenomenological mechanics	A novel concept that examines the experience of subjective phenomena such as time, directional motion and related parameters in terms of the laws of mechanics, which govern the behaviour of physical bodies in the natural world.
polarised couplet cell	The polarised couplet cell is proposed as the necessary binary conceptual structure, phenomenologically represented, for the experience, perception, and attribution of directional motion in music. The polarised couplet cell permits, by its polarity, asymmetry, which allows the representation of directional space and, within it, directional movement.
potential energy	The energy that derives from position rather than motion. Here, the concept of <i>potential phenomenological energy</i> is used to describe musical composition that is in a “developed” state.

⁴ See <https://www.merriam-webster.com/dictionary/penumbra>

	The potential phenomenological energy — the phenomenological energy of <i>position</i> associated with this developed state — is comparable to a ball at the top of an incline or a charged battery. In the words of Dahn, in this developed state, music is “active” and carries with it a tendency or tension (“almost a will”) that strives towards resolution. ⁵
quantum entanglement	The “bizarre, counterintuitive phenomenon” that explains how “two particles link together in a certain way no matter how far apart they are in space”. ⁶
quantum problem	The term used by Einstein to describe the appearance of interdependence between the physical behaviour of matter and its observation. In the context of the dissertation, the significance of the “quantum problem” is metaphorical. Whereas the quantum problem associates the behaviour of matter (the domain of physics) with observation (the domain of phenomenology), phenomenological mechanics is a characterisation of a phenomenological experience — that of directional motion in music — by relating it to the laws of physics. ⁷
regular interval guitar	A guitar tuned to a single repeating inter-string interval. The regular interval guitar used for the major artefact is an 8-string regular interval guitar tuned in perfect fourths from A1: A1 D2 G2 C3 F3 Bb 3 Eb 4 Ab 4.
RD	Rhythmic density.
RP	Research proposition.
tabla	Refers either to <i>both drums of a pair</i> of drums played by a tabla player or to the right-hand drum only (the left-hand drum being the <i>bayan</i>).
tabla set	A set of tabla tunings.
umwelt	The world as it is experienced from the perspective of a particular organism. Regarding the dissertation, the concept of umwelt is used by Fraser to describe his proposed canonical forms of time.
vector	A physical quantity that has both magnitude and direction.

⁵ Luke Dahn, “A Summary and Reflection on Victor Zuckerkandl’s *Sound and Symbol: Music and the External World (1956)*” (Blog, written in 2006 and 2007). <http://www.lukedahn.net/Zuckerkandl.htm>

⁶ Jesse Emspak, Quantum entanglement is one seriously long-distance relationship. <https://www.space.com/31933-quantum-entanglement-action-at-a-distance.html#:~:text=Quantum%20entanglement%20is%20when%20two,Their%20state%20remains%20the%20same.>

⁷ Bruce Rosenblum and Fred Kuttner, *Quantum Enigma: Physics Encounters Consciousness* (Duckworth, London, 2007), 4.

vectoriality	Directionality. This concept is central to the principal research question: <i>What is the nature of the experience of directional motion in music and how can it be conceptually represented?</i>
vector field	A collection of vectors whose magnitudes and directions contribute directional properties to a defined space.
void-form-void movement	<i>Void-to-form</i> movement followed by <i>form-to-void</i> movement.
wave theory of metre [meter]	Zuckerlandl's (1956) theory is that a bar of music comprises not equal fractions of time but rather a succession of mutually complementary cyclical phases — the experience of musical metre thus being analogous to wave motion.

SUMMARY OF CENTRAL PHENOMENOLOGICAL MECHANICS CONCEPTS

Negative and positive phenomenological energetic and phenomenological entropic transformations as the phenomenological mechanics concepts of development and resolution

In the dissertation, I use a nominal convention where the *positive* direction of phenomenological energy and entropy transformation of a system is the *spontaneous* direction of transformation for which *kinetic* energy (i.e., the energy of *motion*) input is not required. Conversely, negative energetic and entropic transformations are *non-spontaneous* transformations for which (kinetic) energy is required.

Regarding transformation of *energy*, negative energetic transformations move the system from a *lower* potential energy state (i.e., lower *energy of position* state) to a *higher* potential energy state. In so doing, they require and consume *kinetic* energy — the energy of motion (thus maintaining overall energy conservation).

Negative energetic transformation is an *increase in potential energy* (energy of *position*) with a corresponding *decrease in kinetic energy* (energy of *motion*). It is equivalent to the physics term *endothermic* transformation.

Regarding transformation of *entropy*, *negative* entropic transformations move the system in the direction *away from chaos* and *towards order*. *Positive* energetic and entropic transformations are the converse — *spontaneous* (or *exothermic*) transformations of state that are kinetic energy releasing and potential energy consuming.

Negative energetic and entropic movements are thus analogous to *uphill* movement or a battery *charging*. Conversely, positive energetic and entropic movements are analogous to *downhill* movement or a battery *discharging*.

In phenomenological mechanics terminology, negative and positive phenomenological energetic and entropic transformations correspond to the compositional concepts of *development* and *resolution*, respectively.

PREFACE

When I was eight, I expected a billy cart for Christmas. With profound disappointment, I received a guitar instead. It was a strange-looking thing. The first thing I noticed about it was that it had no wheels. To my young eyes, that was a glaring design flaw.

When an adult, I had the guitar modified, and a musical journey ensued. It was not a physical journey on wheels — rather, a conceptual journey, more like a thought experiment ... on a wave.

1. Instruments

The classical guitar

After receiving my first guitar, I eventually got used to the idea that it could not be ridden. As a child, I had no adult rights, so for the next few years, I dutifully learnt the classical guitar, studying the Frederick Noad method in Brisbane under the patient eye of my first music teacher, Geoff Goon.

Modified instruments

I continued to wonder whether you might be able to add wheels to the guitar. I never found out. But the desire to alter musical instruments to make them fit for purpose seems to have followed me into my adult life. The two guitars that feature in the dissertation's creative works are modified in string numbers, tunings, intervals and fretting.

The clarinet

My father's father was described as a self-taught musician who could "play anything". My father was a professional boxer. Later in life, my father chose the safer sport of sprinting and won numerous medals. In the meantime, owing to his profession and the historical poverty of the time, he lost his teeth and couldn't play his beloved Selmer Console clarinet. He gave it to me instead.

I remember the musty smell of wood oil whenever it was opened. I learnt it as my second instrument at school and played it obediently from age nine onwards.

2. Composed music and improvisation

When a teenager, I revived my interest in the clarinet. I remember well the following seminal experience as my introduction to improvisation. It was in Kings Cross in Sydney. Coming from the "big country town" of Brisbane and visiting the city for the first time, Sydney was definitely "the big smoke".

What changed the course of my musical life was watching a band play from *Ruby My Dear* late one night in a tiny club in the city. While watching the band playing on double bass, guitar and drums, out of the blue, a young, slim, dark-skinned man walked through the door carrying a small overnight bag.

Without so much as slowing his pace, he strode through the door, jumped onto the stage, and extracted from his small bag a clarinet in two pieces, which he promptly put together and immediately began blowing.

At first, none of the notes was in the key of the piece nor even in tune.

He was utterly unfazed by this.

In a heuristic manner, he moved through his “wrongness” to first get in tune with the band and then to find the key centre they were playing in, from there blowing the house down.

What impressed me in that encounter was his acceptance that finding and playing notes was a process — and one with many possibilities. The discovery process was an integral part of the performance — somehow that made it all seem real.

Improvisation, I realised, was an exploration in real time. For me it was a profound liberation from the strictness of the classical guitar.

3. Fundamental concepts

Form and void

In my first experience of music, I learnt that if I played the pieces as expected, nothing much would happen. But if I deliberately played a section differently, my teacher would notice.

Unknowingly, I was experimenting with the concepts of form and void.

Clearly, my teacher had a reference point — a representation of the way things were when *nothing* was *happening* — or, more correctly, *nothing unexpected was happening*.

Form and void, I would later understand, is a fundamental concept upon which the phenomenological representation of dualistic space-time is founded. Without form and void there can be no conceptual representations of movement, including musical movement.

The musical representations of form and void — both Western and Eastern — are fundamental concepts of the theoretical part of the dissertation. Western and Eastern concepts of form and void as they apply to music are further explored in *Musical phenomenologies — Cage* (Chapter 1) and in Appendix 2.

Memory and expectation

I was impressed that my guitar teacher, Mr Goon, sitting on the other side of my music charts, could apparently read music upside down. At that young age, I had no concept that my teacher had committed Frederick Noad’s various technical studies and etudes to memory.

As well as the concepts of form and void, *memory* and its correlate, *expectation*, are important underlying concepts of the dissertation. A major reason for this is because, in the dissertation, I am not examining mechanics itself but rather the way that mechanics — specifically, the concepts and language of mechanics — can be applied to represent the phenomenological experience of forwards and backwards motion in music. Memory and expectation are thus duly considered concepts that originate from the musicological work of Victor Zuckerkandl (see also Appendix 6).

Therefore, Zuckerkandl’s (1956) wave theory of metre is the initial concept through which the dissertation situates itself within the musicology literature.⁸ It is also the foundation of the concept of phenomenological mechanics as it applies to music. Rather than representing metre as a punctuation of discrete events of form — as beats superimposed on a static background of void (as silence) — Zuckerkandl’s theory represents the experience of metre as a continuous phenomenological wave.

From this concept, via ten incremental steps, I present the concept of *phenomenological mechanics* as it applies to the experience of directional motion in music. This is presented as Research Proposition 1A, a conceptual model for the representation of the experience of directional motion in

⁸ Victor Zuckerkandl, *Sound and Symbol: Music and the External World*, trans. Willard R. Trask (London: Routledge and Kegan Paul, 1956).

music. The ten steps are listed in Section B: Thought Experiment of Chapter 1, at the end of Research Area 1.

Phenomenological polarity

The appreciation that music could be upside down was a significant realisation in my early experience of music. I also learnt that music could be back to front. Music, I learned, was not symmetrical. Even at that young age, I was aware that music had polarity.

In the dissertation's conceptual model for the experience of directional motion in music, the representation of music in terms of its phenomenological polarities is a fundamental contributing concept.

Time as a vector

Just as up was not down, left was also different from right. In that sense, music moved in a direction.

Time as a vector, as represented by the Western concept of the *arrow of time*, is also a fundamental concept on which the examination of directional musical motion is based.

It is a distinguishing cultural concept referenced in the dissertation. Specifically, time as a vector is referenced to contrast Western and Eastern musical forms in accordance with their contrasting representations of cultural time.

Western and Eastern paradigmatic frameworks — dualistic and monistic compositional space

The dissertation also examines contrasting Western and Eastern representations of dualistic and monistic compositional space as alternative frameworks for musical organisation.

Western and Eastern musical organisation — linear and cyclic temporality

In further investigating such concepts, the dissertation proposes that a dualistic representation of time accords with the primarily *linear* organisation of Western music. Conversely, a cyclic concept of time accords with the primarily *cyclic* organisation of Eastern music.

These concepts are the foundation of the dissertation's second main area of research — namely, *composition as intercultural metaphor*.

Western and Eastern development processes — vectorial development and intensification

The dissertation also examines the nature of *musical development*, which is possible within Western dualistic and Eastern monistic cultural and musical frameworks.

I propose that Western musical form is characterised by *vectorial development*, consistent with the Western paradigmatic representation of time as dualistic and linear. Conversely, Eastern musical form is characterised by the non-vectorial process of *intensification*⁹ consistent with the Eastern paradigmatic representation of time as monistic and cyclic.

Operationalisation of concepts to composition

In metaphorically representing this concept in the form of a composition, I investigate the contrasting concepts of linearity and cyclicity from various musical perspectives. These include linear and cyclic concepts of time, linear and cyclic harmonic movement, and linear and cyclic global form.

⁹ The metaphorical representation of Western linear and Eastern cyclic time is compositionally represented both at the level of global form and the level of harmonic movement. These concepts are represented in Figure 55 and Figure 56, respectively.

The main artefact, *Oscillation 1*, a composition for 8-string regular interval guitar and 12-drum harmonic tabla set, is both an example of and a metaphor for linearity and cyclicity as it characterises Western and Eastern paradigms.¹⁰

As summarised in Table 8 (Appendix 7), *Oscillation 1* exemplifies the concepts on which I based the dissertation's conceptual model for the experience of directional musical motion. This includes the representation of musical form in terms of *linear and cyclic phenomenological vectors*.

Composition as intercultural metaphor

Having organised the composition on both these principles (i.e., contrasting linear and cyclic *modulation* and linear and cyclic *global form* as a metaphor for Western linear and Eastern cyclic time) and used instruments from both Western and Eastern traditions, I tender *Oscillation 1* as an intercultural composition.

In situating the composition within existing Western and Eastern musical and fine-arts perspectives, I examine it in reference to the Western and Eastern musical frameworks of Western minimalist composition and North Indian classical music (see Chapter 3).

I also examine the broader fine-arts question of what happens when disparate musical systems confront one another, referencing concepts from fine arts (altermodernism and intercultural symbiosis) and linguistics (creolization and pidginization).

We hear music as we hear life

The dissertation finishes with a proposed application of its theoretical concepts to the practical fields of musical composition and improvisation. Echoing the sentiments of Jonathan Kramer, I invite musicians (including myself) to consider *new temporalities* and new listening strategies as they apply to music and more broadly.

Tertiary research propositions — applications to music performance: helix and vortex

Applying its theoretical concepts to music performance and analysis, the dissertation concludes with its tertiary research propositions (RPs) — the propositions of contrasting geometrical models of Western and Eastern musical form as *helix* and *vortex*.

4. Mechanics — physical and phenomenological

Einstein and physics

In high school, I was given a book on Einstein's theory of relativity. What I learned from this book was that theoretical science approximates ideas to create a working model. I also discovered that the deeper one ventures into reality, the more absurd things may seem to appear. I also learned that many of science's discoveries, including those of Einstein, were highly counter-intuitive. Einstein described this as follows:

In a good mystery story the most obvious clues often lead to the wrong suspects. In our attempts to understand the laws of nature we find, similarly, that the most obvious intuitive explanation is often the wrong one. ... Galileo's contribution was to destroy the intuitive view and replace it by a new one.¹¹

¹⁰ This metaphorical representation of linear and cyclic organisation is at the level of global form. See Figure 2.

¹¹ Albert Einstein and Leopold Infeld, *The Evolution of Physics: The Growth of Ideas from Early Concepts to Relativity and Quanta* (New York, Simon and Schuster, 1938). Quoted in Ulrich Kuhne, "A Short History of the Method of Thought Experiments in Science" http://philsci-archive.pitt.edu/16464/1/TE_Toronto090522_kuehne.pdf

Many, including Einstein himself, were in search of a Theory of Everything. As far as I am aware, none has been found.

Particles and waves

A central concept of quantum mechanics duality addresses the inadequacy of conventional concepts like “particle” and “wave” to meaningfully describe the behaviour of quantum objects ... all objects have both wave and particle nature.¹²

In 1921, Einstein was awarded the Nobel Prize in Physics for his discovery of the law of the photoelectric effect — a demonstration of the dual nature of light as both particle and wave.¹³ In this dissertation, I examine metre in the same way — specifically, the phenomenological experience of metre as particle versus the experience of metre as wave. This concept of metre as a continuous phenomenological wave rather than a discrete repetition of particulate events is then applied more broadly to other musical parameters, including those of melody, harmony, modulation and global form.

A conceptual model for the experience of directional motion in music

From this application, I develop Research Proposition 1A — a model comprising two contributing concepts. The first, referencing Zuckerkandl’s *Sound and Symbol*, is the concept of a fundamental, indivisible *molecule* of directional motion. In this dissertation, I coin the term *form-void couplet* as the phenomenologically represented *phenomenological molecular structure* that permits the experience of directional motion in music.

The second, referencing concepts from Kramer’s *The Time of Music*, describes the conceptual structural organisation of such phenomenological molecular units within a composition. It does so both in terms of hierarchical organisation (Kramer’s concept) and an extension of Zuckerkandl’s concept to parameters beyond metre — specifically, application at the musical parameter levels of melody, harmony, modulation, and global form. In referencing this second compositional organisation part of the model, I use the term *complex phenomenological machine architecture*.

This conceptual model, presented as Research Proposition 1A, proposes that the phenomenological experience of directional movement within a music composition is conceptually representable as a “phenomenologically determined, hierarchically organised, multi-parameter form-void vector field”.

Experience of directional motion in music

From this idea, I developed Research Proposition 1B — the concept that the net phenomenological vector field (i.e., the vector sum of the contributing phenomenological vectors at all phenomenologically relevant musical parameters, including melody, harmony, modulation, and global form) conceptually represents the experience of musical direction. When this net phenomenological vectorial experience is nominally *forwards moving*, we are experiencing overall musical or compositional *development*. Conversely, when it is nominally *backwards moving*, we are experiencing overall *resolution*.

Primary Thesis Corollary 1B thus represents the experience of directional motion in music as a *complex* (multi-parameter, hierarchically organised) *machine*, acting in accordance with *phenomenological mechanics*, defined in the dissertation as a novel concept that examines the

¹² *Science Daily* at https://www.sciencedaily.com/terms/wave-particle_duality.htm

¹³ The Nobel Prize in Physics 1921 at <https://www.nobelprize.org/prizes/physics/1921/summary/>

experience of subjective phenomena (such as time, directional motion and related parameters) in terms of the laws of mechanics, which govern the behaviour of physical bodies in the natural world.

Application of concepts

In Chapter 3 (Discussion), I provide examples of the utility of this conceptual model as it applies to the analysis of three contrasting compositions: major artefact *Oscillation 1*, a 12-bar blues chord progression, and Cage's 4'33".

5. Thought experiments

In investigating the outer world, both Einstein and Galileo frequently used thought experiments as a method of inquiry. Galileo's most famous thought experiment resulted in the discovery that the speed at which an object falls to earth under gravity is independent of its mass.¹⁴ Einstein's most famous thought experiment involved imagining what light would look like for a person travelling on a photon at the speed of light.

Phenomenological mechanics

As described in the previous section, I use the same primary methodology to generate a conceptual model for the experience of directional motion in music. But my thought experiment is applied to the inner phenomenological world — to the phenomenological experience of directional musical motion. It examines concepts of mechanics, including those of time, motion, force, energy, work, and machine, and the laws that govern them. However, these concepts do not exist in the physical domain but in the phenomenological.

In presenting this idea, a proposition with potentially broad interdisciplinary applications, I introduce the novel concept of phenomenological mechanics.

6. 12-key composition

Science and musical languages

A few years after finishing high school, I completed my undergraduate science degree at The University of Queensland, where I took subjects in physics, philosophy and literature and ended up majoring in psychology.

After graduating, I moved to live in Cairns, North Queensland, for six months, where I studied clarinet and jazz theory with German saxophonist Rudy Holmberg. Rudy agreed to take me on as a student at my first lesson. There was, however, one condition. I would need to translate each lesson before attending the next one. Though I spoke rudimentary German, this seemed a bit extreme, even for a committed teacher–student relationship.

Then I understood. It was not the lesson but the music I would need to “translate”.

12-key composition

I would need to transcribe and play each lesson in all 12 keys — first chromatically and then around the cycle of fifths. Having been brought up on guitar and its bias towards sharp keys,¹⁵ it was both a confrontation and liberation to venture progressively into the *dark side* of the cycle. Emerging, like a

¹⁴ James Robert Brown, *The Laboratory of the Mind: Thought Experiments in the Natural Sciences*, 2nd Edition (London: Routledge, 2009), 2.

¹⁵ Refer to Appendix 6 for further commentary on the guitar's bias towards sharp keys and the rationale for the two newly imagined guitars of the dissertation.

train passing through an underground tunnel, I would escape from the keys of D flat and F sharp, magically getting back to C again without ever having to change the direction of modulation.

I spent the next six months daily visiting the Barron River and relentlessly woodshedding my 12-key clarinet chops. The frogs and crickets did not complain. They had their own songs to work on.

Cyclic fugues

After many months of practising in this way, I became fascinated with the idea of perpetual forward motion by modulation. I started writing technical pieces for keyboard, which I called “cyclic fugues”. Essentially, they were pieces that continuously modulated through all 12 keys, cycle after cycle. Initially, they were etudes (i.e., technical pieces). Later, they became compositions.

Oscillation 1, the current dissertation’s major artefact, is an example of one such “cyclic fugue”.

The soprano saxophone

With Rudy’s trial by musical fire under my belt, I moved to Melbourne the following year to study music at the tertiary level. I enrolled in the music program at Preston College and completed grades in the clarinet and piano. I also commenced playing the saxophone for the first time.

A year later, I auditioned on the clarinet and soprano saxophone for the improvised music diploma/degree at the Victorian College of the Arts (VCA). My audition pieces included an original composition for soprano saxophone in 7/8 time. This composition marked the beginning of an interest in odd and complex time signatures, eventually leading me to my studies in Indian classical music.

At the VCA, I studied saxophone under Lachlan Davidson, with the keyboard as my second instrument. I also furthered my fascination with functional harmony, as taught by Tony Gould, and was informally mentored by Brian Brown. Brian introduced me and many others to the possibilities of music as an art form within a broader contemporary fine-arts context. I learnt a lot in a short period.

However, being among musicians of a much greater technical ability than mine, I was out of my depth. I had also become increasingly interested in musical composition, rather than performance, and in instrument design and modification. I decided to defer.

7. Musical languages — linear and cyclic

Sequential versus gestalt processing

After deferring from the VCA, I returned to my previous studies and completed a masters preliminary degree in psychology at La Trobe University.

During this time, I wrote two theses. The first was a theoretical thesis — a conceptual analysis of objectivity in perception, a useful grounding for the theoretical part of my current dissertation. This was particularly so regarding the primary theses — specifically, the *phenomenological determination* component of the proposed model for the experience of musical direction.

The second was an empirical thesis — a study of language acquisition. In this thesis, I studied the linguistic processes of the respective phonetic and iconic/pictographic versions of the Japanese languages *kana* and *kanji*.

These concepts are themes throughout the dissertation, particularly in the secondary theses.

Left and right hemispheric musical processing

In studying *kana* and *kanji*, I was introduced to the concept of left and right hemispheric processing as it applies to language acquisition and concepts such as sequential versus simultaneous processing and

algorithmic versus gestalt pattern recognition. These concepts are central to the development of the dissertation, where the conceptual model proposed in the primary theses are applied in the secondary theses within Western and Eastern *cultural* contexts.

In the context of music, the dissertation examines these concepts within Jonathan Kramer's framework of linear and non-linear musical processes.

Western and Eastern linguistic and musical processes

The study of *kana* and *kanji* also introduced me to *Western* and *Eastern* linguistic processes. Being sequential, *kana* is more closely related to English. In contrast, *kanji* orients towards wholistic recognition of symbols and context. Hence, the processing of *kana* is more Western and dualistic, while the processing of *kanji* is more Eastern and monistic.

Integrating these concepts, the dissertation proposes a conceptual framework through which the compositional organisation and experience of directional motion in Western and Eastern music may be represented. Included in this integration is an investigation of Western linear and Eastern cyclic concepts of time, and its accordance with the experience of directional motion in their respective musical forms.

8. Indian classical music

After graduating from La Trobe University I travelled to Japan and then India and Nepal.

In Nepal, I met my classical music teacher Ustad Ram Hari Gurung. With bansuri (Indian flute) as my principal instrument, I studied with Mr Rama over the course of some years.

One day, Mr Rama advised it was time for me to travel to Delhi, where I would meet Harsh Warden, the flute maker of Pandit Hari Prasad Chaurasia. Harsh Warden would provide me with a new concert flute and advise me on the next phase of my Indian classical music journey.

As it turned out, I did not study with Harsh Warden but with Milind Date, a younger and more Western-influenced music student of Hariji's lineage.¹⁶

New instrument: the Boehm tarogato

Around this time, I designed several hybrid Western-Eastern wind instruments. Some years later, I commissioned the building of an instrument that would have the warmth and woodiness of the clarinet with the technical facility of the soprano saxophone, albeit non-transposing.

The result was the Boehm tarogato in C. Shortly after its design, it was built by tarogato builder Józef Toth in Hungary.

From a Western instrumental perspective, being a non-transposing woodwind instrument, the Boehm tarogato in C was suitable for playing music directly from a flute and oboe repertoire. It also — after transposition — was suitable for most soprano saxophone repertoire.

From a Western-improvisation perspective, like the saxophone, the Boehm tarogato in C was a “regular” instrument. Like the saxophone, its fingering patterns were consistent from one octave to another, thus facilitating ease of vertical harmonic improvisation.

Included in its design were two alternative bells: a Western bell and an Eastern bell. The shorter Western bell facilitated playing the instrument from a standing position, with B^b as the fundamental

¹⁶ Hariji is widely recognised as the greatest living master of the bansuri — the North Indian bamboo flute.
<https://www.folkradio.co.uk/2018/06/pandit-hariprasad-chaurasia-bansuri/>

(i.e., lowest) note. The longer Eastern bell included an additional low A. Furthermore, the longer Eastern bell allowed the Boehm tarogato to be played in the traditional Indian sitting position, with the bell resting on the floor. With this extension of range, when playing in D, it could also play low A (i.e., *pancham* or *pa*), the important fifth tone of the Indian scale.

9. Linearity and cyclicity as principles of compositional organisation

The 8-string regular interval guitar

In the current dissertation, I have applied the same concept I applied to the tarogato to modifications of the standard guitar. Working with Melbourne-based luthier Ruben Becker, I designed and commissioned two guitars: the 8-string regular interval guitar and the 6-string fretless octave guitar. The designing of these two modified guitars occurred concurrently with developing compositional interests in linearity and cyclicity as principles of compositional organisation.

Tuned in perfect fourths (A¹ D² G² C³ F³ B^{b3} E^{b3} A^{b4}) and designed for Western (cyclic) improvisation, the 8-string regular interval guitar allows ease of transposition of *harmonic* ideas both horizontally (up and down the fretboard) and vertically (from string to string) without the need for adjustment. Thus, it is designed for harmonic and cyclic composition and improvisation. In the Western-Eastern musical continuum, the 8-string regular interval guitar is relatively oriented to Western music.

In the dissertation's major artefact, *Oscillation 1*, the 8-string regular interval guitar is used as a "harmonic tanpura" in support of the soloing tabla. Though the guitar does not improvise in this piece, the dissertation includes (Appendix 9) a fingering chart for all chords used in the 12-key equi-harmonic composition.

The 6-string fretless octave guitar

Tuned in alternating perfect fifths and perfect fourths (C² G² C³ G³ C⁴ G⁴) and thus for every second string tuned in octaves, and designed for Eastern (linear) improvisation, the 6-string fretless octave guitar facilitates transposition of *melodic* ideas both horizontally (up and down the fretboard) and vertically (from string to string) without the need for alteration of fingering. It is designed for melodic and linear composition and improvisation.

Additionally, being fretless, the 6-string fretless octave guitar can emulate the glissandos and vocal nuances that characterise Eastern music. Hence, in the Western-Eastern musical continuum, this instrument is oriented to Eastern music. In the dissertation, it is used for the minor artefact, the solo improvisation *Beginner's Mind*.

The 12-drum harmonic tabla set

The dissertation's major artefact, *Oscillation 1*, also features a 12-drum harmonic tabla set. This is a purpose-built configuration of six paired tabla tunings that permit the tabla to play in 12 keys. The paired (left-hand bayan–right-hand tabla) tunings for the 12-drum harmonic tabla set are F²-F⁴, E^{b2}-E^{b4}, A^{b2}-D^{b4}, G^b/F[#] 2-B⁴, A²-A⁴, G²-G⁴.

This 12-drum tabla set was designed and empirically tested while working with Dr Sam Evans, who also plays the instrument in the recording. Sam is Australia's first and (as far as I am aware) only PhD graduate in tabla performance. *Oscillation 1*, written for Sam, extends his concepts of melodic and harmonic tabla as described in his (2019) PhD thesis "Tabla without Borders".¹⁷

¹⁷ Samuel John Evans, "Tabla without Borders: Toward a Contemporary Model for Tabla Performance and Composition" (PhD dissertation: Monash University, 2019).

Oscillation 1

In *Oscillation 1*, the 12-drum harmonic tabla set, facilitated by a studio recording and mixing process (described in Appendix 5), follows the composition's harmonic movement and plays in all 12 major keys.

Oscillation 1 is presented in a few formats. For the purposes of this dissertation it is primarily presented as a 154-minute recording with accompanying full manuscript, as well as a guitar lead sheet and chord chart.

The composition comprises a 3-minute introduction (guitar only) plus the main tabla content — 54 minutes of an algorithmically determined, incrementally implemented *increasing* rhythmic density, followed by 54 minutes of algorithmically determined, incrementally implemented *decreasing* rhythmic density plus a 3-minute (guitar only) “outro”.

This full-length version demonstrates the concepts of linear and cyclic global form (as they are graphically represented on the left of Figure 2). It also demonstrates the tabla's capacity to play *equi-harmonically* (i.e., where, based on the available tunings within its physical tolerances, it can be played concordantly within all 12 keys).

Anticipating some listeners might find the listening experience challenging (given the composition's length and its slow and incremental development and resolution over 108 minutes) I also produced an abridged one-hour version accompanied by a corresponding music video. This shorter version — where the image on the screen (also slowly and incrementally developing and resolving per the music) serves as a secondary reference for the composition's development and resolution *movements* — is considered a more accessible version of the composition.

The abridged version of the music video is included as an example of the dissertation's compositional concepts to other disciplines and as a subject for further research. This music video version of the composition is not, however, presented as an examinable artefact.

10. Situation of artefact within the literature — minimalist process and Indian classical music

If we want to learn about anything really deep, we have to study it not in its “normal”, regular, usual form, but in its critical state in fever, in passion.

If you want to know the normal ... study it when it is abnormal

If you want to know ordinary... study ... lunatic fringe.¹⁸

Some years later, still following my musical interests, I moved to New York, where for around five years I further explored improvised music, both jazz and Indian classical music.

I also wrote a musical rock opera during this time.

Subsequently, I was influenced by New York-based bansuri artist, Joshua Geisler. As well as being the musical director of Circus de Soleil, Josh is the author of *The Chromatic Bansuri: A Cross-Cultural Guide to Learning the North Indian Bamboo Flute*.¹⁹ Josh's concepts furthered my enthusiasm for intercultural music. I also explored my interest in minimalist and process music during this time.

¹⁸ I. Lakatos, *Proofs and Refutations* (Cambridge: Cambridge University Press, 1976), 23, quoted in Brown, *The Laboratory of the Mind*, 31.

¹⁹ Joshua Geisler, *The Chromatic Bansuri: A Cross-Cultural Guide to Learning the North Indian Bamboo Flute* (Covel Music Inc., 2008).

Indian classical music and minimalist musical composition

Though I did not realise it at the time, my journey from Indian classical music to the dissertation's minimalist style of composition was a natural one. While I did not consciously set out to compose a piece of music that I would call minimalist, it is certainly an example of process music — the processes, however, were in many ways necessitated by the compositional intent of the piece.

The composition, particularly its “processes”, is more than an intentional composition; it is a collection of practical solutions to several musical problems. In that sense, *Oscillation 1* is a demonstrative musical work. Its primary purpose is as an artefact that exemplifies the dissertation's theoretical and compositional concepts. Additionally, via the *emergent process* of its compositional journey, it has addressed and found solutions for some practical musical problems or challenges.

These include:

- How does a tabla play in 12 keys?
- How can a tabla develop its improvisation so slowly that it does not peak for 54 minutes?
- Is it possible to design and build a guitar that permits regular transposition not only horizontally (*along* the fretboard) but also vertically (*across* the fretboard) from string to string?
- How can a guitar be played so that it does not detract attention from a featured percussion instrument?

The tabla is a traditional North Indian classical music instrument, and to that extent its inclusion in the composition links it to Indian classical music. In the research I have undertaken for this dissertation, however, I have come across several references that link and find similarities between minimalist composition and Indian classical music.

Further, it is well-established that prominent minimalist composers such as Terry Riley and La Monte Young travelled to India, had Indian classical music teachers, and were highly influenced, both musically and culturally, by Indian classical music, which has improvisation processes comparable with those of Western minimalist music.²⁰

Referencing the work of Sabine Feisst and others, the dissertation situates the submitted composition *Oscillation 1* within this minimalist process music context.²¹

11. The entanglement of time and motion, physical and phenomenological

Time and motion in music and science

Some years later, after leaving New York and while living in London, I would read Brian Greene's *The Fabric of the Cosmos*²² — paradigm-blowing paragraph by paradigm-blowing paragraph. During this time, I also read Martin Clayton's *Time in Indian Music — Rhythm, Metre and Form in North*

²⁰ Sabine Feisst, “Negotiating Freedom and Control in Composition: Improvisation and Its offshoots, 1950 to 1980,” in *The Oxford Handbook of Critical Improvisation Studies Volume 1*, G. Lewis and B. Piekut, eds. (Oxford: Oxford University Press, 2016), 213–214.

²¹ Feisst, 213–214.

²² Brian Greene, *The Fabric of the Cosmos: Space, Time and the Texture of Reality* (Melbourne: Penguin, 2004).

Indian Rag Performance.²³ Clayton's ethnomusicological work led me to the works of Zuckerkandl,²⁴ then to Jonathan Kramer²⁵ and finally to Julius Fraser²⁶ — where the literature review concludes.

The entanglement of phenomenological time and motion

In the concluding ideas of the literature review, I reflect that the common question that linked these theorists (across their interdisciplinary domains of theoretical physics, ethnomusicology, musical phenomenology, and composition) was an inquiry into the nature of time.

It was not the *nature* of time itself that was the primary fascination but the *experience* of time — that is, temporality or, in the terminology of the dissertation, *phenomenological time*.

In my own story, I commenced this research journey with a research question not about time but about motion. The research question addressed by the thought experiment is *What is the nature of the experience of directional motion in music?*

In the process of undertaking this research and nearing its completion, it has become apparent that, in investigating the experience of phenomenologically experienced musical *motion*, I too was in a process of inquiry into the nature of phenomenological *time*. It seemed to make no difference that time was phenomenological time and motion was phenomenological motion. Just as time and motion are interdependent in *physical* mechanics, so too, it would seem, are they interdependent in *phenomenological* mechanics.

Epistemologies, Western and Eastern

The way in which a person knows music is not different from the way he knows in general. That is, musical knowledge is based on the same epistemology which underlies and pervades the entire culture.²⁷

Motion, it would seem, cannot be meaningfully separated from time — be that physical or phenomenological. Furthermore, the cultural and personal *filter* through which we experience motion would seem to be the same cultural and personal filter through which we experience time.

If in music we hear Western phenomenological time, it follows that we will experience Western phenomenological motion. Conversely, if in music we hear Eastern phenomenological time, we will experience Eastern phenomenological motion.

²³ Martin Clayton, *Time in Indian Music: Rhythm, Metre and Form in North Indian Rag Performance* (New York: Oxford University Press, 2000).

²⁴ Zuckerkandl, *Sound and Symbol*.

²⁵ Jonathan Kramer. "Postmodern Concepts of Musical Time," *Indiana Theory Review* 17, no. 2 (1996): 25. <https://www.uh.edu/~tkoozin/rhythm/KramerPostmod.pdf>; Jonathan Kramer. *The Time of Music — New Meanings, New Temporalities, New Listening Strategies* (New York: Schirmer Books, 1988); Jonathan Kramer and Robert Carl, eds, *Postmodern Music, Postmodern Listening* (Bloomsbury Publishing, 2016).

²⁶ Julius Thomas Fraser, "Levels of Temporality as Cognitive Representations," in *The Study of Time*, Nathaniel Lawrence and Frances C. Haber, eds. (Amherst: University of Massachusetts Press, 1986); J.T. Fraser, *The Genesis and Evolution of Time: A Critique of Interpretation in Physics* (Boston: University of Massachusetts Press, 1982). Cited in Kramer, *The Time of Music*; J.T. Fraser, "Human Temporality in a Nowless Universe," *Time and Society* 1, no. 2 (May 1992): 159–173; J.T. Fraser, "The Art of the Audible 'Now,'" *Music Theory Spectrum* 7 (1985): 181–84; J.T. Fraser, Nathaniel Lawrence and David Park, eds, *The Study of Time III. Proceedings of the Third Conference of the International Society for the Study of Time* (New York: Springer-Verlag, 1978).

²⁷ Stanley Hoffman, "Epistemology and Music: A Javanese Example," *Ethnomusicology* 22, no. 1 (1978): 69–88, quoted in Clayton, *Time in Indian Music*, 10.

New listening and performing strategies

Our experiences of musical motion would appear to reflect what Kramer describes as our *listening strategies*. Further, listening strategies (*the way we listen*), temporalities (*the way we experience time*), musical performance (*the way we play music*), and improvisation (*what we spontaneously play*) would seem to be deeply interconnected.

Referencing Julius Fraser's *canonical forms of time* and Sabine Feisst's *freedom and control* in improvisation, the dissertation applies these theoretical concepts to the performance and analysis of music.

12. From wave theory to phenomenological mechanics

In summary, my dissertation develops the existing literature in the form of Zuckerkandl's 1956 wave theory of metre. It explores and extends this concept to arrive at the broad concept of phenomenological mechanics — the characterisation of the experience of subjective phenomena, including musical time and motion, in terms of the principles of physical mechanics.

In such a representation, just as time and motion are entangled in the material world, so too are phenomenological time and motion entangled in the phenomenological domain. The examination of motion is thus implicitly an examination of time. Further, an examination of the experience of *phenomenological* motion, as it applies to music, is implicitly an examination of the experience, in music, of phenomenological time.

Zuckerkandl, in his 1956 wave theory, alludes to the concept of representing musical experience in terms of the laws of nature. Taking this as a starting point, I examine and develop the idea in this dissertation, eventually arriving at the concept of *phenomenological mechanics*. As exemplified in the major and minor artefacts, *Oscillation 1* and *Beginner's Mind*, respectively, I then apply the concept of phenomenological mechanics to composition and improvisation.

The dissertation concludes with a visual summary of the major concepts, including the representation of contrasting Western and Eastern musical forms as *helix* and *vortex*, and consideration of the application of these concepts to further musical performance and analysis.

CONCEPTUAL MAP

This “conceptual map”, designed to help the reader navigate through the dissertation, has the following structure:

- Overview — physics, phenomenology, and music
- Visual representation of research propositions
- Aims and objectives
- Areas of research, research questions, and research propositions
- Summary of findings
- Structure of dissertation
- Relationship between theoretical and creative work
- Inquiry process
- Scope
- Artefacts
- Summary of significance of research and applications

Overview — physics, phenomenology, and music

That physics has encountered consciousness cannot be denied.²⁸

In a meeting with Albert Einstein, Bruce Rosenblum notes Einstein’s concern about the *quantum problem* — the apparent connection between physics and what is essentially phenomenology.

He quotes Einstein’s words as below:

I have thought a hundred times as much about the quantum problem as I have about general relativity theory.²⁹

This dissertation is not about the quantum problem. Rather, it is the opposite.

Whereas quantum physics at its peripheral edge seeks to relate the laws of motion to concepts of phenomenological experience (observation) — the *quantum problem* — in this dissertation, I am seeking to describe a phenomenological experience by relating it to the laws of physics.

That phenomenological experience is the experience of vectorial (i.e., directional) motion in music.

The dissertation that follows arises not from the objective observation of scientific data but from a consideration of my subjective experience. Although its terms are in places scientific, and it is informed by concepts from physics, the association is not literal but one of poetic analogy.

Hence, the dissertation is not a scientific analysis but a subjective phenomenological inquiry. Arising from this inquiry, I present two musical artefacts — one composed and one improvised. Both are inspired by and grounded in the dissertation’s theoretical concepts regarding musical time and motion.

In the first part of the dissertation, via a conceptual thought experiment, I develop a model for the experience of directional motion in music, referencing concepts that originate in physics — that branch of physics known as *mechanics*. I apply concepts from physics to *phenomenological*

²⁸ Bruce Rosenblum and Fred Kuttner, *Quantum Enigma: Physics Encounters Consciousness* (Duckworth, London, 2007), 4.

²⁹ Rosenblum and Kuttner, *Quantum Enigma*, 6.

experience because physics has a terminology that is well-established, consensually understood, and inherently useful for conceptualising the experience of motion.

The dissertation, however, is not just about the experience of motion in *Western* music. It is also about that experience, or rather its contrasting experience, in *Eastern* music. Therefore, in the second part of the dissertation I also apply this model to examine my own experience of musical motion (referenced against similarly described experiences such as those described by Clayton³⁰) as it is differently experienced in Western and Eastern (i.e., North Indian classical) music.

Motion in time ... is ... music itself.³¹

As is the case in mechanics, motion and time in music are intimately related concepts. It is, therefore, not surprising that what commenced as an investigation into the experience of *musical motion* has become an investigation into the experience of *musical time*. Reflecting this as an outcome of the research, the third part of the dissertation presents alternative geometrical models of musical form — *helix* and *vortex* — based upon contrasting Western and Eastern cultural representations of time. Such contrasting representations of time reflect, I propose, paradigmatically distinct and fundamentally different Western and Eastern characterisations of the relationship between form and void.

It is my belief and desire that the concepts presented within the research have relevance to the performance of music, and in particular improvised music, a discipline that has the freedom to assume its own human temporality (i.e., its own experience of time).

Visual representation of research propositions

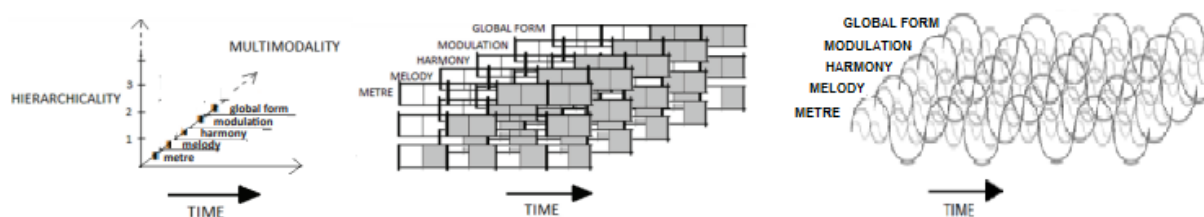
As the ideas in the dissertation are essentially simple concepts that lend themselves well to visual representation, I have, in addition to their written description, presented a “visual abstract” or a diagrammatic summary of the dissertation’s central concepts and how they relate to one another. The usefulness of such a visual abstract became apparent in my Completion Seminar, where diagrams replaced text as the most concise way to present the essential concepts of the research.

A dissertation such as this is easier to read and navigate, I believe, when one is equipped with a conceptual map of the logical progression of the research — where it *starts*, where it *moves through*, and where it *lands* or concludes. Arising from a thought experiment regarding the experience of directional motion in music, the dissertation starts with the primary research propositions (RPs). The conceptual terrain through which the dissertation *moves* is the secondary RPs — this is the application of the primary RPs to contrasting Western and Eastern paradigmatic musical and cultural environments, particularly regarding the cultural and musical representations of time.

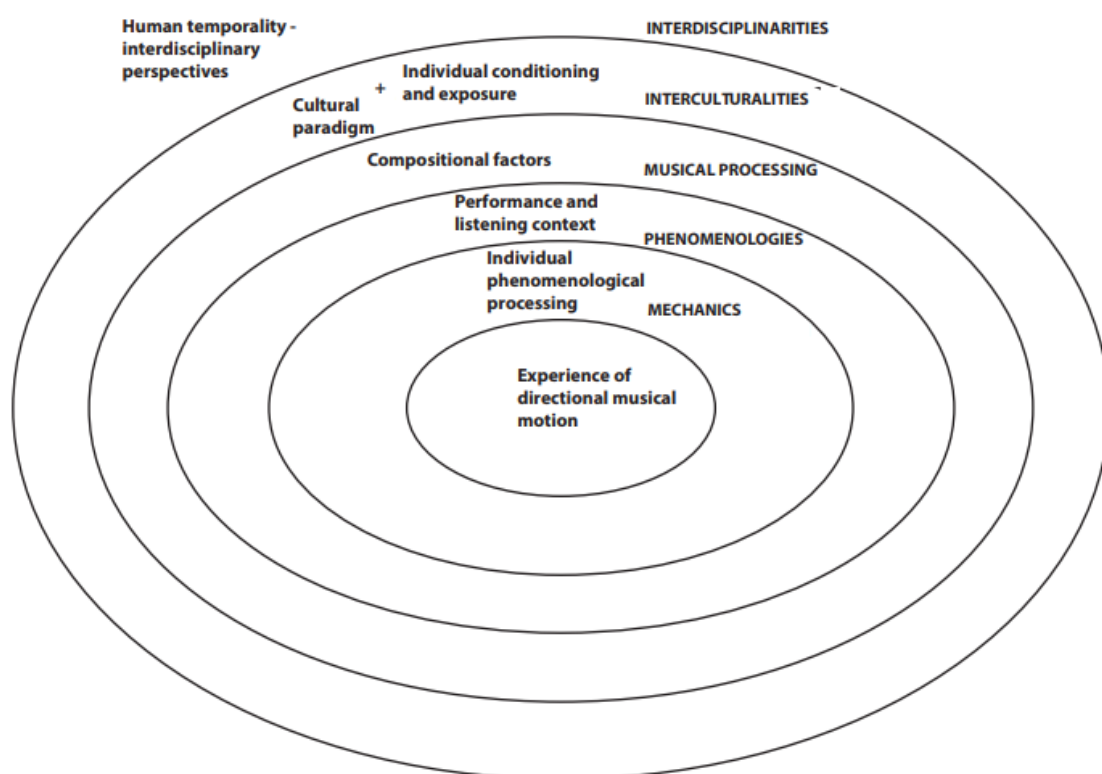
The dissertation concludes with its tertiary RPs — the geometrical representations of Western and Eastern musical form as *helix* and *vortex*, respectively. These contrasting visual concepts carry and contain within their structure and meaning metaphysical, cultural, and musical contrasts of Western and Eastern paradigms (i.e., of Western and Eastern *ways of seeing*). Finally, consideration is given to what such conceptual representations can potentially mean for expanding the possibilities for musical performance and analysis. Figure 1 is thus a conceptual map of the dissertation’s main assertions across its primary, secondary, and tertiary RPs (as summarised in Table 1), introduced chronologically in the development of the dissertation and detailed in their respective sections.

³⁰ Clayton, *Time in Indian Music*, 10–26.

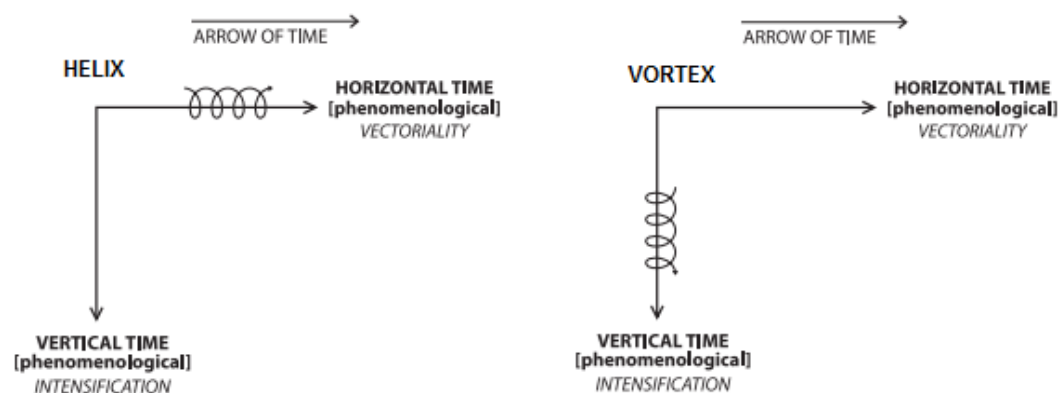
³¹ Richard Franko Goldman, *Harmony in Western Music* (New York, W.W. Norton and Co. Inc., 1965), 52–53.



RP 1A: The experience of directional motion in music is representable as a “phenomenologically determined hierarchically organised, multi-parameter form-void vector field” — l to r: Cartesian, particle stream and phenomenological wave representations.



RP 2A: Western and Eastern musical forms (and the experience of directional motion within them) are metaphorical of their broader philosophical and cultural paradigms.



RPs 3A and 3B [paraphrased] Reflecting their respective contrasting concepts of time as linear and cyclic, Western and Eastern musical forms are representable as, respectively, *helix* and *vortex*.

Figure 1: Visual abstract — primary, secondary and tertiary research propositions 1A, 2A, 3A&3B

Aims and objectives

The dissertation has both theoretical and creative aims and objectives. The main *theoretical* ones are:

- To investigate the phenomenological experience of directional motion in music.
- To generate via the process of a thought experiment, a conceptual model for the representation of the phenomenological experience of directional motion in music. (This is presented as RP 1A.)
- To apply this conceptual model to characterise the contrasting directional musical motion experiences that have been attributed to Western and Eastern musical forms.
- To apply the concepts presented within the research to the performance and analysis of music, especially improvised music.

The main *creative* ones are:

- To compose and produce a musical artefact or artefacts that *exemplify* or are *metaphorical* for the concepts of the theoretical work.
- To situate the composition within a musical and fine-arts theoretical context.

Research questions, research areas, and research propositions

While pursuing these aims and objectives, the dissertation addresses the following theoretical and creative **research questions**:

- *General theoretical questions*
 What is the nature of the experience of directional motion in music?
 How is the experience of musical direction related to compositional structure?
 How is the experience of musical direction related to the cultural representation of time?
- *Conceptual model questions*
 How can these concepts be represented in terms of a conceptual model for the experience of directional motion in music?
 How is this conceptual model affected by cultural factors such as contrasting Western and Eastern representations of time?
 What is the utility of such a model to the performance and analysis of music?
- *Applied exegesis questions*
 How can musical parameters such as harmony and global form be used to compositionally operationalise the dissertation's theoretical concepts?
- What are the broader musical and fine-arts concepts that arise from such a composition?
 How might a composition be organised to exemplify such a model and be a metaphor for the concepts on which it is based?

In addressing these questions, the dissertation spans four main **research areas**, as listed below:

1. Music as phenomenological mechanics
2. Composition as intercultural metaphor
3. Applications of theory to music performance and analysis
4. Ancillary artefact composition and production-related research.

Thus, in addition to the three theoretical areas of research (Research Areas 1–3), the dissertation includes ancillary artefact production-related research, such as newly imagined instruments and novel compositional processes (a progressive algorithmically determined process for incremental control of rhythmic density), a studio accommodation process for recording and assembling recorded parts of the 12-drum harmonic tabla set, and an equi-harmonic compositional technique (Research Area 4).³²

Arising from the research areas, the dissertation presents twelve **research propositions (RPs)**. These are categorised as *primary*, *secondary*, *tertiary* or *ancillary* to describe the position within the dissertation's logical progression and development where the RPs are relevant.

- The *primary* RPs (1A, 1B, 1C) are statements in relation to the proposed conceptual representation of directional motion in music.
- The *secondary* RPs (2A, 2B, 2C) are an application of this model within an intercultural context to postulate the reasons Western musical form is different in its structure and organisation from Eastern musical form, especially in terms of relative linearity and cyclicity of global form, respectively.
- The *tertiary* RPs (3A, 3B) are an application of the theoretical work to the performance and analysis of music. They propose alternative geometrical models of musical form as *helix* and *vortex*, based on Western and Eastern concepts of, respectively, linear and cyclic time.
- The *ancillary* RPs relate to the composition and production process for the artefacts.

The RPs are also characterised as *general*, *exegesis*, and *artefact*.

- *General RPs* (1A, 1B, 1C, 2A, 3A and 3B) relate to the experience of music *in general*.
- *Exegesis RPs* (2B, 2C) are positions taken regarding the music and fine-arts theoretical positions that arise from an analysis of the composition *Oscillation 1* in the context of the theoretical work.
- *Artefact RPs* (4A, 4B, 4C, 4D) relate to the composition and production of the artefact.

Table 1 summarises the RPs as they relate to the research questions. It also functions as a one-page summary of the logical development of the dissertation and the research areas covered. It provides an overview of the development of the model of the experience of directional musical motion *conceptually developed* in the primary RPs, *analysed* within an intercultural context in the secondary RPs, and *applied* to the performance and analysis of music in the tertiary RPs. Table 1 also lists the *artefact* RPs — the ancillary findings of a practical nature related to the production of the artefacts. The artefact RPs are propositions in relation to instrument design and modification of the guitar and tabla, equi-harmonic (i.e., harmonically equally distributed) compositional process, and specific studio processes, which facilitate the recording of monophonic instruments such as the tabla. As noted in the previous section, the artefact RPs, though worthy of consideration, are ancillary to the progressive development of the theoretical concepts of the dissertation and so are addressed separately.

³² The artefact production-related research, though original, does not directly contribute to the development of the theories from primary to secondary to tertiary RPs. For this reason, a significant proportion of the artefact composition and production-related research is treated as ancillary to the main research and presented in the form of appendices rather than in the main content of the research. Appendix 5, for example, outlines how the artefacts were composed and produced, especially the major artefact, *Oscillation 1*. This process of appending content that is not essential to the development of the dissertation's main propositions has allowed the research to develop through its propositions and arrive at its concluding findings. The novel findings appended in this way may be suitable for further dedicated research.

Table 1: Relationship of research propositions to areas of research**RESEARCH AREA 1: MUSIC AS PHENOMENOLOGICAL MECHANICS****General RPs****Primary RP 1A**

The phenomenological experience of directional movement within a music composition is conceptually representable as a “phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field”.

Primary RP 1B (Corollary)

The phenomenological experience of development or resolution at a given point in the experience of music is representable as the vector sum of the contributing phenomenologically determined vectors, such that a net positive vector sum correlates with the experience of musical development at that time, and a net negative vector sum correlates with the experience of resolution.

Primary RP 1C (Corollary)

The phenomenological experience of directional motion in music, occurring at the phenomenological rather than material level, is representable in terms of the concept of phenomenological mechanics — a novel concept that examines the experience of subjective phenomena such as time, directional motion and related parameters in terms of the laws of mechanics, which govern the behaviour of physical bodies in the natural world.

RESEARCH AREA 2: COMPOSITION AS INTERCULTURAL METAPHOR**Secondary RP 2A**

Western and Eastern musical forms can be considered metaphors for the philosophical and cultural paradigms in which they originate, and specifically, for contrasting Western and Eastern representations of time.

Exegesis RPs Referencing the Intercultural and Historical Contexts of the Artefact**Secondary RP 2B (Exegesis)**

The submitted creative work *Oscillation 1*, because of its harmonic organisation and global form, is a metaphor for the linear and cyclic representations of time in Western and Eastern paradigms.

Secondary RP 2C (Exegesis)

As an intercultural composition with characteristics of minimalist music and interculturality consistent with Kurokawa’s philosophy of symbiosis, *Oscillation 1* may be considered an instance of intercultural symbiotic minimalism.

RESEARCH AREA 3: APPLICATIONS OF THEORY TO MUSIC PERFORMANCE AND ANALYSIS**Tertiary RPs for Application to Music Composition and Performance****Tertiary RP 3A**

Incorporating the Western compositional concepts of linearity and horizontality of time, and vectorial development, the dissertation presents a geometric model of music compositional form as *helix*.

Tertiary RP 3B

Incorporating the Eastern compositional concepts of cyclicity and verticality of time, and development by intensification, the dissertation presents a geometric model of music compositional form as *vortex*.

RESEARCH AREA 4: NEWLY IMAGINED INSTRUMENTS AND NOVEL COMPOSITIONAL PROCESSES — INSTRUMENT MODIFICATIONS, PROGRESSIVE RHYTHMIC IMPROVISATION METHOD, STUDIO ACCOMMODATION PROCESS, EQUI-HARMONIC COMPOSITION**Artefact RPs Referencing Instrument Design, Improvisation Algorithm, Studio Process and Composition Method**

Artefact RP 4A *Oscillation 1* presents newly imagined instruments, specifically the 8-string regular interval guitar, the 6-string fretless octave guitar, and the 12-drum harmonic tabla set, which are novel re-imaginings of the instruments from which they are derived.

Artefact RP 4B *Oscillation 1* presents an algorithm for progressive rhythmic improvisation in 12 keys for pitched percussion such as the tabla.

Artefact RP 4C *Oscillation 1* presents a systematic studio recording and mixing process that facilitates the production of 12-key rhythmic improvisation for pitched percussion instruments applicable to studio recording when real-time re-tuning of instruments is not feasible.

Artefact RP 4D *Oscillation 1* exemplifies the concept of “equi-harmonic composition” — that is, it is a composition that has equal harmonic distribution across all 12 major keys.

Summary of findings

The dissertation's findings may be summarised as affirmative responses to the research propositions, as outlined in Table 1. These findings contribute to new interdisciplinary knowledge, both theoretical and practical. The significance of the findings and their applications are presented in detail in Chapter 3 (Discussion). A summary, however, of the significance of the findings is provided at the end of this Conceptual Map.

Structure of dissertation

The dissertation is structured in the standard dissertation format of Introduction, Methodology, Discussion and Conclusion. The Introduction chapter is, however, atypical in that it contains a **thought experiment**. The **literature review** then follows, as an examination of the concepts and related ideas of the thought experiment as they have been considered by others. The thought experiment itself was the initial main source for the dissertation's conceptual model.

The literature review examines, contextualises, and formalises the conceptual model within the familiar language of the discipline, as such concepts have been described by previous theorists.

Furthermore, as previously noted, the dissertation makes frequent use of appendices. This helps present the novel concepts more concisely within the main text. Assigning the details of supporting and extended concepts to appendices allows the focus of the main text to be the systematic development of the primary, through secondary to tertiary RPs, concluding with an application of the theoretical concepts of the dissertation to musical analysis, composition, and improvisation.

Relationship between theoretical and creative work

The relationship of exemplification

The artefacts exemplify the concepts of the theoretical work.

Major artefact

Oscillation 1 exemplifies the concept of RP 1A — the proposition that the experience of directional motion in music is representable as a “phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field”. Table 8 (in Appendix 7) provides a summary of the analysis of *Oscillation 1* in terms of the above proposition.

Additionally, *Oscillation 1* exemplifies the concept of RP 3A — the geometrical model of Western musical compositional form as *helix*. This is visually apparent when one examines the graphical representation of the global form of *Oscillation 1*, as demonstrated in Figure 2.

Minor artefact

The minor artefact, *Beginner's Mind*, exemplifies the concept of RP 3B — the geometrical model of Eastern musical compositional form as *vortex*.

The relationship of metaphor

Oscillation 1 is also a *metaphor* for the theoretical concepts of the dissertation (Western linear and Eastern cyclic time) — specifically, in its linear and cyclic global form and harmonic structure. This concept is demonstrated graphically in Figure 2 below. Details of these compositional processes are also presented in Appendix 5.

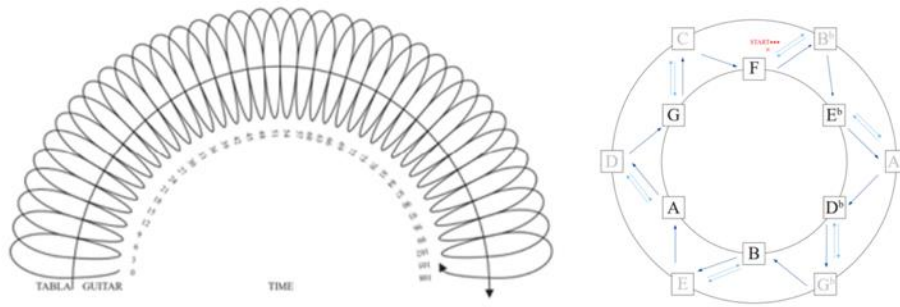


Figure 2: Oscillation 1

(left) the contrasting linear and cycle global forms of the tabla and guitar; (right) equi-harmonic cycle portraying linear (short arrow) and cyclic (long arrow) modulation

Inquiry process

The inquiry process for the dissertation employs a hybrid methodology (detailed in Chapter 2), encompassing:

- A thought experiment
- Interpretative phenomenological analysis
- Practice-led research.

Compared with phenomenological analysis and practice-led research, a thought experiment is less common in music research. For this reason, a brief description of its use is warranted here.

Thought experiments as methodology

In *Thought Experimentation: A Cognitive Approach*, Yeates defines a thought experiment as:

a device with which one performs an intentional, structured process of intellectual deliberation in order to speculate, within a specifiable problem domain, about potential consequents (or antecedents) for a designated antecedent (or consequent).³³

The process of a thought experiment was used in this capacity to address the fundamental question: *What is the nature of the experience of directional motion in music?* Regarding types of thought experimental processes, Brown provides the following classification system:³⁴

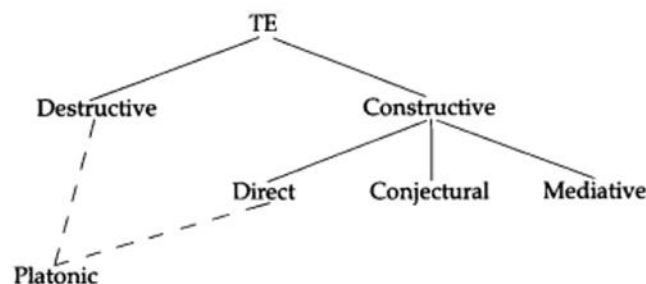


Figure 3: Brown's classification system for a TE (thought experiment)

³³ Lindsay Bertram Yeates, "Thought Experimentation: A Cognitive Approach" (Graduate Diploma in Arts, University of New South Wales, 2004), 150. https://en.wikipedia.org/wikiThought_experiment.

³⁴ James Robert Brown. *The Laboratory of the Mind: Thought Experiments in the Natural Sciences*. 2nd Edition (London: Routledge, 2009).

According to Brown's classification system, the thought experiment methodology used in the dissertation is most appropriately considered "conjectural" — that is, it establishes a theory based on observation and then considers the implications of such a theory when exposed to a process of questioning.

In Chapter 2, I further discuss the suitability of a thought experiment as a methodology for the dissertation, particularly the concepts of Popper, Brown, and Kuhne.

Overview of method

In Appendix 5, I provide a detailed description of the process of instrument design and construction, compositional method, and production of the artefacts. In section 8 of Appendix 5, I also provide a detailed account of the specific processes, algorithms and musical devices that were used to translate or *operationalise* the abstract concepts of linearity and cyclicity into tangible musical representations — those of global form and harmonic movement. Figure 2 (above) represents these translations graphically.

Scope

Terminologies and established concepts

In describing the terms of the dissertation, I have made the conscious decision not to re-define terms such as *Western*, *Eastern*, *Western music*, *Eastern music*, *linearity of form in Western music*, *cyclicity of form in Eastern music* etc. Instead, I have used such concepts in accordance with the established meaning they are understood to have in the existing literature, as used by past theorists.

For example, terms such as *Western music* and *Eastern music* are used in the same way as Martin Clayton and Bruno Nettl use these terms. *Eastern music* is a reference to North Indian classical music, this term having essentially the same meaning as Clayton's use of the term in his extensive text on the subject.³⁵ Similarly, *Western music* refers primarily to composed art music within the Western canon — also known, as described by Bruno Nettl, as "Western classical music", "art music", "canonic music", "cultivated music" and "serious music".³⁶

I have taken a similar approach when referencing musical examples of concepts that are well-established in the literature.

An example of this is the well-established concept of the relative linearity of Western music and the relative cyclicity of Eastern music. These concepts have been well explored and are not new. Rather than citing new examples, I refer to the theorists who have come to this position and why they have done so. Such an acknowledgement is important because the dissertation's main artefact, *Oscillation 1*, in its linear and cyclic global form and harmonic structure, is directly informed by the concept that Western music in its global form is relatively linear while Eastern music is relatively cyclic.

Such a generalisation, however, immediately exposes one to criticisms around definitions — of Western and Eastern music, of linearity and cyclicity etc. Instead, use of such terms in the dissertation is aligned with the way the important theorists in the literature have defined or used such concepts.

³⁵ Clayton, *Time in Indian Music*.

³⁶ Bruno Nettl, *Heartland Excursions: Ethnomusicological Reflections on Schools of Music* (University of Illinois Press, 1995): 3. https://en.wikipedia.org/wiki/Art_music

For example, the dissertation refers to Clayton's position on Western music's relative linearity of global form, and Eastern music's relative cyclicity of form as follows.

I agree with Kramer that any piece of music exhibits both linear and non-linear features; I am certainly not about to propose any simple dichotomy . . . Yet it does appear that "relative to Western tonal music" Indian music seems to display non-linear features more prominently and linear features less so. This seems to me inherent in assumptions about the nature of rag, tal and composition (bandis).³⁷

Notable is the way Clayton as a theorist (citing the work of another theorist, Kramer) manages concepts such as Western music, Indian music, linearity, and cyclicity.

Thus, for the purposes of composing a musical piece that is a metaphor for this concept of Western linearity and Eastern cyclicity, the dissertation accepts such a position, as it is presented and established within the literature. By taking this approach, the dissertation is then able to focus on its own principal aims and objectives.

What the dissertation is not

Clarifying what the dissertation is *not* and what it is *not about* is an important process. Such a clarification allows the RPs to be seen for what they *are* and *are about*. This process permits the presentation of the dissertation's focused scope of inquiry.

In consideration of this, the following is a list of what the dissertation is *not* about:

- The RPs are not about the idea that there is a material relationship between the phenomenological experience of music and the laws of nature.
- The primary RPs, though they refer to mechanics concepts such as vectors, charges, forces, and fields, are not intended to be interpreted as proofs of the concepts raised. Concepts such as "phenomenologically determined vector field" and "phenomenological charge" are conceptual constructs only. Models of such constructs may share an analogous conceptual structure with systems in the material world, as does the broader concept of phenomenological mechanics. All the inputs and outputs of the model are, however, phenomenological in nature — they are personal, subjective, and individual experiences.
- Just as the dissertation is not about physics itself, nor is it about phenomenology. Rather, it borrows concepts from both physics and phenomenology to investigate the experience of directional motion in music. I will often use the term "phenomenological" or "phenomenological experiential" to emphasise that what is being investigated is the "experience" of music rather than its physical correlate of "organised sound". In such instances, the term "phenomenological" is used generally rather than specifically.
- A historical discography of Western and Eastern compositions is provided for reference (see Appendix 8). This discography is not tendered as a comprehensive or objective, or even representative, selection from the Western and Eastern musical canons. Such a selection would be the work of music historians, which is neither the focus nor the intent of the current dissertation. Rather, a selection of historically significant Western and Eastern compositions is included to demonstrate concepts and for referencing where required.

³⁷ Clayton, *Time in Indian Music*, 25.

- Whereas a traditional musical dissertation is often *inductive* in its reasoning — that is, it examines multiple *specific* instances (examples of musical works) and from their commonality, draws an inference regarding the *general* case — in the current dissertation, consistent with the process of a thought experiment, I employ frequent use of *deductive* reasoning. For example, in the case of the musical development process in Eastern musical form (being one of *intensification* as opposed to Western *vectorial* development), I consider this concept from the perspective not of historical examples but from the logical possibilities for movement based upon contrasting Western and Eastern representations of the relationship between form and void. In the Western case, this form-void relationship is proposed as being one of *dualistic mutual exclusivity* — as opposed to the Eastern case of *monistic mutual inclusivity*.³⁸

Via a deductive process, I make the case that musical characteristics that distinguish Eastern music from Western music are consistent with what one might expect, based upon their contrasting paradigmatic representations of the relationship between form and void.³⁹ Such contrasting Western and Eastern musical characteristics, which *accord with* the paradigmatic distinction of the form-void relationship (being one of dualistic mutual exclusivity as opposed to monistic mutual inclusivity), include the following:

- *linearity* versus *cyclicity* of form
- *teleologicality* versus *non-teleologicality* of form
- *vectorial development* versus *development by intensification*
- *musical form as helix* versus *musical form as vortex*, and
- *improvisation by musical creation* versus *improvisation by musical discovery and revelation* — in the words of Clayton, the discovering and revealing within music of a *pre-existent* order.⁴⁰

The dissertation in essence

In essence, the dissertation combines theoretical written work and creative works. The creative works, as artefacts, are listed in Table 2 at the end of this conceptual map.

Regarding the theoretical work, the RPs and areas of research and their relationship to the development of the dissertation are listed in Table 1. Reprising this, the dissertation focuses on four research areas. Three of these areas are theoretical and one is creative. The three theoretical research areas are:

1. the experience of music as phenomenological mechanics
2. composition as intercultural metaphor, and
3. applications of theory to music performance and analysis.

³⁸ These concepts are further discussed in Appendix 2. Furthermore, this relationship as it is contrasted in Western and Eastern paradigms is graphically represented in the concepts of the Western form-void *switch*, and the Eastern form-void *taijitu*, as presented in Figure 5.

³⁹ These contrasting Western and Eastern musical characteristics are allegorically represented in Appendix 3, which represents Western and Eastern perspectives of motion as an allegory for Western and Eastern concepts of time, for which Western and Eastern musical form is arguably metaphorical.

⁴⁰ Clayton, *Time in Indian Music*, 2.

The area of creative research is *newly imagined instruments and novel compositional processes*. Overall, the dissertation presents three primary, three secondary (two exegesis), two tertiary, and four artefact research propositions — a total of 12 RPs (refer to Table 1).

Challenges — physical, conceptual, and aesthetic

Physical challenges

The major artefact, *Oscillation 1*, is a composition arising out of overcoming challenges of physical, conceptual, and aesthetic origin.

The major physical challenge was the extension of ranges, physical integrity and playing capacity for the instruments, especially the tabla, to facilitate the playing of an equi-harmonic composition — that is, a composition that equally traverses all 12 major keys. This process required achieving physically acceptable tolerances for both instruments so that they stayed in tune and did not break. The design and building of both instruments also required the negotiation of instrument-specific challenges, including those arising from ergonomic challenges. Thus, both instruments, beyond being novel re-imaginings, also had to be playable. The composition is the audible materialisation of the process of meeting such challenges.⁴¹

Conceptual challenges

The conceptual challenges are those oriented towards the operationalisation of abstract concepts such as linearity and cyclicity of time to compositional form.⁴²

Aesthetic challenges

It is my expectation that, on first listening to the major artefact, *Oscillation 1*, a proportion of listeners may respond with the criticism that it is “too simple”. The following points address such conceptions, proposing that, citing Kramer, the composition is an opportunity for new *listening strategies*.⁴³

Firstly, it has been my experience, both in Western and Eastern musical contexts, that musical listening has a *bias* towards giving priority to the melodic instrument over the rhythm instrument. In the case of *Oscillation 1*, that melodic instrument is the guitar. It is, therefore, natural to assume that the composition is primarily for the guitar and that the tabla, as a percussion instrument, plays the rhythmic accompaniment. Thus, when the composition is listened to, it may be that one initially hears the composition in the traditional way of a rhythm instrument supporting a melody instrument. In such a listening approach, the guitar appears, musically, *not to be doing very much*. One of the challenges of the composition is to address such bias. In fact, the composition is written not primarily for the guitar but rather for the tabla. Specifically, it was written for Dr Sam Evans, Australia’s first (and currently only) PhD recipient in performance for the tabla.⁴⁴ Therefore, *Oscillation 1* invites the listener to pay attention to the *tabla being accompanied by the guitar*, rather than the reverse. In this way the composition explores the capacity of the tabla to extend its limits. The role of the guitar is then to accompany and support this process rather than compete with it. The guitar’s role is like that of a tanpura as it is used in North Indian classical music. The guitar, however, playing repeating equi-

⁴¹ Appendix 6 outlines the designs for the 8-string regular interval guitar and the 12-drum tabla set. Whereas I was responsible for the design of the 8-string regular interval guitar, its physical construction was the responsibility of Melbourne-based luthier Rubin Becker. The physical construction of the tabla drums was the responsibility of Dr Sam Evans, building on his 2019 PhD thesis “Tabla without Borders”.

⁴² As previously noted, this operationalisation process is presented in detail in Appendix 5.

⁴³ Kramer, *The Time of Music*.

⁴⁴ Sam Evans: Australia’s first PhD graduate in tabla. <https://www.indianlink.com.au/india-in-australia/melbourne/sam-evans-australias-first-phd-tabla/>

harmonic cycles, functions not as a *melodic* drone but rather as an *equi-harmonic* drone. In its repetition (36 times) of the equi-harmonic cycle, the guitar harmonically traverses the entirety of the Western musical system's 12 major keys — proportioning its harmonic material equally — in 15-second sections such that all keys are represented equally in each three-minute duration of the cycle.

Secondly, the appreciation of both the harmonic movement and the global form of the composition requires long rather than short periods of listening. Without this capacity, one will certainly get the feeling that, musically, not very much is happening. The composition, rather than providing short-term musical gratification, invites a listening strategy of patience and appreciation of the overall global form.

In its equi-harmonicity (i.e., the equal distribution of its harmonic content across all 12 major key centres), the guitar's role is one of outlining the modulation movement for the tabla to play over. Being 168 bars (and three minutes) long, however, it is unlikely that the experience of completion of the equi-harmonic cycle is apparent in the way completion or resolution is apparent in shorter musical movements.⁴⁵ Thus, the complexity of the guitar part exists over its extended 168-bar equi-harmonic cycle.⁴⁶

As an *instantaneous visual reference*, rather than a reference *tied to time*, the graphic representation of the equi-harmonic cycle (Figure 2) captures its form more easily than does the three-minute experience of listening to it. In such a geometric representation, it is apparent that the guitar part has both complexity *and* simplicity. Arguably, this is also the case for the tabla part and its graphic.

Where a concept is definable by a single geometric structure, as is the case in *Oscillation 1*, for both the guitar part (globally cyclic in form) and the tabla part (globally linear in form), there is novelty in characterising such a musical process in this concise way. This is evident in the graphic representation of the composition in terms of its linearity and cyclicity, represented both in its global form and its harmonic movement, as represented in Figure 2.

Furthermore, the tabla, in completing an equi-harmonic cycle, is playing in all keys, assisted by its studio process. As detailed in Appendix 5, this was not particularly simple. Rather, it required extending the range of the instrument, building the drums with more durable (synthetic) materials (entirely the work of Evans⁴⁷), establishing a system of paired tunings, and solving the ergonomic and logistical challenge of how a 12-drum tabla configuration can be played and recorded in 12 keys.

The composition is thus the result of addressing these listed challenges. In doing so, *Oscillation 1* functions as the creative correlate of the theoretical work to exemplify its concepts⁴⁸ and as a metaphor for contrasting Western and Eastern understandings of linear and cyclic time. Table 2 presents the seven artefacts (which are also listed in Appendix 1).

⁴⁵ Kramer in *The Time of Music* addresses relevant questions about this phenomenon, such as “How long is the present moment?”.

⁴⁶ In contrast, the linear process of the tabla takes a full 108 minutes to complete. Thus, the appreciation of the tabla part takes an even longer listening approach than does the guitar. Kramer addresses the concept of “How long is now?” from a musical perspective (*The Time of Music*, 370–374). The question of “How long is now?” has also been addressed from a psychological and scientific perspective, suggesting “now: is experienced at most as lasting for a few seconds”. Nicholas Brealy, “How Long Is Now? Fascinating Answers to 191 Mind-boggling Questions,” *New Scientist* (2016).

⁴⁷ Evans, “Tabla without Borders.”

⁴⁸ The composition *Oscillation 1* has two variations of duration — a full-length version of 1 hour and 54 minutes and an abridged version with a duration of 54 minutes. Each version has three media versions: audio, video, and manuscript. In the sample of the artefacts provided, which I have called “major artefacts”, the manuscript represents the full-length version of the composition. The music video version provided, however, is for the abridged version.

Table 2: The seven artefacts

Composition: <i>Oscillation 1</i> — for 12-drum tabla set and 8-string regular interval guitar	1. Full Manuscript (277 pages, 6384 bars) 2. Lead sheet and chord chart for guitar (4 pages, 168 bars) 3. Audio recording (1 hour 54 minutes) Note: A (non-examinable) abridged (1 hour) music video version of the composition is also included as an example of application of the compositional concepts to other media (video) — a subject for further research.
Improvisation: <i>Beginner's Mind</i> – for fretless octave guitar	4. Audio recording (5'56")
New/Modified Instruments	5. 8-string regular interval guitar – photograph and tuning 6. 6-string fretless octave guitar – photograph and tuning 7. 12-drum harmonic tabla set – photograph and tuning

Summary of significance of research and applications

The proposed potential significance and applications of the research are presented in more detail in Chapter 3 (Discussion). This Conceptual Map, functioning as an overview of the research, concludes with a short summary of what may be considered the significance of the findings:

Theoretical

1. The generation of a conceptual model for the experience of directional motion in music — specifically, the conceptual representation of music as a “phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field”.
2. An incorporation of the theoretical concepts of existing musical theorists into this model, including concepts from Zuckerkandl, Cage, Clayton, Kramer, and Fraser.
3. Demonstration of application of the model to the analysis of directional musical movement in three contrasting compositions — the major artefact *Oscillation 1*, a 12-bar blues progression, and Cage’s *4'33"*.
4. Based upon the theoretical work of Fraser, an introduction to the application of *alternative temporalities* (i.e., experiences of time) to expand the possibilities for musical performance, particularly improvisation.
5. The generation of contrasting geometric models of global form, based upon Western and Eastern concepts of linear and cyclic time, as *helix* and *vortex*.

Exegetic

6. Analysis of the major artefact *Oscillation 1* in terms of RP 1A (the conceptual model for the experience of directional motion) and of RP 3A (the geometric model of global form as *helix*).
7. Demonstration of the application of RP 3B (the geometric model of global form as *vortex*) to musical improvisation — as demonstrated in the minor artefact *Beginner's Mind*.

Artefact – Instrument design

8. Instrument modification to produce the 8-string regular interval guitar designed for Western harmonic improvisation.
9. Instrument modification to produce the fretless octave guitar designed for Eastern melodic improvisation.

10. Extension of tabla concepts of Dr Sam Evans in the composition and recording of a musical work for tabla in 12 keys.

Artefact – composition

11. Introduction and demonstration of the concept of equi-harmonic (i.e., harmonically equally distributed) composition.

Fine arts

12. A proposed definition for the concept of minimalism, as it applies to music and, more broadly, in fine-arts contexts generally, based upon the concept of the *equal compositional significance of form and void*.

CHAPTER 1: INTRODUCTION

Music ... has important implications for metaphysical philosophy: It insists upon a broad conception of the external world, and the examples it provides of motion and time and space become as significant as those of science.

Edward Lippman⁴⁹

The highest aim of our music is to reveal the essence of the universe it reflects.

Ravi Shankar⁵⁰

Although the mind is void ... all things it ... contains.

Tilopa⁵¹

Approach to the Research Questions

Each answer remains in force as an answer only as long as it is rooted in questioning.⁵²

In acknowledging the non-linearity of his seminal work, *The Time of Music*, postmodernist composer and music theorist Jonathan Kramer acknowledges that the submission of evidence for his hypotheses does not follow the form of a strict and logical argument. Instead, Kramer describes it as follows:

My aims are not to prove hypotheses ... Rather, I want to challenge readers with suggestions about new ways to listen to many kinds of music, new and old. I am more interested in asking the right questions than finding the right answers.⁵³

Kramer goes on to say:

Questions can open up discussions, avenues of thought, and modes of perception: answers tend to close off such things.

In this dissertation I take a similar approach. The purpose of the research is not to provide answers but to explore wholeheartedly the questions themselves.

⁴⁹ Edward A. Lippman, "Reviewed Work: 'Sound and Symbol: Music and the External World' by Victor Zuckerkandl, Willard R. Trask," *The Musical Quarterly* 43, no. 1 (1957), 122–28. <http://www.jstor.org/stable/740391>.

⁵⁰ Ravi Shankar, *My Music, My Life* (New Delhi: Sangam Books, 1969), 17.

⁵¹ Tilopa (c. AD 1000), *The Song of Mahamudra*, trans. Garma C.C. Chang, Tibetan Buddhist Encyclopaedia, [http://tibetanbuddhistencyclopedia.com/en/index.php/The_Song_of_Mahamudra_by_Tilopa_\(translated_by_Garma_C._Chang\)](http://tibetanbuddhistencyclopedia.com/en/index.php/The_Song_of_Mahamudra_by_Tilopa_(translated_by_Garma_C._Chang))

⁵² Martin Heidegger, "The Origin of the Work of Art," in *Art and Objecthood: Essays and Reviews*, Michael Fried, ed. (Chicago: University of Chicago Press, 1998); Martin Heidegger, *The Origins of the Work of Art in Poetry, Language, Thought*, trans. Albert Hofstadter (New York: Harper Collins, 1971), 71.

⁵³ Jonathan Kramer, *The Time of Music — New Meanings, New Temporalities, New Listening Strategies* (New York: Schirmer Books, 1988), viii.

Section A: Linearity and Cyclicity in Compositional Form and Process

Jonathan Kramer describes *The Time of Music* as being as much composed as it is written. He extrapolates:

The Time of Music has but one main thesis: that time in music can be many things. Such a nebulous hypothesis is not well served by a step-by-step exposition. Thus, this book is as non-linear as much of the music it describes.⁵⁴

Linearity and cyclicity in the dissertation's exposition of concepts

Whereas *The Time of Music* is a comprehensive compilation of ideas from a revolutionary leader in his field, the current research arises in the context of a contemporary PhD dissertation. For this reason, the dissertation is written within a formal academic research structure. Nonetheless, within such a structure, it also utilises an approach to the exposition of its concepts that, as described by Kramer in *The Time of Music*, is like music composition — at times linear and at times cyclic.

Regarding *linear* processes, I utilise this approach to demonstrate in a summarised way where an idea is going and, importantly, where it will end. Linear processes are thus used to provide conciseness, closure, and direction.⁵⁵

Conversely to this, a *cyclic* process of exposition of content is used in other sections of the dissertation. This approach permits the immediate presentation of broad summarising propositions regarding the dissertation's main concepts and themes. Later, these concepts are *iteratively revisited and examined* in detail or in a broader context. Cyclic processes of exposition are used to further examine concepts both in greater *breadth* and greater *depth*.⁵⁶

Linearity and cyclicity in standard academic and narrative curve form

As previously noted, the structure of this dissertation conforms to a standard academic framework. It comprises the standard sections of *Introduction*, *Methodology*, *Discussion*, and *Conclusion*. Primarily this is a linear form. In Clayton's terminology, in referencing the linearity within the global form of Western music, the dissertation has *moved from A to B* in a linear manner.⁵⁷ Such a form may be broadly considered AB form, although Chapter 4 (Conclusion) also re-addresses the concepts with which it started.

⁵⁴ Kramer, *The Time of Music*, viii.

⁵⁵ An example of where this linear process of exposition is used is in *From wave theory to phenomenological mechanics — 10 steps*, at the end of Section B: Thought Experiment. It demonstrates unambiguously the ten-step incremental process by which Zuckerkandl's (1956) wave theory is developed, extended, and broadened to arrive at the primary RPs, and, in this process, to arrive at the concept of phenomenological mechanics as it applies to music.

⁵⁶ An example of this is the concept of *linearity-versus-cyclicity* of organisation itself — a concept that has relevance throughout the dissertation in its theoretical and creative applications.

Regarding use of the cyclic process to provide *breadth*, the concept of linearity-versus-cyclicity reappears throughout the dissertation as a *recurring theme*. Thus, somewhat like a musical theme, it undergoes progressive development.

Regarding use of the cyclic process to provide *depth*, such depth is provided when a concept is *drilled down into* to reveal its more minute details. By discussing such concepts multiple times in increasing degrees of complexity, they can be initially presented at the macro level and later further examined at the micro level, either within the main text or in the appendices. An example of a cyclic process used to provide depth in this way is the examination of the experience of metre as a double phenomenological wave of both memory and anticipation, as introduced in the main text and described in more detail in Appendix 6.

⁵⁷ Clayton, *Time in Indian Music*, 19.

Viewing the dissertation's structure from this perspective, one could say that — within its academic form — the dissertation also has a cyclic or *ternary* form. Such a form may be broadly represented as ABA form.

The dissertation arrives, however, not at a point of *re-statement* of its opening question (“What is the nature of the experience of directional motion in music?”) but at a point of *development* of its original question, and then, in re-referencing this original question, a point of *resolution*. Thus, the global form of the dissertation is ultimately not a repetitive process but a *transformative* one.

Represented symbolically, A has moved not *backwards* to A but rather *onwards* to A'.

Standard academic form as narrative curve form

The Western European intellectual and cultural tradition has seemingly found most fundamental a basic structural organization of a work of time art, what might be called a “narrative curve” ... a stylized reflection of how the tradition views life itself.⁵⁸

Within its formal academic structure, the form of the dissertation from Introduction to Conclusion may thus be summarised as ABA', where A' is the transformation of A from an ordinary state (the beginning state of *unknowing*) to A', the transformed state — a state of *knowing*.

In the terminology of literary theory, the global form of the dissertation is more precisely expressed as a *narrative curve*.⁵⁹

Global musical forms — Western linear and Eastern cyclic — helix and vortex

Referencing Kramer's concept that a musical composition may be *written* — or the converse proposition that a written dissertation may be *composed* — the global nature of the dissertation's academic form demonstrates that the concept inherent within its structure is both linear and cyclic movement.

The concept of global linear and cyclic form is not only the *beginning* concept of the dissertation but also its *concluding* concepts — especially in the presentation of the final RPs (3A and 3B), which show the contrasting representations of the global musical form as *helix* and *vortex*. In this representation, *helix* and *vortex* may be characterised as contrasting geometrical representations of Western linear and Eastern cyclic time as such inform the organisational structure of their respective musical forms.

Linearity and cyclicity in musical development processes

The dissertation's concluding concepts of Western and Eastern musical forms as helix and vortex also present several other corresponding and contrasting compositional processes. In the context of the dissertation being an examination of the experience of directional movement, important among these proposed differences are what appears to be contrasting processes of musical development. Thus, the dissertation presents the concepts of contrasting Western and Eastern processes of musical development as *vectorial development* and (as described by Clayton) *development by intensification*, respectively.⁶⁰

⁵⁸ Barney Childs, “Time and Music: A Composer's View,” *Perspectives of New Music* 15, no. 2 (1993), 19–35.

⁵⁹ Childs, “Time and Music,” 19–35.

⁶⁰ Clayton has coined the term *intensification* — described as a “large-scale process ... proceeding by a process of expansion”. Clayton, *Time in Indian Music*, 25.

These contrasting processes of Western and Eastern processes of musical development, I propose, correspond with contrasting Western linear and Eastern cyclic cultural representations of time. More fundamentally, they reflect Western dualistic and Eastern monistic paradigmatic representations of the relationship between form and void itself.

These concepts are examined in progressive detail throughout this chapter.

Linearity and cyclicity of time as alternative phenomenological mechanics

Considered in this way, Western linear and Eastern cyclic representations of time arguably function as different *system conditions* within which Western and Eastern musical forms have developed.

In the terminology of the dissertation, the geometrical shape of helix represents musical development as it may be imagined within Western linear time, and the geometrical shape of the vortex represents musical development as it may be imagined within Eastern cyclic time.

Thus, the representation of Western and Eastern musical forms as helix and vortex achieves these three things:

- First, from the perspective of musical *analysis*, it demonstrates the usefulness of the concept of phenomenological mechanics to music.⁶¹ This concept is further examined in this chapter under *Musical mechanics — Zuckermandl*.
- Second, from the perspective of *ethnomusicological* analysis, it demonstrates that concepts of how motion is experienced in Western and Eastern musical forms may be characterised in terms of contrasting cultural representations of time. This concept is further examined in this chapter under *Musical interculturalities — Clayton*.
- Third, from the perspective of musical performance, and in particular improvisation, the representation of Western and Eastern musical forms as helix and vortex provides concise, graphical representations of two contrasting musical forms. Such alternative representations of musical form may be used as conceptual models for performing improvised music within particular temporal frameworks. In this way, the geometric models of musical form as helix and vortex may be used as a tool to analyse or guide the performance of improvised music.⁶² Representing the extremes of horizontal and vertical *phenomenological time* in this way also permits music to be deliberately played (and analysed) within the reference points of these extremities. This concept is further examined in this chapter under *Musical interdisciplinarity — Fraser* and again in Chapters 3 and 4.

Linearity and cyclicity in musical time and motion

The Western and Eastern globally linear and globally cyclic musical forms of helix and vortex, and the Western and Eastern contrasting musical development processes of *vectorial development* and *intensification*, are consistent with the Western and Eastern representation of time as linear and cyclic, respectively.

Expressed in the terminology of the dissertation, the contrasting global musical forms and contrasting musical development processes that characterise Western and Eastern music may be considered as the

⁶¹ Time is a significant concept in physics, phenomenology, and music — as evidenced by many seminal texts on time written from the perspectives of each of these disciplines. For example, *A Brief History of Time* (Stephen Hawking), *Being and Time* (Martin Heidegger), and *The Time of Music* (Jonathan Kramer), respectively.

⁶² I provide this analysis, in relation to the artefacts, in Chapter 3.

musical manifestations of alternative phenomenologies — the phenomenology of *time as a line* versus the phenomenology of *time as a cycle*.

The cultural representation of *time as a line* as embodied in the Western concept of the *arrow of time* — and the significance of such a cultural representation for the experience of musical motion — is discussed later in the dissertation.

Linearity and cyclicity as concurrent themes of theory and artefact

The concepts of linear and cyclic musical form, linear and cyclic developmental processes, and linear and cyclic temporalities (i.e., experiences of time) are the fundamental preliminary themes of the research. This contrast of linear and cyclic forms, processes, and experiences is considered in the theoretical section of the dissertation where it examines the experience of directional motion in music from an intercultural perspective.

Connecting the theoretical and the creative components of the dissertation, the concept of linearity-versus-cyclicity is also metaphorically represented in the compositional processes of the major artefact, *Oscillation 1*. Specifically, this is represented in the contrasting linear and cyclic global forms of the composition's tabla and guitar parts, respectively, and the alternating linear and cyclic modulation that defines the composition's harmonic movement. The two diagrams in Figure 2 graphically summarise these linear and cyclic relationships at the level of global form (left figure) and at the level of harmonic movement (right figure — the equi-harmonic cycle). The method by which these abstract concepts are operationalised to compositional processes is described in detail in section 8 of Appendix 5.

Section B: Thought Experiment

In addition to the common and unifying concept of *linearity versus cyclicity*, which spans all three of the dissertation's main theoretical areas of research, in this section I introduce several other fundamental concepts and themes that are *specific* to each of these research areas.

In the primary RPs arising from *Research Area 1: The Experience of Music as Phenomenological Mechanics*, these concepts and themes derive essentially from the discipline of *mechanics*. They include the concept of polarity, the concept of dualistic and monistic perspectives of space and time, and the consideration of metre as phenomenological periodic motion.

Such concepts are relevant to the experience of directional motion in music in several ways. Firstly, they permit the characterisation of the experience of musical motion as a *phenomenological vector* moving between void and form (or home and away) states. This is one of the fundamental concepts of RP 1A, the proposed conceptual representation of the experience of directional musical motion.

Secondly, considered in this way, metre and (and other musical parameters that share the same asymmetrical or polar phenomenological representation⁶³) may be considered as conceptually represented as phenomenologically determined *periodic motion* — a repeating pattern of transitions between phenomenologically determined alternate states of form and void. Rather than a repeating movement between high and low *physical* energy states — the periodic movement of a pendulum, in the case of metre (and other musical parameters) — this repeating periodic motion is an oscillation

⁶³ The concept of *polarity* of phenomenological representation and the related concept of the *polar couplet cell* as the fundamental phenomenological structure within which the experience of movement may be conceptually represented are further discussed in this section.

between high and low *phenomenological energy* states, the low state being the home or void state (e.g., beat 1 in 2/4 metre) and the high state being the *away* or *form* state (beat 2 in 2/4 metre).⁶⁴

Thirdly, such concepts derived from mechanics include the representation of metre (and other musical parameters) from both particle and wave perspectives. Although a comprehensive discussion of this concept is beyond the scope of the dissertation, it is introduced and briefly considered in Appendix 4.

In the secondary RPs arising from *Research Area 2: Composition as Intercultural Metaphor*, the concepts and themes principally derive from phenomenological considerations of the experience of *music itself*. This section includes an examination of what constitutes musical form, both in traditional and more modern musical contexts. The four examples of musical form and void considered are: silence and sound, dominance and non-dominance, steady state and change, and expectation fulfilment and expectation non-fulfilment (i.e., surprise).

In the second part of the analysis, *Intercultural phenomenologies — Western and Eastern*, the experience of directional motion in music is considered from the perspective of contrasting Western and Eastern epistemologies — that is, alternative Western and Eastern “ways of knowing”.

In the tertiary RPs, and *Research Area 3: Application of Theory to Musical Performance and Analysis*, these concepts and themes are considered as they apply to the performance and analysis of music. From this process, incorporating the concept of alternative Western and Eastern temporalities as *linear*, *horizontal*, and *teleological* versus *cyclic*, *vertical*, and *non-teleological*, the research arrives at its concluding concepts of alternative geometrical models of Western and Eastern global musical form as *helix* and *vortex*.

The application of the research to music performance is demonstrated in the two artefacts:

- *Oscillation 1*, a composition for the 8-string regular interval guitar and 12-drum tabla set, and
- *Beginner’s Mind*, a 6-minute improvisation for the 6-string fretless guitar.

Thus, the next section begins with a presentation of the main themes and concepts arising from the *primary* RPs and Research Area 1. This is followed by an analysis of the main themes and concepts arising from the *secondary* RPs and Research Area 2. The section then concludes with the main themes and concepts arising from the *tertiary* RPs and Research Area 3.

In Section C, I present the dissertation’s literature review, which examines the contributing concepts of *mechanics*, *phenomenologies*, *interculturalities*, *linear and non-linear musical processing*, and *interdisciplinarity* to phenomenological mechanics, as these concepts are represented in the literature by principal theorists Zuckerkandl, Cage, Clayton, Kramer, and Fraser, respectively.

Research Area 1: Music as Phenomenological Mechanics

Primary RP 1A

The conceptual model for the experience of directional musical motion, described in RP 1A and its corollaries 1B and 1C, proposes that the experience of directional motion is conceptually representable as a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field*.

⁶⁴ The concept of phenomenological energy and other phenomenological mechanics parameters are discussed in detail later in this chapter.

Such a conceptual model contains the following fundamental contributing concepts:

- The concept of phenomenological determination.
- The concept of representation of musical form in terms of the phenomenological polarity of form and void, and the representation of the experience of directional musical motion in terms of such polarity.
- The concept of the *polar couplet cell* as the conceptual separation and division of a monistic concept such that it is represented in a dualistic way, permitting the concept of movement, as it is represented within a Western dualistic spatiotemporal framework. An example is the concept of *away-ness*, represented in terms of the dualistic concepts of *home* and *away*.
- The concept that the polar elements of such a couplet cell are representable as a couplet pair, such that one element of the pair is represented as *void* and the other as *form*. A polar couplet cell is thus representable by its common structure as a form-void couplet.
- The concept that the experience of phenomenological *movement* is representable as a transition between such polar states, one functioning as *void* and the other as *form*.
- The concept that wherever musical elements or sections of music are phenomenologically representable as a polarized couplet cell, there exists the capacity for the experience of a (phenomenologically determined) form-void vector and thus the experience of directional musical movement.
- The concept that *polar couplet cell structures*, experienced as phenomenologically determined *form-void vectors*, are evident within multiple musical parameters, including those of metre, melody, harmony, modulation, and global form, and thus it is possible to experience directional musical motion within such musical parameters.
- The concept that such *form-void vectors* may be further organised hierarchically within any of these parameters or all of them. An example of this within metre is compound metre — experienceable as a form-void vector nested within another, larger form-void vector.
- The concept that such phenomenological form-void vectors are *additive* — that is, they may be experienced as a *summation* both of magnitude and direction analogous to vector addition, such summation constituting a *phenomenological vector field*.
- The concept (Corollary 1B) that when the *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field* at any point in a composition is experienced as moving from *void* to *form*, the experience of music is one of musical *development*. Conversely, when the overall vector field is experienced as moving from *form* to *void*, the experience is one of musical *resolution*.
- The concept that *musical development* and *musical resolution* are characterizable, in the terminology of phenomenological mechanics, analogously with the first and second laws of thermodynamics — in simple terms, the law of *conservation of energy* (and in accordance with it, the spontaneous movement from high to low potential *energy* states) and the law of *order and chaos* (in accordance with it, the spontaneous movement from low to high *entropy* or disorder states), respectively.
- Thus, in terms of *energy* transformation, musical *development* is characterizable as the experience of *endothermic phenomenological energy transformation* — that is,

transformation *from the energy of motion to the energy of position* (and in accordance with it, the non-spontaneous movement from low to high potential *energy* states).

- Correspondingly, in terms of *entropy* (i.e., disorder), musical *development* is characterizable as the experience of *negative* phenomenological *entropy* transformation — that is, transformation of a musical system that moves *from chaos towards order*.⁶⁵
- Conversely, the experience of musical resolution is characterizable as the experience of exothermic phenomenological energy transformation — that is, transformation from the energy of position to the energy of motion — and positive phenomenological entropy transformation (i.e., movement in the direction from order to chaos).

These concepts are further examined in the dedicated sections that follow.

Phenomenological determination

The universe starts to look more like a great thought than a great machine.⁶⁶

Phenomenological determination, as the term is used in the dissertation, informs the experience of directional musical motion in two separate ways.

- Firstly, the experience of directional musical motion is directly *experienced* at the phenomenological level — as is all experience. The experience of directional musical motion is thus phenomenologically determined — *because all experience* is ultimately phenomenological in nature. This interpretation is not, however, the interpretation intended by the inclusion of phenomenological determination as a contributing proposition of the conceptual model proposed. Rather, it is the second interpretation, described next.
- Secondly, the conceptual framework within which movement is represented is founded in the *attribution of personal, subjective, and individual meanings*, which are themselves phenomenologically determined. Therefore, the conceptual organisation and *representation* of directional musical motion is also phenomenologically determined because of the personal, subjective, and individual meanings of the *signifiers* (colloquially, the attributions of states — such as the attribution of home and away states respectively to beats 1 and 2 of the 2/4 measure) that define the conceptual map against which the experience of directional movement is referenced.

In considering the former, the “organised sound” of the music, acting as a trigger is objective, but the experience of this “trigger” is ultimately subjective. The mechanism through which we experience

⁶⁵ In the dissertation, I use a nominal convention where the positive direction of phenomenological energy and entropy transformation is the spontaneous direction of transformation of a system for which energy input is not required. Positive energy and positive entropy movements are analogous to downhill movement. They move the system from a higher energy state (specifically, higher *potential* energy state — i.e., higher *energy of position*) to a lower (potential) energy state, and from order to chaos. Positive phenomenological energy and entropy movement thus correspond with the musical concept of *resolution*.

Conversely, the *negative* direction of phenomenological energy and entropy transformation is the *non-spontaneous* direction of transformation of a system for which *energy input is required*.

Negative energy and entropy movements are analogous to *uphill* movement. They move the system from a *lower* (potential) *energy* to a *higher* (potential) *energy* state and *from chaos to order*. Negative energy and entropy movements thus correspond to the musical concept of *development*.

In summary, *negative* and *positive* phenomenological energy and phenomenological entropy movements correspond, respectively, to the musical concepts of *development* and *resolution*.

⁶⁶ Quote attributed to Sir James Jeans in Rosenblum and Kuttner, *Quantum Enigma*, 50.

movement is thus a phenomenological one. This aligns with Zuckerkandl's position that the meaning within music lies not externally but internally — within the "pointer"⁶⁷ (i.e., the experiencer).

Regarding the latter, a melodic call-and-response figure functions as a call and response because it is phenomenologically experienced in reference to attributions of one phrase functioning as the home state and the other functioning as the away state. The *meanings* of such attributions are, however, personal, subjective, and individual. The void and form concepts of home and away, *as they are experienced*, are thus embedded in the music listener's personal, subjective, and individual framework and representations.

Referencing the example of metre, if I experience beat 1 as home or void, I have phenomenologically assigned this meaning. Such meanings are typically culturally shared but nonetheless are personal, subjective, and individual and thus ultimately phenomenologically determined.

Critical to RP 1A is the tempering caveat that the experience of directional musical motion is *experienced* phenomenologically and *conceptually represented* phenomenologically in terms of the personal, subjective, and individual framework to which such concepts as home (void) and form (away) are attributed.⁶⁸

Phenomenological vectors

Polar couplet cell

In representing the concepts on which the model described in RP 1A is founded, I introduce the concept of the *polar couplet cell*. As noted above, the polar couplet cell separates and divides a monistic concept so that it is represented in a dualistic way (two contrasting states). Such a conceptual structure permits the possibility for phenomenological representation of a change from one state to the other — a transformation that is representable as *movement*. The example provided is the concept of *away-ness* represented as a polarized couplet cell whose elements are poles (opposites): *home* and *away*. Within such a structure, directional movement is conceptually possible in one of two ways — either *from home to away* or in the opposite direction, *from away to home*.

The capacity for representation of a musical event or experience in terms of a *polar cell couplet* is tendered as a necessary condition for the experience of directional musical motion, at least as such movement is represented from the Western perspective.

Without this fundamental asymmetry of structural representation, the concept of movement becomes unrepresentable — conceptually, there is nowhere for the movement to go *to* — which is different from the place or state in which it already *is*. Such phenomenological representations of polarity, therefore, permit the very concept of movement itself — a change of state occurring between two non-equivalent places or states in time or space or both.

The concept of *movement in space* thus invokes the necessary polar couplet cell of *here* and its opposite *there*. Similarly, the concept of *movement in time* invokes the polar couplet cell of *now* and *then*.

⁶⁷ Zuckerkandl, *Sound and Symbol*, quoted in Dahn, "A Summary and Reflection on Victor Zuckerkandl's *Sound and Symbol*."

⁶⁸ Appendix 3 presents this concept by allegory. The allegory makes the case that on a train moving in one direction, the concept of whether it is moving forwards or backwards is referenced against one's individual attributions of home and away. Such concepts are phenomenologically represented within the traveller's own individual phenomenological representation and framework. So too is it for the experience of directional motion in music.

Such characteristically Western representations of dualistic time — as characterised by the concept of the *arrow of time* — accommodate in their meaning, the capacity for a *then* point in time as distinct from a *now* point in time. In this way, they permit the concept of *linear* movement in time — from point A to point B.⁶⁹

Western time — as characterised by the arrow of time — is thus representable as a polar couplet cell. It contains within its conceptual structure the capacity for directional movement — from now to then. This contrasts with Eastern monistic time, where the concept of “then” is *already contained* within the concept of “now” — thus, there can be no linear movement from one to the other because each of these states is, according to Eastern monistic time, already contained within the other.⁷⁰ Accordingly, Eastern time is cyclic, periodically revealing contrasting aspects of what is essentially a monistic phenomenon.

Further, the linear and cyclic global forms of Western and Eastern *musical forms* are, I propose, comparable with the linearity and cyclicity of the Western and Eastern cultural representations of *time*. This concept and its implications for the experiences of directional musical movement in Western and Eastern musical forms are explored later in this section.

Polar couplet cell — form and void correlates

Consistent with the concept introduced in the previous section, the elements of such polar couplet cells have a void correlate and a form correlate — thus, they are presentable as a form-void couplet cell and have the capacity to be experienced vectorially as a *form-void vector*.⁷¹

In the above examples, *here* and *there* are respectively the void and form correlates of the polarized couplet cell of here-and-there — a dualistic representation of here-there-ness. Similarly, *now* and *then* are respectively the void and form correlates of the polar couplet cell of now-and-then — a dualistic representation of *now-then-ness*.

The concept of *here-there-ness* is the concept of *space*. Similarly, the concept of *now-then-ness* is the concept of *time*. Space and time may thus be represented and phenomenologically experienced in either a dualistic or monistic way depending on the way one experiences the polar cell couplet — either *monistically* (i.e., as a *cell*), or *dualistically* (i.e., in terms of its opposite elements or *poles*).

Physical and phenomenological movement

When home and away (as representations of void and form) are *physical* places, the concept of *physical* directional movement is possible. This is because such a representation permits the possibility for linear directional movement in one of two possible directions — one may either move nominally *forwards* (from home to away) or nominally *backwards* (from away back to home).

In his (1956) wave theory of metre, Zuckerkandl implies such bi-directional vectoriality of metre:

To be able to come back, one must first have gone away; now we also understand why we count one, “two” and not one-one.

Here “two” does not mean simply “beat number 2”, but also “away from”.⁷²

⁶⁹ The concept of the arrow of time is discussed further in *Research Area 2: Composition as Intercultural Metaphor*, and in the literature review under *Musical interculturalities — Clayton*.

⁷⁰ The Western and Eastern cultural representations of time as, respectively, switch and taijitu, is considered further in the chapter.

⁷¹ The concept of form-void vector is the subject of the following section.

⁷² Zuckerkandl, *Sound and Symbol*, 168, quoted in Clayton, *Time in Indian Music*, 20.

Any representation of a system such that it comprises two non-equal points permits the possibility of directional movement. Thus, for the possibility of directional movement, space (or time) must be representable *asymmetrically*, permitting as a minimum the concept of forwards and backwards directional movement within the space — or time defined by two such non-equal points.

The experience of directional motion in music is not, however, an experience of *physical* movement. The journey is not a physical journey. It is a *conceptual* journey. It is also a *phenomenological* journey. Thus, its *signposts* (i.e., reference points) for concepts such as *home* and *away* are personal, subjective, and individual.

The movements of *away-ward* and *homewards* have meaning only when anchored in a phenomenological framework within which home and away have distinct attributed meanings.⁷³

There are many examples of this concept within music. Within metre, if beat 1 of 2/4 metre represents *home*, then the movement from beat 1 to beat 2 may be considered *forward* movement. Melodically, if a succession of notes is experienced as being within a tonal centre, then an individual note can function as a resting note or a passing note. Harmonically, if chords are experienced as being within a key, then an individual chord (the tonic) can be phenomenologically experienced as *home*, and another chord (the dominant) can be experienced as *away*.⁷⁴

In each of these examples — beat 1 and beat 2, resting note and passing note, and tonic and dominant — musical elements are phenomenologically represented as a polar cell couplet, thus allowing the experience of directional motion.

In its conceptual organisation, such a phenomenological representation can accommodate the simplest of phenomenologically determined directional musical movements — that of *linear forwards movement* and *linear backwards movement*. Otherwise expressed, such linear forwards and backwards motion is the phenomenological experience of, in Zuckerkandl's terms “going away” and “coming back”. Whereas Zuckerkandl relates this concept to metre, in this dissertation I extend the concept, arguing that it applies throughout music wherever musical elements can be represented in the form of a polar cell couplet.

⁷³ This concept is demonstrated in Appendix 3.

⁷⁴ For this example, only two chords are described — the tonic and the dominant. As described in the section “From wave theory to phenomenological mechanics — 10 steps”, this does not limit a musical representation to two elements. Rather, the conceptual representation of musical systems with more than two elements is typically such that one element functions as home and all others function as “away”. For example, ¾ metre is conceptually representable as a polar couplet (rather than triplet) cell because it still conforms to the form and void (i.e., home and away) structure. In such a representation, home is attributed to beat 1 and away is attributed to “all other beats”. The same applies to melody, where the tonic functions as home and all other notes to varying degrees function as “away”. The same also applies to harmonic movement where the tonic functions as home and all other chords typically function as “away”.

The practical application of this concept is that music becomes more interesting — from a directionality perspective at least — when the “away-ness” of non-home states is a variable one. This principle applies to metre, melody, and harmony. In metre for example, in 4/4 time, beat 4 may typically be experienced as having more “away-ness” than beat 3. In melody, the leading note may typically be experienced as having more “away-ness” than the submediant — not just in distance but in tension. Harmonically, the dominant may typically be experienced as having more “away-ness” than the relative minor.

The musical specifics of such concepts are, it is proposed, highly relevant to the experience of directional motion in music. Further discussion of this is, however, beyond the scope of the current dissertation.

From a phenomenological mechanics perspective, the musical concept of “away-ness” as it relates to musical “tension” accords with the mechanics concept of “distance” as it relates to “gravity”. Such concepts as they relate respectively to metre, melody, and harmony are discussed in detail in such texts as *Sound and Symbol* (Zuckerkandl), *Harmony in Western Music* (Goldman), and *The Lydian Chromatic Concept of Tonal Organisation* (Russell). Russell's concept of “tonal gravity” — both in its terminology and its functional meaning — is entirely consistent with the broader concept of phenomenological mechanics as it applies to music.

Furthermore, at the *local* level of the simple parameter (e.g., the 2/4 measure), the nominally forwards void-to-form movement may be considered *development*, and the nominally backwards form-to-void movement may be considered *resolution*. I present the proposition that such *local* developments and resolutions, *hierarchically organised across multiple parameters*, amount to a phenomenologically determined *vector field*, whose net value is either nominally forward moving from void to form or nominally backwards moving from form to void.

The real-time experience of music *at the compositional level* being in a state of either *development* or *resolution* thus accords with the summated polarity of its (phenomenologically determined) form-void vector field having a net forward or net backward direction.

The nature of polarity

Polarity, as used in the dissertation, may be defined as the relationship between two elements, A and B, within a common system that has the following properties:

(i) Asymmetry:	A is not B (and conversely, B is not A)
(ii) Interdependency of meaning	A and B have interdependent meaning. In the absence of B, A has no meaning (and vice versa)
(iii) Opposition of meaning	The meaning of A = not B (and conversely)
(iv) Combined frame entirety ⁷⁵	The entirety of the system less (A + B) = zero.

Dualistic and monistic perspectives of the polar couplet cell

Our interest is not in the dividing points [the beats], but in what goes on between them ...We discover that it [metre] is not in the demarcating beats but where at first we did not look at all, where nothing happens, where time simply passes — it is in the apparent vacuum between the demarcating beats that musical meter is born.⁷⁶

Polar couplet cell is thus the term I use in the dissertation to describe the set of paired opposites which, using Zuckerkandl's term, *demarcate*⁷⁷ a phenomenologically represented concept in the manner that the sounds of beat 1 and beat 2 *demarcate* the 2/4 measure.

As previously noted, inherent within the meaning of the polar couplet cell is the representation of a *fundamentally monistic concept represented in dualistic terms*. Conceptually, the phenomenological experience of *away-ness*, for example, is described relative to its poles of *home* and *away*.

Day and night

The concept of day and night is a suitable analogy for presenting dualistic and monistic perspectives of natural phenomena, as an analogy for dualistic and monistic perspectives of metre. In such a representation, the “system” of day and night conforms to a polar couplet cell structure. The concepts *day* and *night* are polar because they meet the previously described criteria for polarity.⁷⁸

⁷⁵ The best visual representation I know of for the concept of *combined frame entirety* is that of the hourglass. When sand falls through an hourglass, each grain of sand is either in the upper chamber or the lower chamber. It is never in neither and never in both. Combined frame entirety simply means that all concepts within the system (or all grains of sand within the hourglass) are contained in meaning (or in the case of the hourglass, literally) within one concept (or chamber) or the other.

⁷⁶ Zuckerkandl, *Sound and Symbol*, 169.

⁷⁷ Zuckerkandl, *Sound and Symbol*, 169.

⁷⁸ The criteria for polarity as it applies to the concepts of day and night are as follows:

(i) Asymmetry: Day $\neq$ night (and conversely the night is not equal to the day)

In a *dualistic* representation of the day and night phenomenon, the system is represented as two demarcation points — a “dawn” point (the point within a 24-hour duration where the night “switches” to the day) and a “dusk” point (corresponding point where the night “switches” to the day).⁷⁹

In a *monistic* representation of the day and night phenomenon, the system is represented in continuous transition between two opposing concepts, each concept containing its opposite. However, the concept of night and day is, by its cosmological origin, a single continuous activity — the continuous spinning earth and its shadow.

Regardless of its *physical activity* (continuous revolution) being a monistic one, its Western epistemology, culturally defined, is typically *dualistic* — the way one *knows* day and night in ordinary conversation is not as a monistic phenomenon but rather as a pair of opposites. Our cultural terminology thus reduces the perpetual continuity of the process to two “demarcating” extremes — the extreme of pure day and the extreme of pure night.

The polar couplet cell experienced in its monistic sense is the experience of cyclicity. The polar cell couplet experienced in its dualistic sense is the experience of linearity. Within the latter of these (i.e., the linear dualistic representation of the polar couplet cell) is, I propose, the capacity for the experience of directional musical motion as represented in the Western paradigm.

When the day-night phenomenon is represented linearly and dualistically (i.e., in terms of its “demarcating” extremes), two directional possibilities arise — nominally *forwards* movement in the direction of “dawn” to “dusk” and nominally *backwards* movement in the direction of “dusk” to “dawn”. Represented linearly, the possibility for directional motion arises (i.e., forwards directional motion or backwards directional motion). Such forwards and backwards directional possibilities are unique to the *linear dualistic* representation of day and night — they are not possible within the monistic cyclic representation, which, in its cyclicity, moves perpetually in a single direction.

As a graphic demonstration of this concept, one may imagine the appearance of a pendulum moving in a circle. Viewed from above (the *cyclic perspective*), the pendulum appears to be moving continuously in the one cyclic direction. However, viewed from the side (the *linear perspective*), it appears to be moving linearly — that is, *backwards and forwards* between two points.

Thus, contained within the nature of linearity is the capacity for directional movement — as forwards or backwards movement.

Phenomenological representation of the polar couplet cell

Whereas the pendulum is a physical object and the movement between its “demarcating” points is a physical movement, the research question of this dissertation is concerned with *phenomenological* directional motion — the experience of directional motion in music.

However, a central tenet within the concept of phenomenological mechanics is that mechanics, as it applies in the *physical* realm, may be applied to understand concepts as they are experienced within

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- (ii) Interdependency of meaning: The meanings of day and night are interdependent of one another. In the absence of night, day has no meaning (and vice versa)
 - (iii) Opposition of meaning: The *meaning of day* = the meaning of *not night* (and conversely)
 - (iv) Combined frame entirety: The entirety of the system less (day + night) = zero.

⁷⁹ The dualistic representation of day and night as a polar couplet cell (and form-void couplet cell) is exemplified not in the Western scientific understanding of the concept (which is monistic) but in the *language* that accompanies it. The phenomenon of day and night (excluding the concepts of dawn, dusk etc.), *as linguistically represented*, exists in one of two polar states — for practical purposes, at any time of the day, it is *either* day or night, and never both nor neither.

the *phenomenological* realm. As an example of such an application, the concept that the possibility of forwards and backwards movement is possible within a linear system applies equally to the experience of direction within a phenomenological system — as is music.

During this section of the dissertation, the following analogous concepts are thus addressed:

- the representation of metre as a *polar couplet cell*
- the representation of *vectorial development* within the linear dualistic representation of the couplet cell
- the representation of metre as *wave versus particle stream*.

Such concepts arise from the *mechanics* aspect of phenomenological mechanics.

Form-void representation within the polar couplet cell

Before exploring these concepts as they apply to metre, and subsequently other polar couplet cell representations of musical parameters, including melody, harmony, modulation, and global form, it is necessary to examine the *phenomenological* aspect of phenomenological mechanics as it applies to the polar couplet cell. This phenomenological examination involves examining the concept of the phenomenological representation of form and void.

The reason for this is that the representation of movements within the experience of music, which can be characterised in the terminology of a polar couplet cell, permits an analysis of the experience of directional motion in music in terms of a commonly described phenomenological vector.

That common phenomenological vector — conceptually, the fundamental unit of experience of directional motion in music — is the form-void vector. The following section thus introduces the concept of the *form-void vector*.

Form-void vector

The concept of the form-void vector derives from combining two contributing propositions. The first proposition is that inherent within the polarity of the phenomenological representation of musical elements as a polar cell couplet, there exists the capacity for the experience of vectoriality (directional movement). Such vectoriality is implicit in Zuckerkandl's statement in relation to the experience of 2/4 metre that "to be able to come back, one must first have gone away".⁸⁰

The second proposition is that in any phenomenologically represented polar couplet cell, one of the elements is experienceable as a *void* state, the other as a *form* state. (In the example of Zuckerkandl's description of metre, beat 1 is traditionally considered the home or void (or undeveloped) state, and beat 2 is considered the opposite — the away or form (or developed) state.

The reason this is possible is because the attributed meanings of the two poles of the cell are, by definition, relative to one another. Each pole represents the extremes on a continuum of a *single variable*, dualistically represented. Thus, the poles are comparable with one another such that one pole (as form) is represented as *phenomenologically displaced*, relative to the void pole. Arguably, such *displacement from the default state of musical void* is the broader meaning of the concept of *musical form*. The concept of musical *development* is then characterizable as the phenomenologically experienced *journey* from void to form.

⁸⁰ Zuckerkandl, *Sound and Symbol*, 168.

These concepts, particularly the musical concepts within which musical form and musical void are typically represented, are further discussed in Research Area 2. They are also further considered in the literature review, specifically in the section *Musical Phenomenologies — Cage*.

Form and void as universal poles

Simply expressed, the meaning of void is *that which is not*. Conversely the meaning of form is *that which is*. In accordance with the definition of polarity as used in the dissertation, form and void are thus polar concepts. Furthermore, arguably they are *universal* polar concepts — universal because all polar concepts may be represented in terms of having a *void correlate* and a *form correlate*, *relative to one another*.

Phenomenological vectoriality

The concept of the phenomenologically experienced polar couplet cell as the fundamental unit or phenomenological *molecule* within which is contained the concept of polarity is a central tenet of the primary RPs and the conceptual model for the representation of the experience of directional motion in music.

Thus, the polar couplet contains within its definitional structure the necessary *elements* for the representation of duality and the concept of directional movement. In this way, the polar couplet cell is a conceptual phenomenological structure from which it is possible for the experience of directional motion to arise.

Conceptually represented, the polar couplet cell's poles are translatable in their phenomenological representation to a form pole and a void pole, whose diametric oppositions define a dualistic conceptual space within which the phenomenological experience of directional motion becomes possible.

The concept of the *form-void vector* is proposed as a fundamental unit for the phenomenological experience of directional musical motion with this dualistically defined space.

The concept has utility in musicology because it follows that any musical structure that may be represented as a polar couplet cell can be expressed in terms of a polar form-void structure, with the potential to be experienced vectorially (i.e., as a unit of directional musical motion).

As is further described in the next main section, phenomenologically determined polar couplet cell structures would seem to be commonplace in Western musical organisation. It follows that the capacity for the experience of directional motion — as movements between the home and away (or void and form) poles of such a structure — can arise from any or all such musical structures.

Furthermore, the experience of such “form-void vectors” may be considered to “interact” not unlike the way waves on a pond “interact” with one another — some being additive (when in-phase), some being mutually cancelling (when out of phase). It is from this concept that RP 1A includes in its proposition the notion of the overall experience of movement within music as a “vector field” — conceptually, the sum of the form-void vectors from multiple musical parameters.

The musical parameters examined in this way within the scope of the dissertation are the parameters of metre, melody, harmony, modulation, and global form. Appendix 7 demonstrates this concept as it applies to the major artefact, *Oscillation 1*. Such a concept extends and generalises the vectoriality within metre throughout other musical parameters, alluded to in Zuckerkandl's statement in his (1956) wave theory of metre: “to be able to come back, one must have first gone away”.

As previously noted, I propose ten specific ways in which this concept from Zuckerkandl's wave theory of metre may be generalised to arrive at the concept of phenomenological mechanics — a novel concept that describes human behaviour in response to subjective phenomena with the comparable behaviour of physical bodies in the natural world.⁸¹ In moving to this position, it is now appropriate to consider the next concept of Research Area 1 — the broader concept of phenomenological mechanics, which provides a conceptual framework for characterising the experience of directional motion.

Phenomenological mechanics

Reprisal of concepts

In describing the concept of the experience of music in terms of phenomenological mechanics, I have thus far introduced the following related concepts:

1. The phenomenological process of dividing and separating musical parameters to redefine a monistic concept dualistically in terms of *poles*.
2. The phenomenological attribution of one pole as *void* and the other as *form*.
3. The concept of the *polar couplet cell* as the conceptual structural unit that contains the representation of a parameter in terms of such poles.
4. The concept of the polar couplet cell as a fundamental structure that contains within its dualistic structure the *capacity for the experience of directional musical motion*.
5. The concept of the phenomenological *form-void vector* as a representation of the experience of directional motion where one pole of the polar couplet cell is phenomenologically attributed as a void (or home) state, and the other pole, a form (or away) state.
6. The concept that musical form is characterizable as a phenomenological *displacement*⁸² from a void state to a form state.
7. The associated concept that musical *development* is the *phenomenological process* represented by such a displacement from void to form, and the converse proposition that *resolution* is the phenomenological process of vectorial *re-replacement* to a pre-existing void state. Further, such development and resolution may occur at the local level (e.g., within metre) or at the compositional level, as the sum of the phenomenological form-void vectors, constituting an aggregated phenomenological vector *field*.

Defining phenomenological mechanics

The following section furthers these *phenomenological mechanics* concepts to present concepts of mechanics as they inform the conceptualisation of phenomenologically experienced movement, commencing with the concept of a *phenomenological machine*.

The experience of music as a phenomenological machine — simple and complex

In mechanics, a machine may be defined in various ways. In the dissertation, I use two definitions — one for a **simple phenomenological machine** (or phenomenological machine *unit*) and the other for **complex phenomenological machine architecture**, where simple phenomenological machine *units*

⁸¹ These processes are summarised later in this chapter under *From wave theory to phenomenological mechanics – 10 steps*.

⁸² As previously noted, the term displacement is used here in its specific meaning as a vector (i.e., a movement that has both magnitude and direction).

are organised into a single coordinated machine structure to make a *complex phenomenological machine*.

The term *machine unit* is thus used for the concept of the irreducible cell or molecule within which a machine function is representable. Characterised in this way, the term *phenomenological machine unit* is synonymous to the cylinder of an engine, albeit at the phenomenological level. In essence, it contains the minimum necessary units to function as a machine.

Thus, a **machine unit**, considered in this way, is a device that transmits or modifies forces of motion,⁸³ and a **phenomenological machine unit** is a device (represented as a fundamental unit) that transmits or modifies not physical but *phenomenological* force or motion.⁸⁴

The propositions within RP 1A as they relate to simple phenomenological machine units and complex phenomenological machine architecture

The proposition of RP 1A is that the experience of music is representable as a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field*, which (as per RP 1C) is representable in terms of the novel concept of phenomenological mechanics.

Contained within this proposition is a description both of a *fundamental unit* — the simple phenomenological machine unit and of the *organisation* of this unit within the experience of music — that is, its phenomenological machine architecture.

RP 1A thus contains within it five propositions. Of these, the propositions of phenomenological determination and form-void vector representation are apparent in the definition of the phenomenological machine unit.

The remaining propositions — hierarchical organisation and multi-parameter representation — are apparent in the complex phenomenological machine — that is, in how these simple units are experienced *holistically* to produce the overall experience that a piece of music is moving nominally forwards (developing) or backwards (resolving).

The phenomenological machine unit is thus the conceptual representation of a phenomenological experience, arising from a polar couplet cell structure in music, experienced as a *form-void vector*. As I explain in more detail further in the dissertation, the phenomenological machine unit may be conceptually represented as functioning analogously to a physical machine — conceptually functioning like the cylinder of an engine, albeit at the phenomenological level.⁸⁵

Complex phenomenological machine

As noted in the previous section, in contrast to the phenomenological machine unit, the *complex phenomenological machine* refers to the remaining propositions of the model — that is, the *arrangement* of such phenomenologically experienced units within a compositional structure.

⁸³ See <https://www.dictionary.com/browse/machine> for a definition of “machine”.

⁸⁴ Within the concept of phenomenological mechanics, as presented in the dissertation, several mechanics terms are represented as phenomenological analogues. Further in the dissertation, I refer to concepts such as *phenomenological tension*, *phenomenological charge*, *phenomenological force*, *phenomenological vector field*, *phenomenological energy*, *phenomenological entropy*, *phenomenological work*, *phenomenological time*, and *phenomenological machine*.

⁸⁵ When referenced separately from the phenomenological machine considered in its entirety (the *complex phenomenological machine*), the terms *simple phenomenological machine* and *simple phenomenological machine unit* are used in the dissertation synonymously and interchangeably with the term *phenomenological machine unit*.

The definition of a machine as it applies to the dissertation's concept of a complex phenomenological machine is thus a combination of two or more simple machines that work together.⁸⁶

This concept is applicable to the remaining propositions of RP 1A — the model's propositions of *hierarchical organisation* (exemplified within complex metre), *multimodality* (pertaining to multiple musical parameters, including those of *metre*, *melody*, *harmony*, *modality*, and *global form*) and *vector field summation*, the concept that phenomenological form-void vectors can be aggregated into a single phenomenological field.⁸⁷

Phenomenological charge

[Music] "becomes active" and carries with it a tendency or tension ("almost a will") that strives towards resolution.⁸⁸

In mechanics, charge is defined as *the physical property of matter that causes it to experience a force when placed in an electromagnetic field*.⁸⁹ The concept of phenomenological charge as it applies to music is similar. Thus, just as an electrochemical cell of a battery may be physically charged, the experience of music may be *phenomenologically charged*.

Analogously with physical mechanics, within *phenomenological charge* is the property of an experience that causes it to experience a *phenomenological force* when placed within a *phenomenological field*.

In elaborating this concept, the following sections introduce the concepts of *phenomenological force* and *phenomenological field*. Such concepts inform the proposed model for the experience of directional motion in music, from a phenomenological mechanics perspective.

Phenomenological force

The concept of a *phenomenological force* is relatively straightforward. In the physical context, force may be understood as an external agent capable of changing the state of rest or motion of a particular body.⁹⁰ In the phenomenological context, consistent with Dahn's terminology in describing Zuckerkandl's concepts,⁹¹ *phenomenological force* may be understood as the *tension or tendency to change the state* of a phenomenological object — such as the experience of a musical device or section.

The *change of state* that occurs when music becomes charged, or in Dahn's terminology *active*, may be considered as a change of phenomenological state — from its home or void *inert* state, it transforms into an away or form *activated* state.

⁸⁶ See <https://www.reference.com/science/complex-machine-9a41d13e810d4e4c> for a discussion of what constitutes a complex machine.

⁸⁷ As it relates to my investigation of the experience of directional motion in music, this single aggregated overall form-void vector field is a conceptual representation of the musical concepts of development and resolution. Otherwise expressed, *taking into account all of the phenomenological experiences of directional musical motion it evokes*, a composition may be experienced as either moving forwards — from a void state to a form state (the musical experience of *development*) or backwards — from a form state to a void state (the musical experience of *resolution*). This concept is represented in RP 1B.

⁸⁸ Luke Dahn, "A Summary and Reflection on Victor Zuckerkandl's *Sound and Symbol: Music and the External World (1956)*" (Blog, written in 2006 and 2007). <http://www.lukedahn.net/Zuckerkandl.htm>

⁸⁹ See <https://www.coursehero.com/file/p60np6b/Electric-charge-is-the-physical-property-of-matter-that-causes-it-to-experience/> for a discussion of electric charge as the physical property of matter.

⁹⁰ <https://byjus.com/questions/what-are-the-effects-of-force-on-an-object/>

⁹¹ Luke Dahn, "A Summary and Reflection on Victor Zuckerkandl's *Sound and Symbol: Music and the External World (1956)*" (Blog, written in 2006 and 2007). <http://www.lukedahn.net/Zuckerkandl.htm>

From this activated state, it then has a *tension or tendency* towards resolution — a tendency to return from its form state back to a void state. Conceptually, at the local level, it has become *developed*, transforming from a stable to a relatively unstable state — a state Dahn characterises as having a *tension* or a *tendency* to resolve.

The concept of local musical development as the transformation from a stable to an unstable state is further considered in this section, especially in the concluding concepts of the experience of music as a *quantum phenomenological machine*.

Phenomenological field

The concept of the phenomenological field is an associated concept. The concept, as it informs the proposed model for the experience of directional motion in music and its applications, is presented in the section that follows. I present the concept of phenomenological field initially in reference to the experience of literature, and then in reference to the experience of music.

The phenomenological field of teleological interpretation in literature — Kermode

Human beings reflexively interpret the world around them teleologically — in terms ... of beginnings and endings.⁹²

In *The Sense of an Ending*, literary theorist Frank Kermode makes the case that conceptually “hardwired” into the human condition is an “addiction to beginnings and ... endings”.⁹³ In that regard, according to Kermode, the experience of literature is one that occurs not from a position of “*tabula rasa*” but in accordance with a type of “innatism”— an understanding that phenomenological experience begins from a non-neutral position, bringing with it certain pre-conditionings. The most significant of these to the dissertation’s research question “What is the nature of the experience of directional movement in music, and how can this experience be conceptually represented?” is the preconditioning to interpret literary narrative teleologically in terms of “beginnings and endings”.

Teleological interpretation, according to Kermode, is thus a manifestation of the preconditioned *expectation* of the way events occur — reflected in our human expectations of literary narrative structure. As such, expectation may be considered a phenomenological field as it applies to the experience of directional motion in literature.

Considered in this way, Kermode’s proposition is consistent with what I have proposed in the previous section in relation to the polar couplet cell structure and the experience of directional motion. When Kermode describes literature in terms of beginnings and endings, implicit within these complementary terms is the concept of polarity — the place the beginning moves to. The ending is not the same place as the beginning — rather it is a place with *equal but opposite* meaning.

The concept of *ending* is equal and opposite because it is of a magnitude and direction that exactly negates the concept of beginning. The purpose of an ending is thus to *perfectly resolve* a beginning — to return it exactly to its pre-transformed zero magnitude void state.

The expectation of resolution in literature — and the phenomenological field that accompanies it, is, according to Kermode, quintessentially human. Expressed in this way, literary narrative, like linear music, is implicitly vectorial — it moves, in accordance with human expectation, linearly and directionally from A to B.

⁹² Kermode, Frank. *The Sense of an Ending: Studies in the Theory of Fiction* (Oxford: Oxford University Press, 1967), 69.

⁹³ Kermode, *The Sense of an Ending*, quoted by Sutherland, *50 Literature Ideas*, 68.

The phenomenological field of expectation is now considered as it applies to the experience of directional motion (specifically in music), starting with the concept of *teleological listening*.

The phenomenological field of teleological listening in music — Kramer

Arguably, the reflexive interpretation of the world teleologically — *as a phenomenological field* — applies not just to literature but also to the listening experience of music.

In the following extended description of his experience of repetition, Kramer describes the experience of teleological listening as a phenomenological field.

I attended about three hours of an 18-hour performance of Erik Satie's *Pages mystiques* (1893), the middle movement of which is the infamous *Vexations*. This movement consists of four eight-bar phrases ... each with the same bass line. Satie indicates that the movement is to be played 840 times in succession. Although this instruction may have been one of the composer's cryptic witticisms that he typically wrote in the margins of his scores, several present day musicians have decided to take it quite seriously and literally.

Thus a team of pianists agreed to play *Vexations* at the Oberkin Conservatory in 1971.

The piece and in particular this performance of it invokes the non-linearity of vertical time. When I first entered the concert, I listened linearly. But I soon exhausted the information content of the work. For a brief period I found myself getting bored ...

But then I found myself moving into a different listening mode. ... I forgot about the music's past and future...I was no longer frustrated because I had given up expecting. I had left behind my habits of teleological listening. I found myself fascinated with what I was hearing.⁹⁴

This description of a phenomenological field of teleological listening is significant. Of further significance, however, is the observation that the phenomenological experience of musical motion changed from *linear* (nominally *horizontal*, in accordance with the arrow of time) to vertical. However, this change in the qualities of the musical motion had nothing to do with any changes occurring within the music itself.

Such an observation is consistent with the concept of the influence of a *phenomenological field* as a subjective, non-neutral condition or influence that the listener brings to the listening experience, in so doing influencing such phenomenological parameters as the experience of phenomenological time, motion, direction, tension, force etc.

In Kramer's description, when the quality of the phenomenological field changed — from one of teleological listening to one of non-teleological listening — so too did the phenomenological experience of directional musical motion change — in this case, from the experience of music moving *linearly* to the experience of something else.

Thus, analogously to a physical field, the phenomenological field⁹⁵ has the capacity to influence *the experience of directional motion in music*.

⁹⁴ Kramer, *The Time of Music*, 378–379.

⁹⁵ In this case, the phenomenological field of teleological listening, but the same applies in principle to any phenomenological field.

The phenomenological field of tension or tendency ... towards resolution — Zuckermandl

[Music] “becomes active” and carries with it a tendency or tension (“almost a will”) that strives towards resolution.⁹⁶

What Kermode describes in the experience of literature as an “addiction to beginnings and ... endings”,⁹⁷ Dahn describes in the experience of music as a “tension or tendency... towards resolution”.⁹⁸ Using Dahn’s word, music becomes “active” in this process. The state of becoming “active” is akin to the state of becoming *phenomenologically charged*.

Such phenomenological charge is analogous to the carrying of a physical charge.

While *physical charged* results in a *physical force* when occurring in a *physical field*, the same may be analogously represented in phenomenological terms. Thus, Dahn’s description that music “becomes *active* and carries with it a *tendency or tension ...* that strives towards resolution”⁹⁹ may be paraphrased in terms of analogous phenomenological concepts — that music becomes *phenomenologically charged* and carries with it a *phenomenological force* that occurs within a *phenomenological field*.

In the terminology of the dissertation, such a *phenomenological charge* is representable as the transitioning from a void state to a form state within a polar couplet cell.

As an example of this, the state of *beat 2* within Zuckermandl’s representation of metre, as described by Dahn, is such that it has become “active”.¹⁰⁰ This is synonymous to being in a *charged* state. Being in a charged state means it has a *tendency or tension ...* towards resolution. As introduced in the previous section, conceptually it has transformed from a state of relative *stability* to a state of relative *instability*.

The presupposition that music should *resolve* — or in the terminology of the dissertation, that it should *return* to its original undisturbed void state — may be understood as a phenomenological field. In simple terms, such a musical expectation functions as a phenomenological field.

The phenomenological field of tonal gravity — Russell

George Russell in his *Lydian Chromatic Concept of Tonality*¹⁰¹ describes the concept of *tonal gravity* as it relates to an ordering of chord tones derived from a Lydian mode. A detailed examination of the specifics of Russell’s influential harmonic concepts is beyond the scope of this dissertation. However, Russell’s reference to concepts of tonal “gravity” and his concepts of “forward-moving” harmonic motion are inherently vectorial concepts.

Of particular interest is Russell’s allusion to *proportionality* (my term, not Russell’s) of harmonic distance and tension. Such proportionality is not linear but may be considered *ordinal*. In other words, what Russell is describing in his *Lydian Chromatic Concept of Tonal Organization* is that the *distance* of chord tones from a tonal centre (based upon a Lydian configuration) correlates with tonal

⁹⁶ Dahn, “A Summary and Reflection on Victor Zuckermandl’s *Sound and Symbol*.”

⁹⁷ Kermode, *The Sense of an Ending*, quoted by Sutherland, *50 Literature Ideas*, 68.

⁹⁸ Dahn, “A Summary and Reflection on Victor Zuckermandl’s *Sound and Symbol*.” <http://www.lukedahn.net/Zuckermandl.htm>

⁹⁹ Dahn, “A Summary and Reflection on Victor Zuckermandl’s *Sound and Symbol*.” <http://www.lukedahn.net/Zuckermandl.htm>

¹⁰⁰ Kermode, *The Sense of an Ending*, quoted by Sutherland, *50 Literature Ideas*, 68.

¹⁰¹ George Russell, *George Russell’s Lydian Chromatic Concept of Tonal Organization* (2001), cited at https://en.wikipedia.org/wiki/Lydian_Chromatic_Concept_of_Tonal_Organization

gravity — the tendency or tension of a chord tone to return to its tonal centre.¹⁰² Regardless of the fact that Russell uses a different terminology, the concept of tonal *gravity* is a clear reference to Russell's position that harmonically at least, the experience of music is the experience of a phenomenological field. Further, it is a field that accords with phenomenological distance — the distance between a chord and its tonal centre, derived from the Lydian mode. Considered in this way, Russell's *Lydian Chromatic Concept of Tonality* is founded upon the concept of a *phenomenological field* as such applies to functional harmony.¹⁰³

The phenomenological field of expectation — Cage

The work [John Cage's 4'33"] highlights as it stimulates expectations on the part of the audience member.¹⁰⁴

Perhaps the simplest and most familiar representation of a field as it applies to physical directional movement is that of the gravitational field. An object appearing within a gravitational field is subject, *without doing anything of its own accord*, to a force and subsequent movement. In the following section, I introduce an analysis of Cage's 4'33" in terms of the concept of musical expectation as a phenomenological field.¹⁰⁵

When David Tudor first played 4'33" at the Maverick Hall in Woodstock, New York, in 1952, some audience members are reported to have *left in a huff*.¹⁰⁶ Literally, the action of David Tudor *doing nothing* resulted in the physical movement of patrons exiting the hall.

Arguably, however, the experience of doing nothing also resulted in *phenomenological motion*.

Conceptually, at least in terms of its analogous phenomenological representation, such an observation initially appears to contravene Newton's first law of motion (also known as the law of inertia). This law states that a body at rest will remain at rest, and a body in motion will remain in motion, unless it is acted upon by an external force.¹⁰⁷

The position that such a movement does *not* contravene Newton's first law is possible when one introduces into the situation the presence of a *field*.

As noted in the previous section, when an object becomes *charged*, it experiences a *force* when placed in an electromagnetic *field*.¹⁰⁸ Such a description, however, applies to the physical concept of an *electrical charge* — a physical concept.

Chargedness in the experience of music (in Dahn's terminology, akin to "tension"), including the experience of *nothing happening* in music, arises not within a physical but a *phenomenological field*.

¹⁰² I use the term *ordinal distance* to describes Russell's concept that chords built upon scale tones may be arranged in an order of "relatedness" to the tonality of the tonic. Ordinal distance is thus the number of places away from the tonic of a given chord, when chord tones are arranged in the order of Russell's proposed (Lydian-based) order of tonal relatedness.

¹⁰³ In relation to the main artefact, *Oscillation 1*, Russell's concepts of harmonic motion are relevant and evident, particularly in the alternating linear and cyclic modulation structure of the equi-harmonic cycle of the guitar part.

¹⁰⁴ Linda Kouvaras, *Loading the Silence: Australian Sound Art in the Post-digital Age* (Oxfordshire: Routledge, 2016), 56.

¹⁰⁵ Cage's concepts as they inform the dissertation are discussed in further detail in the section *Musical phenomenologies — Cage*.

¹⁰⁶ *Encyclopaedia Britannica*, 4'33": Work by Cage. <https://www.britannica.com/topic/433-by-Cage>

¹⁰⁷ In this analogy, I am not suggesting that a phenomenological state directly produced a physical movement. What I am saying here is that a phenomenological force is associated with the experience of phenomenological motion — the experience of musical movement. In Chapter 3, I examine the experience of vectorial (i.e., directional) motion within 4'33" from the perspective of the model proposed in RP 1A.

¹⁰⁸ See <https://www.coursehero.com/file/p60np6b/Electric-charge-is-the-physical-property-of-matter-that-causes-it-to-experience/> for a discussion of electric charge as the physical property of matter.

Regarding the experience of nothing happening, non-action becomes musical form because it arises within a phenomenological field — the phenomenological field of expectation.¹⁰⁹

The phenomenological field of expectation — which Cage's works alternately provoke and seek to remediate — creates the possibility that silence may be experienced as musical form. While 4'33" exemplifies the former, Cage's aleatoric works would seem to exemplify the latter.¹¹⁰

The phenomenological field of expectation and the Western arrow of time

Analogously to its physical counterparts, the concept of the phenomenological field has utility in the conceptualisation of the experience of directional motion in music.

In what Kramer calls *teleological listening*, the phenomenological field is the phenomenological field of expectation. In the context of the current dissertation (being an *intercultural* consideration of the experience of music as phenomenological mechanics), the phenomenological field of expectation may be characterised as a *Western* way of listening to music.

The phenomenological field of expectation, and its associated *teleological listening*, accords with Clayton's description that Western music goes *from A to B* in a linear manner.¹¹¹ In accordance with this, it may be proposed that *Western music* goes *from A to B* in a linear manner because *Western time* goes from A to B in a linear manner.

The representation of *Western time* going *from A to B* in a linear manner is a representation of Western time by the metaphorical concept of the *arrow of time*. The Western concept of the arrow of time is a particularly useful construct both in intercultural musical analysis and in exploring alternative temporalities within which music may be performed.

The *arrow of time* is discussed throughout the dissertation.

- In *Section C: Literature Review*, the arrow of time is considered as it features in the literature, primarily in relation to Fraser's concept of the canonical forms of time, presented as graphical variations or, more precisely, *alterations* of the concept of the arrow of time.¹¹²
- In *Research Area 1*, the arrow of time is presented in further detail in the section *Phenomenological entropy and the arrow of time*.
- In *Research Area 2*, the arrow of time is discussed as it applies to the secondary RPs and in particular Secondary RP 2A, where Western and Eastern musical form is considered in terms of Western and Eastern cultural concepts of linear and cyclic time.
- In *Research Area 3*, the arrow of time is directly referenced in the geometrical representation of contrasting musical forms *as helix and vortex*, arising from contrasting Western linear and Eastern cyclic representations of time.¹¹³

¹⁰⁹ This concept and the related concepts of what constitutes musical form (and musical void) is further discussed in *Research Area 2* under *Composition as intercultural metaphor/Musical phenomenologies/Form-void polarities*, and again in the literature review under *Musical phenomenologies — Cage*.

¹¹⁰ These concepts are further discussed in *Research Area 2* under *Composition as intercultural metaphor/Musical phenomenologies/Phenomenological form-void polarities/Expectation fulfilment and surprise*.

¹¹¹ Clayton, *Time in Indian Music*, 19.

¹¹² Julius Thomas Fraser, "Levels of Temporality as Cognitive Representations," in *The Study of Time*, Nathaniel Lawrence and Frances C. Haber, eds. (Amherst: University of Massachusetts Press, 1986).

¹¹³ As previously noted, I provide an example of the latter in the improvised minor artefact *Beginner's Mind*.

Application of phenomenological mechanics to temporal art forms

The description of the experience of musical motion in such phenomenological mechanics terms is a making *explicit* of concepts that, as is made apparent in the literature review, are *implicit* within the position of such musical theorists as Zuckerkandl, Cage, Clayton, Kramer, and Fraser.

The concept of phenomenological mechanics also *integrates* related concepts within an existing system of knowledge — that of mechanics.

Beyond the field of music, such concepts are apparent in literary theory, examples of which have been provided from the work of Frank Kermode.

What is common to all these examples is that such art, be it musical or literary, unfolds within a conceptual representation of time. The concept of phenomenological mechanics would thus be seen to have application to describing the *experiential dynamics* of a wide variety of musical and other contexts — any experience, in fact, where the experience of time plays a prominent role. Such temporal art forms may be conceptually represented as an array of events. The application of concepts from phenomenological mechanics provides a framework and language for characterising what gives *dynamic meaning* to the experience of such *arrays of events* — such that they are experienced in terms of the phenomenological attributions of directional motion of *going somewhere* or *coming back*.

Phenomenological mechanics and minimalist music

In its broadest interdisciplinary applications, phenomenological mechanics may be applied to the consideration of how *an array of events in time* (such as music) is experienced or conceptually represented in terms of concepts borrowed from mechanics.

Within music, the concept of phenomenological mechanics is, therefore, appropriate for the composition and analysis of musical forms that may be considered in terms of musical *processes in time*. Among musical genres, phenomenological mechanics thus has application to the composition and characterisation of minimalist music, especially the musical process element of minimalist music.

In Chapter 3, the concept of phenomenological mechanics is discussed, both generally and specifically in relation to minimalist music. The major artefact is also considered from a minimalist music perspective. Furthermore, Chapter 3 presents a novel characterisation of minimalist music, as defined by the relationship between form and void. Specifically, minimalism is described as a compositional process where form and void are attributed equivalence of significance.¹¹⁴

Application of phenomenological mechanics to musical analysis, composition, and improvisation

Applied to musical analysis, composition, and improvisation, phenomenological mechanics provides a conceptual language both for the creation of music (composed or improvised) and its analysis. In Chapter 3, I provide an example of the application of phenomenological mechanics to each of the aspects of music. Additionally, Appendix 7 provides a detailed example of the application of phenomenological mechanics concepts to the composition of music, and to its analysis.

As it applies specifically to musical *improvisation*, in the final segments of this section I propose that the concept of phenomenological mechanics has application to improvised music in terms of

¹¹⁴ The intended interpretation of such a proposition is not that a minimalist composition has 50% content and 50% space. Rather, the meaning of such equivalence of significance is considerably more subtle — it is the meaning that form and void are equally capable of “filling” a compositional frame. From a minimalist perspective defined in this way, the compositional frame is “always full” — be that filled with form (i.e., content that is apparent) or filled with void (i.e., space).

providing alternative temporalities (i.e., experiences of time) within which to perform improvised music. These possibilities are particularly informed by the Julius Fraser's canonical forms of time, as described in the final section of this chapter, *Musical Interdisciplinarity* — Fraser.

Laws of motion, energy exchange and entropic directionality as they apply to musical development and resolution

The concept of phenomenological mechanics provides a framework for representing several related concepts, most notably the following:

- the experience of a phenomenological movement
- the experience of a phenomenological charge
- the experience of a phenomenological force
- the experience of a phenomenological field
- conceptual representation of the storage and release of phenomenological energy
- conceptual representation of the relationship between phenomenological entropy (i.e., a system's state of disorder or randomness) and the directionality of time
- conceptual representation of the laws or principles that define the relationship between these parameters in the physical domain, applied to the phenomenological domain.

Regarding the last of these, in this section I consider the following laws as they inform the proposed model for the experience of directional motion in music, characterising the experience of directional motion in music. I then characterise the concepts of musical development and musical resolution in the context of established laws of nature.

These include:

- *Newton's third law of motion* — for every action there is an equal but opposite (in direction) reaction (also known as the *law of action and reaction*)¹¹⁵
- The *first law of thermodynamics* — energy can neither be created nor destroyed, only converted from one form of energy to another (also known as the *law of conservation of energy*)¹¹⁶
- The *second law of thermodynamics* — the total entropy of a system either increases or remains constant in any spontaneous process (in simple terms, *the law of order and chaos*).¹¹⁷

The sections that follow examine the listed laws of motion, energy exchange, and entropic directionality as they inform the experience of directional motion in music and, particularly, the experience of *musical development and resolution*.

These laws of mechanics, as they may be applied to music, as applications of the concept of *phenomenological mechanics*, are now considered individually.

¹¹⁵ See <https://www.physicsclassroom.com/class/newtlaws/Lesson-4/Newton-s-Third-Law>

¹¹⁶ See https://energyeducation.ca/encyclopedia/Law_of_conservation_of_energy

¹¹⁷ See <https://openstax.org/books/physics/pages/12-3-second-law-of-thermodynamics-entropy#:~:text=The%20second%20law%20of%20thermodynamics%20states%20that%20the%20total%20entropy,spontaneous%20process%3B%20it%20never%20decreases>

Newton's third law of motion — action and reaction

Conceptually, Newton's third law of motion, the law of *action and reaction*, may be applied to concepts in music. In the following section, I demonstrate the analogous representation of Newton's third law as it applies to the concept of *cadence*. Such a representation arguably applies to the concept of cadence both in the *broad* meaning of cadence (described in the following section) and in the *specific, harmonic* meaning.

Newton's third law of motion as it applies to cadence

The concept of cadence broadly aligns with the way Kramer characterises cadence — as anything that tends to *close off* a preceding event.¹¹⁸ This meaning is also consistent with the etymological meaning of cadence — originating from the Latin *cadere* and having the meaning of “to fall”.¹¹⁹

When the concept of cadence as a *closing off* or a *falling* is examined, it is apparent that inherent within its meaning are the concepts of *equality*, *opposition*, and *directional movement*.

To the extent that “closing” is the equal but opposite in direction meaning of “opening”, and “falling” is the equal but opposite in direction meaning of “rising”, cadence, as characterised by these meanings, is an inherently polar concept. Thus, cadence within music also has the same conceptual structure as Kermode's *theories of fiction* concept of “beginnings and endings”.

Cadence, in its broad sense — *regardless of how it is individually phenomenologically codified* — may be understood in terms synonymous with Newton's third law of motion, the law of *action and reaction*. A musical action, like a physical force, thus carries with it a *tendency or tension* to negate itself by association with its equal and opposite counterpart.¹²⁰

Newton's third law of motion locally and globally — cadence and development

Referencing the above broad sense of cadence as a closure to an opening, cadence may be conceptually represented as an *equal but opposite action* (closure) *to an action* (opening). At the global compositional level, such action and negating reaction are the musical concepts of development and resolution.

Further, such a representation of cadence as being in accordance with Newton's third law of motion may be both in terms of its broad meaning, as described, and in terms of its specific harmonic meaning.

When considered in its broad meaning, Newton's third law of motion is apparent in resolution, being the equal but opposite reaction to development. The next section considers this proposition in terms of the specific (i.e., harmonic) meaning of cadence.

Considered in this way, musical composition is microcosmic of natural law, and natural law is macrocosmic of musical composition.

Newton's third law of motion — cadence in its specific harmonic meaning

Newton's third law of motion has similar conceptual application to the representation of cadence in its specific harmonic meaning. This would seem apparent when one considers the harmonic sequence of an imperfect I-V cadence followed by a perfect V-I cadence. Considered in this way, the fundamental

¹¹⁸ Kramer, *The Time of Music*, 137–38.

¹¹⁹ See <https://latin-dictionary.net/definition/7249/cado-cadere-cecidi-casus>

¹²⁰ Dahn, “A Summary and Reflection on Victor Zuckerkandl's *Sound and Symbol*.” <http://www.lukedahn.net/Zuckerkandl.htm>

harmonic movement of the tonic to the fifth — imperfect cadence — begets perfect cadential negation by the equal and opposite musical movement of V *back to* I.

Considered in the terminology of phenomenological mechanics, the tonic and dominant represent a polar couplet cell, the former having the phenomenological attribution of “home” or “void” and the latter having the phenomenological attribution of “away” or “form”.

Synonymously with Zuckerkandl’s concept in relation to metre (i.e., “two” does not mean simply “beat number 2” but also “away from”), harmonically, “V” does not simply mean “chord number V” but also “away from.”¹²¹

Cadence, be that in its specific harmonic or in its broad meaning contains within its polar couplet cell structure, the capacity for the experience of musical directionality synonymously with the way Zuckerkandl represents metre, albeit within the musical parameter of harmony.

Implicit within Newton’s third law of motion and its musical analogue — the *action and reaction of cadence* — is thus the concept of polarity and, with it, the capacity for the experience of directional musical motion.

Cadence as phenomenological field

Referencing the concepts of the previous section, the harmonic movement of the imperfect I-V cadence may be considered in terms of a phenomenological field.

In Kermode’s terminology, the phenomenological *force* that accompanies such a harmonic movement may be considered an *unrequited beginning* that arises within a phenomenological field of addiction to beginnings and endings.¹²² In Zuckerkandl’s terminology, it may be considered a *tension* or *tendency* that arises in a phenomenological field, which is the expectation for music to move *towards resolution*.¹²³

In the terminology I use in the dissertation, the harmonic movement of the imperfect I-V cadence is representable as a phenomenological movement from *void* (the I tonic functioning as the *home* pole) *to form* (the V dominant functioning as the *away* pole). Conversely, the equal but opposite reaction that follows the imperfect cadence (i.e., the V-I *perfect* cadence) may be considered a *form-to-void* movement, returning the system to its *void* (i.e., *home*) state. In the same way that Zuckerkandl describes the experience of directional movement within the 2/4 at the parameter of *metre* as going *to* and *away from*, such harmonic movements at the local level of *harmonic movement* are, respectively, the musical directional movements of development and resolution.

The broad concept of cadence as phenomenological charging of the polar couplet cell

The concept of the experience of directional motion as a *charging* of a polar couplet cell is a broad concept that is applicable both to musical and non-musical phenomenological experiences of directional movement.¹²⁴ To exemplify the concept, the concept of cadence as *phenomenological charge* is considered next.

¹²¹ Zuckerkandl, *Sound and Symbol*, 168, quoted in Clayton, *Time in Indian Music*, 20.

¹²² Kermode, *Sense of an Ending*, quoted by Sutherland, *50 Literature Ideas*, 68.

¹²³ Dahn, “A Summary and Reflection on Victor Zuckerkandl’s *Sound and Symbol*.” <http://www.lukedahn.net/Zuckerkandl.htm>

¹²⁴ The analysis that follows examines the concept of imperfect I-V cadence as a charging of the I-V tonic-dominant polar couplet cell and perfect V-I as a discharging of the I-V polar couplet cell.

This simple and familiar example of cadence is chosen because it readily demonstrates the concept of phenomenological charging. It is important, however, that such an application of phenomenological mechanics is not understood as a

Cadence as phenomenological charging of the tonic-dominant polar couplet cell

The concept of cadence may also be represented as a phenomenological charge. In such a representation, cadence is a charging of a polar couplet cell — a movement from the void pole to the form pole. In the example described, the polar couplet cell is a phenomenological structure whose two elements or *poles* are the tonic I chord and the dominant V chord. The I chord functions as the home or void pole, and the V chord functions as the away or form pole.

The void-to-form movement of the 1-V imperfect cadence, considered as the phenomenological charging of a polar couplet cell, is the representation of the polar couplet cell in its form state — the V pole (i.e., *charged*). Conversely, the polar couplet cell is *uncharged* when the polar couplet cell is in its void state — the tonic I pole.

Polarity and relativity of tonic and dominant within the tonic-dominant polar couplet cell

Conceptually, the tonic dominant polar couplet cell is charged when it is in its dominant state.

Both conceptually and as it is musically experienced, *dominant* is a relative concept — a chord only functions as dominant relative to a tonic. Thus, the musical experience of the dominant functioning as *away* or *form* necessitates reference to a tonic functioning as *home* or *void*. Such a proposition demonstrates the nature of the relationship between the tonic and dominant chords as being one of polarity, the polarity permitting the phenomenological representation of directional (i.e., forwards and backwards) movement between them.

When represented as a phenomenological charge, cadence may be considered as a phenomenological charging and discharging of the tonic dominant polar couplet cell.

In the terminology of phenomenological mechanics, the I-V harmonic movement of the imperfect cadence may thus be considered a phenomenological *charging*. Conversely, the V-I form-to-void movement may be considered a phenomenological *discharging*.

The tonic-dominant polar couplet cell as a phenomenological machine unit

The language of charging and discharging of polar cell couplet units invites consideration of the I-V polar cell couplet as functioning akin to a *phenomenological machine* — in this case, the simple

statement about the specifics of the tonic-dominant relationship itself — this is well-established and is not the purpose of the demonstration.

The concept of phenomenological charging of a polar couplet cell applies to any musical experience or any *temporal experience* beyond music that may be represented as a polar couplet cell. The concept may well have been demonstrated in a few non-harmonic ways and even in non-musical ways.

One may, for example, consider the act of falling while walking — a cadential act. In such a representation, walking — like an unchanging ostinato pattern — may be considered a steady state. Its phenomenological state is a void state. The proposed reason for this is that, as is discussed in further detail in Research Area 2, in addition to the representation of void and form and silence and sound, *steady state* and *change* are proposed as one of several relative rather than absolute void-form representations within music.

Represented as a polar couplet cell within the system of walking, walking is void and falling is form. Walking without change does not have compositional significance. Falling, a change to this state, does.

Within the domain of music, the concept that the experience of directional movement is representable as a phenomenologically determined polar couplet cell, from which structural arrangement it is possible to experience directional motion in terms of a form-void vector, is a broad concept — equally applicable to the experience of directional motion in postmodern and avant-garde music as it is to more traditional music.

To demonstrate the broadness of this concept, I present in Chapter 3 an examination of the experience of directional musical motion in Cage's 4'33". To exemplify the concept, the current section presents the concept of cadence as a phenomenological charging of a polar couplet cell in terms of the familiar concepts of tonic and dominant cadential harmonic movements.

machine of an electrochemical cell of a battery, a familiar concept that aligns well with the meaning of the concept of charging and discharging.

This central concept — the concept of charging and discharging of polar cell couplet units, each unit potentially functioning as a simple *phenomenological machine unit* — and the entirety of the composition in terms of its aggregated form-void vectors functioning as a *complex phenomenological machine* are discussed in the sections that follow.

The concept of the representation of directional motion in music in terms of oscillations between charged and uncharged states is also briefly discussed in this chapter under *Final concept — The experience of directional motion in music as quantum phenomenological machine*.

Imperfect and perfect cadence — a quantum phenomenological mechanics perspective

The directional movements of imperfect I-V and perfect V-I cadential movement may also be characterised in terms of the extended concept of quantum phenomenological mechanics. In such a characterisation, these cadential movements may be considered as transformations from *stable to unstable*, respectively, and from *unstable to stable* phenomenological states.

As previously noted, the concept of quantum phenomenological mechanics and its characterisation of *directional movement* as transformation between stable and unstable states, as related to the experience of directional motion in music, are introduced in the final segments of this section.

The first law of thermodynamics

The next law — considered because it is relevant to the application of phenomenological mechanics to the experience of directional motion in music — is the first law of thermodynamics. As noted in the previous section, this law (also known as the *law of conservation of energy*) states that the total energy within a closed system is fixed, and that energy can neither be created nor destroyed.

Importantly, the first law of thermodynamics does not prohibit energy *exchange*. On the contrary, it provides a mechanism for conceptually representing the transformation that occurs between different energy forms, as they are described in mechanics, whilst conserving the total energy of the system.

The relevance of this concept to the processes of compositional development and resolution is discussed in the *Phenomenological energy* section, which follows shortly.

The second law of thermodynamics as it applies to phenomenological mechanics of music — order and chaos

The second law of thermodynamics states that the total entropy of a system either increases or remains constant in any spontaneous process.¹²⁵ As introduced in the prior section, *entropy* is the mechanics term used to describe the extent of *randomness, disorder or chaos* of a system. Conceptually, entropy is the opposite of order.

The second law of thermodynamics thus describes the spontaneous directional movement of a system from order to chaos in the absence of any (energy-requiring) organisational forces acting to the contrary. The relevance of this concept to the processes of compositional development and resolution is discussed in the *Phenomenological entropy* section, which also follows shortly.

¹²⁵ See <https://openstax.org/books/physics/pages/12-3-second-law-of-thermodynamics-entropy#:~:text=The%20second%20law%20of%20thermodynamics%20states%20that%20the%20total%20entropy,spontaneous%20process%3B%20it%20never%20decreases>

Phenomenological energy

Kinetic and potential energy transformations in mechanics — the example of the inclined plane

A concept of energy exchange that is fundamental to the conceptual model presented in RP 1A (and RP 1B) is well-described in mechanics. This is the concept of energy exchange between kinetic energy and potential energy states — kinetic energy being the *energy of movement* and potential energy being the *energy of position*.

The concept of transformation between kinetic and potential energy states may be represented or demonstrated within any simple machine. In the context of the current dissertation, the simplest exemplification of this concept is the inclined plane. In the simple machine of the inclined plane, a ball may be moved from the low point on the plane to the high point on the plane. Such a transition *expends* kinetic energy — the energy of movement and *acquires* potential energy — the energy of position.

Conversely, the ball may then be allowed to roll *down* the slope, a process that *acquires* kinetic energy and *expends* potential energy. The first of these is a *kinetic-to-potential* energy transformation. The latter is a *potential-to-kinetic* energy transformation.

These conceptual energy transformation processes — also known as *endothermic* and *exothermic* processes, respectively — are discussed further below.

Kinetic and potential phenomenological energy transformations in phenomenological mechanics — the example of the electrochemical battery cell

The example provided in the previous section is representable as an energy transformation between kinetic and potential energy states. In the case of moving the ball to the top of the inclined slope, the system has undergone an *expenditure of kinetic energy* in exchange for an *acquisition of potential energy*, and conversely for the situation where it is allowed to roll back down the slope.

These forwards and backwards kinetic-potential phenomenological energy transformations are also conceptually representable in the simple machine of the battery electrochemical cell.

In this representation, the *kinetic-to-potential* energy transformation (analogous to the movement of a ball *up* to a *higher* position on an inclined plane) correlates with the concept of a *charging* of the electrochemical battery cell (literally the movement of electrons not against gravity but an electrochemical gradient). Conversely, the *potential-to-kinetic* energy transformation (analogous to the ball rolling *down* to a *lower* position on an inclined plane) correlates with the concept of the *discharging* of the electrochemical battery cell.

In this representation, the *field* within which the action takes place is not (as is the case in the inclined plane) gravity but rather an electrochemical field — an electrochemical gradient.

The inclined slope thus functions as a gravitational machine, and the battery cell functions as an electrochemical machine. Conceptually, they can create directional (positive and negative) movement because they function within a field — a gravitational and an electrochemical field, respectively.

In this dissertation, I am proposing that the experience of directional movement in music can be represented in analogous terms.

Within the concept of phenomenological mechanics as it applies to music, polar couplet cell structures within musical organisation — evident in metre, tonal melody, functional harmony etc. — are experienceable as a *phenomenological field* wherever there is a home pole and an away pole.

In the presence of such a *phenomenological field*, such polar couplet cell structures have the capacity, by their inherent polar structure, to function as *phenomenological machines* facilitating not physical movement but *phenomenological movement* (i.e., the experience of movement).

Musical development and resolution as negative and positive phenomenological energy transformations¹²⁶

In this section, I introduce the concept that the development and resolution processes of music may be conceptually represented as transitions between kinetic and potential phenomenological energy states. This concept also aligns with Kermode's capacitation of literary narrative: that "Human beings reflexively interpret the world around them teleologically — in terms ... of beginnings and endings".¹²⁷

In such a characterisation, development may be seen as a process that is unspontaneous — effectively, it requires an energetic input to change its steady state. In the concepts of phenomenological mechanics, it requires an input of phenomenological kinetic energy and, in its developed or charged state, it acquires potential energy — the energy of position. Like a charged battery it is then able to resolve from this position back to its default undeveloped state.

In phenomenological mechanics, when music is experienced as undergoing *development*, it is being experienced as undergoing transformation from kinetic to potential *phenomenological energy states* — experienced as exchanging the musical energy of motion for the musical energy of position. Resolution, it is proposed is the opposite.

Considered in this way, development is the phenomenological energy exchange between *kinetic and potential phenomenological energy states* — from a kinetic (i.e., *energy of motion*) state to potential (i.e., *energy of position*) states and conversely for resolution.

Arguably, this concept is useful because it provides a conceptual mechanism for the representation of musical development and resolution in terms of well-established directional movement concepts from physics, applying them analogously to the experience of phenomenological movement.

Musical development and resolution as negative and positive phenomenological entropy transformations¹²⁸

As demonstrated in the following section, however, this characterisation of directional musical motion may also be seen in the movement between unequal states, not in terms of their phenomenological *energy* states but their phenomenological *entropy* states (i.e., their perceived states of randomness or disorder).

The concept of phenomenological entropy as a concept arising analogously from the second law of thermodynamics is thus the subject of the section that follows. Afterwards, I provide a characterisation of the musical concepts of development and resolution defined in terms of negative and positive transformations of phenomenological energy and entropy, respectively.¹²⁹

¹²⁶ This nominal convention aligns energy movement from potential (the energy of position) to kinetic (the energy of motion) with the directional convention of the movement from order to chaos as a positive direction of entropy transformation.

¹²⁷ Kermode, *The Sense of an Ending*, quoted in Sutherland, *50 Literature Ideas*, 69.

¹²⁸ As is noted the previous section, this nominal convention aligns energy movement from potential (the energy of position) to kinetic (the energy of motion) with the directional convention of the movement from order to chaos as a positive direction of entropy transformation.

¹²⁹ As above.

Phenomenological entropy

Phenomenological entropy — order and chaos

As noted in the previous section, the second law of thermodynamics states that the total entropy of a system either increases or remains constant in any spontaneous process.¹³⁰ Entropy is thus the concept used in mechanics to measure *disorderliness* — the amount of *randomness* or *chaos* within a system. The concept of *phenomenological entropy* is the equivalent concept as experienced in a musical system phenomenologically.

In this dissertation, I propose the concept of phenomenological entropy as an important concept in music for these three reasons:

1. The concept of phenomenological entropy, moving analogously with the second law of thermodynamics, predicts that a musical system, if allowed to be spontaneous, will ultimately move from order to chaos. This concept has significance for both composed and improvised music. As it relates to improvised music, the concept is discussed in the section that follows in reference to the work of Sabine Feisst,¹³¹ where Feisst's concepts of freedom and control correlate respectively to the concepts of *spontaneous* (positive energetic and entropic) transformations, and *non-spontaneous* (negative energetic and entropic) transformations, as defined in the first and second laws of thermodynamics.
2. When applied together at the phenomenological level, the first and second laws of thermodynamic motion predict that music has a tendency or tension to move in a certain direction from a high energy state to a low energy state and from a state of order to a state of disorder. Such an observation provides the possibility for a broad definition of musical development and resolution, as derived from the concepts of phenomenological mechanics.
3. Entropy is intimately associated with the concept of the arrow of time, which defines Western temporality both broadly and as it applies to Western musical form and its vectorial process of development, described by Clayton as going "from A to B" in a linear manner.¹³² The following sections of the dissertation introduce these concepts.

Phenomenological entropy as it applies to freedom and control in composition and improvisation

The second law of thermodynamics states that the total entropy of a system either increases or remains constant in any spontaneous process.¹³³ It thus states that, other things being equal, *a spontaneous process* will move in a direction that increases its entropy (disorderliness).

Considered in this way, *musical control*, as Sabine Feisst uses the term,¹³⁴ may be understood as an *active process* whose purpose is to humanly intervene in such a spontaneous process. In one sense at least, the concept of musical control is the meaning of composition. The act of composition is thus an

¹³⁰ See <https://openstax.org/books/college-physics-2e/pages/15-3-introduction-to-the-second-law-of-thermodynamics-heat-engines-and-their-efficiency>

¹³¹ Sabine Feisst, "Negotiating Freedom and Control in Composition: Improvisation and Its offshoots, 1950 to 1980," in *The Oxford Handbook of Critical Improvisation Studies Volume 1*, G. Lewis, ed. (Oxford: Oxford University Press, 2016), 207.

¹³² Clayton, *Time in Indian Music*, 19.

¹³³ See <https://openstax.org/books/college-physics-2e/pages/15-3-introduction-to-the-second-law-of-thermodynamics-heat-engines-and-their-efficiency>

¹³⁴ Feisst, "Negotiating Freedom and Control in Composition," 207.

act of *ordering* a musical system.¹³⁵ This aspect of composition is effectively an act of *decreasing musical entropy* — that is, reducing the inherent disorderliness or chaos within the musical system.¹³⁶

Major and minor artefacts as exemplification of Feisst's concept of musical freedom and control

In traditional composition, the purpose is to control the music, ideally completely or at least as much as possible. In improvised music, there is, by definition, less control of musical elements.

This proposition — that the act of composition is effectively an act of *decreasing musical entropy* — is thus particularly applicable to improvised music. Such a proposition accords with Feisst's characterisation of improvised music as a *negotiation of freedom and control*.¹³⁷ The major and minor artefacts submitted in the dissertation, *Oscillation 1* and *Beginner's Mind*, exemplify this concept. Referencing the above broad definition of composition, both submitted musical works may be considered in part musically *free* and in part musically *controlled*, albeit in different ways and to different extents.

Oscillation 1 is highly controlled (notes are defined) in its guitar part and less controlled in terms of the musical parameters in its tabla part (parameters are defined, but notes are not).

Beginner's Mind, although improvised in terms of its note choice, form, duration etc., has significant implicitly controlled structures, the most apparent of which is that the improvisation is highly tonal — specifically, its contributing notes are essentially entirely within a single mixolydian mode.

These concepts are further discussed in the Chapter 3 and Appendix 5.

Summary of section

Musical development and resolution as characterised by first law of thermodynamics — the law of conservation of energy

In an endothermic reaction, the starting materials (reactants) are more stable than the products; they are in a lower energy state. In order for the higher energy products to be formed, energy must be acquired from the environment. A reaction that results in products of greater stability (lower energy) than the reactants gives off energy and is said to be exothermic.¹³⁸

¹³⁵ Regarding the aleatoric compositions of Cage and others, it is possible to take contrasting views on whether such compositions may be considered “composed” in the traditional meaning. The reason for this is that the process of aleatoric composition is in a sense a compositional tool whose purpose is one of counter-composing. Aleatoric composition may be represented within such a characterisation of composition as a paradoxical method of musical control, whose purpose (at least within the aleatoric segments themselves) is to relinquish musical control. In reference to non-linear music — but equally applicable to aleatoric music — Kramer proposes that the music is not really composed in the traditional sense but simply “exists” (Kramer, *The Time of Music*, 384).

¹³⁶ Composition considered in this way addresses the component of *where the music will go to* — that is, will it go towards tension or towards the release of tension? As such, this is a statement about the global form of music. It is not a statement about the way a composer musically achieves this purpose. Thus, a composition resolving from an imperfect cadence to a perfect cadence may not require significant compositional direction. *How* this is achieved and when exactly it occurs within a composition *are* significant compositional processes — but not the subject of this section of the analysis.

¹³⁷ Feisst, “Negotiating Freedom and Control in Composition,” 207.

¹³⁸ Eric Stauffer, Julia A. Dolan, and Reta Newman, “Review of Basic Organic Chemistry,” Chapter 3 in *Fire Debris Analysis* (Elsevier, 2008).
<https://www.sciencedirect.com/topics/neuroscience/endothermic#:~:text=A%20reaction%20that%20absorbs%20energy,be%20acquired%20from%20the%20environment>

The concluding segments of this section of the Introduction apply the described concepts of phenomenological mechanics to characterise and conceptually define the musical experiences of development and resolution in two ways, listed as follows:

- The concepts of *musical development* and *musical resolution*, characterised in the terminology of phenomenological mechanics, respectively, are the experiences of *endothermic* (from kinetic energy to potential energy — i.e., from the energy of motion to the energy of position) and *exothermic* (from potential energy to kinetic energy — i.e., from the energy of position to the energy of motion) *phenomenological energy transformations, experienced through music*.
- Represented in this way, the experience of musical *development* may be conceptually represented as “the experience of transformation of phenomenological energy from *kinetic to potential states*”, and conversely, the experience of musical *resolution* is representable as the experience of transformation of phenomenological energy from *potential to kinetic states, experienced through music*.

In other words, the experience of musical *development* is proposed as the experience of music moving in the direction away from *energy of motion* (kinetic energy) and towards *energy of position* (potential energy). Conversely, the experience of musical *resolution* is proposed as the experience of music moving in the direction away from *energy of position* (potential energy) and towards *energy of motion* (kinetic energy). Such a characterisation defines the experiences of musical development and resolution in accordance with the terms of the first law of thermodynamics.

Musical development and resolution as characterised by the second law of thermodynamics — the law of order and chaos

The experiences of musical development and resolution may also be conceptually represented in terms of the second law of thermodynamics — the law of *order and chaos* — in terms of phenomenological entropy. Thus, the experience of musical development may be characterised as the experience of musical *development*, described as the experience of music moving in the direction of away from *chaos* and towards *order*. Conversely, musical resolution may be defined as the experience of music moving from order to chaos.

Development and resolution defined as “negative” and “positive” transformations of phenomenological energy and phenomenological entropy

As introduced in the previous sections, the experience of musical development in terms both of energy and entropy may be understood as a transformation resulting in *greater instability* than the *undeveloped* state that preceded it. In that sense, musical development is an *active* intervention, as opposed to an *exothermic* (first law of thermodynamics) or *random* (second law of thermodynamics) process.

In conceptual terms, it is a process that requires phenomenological (kinetic) energy or organisation of randomness to order (or both), decreasing phenomenological entropy. Conversely, the process of *musical resolution* may be understood as transformation resulting in *greater stability* than the *unresolved* state that preceded it.

Intuitively, this concept may be seen in reference to the previous example of imperfect I-V cadence followed by V-I perfect cadence. Whereas (in my experience at least) an imperfect I-V cadence is experienced as a movement from stability to instability, the following perfect V-I cadence is experienced as a movement from instability back to stability.

Considered in this way, the I-to-V harmonic movement of the imperfect cadence is experienced as a movement from relative *stability* to relative *instability* because it is associated with both the transformation from *kinetic energy* to *potential energy states*, and a transformation to *decreased entropy* (i.e., increased order) and thus more relative instability.

In Dahn's terminology, there is experienced a "tension or tendency ... to resolution" — an implicit reference to the fact that from a phenomenological mechanics perspective, the movement is from a stable to an unstable state. In accordance with the first and second laws of thermodynamics, analogously applied to composition, such movements are non-spontaneous. Conversely, the V-to-I harmonic movement of the perfect cadence is considered as a movement from instability to stability — thus, analogously with such laws of nature, it is experienced as a spontaneous process.

Because musical *development* characterised in this way is a movement *against* the natural direction of energy movement, musical development is characterizable as a phenomenological energy transformation moving in the *negative* direction.¹³⁹

Combining these two concepts in the terminologies of phenomenological mechanics introduced in this section, musical development and musical resolution may be respectively characterised as follows:

- The experience of musical development is characterizable as the experience of endothermic phenomenological energy transformation — from the energy of motion to the energy of position, corresponding with the experiences of "negative" phenomenological entropy transformation (i.e., the experience of directional motion from chaos to order).
- Conversely, the experience of musical resolution is characterizable as the experience of exothermic phenomenological energy transformation — from the energy of position to the energy of motion corresponding with the experiences of "positive" phenomenological entropy transformation (i.e., the experience of directional motion from order "back" to chaos).

Phenomenological time

Time is an elusive phenomenon. It flies, it drags, and sometimes it seems to stand still. We experience it as an inexorable conveyer belt of "nows" stretching from the past into the future, but we are not really sure it exists: it may be a fundamental property of the universe, like space or mass. Or it may be an illusion created by our brains.¹⁴⁰

The above quote from *New Scientist* — *The Origin of (almost) Everything* succinctly captures the concept of time as *conflict*.

At the end of this chapter, I introduce the time and temporality concepts of Julius Fraser, including the dissonance between the way time is understood and the way it is experienced or felt. In support of the concept of time conflict, I refer to the work of American composer and music theorist Ermir Bejo, specifically Bejo's article *J.T. Fraser's Theory of Time as Conflict*.¹⁴¹

¹³⁹ As previously noted, this nominal convention aligns energy movement from potential (the energy of position) to kinetic (the energy of motion) with the directional convention of the movement from order to chaos as a positive direction of entropy transformation.

¹⁴⁰ Stephen Hawking and Graham Lawton, *New Scientist: The Origin of (almost) Everything* (United Kingdom: John Murray Press, 2016).

¹⁴¹ Ermir Bejo, *J.T. Fraser's Theory of Time as Conflict*. <https://www.ermirbejo.com/writing/j-t-frasers-theory-of-time-as-conflict>

In the presentation of Fraser's canonical forms of time — which are actually *temporalities* (i.e., alternative experiences of time), I examine Fraser's hierarchical system of human temporalities as it applies to music, and in particular improvisation. From the perspective of *time as conflict*, Fraser's system as it applies to the experience and performance of music is thus a classification of the way music is *experienced*.

The way time is experienced is discussed further in the dissertation. For the purposes of this section, it is enough to make the distinction between *physical time* (properties of which we may call time itself) and what may be broadly called *phenomenological time* (the way time is experienced).

As it is understood in physics, most fundamentally, time — or more specifically, the *directionality* of time — is characterizable in the terminology of the second law of thermodynamics (i.e., in terms of the way in which entropy or disorder changes in accordance with the *flow* of time from past to future). This concept is elaborated on in the section that follows.

Phenomenological entropy and the arrow of time as it relates to Research Area 1

Let us draw an arrow arbitrarily. If as we follow the arrow we find more and more of a random element in the state of the world, then the arrow is pointing towards the future ... I shall use the phrase "time's arrow" to express this one-way property of time.¹⁴²

As noted in the previous section, the concept of entropy is intimately associated with the concept of the arrow of time as a vectorial (i.e., directional) concept — a paradigmatically Western *way of seeing things*.

From a mechanics perspective, the concept of entropy (and analogously, phenomenological entropy) is important in the experience of directional motion in music because of this intimate association between the state of randomness of a system and the associated implications of directional time movement within it.

Simply expressed, the concept that time *flows* linearly from present to future is represented in physical processes by the same asymmetrical linear vectoriality as is represented in the second law of thermodynamics — that is, systems spontaneously move in the direction away from order and towards chaos or disorder.

This relationship is such an essential one to the concept of defining time that, in physics, the directionality of the Western arrow of time is theoretically determinable by comparing the randomness of two states. This is evident in the Sir Arthur Stanley Eddington quote above.

More contemporarily, theoretical physicist Brian Greene has defined the directionality of time essentially synonymously with the directional movement from order to chaos — referring to the arrow of time in terms of its association with entropy as the *entropic arrow of time*.¹⁴³

In this final section, I present a graphic model of the conceptual model for the experience of vectorial motion in music as presented in RP 1A, proposing linearity of temporality as one of three dimensions that contribute to the experience of vectoriality in music — the other dimensions being those of hierarchicality and multimodality (refer to Figure 4).

¹⁴² Today in Science History, Sir Arthur Stanley Eddington at https://todayinsci.com/E/Eddington_Arthur/EddingtonArthur-Entropy-Quotations.htm

¹⁴³ Greene, *The Fabric of the Cosmos*, 161.

The concept of gradations of linearity is also presented in the final section of the literature review, *Musical interdisciplinarity* — Fraser, where Fraser's concept of contrasting *umwelts* (or worldviews) of human temporality is presented, with associated musical examples, based upon various levels of degradation of linear time.¹⁴⁴ Graphically, Fraser describes these alternative temporalities in terms of alterations of the metaphorical representation of Western linear time — the arrow of time.

Phenomenological entropy and the arrow of time as it relates to Research Area 2

In *Time in Indian Music*, Clayton asserts there is “clearly a connection between linear conceptions of musical time and wider concerns in European thought”.¹⁴⁵ Further, Clayton cites Gould's position that time's arrow has always been a part of Western ideas and has dominated Western (Judaean-Christian) thought, going back to the Bible.¹⁴⁶ According to Gould, events as they are experienced within the Western paradigm are implicitly understood to occur in accordance with the *arrow of time*, including the implicitly attributed embedded property of *linearity* at the level of phenomenological experience.

The contrasting cultural representations of Western and Eastern concepts of time as respectively *linear* and *cyclic* would seem also to be associated with their contrasting musical forms. In relation to this, Clayton notes (as previously cited) that “relative to Western tonal music” Indian music seems to display non-linear features more prominently and linear features less so.¹⁴⁷ This is an important proposition within the dissertation.

Firstly, the concept of the metaphorical association between Western and Eastern linear and cyclic representations of time and Western and Eastern musical form is the proposition of Secondary RP 2A:

Western and Eastern musical forms can be considered metaphors for the philosophical and cultural paradigms in which they originate, and specifically, for contrasting Western and Eastern representations of time.

Secondly, the major artefact *Oscillation 1* is presented as a composition metaphorical for this concept, as described in RP 2B:¹⁴⁸

The submitted creative work, *Oscillation 1*, because of its harmonic organisation and global form, is a metaphor for the linear and cyclic representations of time in Western and Eastern paradigms.

Phenomenological entropy and the arrow of time as it relates to Research Area 3

The concept of the arrow of time, as represented in the form of linear time as opposed to Eastern cyclic time, is represented in Research Area 3 — the application of the dissertation's theoretical concepts to the performance and analysis of music. Specifically, RPs 3A and 3B present contrasting geometric models of Western and Eastern musical form, based upon Western and Eastern linear and cyclic concepts of time, as *helix* and *vortex*.

¹⁴⁴ Fraser, *Human Temporality in a Nowless Universe*, 159–173. Fraser borrows the term *umwelt* from ethology — the study of animal behaviour, where it is defined as “the world as it is experienced by a particular organism”. <https://www.lexico.com/definition/umwelt>

¹⁴⁵ Clayton, *Time in Indian Music*, 21.

¹⁴⁶ Stephen Jay Gould, *Time's Arrow, Time's Cycle: Myth and Metaphor in the Discovery of Geological Time* (Cambridge, MA: Harvard University Press, 1987), 11, quoted in Clayton, *Time in Indian Music*, 21.

¹⁴⁷ Clayton, *Time in Indian Music*, 25.

¹⁴⁸ This process is described in detail in Appendix 5.

Importantly, in these contrasting geometrical representations of Western and Eastern musical form, it is not time itself that is represented but rather *temporality* (i.e., the experience of time).

For this dissertation, I reference this concept for the experience of time as *phenomenological time*.¹⁴⁹ Accordingly, Research Area 1 concludes with the final concept of phenomenological mechanics — namely, *phenomenological time*. The concept of phenomenological time is further discussed in the literature review under *Musical interdisciplinarity* — Fraser.

Phenomenological machine

The current section brings together concepts from the preceding sections, presented in the integrated concept of the experience of directional motion in music as the experience of a *complex phenomenological machine*, the experience of which may be conceptually represented in terms of the concept *phenomenological mechanics*.

The experience of directional motion in music as the experience of a complex phenomenological machine

In the concluding segment of this section of the dissertation, I present a way in which the experience of musical vectoriality (i.e., the experience of directional motion) may be conceptually represented, as it occurs in a gestalt manner, in real time, at the level of the entirety of the composition.

The experience of directional musical motion experienced in this way is the proposition of RP 1A — that the experience of such directional musical motion is representable as a *phenomenologically determined hierarchically organised, multi-parameter, form-void vector field*.

The conceptual representation of the experience of directional musical motion as a complex phenomenological machine comprises three parts:

1. the *simple phenomenological machine unit* itself — that is, conceptually like the cylinder of a car engine, it is the irreducible unit within which phenomenological energy may be stored and released
2. the *complex phenomenological machine architecture* — that is, the musical organisation of simple phenomenological machine units within a composition, and
3. the phenomenological field within which the musical experience occurs, specifically the *linearity of temporality* of that field.

The sections below discuss each of these contributing components to the experience of directional musical motion as a complex phenomenological machine.

Beforehand, however, it is useful to introduce the concept of simple phenomenological machine unit *multipliers*¹⁵⁰ as a proposed conceptual framework for the representation of directional musical motion

¹⁴⁹ The reasons for this terminology and the use of the term physical time for what has historically been called objective time are described later.

¹⁵⁰ In the model, *multipliers* do not necessarily *increase* the experience of vectoriality — they may also *decrease* or *negate* it. The reason for this, I propose, is because musical modalities — for example, metre — are experienced both as a *vector* and a *wave*. Thus, when multipliers augment the experience of directional motion, they do it by *vector addition* or *wave addition*, or both.

For the first of these, the simple phenomenological machine unit is in its most elementary representation a *vectorial* concept. Multipliers create a vectorial organisation that is both nested within itself (as is the case for the multiplier of hierarchicality) and subject to *vector addition* (as is the case for *multimodality*). For example, in the case of the multiplier of hierarchicality, as represented within the modality of metre as *compound metre*, one level of the metre may be experienced as moving nominally *forwards* (from void to form), whilst another hierarchical level within the compound metre may be experienced as moving *backwards* (from form to void).

at the overall compositional level, rather than at the level of the simple phenomenological machine unit.

Complex phenomenological machine architecture

In the model proposed, the experience of directional musical motion at the compositional level is the experience of a complex phenomenological machine within a phenomenological field — specifically, a phenomenological field of variable linearity of temporality.

In such a conceptual model, a *quantum* of phenomenological energy is contained within a simple phenomenological machine unit.¹⁵¹ Such a quantum of phenomenological energy, contained within the experience of a musical device, passage or section, as a *form-void vector*, provides that section of music with the capacity to be experienced as a vector — that is, as forwards or backwards directional motion.

This quantum of phenomenological energy contained within the simple phenomenological machine unit is then subject to the effect of *multipliers*. Such multipliers may be *intra-organisational* (characteristics of the musical organisational structure) or extra-organisational (characteristics external to the musical organisational structure). In the model that I have presented, the intra-organisational multipliers are those of hierarchicality and multimodality.

The extra-organisational multiplier is that of the phenomenological field of *linearity of temporality*.

When metre is experienced vectorially, each contributing hierarchy of the compound metre contributes to vector addition.

When the phenomenological vectors are moving in *opposite* directions, and the multiplier subjects the phenomenological vector to vector addition, the result (because the vectors are moving in opposite directions) is *reduction* in the absolute value of the experience of directional motion — effectively, the *difference* between the absolute values of the vectors in the direction of the larger.

An example of this concept in Eastern music is the common metre of 16-beat *teentaal* (in Hindi तीन ताल). Unlike Western 4/4 music, however, teentaal is not simply 4 x 4/4 bars. Rather, although it contains 16 *matras* (i.e., beats), these are organised into 4 *vibhags* — literally *departments*. Whereas the first beat of the 16-beat cycle commences with *sam*, the ninth beat, *khali*, is empty. For example, in the 13th beat of teentaal, at the level of *matra* (i.e., beat), the cycle is moving *backwards* to completion.

In contrast to this, within the four-beat unit of beats 13, 14, 15 and 16, at beat 13 the cycle is at the beginning and thus experienced as moving *forward*. At beat 13 of teentaal, the phenomenological vectors are subtractive and the experience of directional motion, after the multiplier of hierarchicality, is subtractive.

In contrast to this, at beats 15 and 16, the two cycles — the 4-beat cycle within the 13, 14, 15, 16 beat section and the 16-beat cycle within the 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 cycle — are *both* moving backwards to completion. The effect of the multiplier of hierarchicality at this point is one of being *additive* — the metre is experienced as strongly moving towards completion.

Secondly, musical modalities are also experienced as phenomenological waves. Like any wave, when one wave is active in the presence of another — like ripples on a pond — they are subject to wave *interference*. If the waves are *in phase* (as is the case for teentaal at the beat 15 and 16 part of the cycle), the effect of the multiplier of hierarchicality is one of *increasing* the absolute values of the amplitudes of the contributing waves. Conversely, when the wave patterns are *out of phase* — as they are at beats 13 and 14 — the overall amplitude is the *difference* between the absolute values of the amplitudes of the contributing waves.

This concept has direct relevance to minimalist and process music. The experience of musical motion in Steve Reich's (1967) *Piano Phase* may be represented in this way (<https://www.youtube.com/watch?v=gzuHmCWD3nA>).

¹⁵¹ I use the term *quantum* here because at the level of the simple machine unit, the transformation of state occurs at a particulate level. In metre — at least when metre (using 2/4 metre as the example) is considered in terms of its components — there are two phenomenological energy states: beat 1 (home or void) and beat 2 (away for form). A movement in metre from beat 1 to beat 2 is, therefore, analogous to “quantum transformation”, which is understood to occur when an electron “jumps” from one orbital — its home of void state orbital — to an energetically higher orbital. This process is understood to absorb or require a quantum (i.e., a fixed and indivisible amount) of energy, releasing a photon of light in the process.

The complex phenomenological machine as a simple phenomenological machine unit plus multipliers — engine analogy

The concept of the experience of directional motion as a complex phenomenological machine experienced within a phenomenological field of linearity of temporality is representable by the following analogy of contributing concepts:

- Simple phenomenological machine unit (e.g., 1-cylinder engine)
- Hierarchicality: *multiple cylinders* (e.g., 3-cylinder engine)¹⁵²
- Multimodality: *multiple vehicles* (e.g., five vehicles,¹⁵³ each with one 3-cylinder engine)
- Phenomenological field of linearity of temporality (e.g., the force and direction of the wind).¹⁵⁴

These concepts are further described individually, as they represent the sub-propositions of RP 1A. At the end of the section, they are represented graphically.

Simple phenomenological machine unit

The first of these is a reprisal of the representation of the *phenomenological machine unit* — represented as the phenomenologically determined form-void vector.

Regarding the sub-propositions, which together comprise the conceptual model for the experience of directional motion in music as a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field*, the phenomenological machine unit as a phenomenologically determined form-void vector contains the propositions of *phenomenological determination* and the representation of the conceptual unit of experienced directional musical motion as the *form-void vector*.

Conceptually, the phenomenological machine unit is proposed to function as the *phenomenological molecule* within which the experience of directional motion may be conceptually represented, permitting the experience of *directional musical motion*.

Multipliers of complex phenomenological machine architecture as hierarchicality x multimodality x linearity of temporality

The concepts of *hierarchicality* and *multimodality* are directly represented in RP 1A in terms of the sub-propositions of the model. The third multiplier of the experience of vectoriality — that of *linearity of temporality* — essentially is the extent to which one's experience of time is linear in accordance with the Western concept of the arrow of time.

¹⁵² The number of cylinders proposed in the example is three because this directly correlates with the three layers of compound metre in the major artefact *Oscillation 1*, as demonstrated in Appendix 7.

¹⁵³ Similarly, the number of vehicles proposed in the example is five because this correlates with the five modalities of metre, melody, harmony, modulation, and global form regarding *Oscillation 1*, as demonstrated in Appendix 7.

¹⁵⁴ This analogy, though useful for visually representing the concept of multipliers, warrants some qualifications.

Firstly, the cylinders, for reasons related to the additive and subtractive vector and wave phase processes, are not always moving the vehicle in the same direction.

Secondly, the concept of a phenomenological field of linearity is not only a multiplier but an enabler — thus, when it has a zero value (as in music experienced as *atemporal*), there is (conceptually at least) no vectorial experience. Although the phenomenological field of linearity or temporality is analogous to it, it is more accurately analogous to the effect of wind as it affects the motion of a *sailboat* rather than a car. The reason is, unlike the car whose motion is *affected* by wind but not enabled by it, the sailboat is enabled by wind — when there is no wind, it does not move at all. This is analogous to the effect of linearity of temporality on vectoriality. When there is no linearity of temporality — as in atemporal music — there is no experience of directional musical motion.

Linearity of temporality is discussed in detail at the end of this chapter in regard to the concepts of alternative human temporalities, as proposed by Fraser in his (1992) “Human Temporality in a Nowless Universe”.¹⁵⁵ The concepts of hierarchicality, multimodality, and linearity of temporality as multipliers of the experience of directional motion in music are represented in Figure 4 below.

Conceptually, the volume of the cuboid — the brick-shaped figure — is linearity of temporality x hierarchicality x multimodality, as phenomenologically determined. This represents the vectoriality experienced in the experience of music at any given time, as conceptually represented by the model, in the experience of directional musical motion as a complex phenomenological machine.

The figure is drawn with diagonal lines onto an arrow, which represents time. It is drawn in this way to indicate that the experience of directional movement in music varies in real time, contingent on the linearity of temporality one brings to the experience of musical listening — as it changes in real time. In addition to the intra-organisational multipliers of hierarchicality and multimodality, linearity of temporality is thus an additional dimension, a phenomenological field, changing in real time.

Representing the concept of vectoriality in this way is not to deny that certain compositional structures facilitate the experience of directional motion more than others. It is simply to represent the component of this process, which resides within the listener based upon their experience of time, as aligned with, in Kramer’s terminology, the level of *teleological listening* one brings to the experience of music.¹⁵⁶

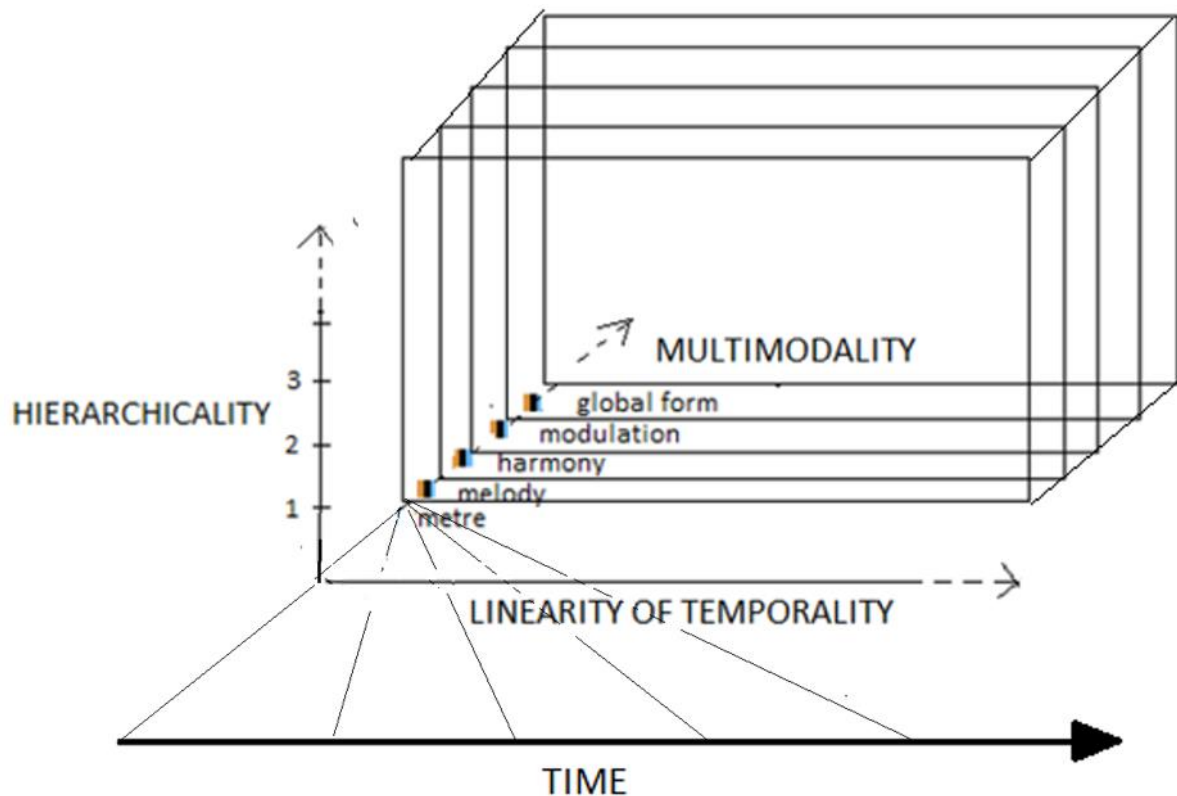


Figure 4: Multipliers of vectoriality

¹⁵⁵ Fraser, “Human Temporality in a Nowless Universe,” 159–173.

¹⁵⁶ Kramer, *The Time of Music*, 378–379.

Figure 4 is thus a representation of RP 1A, at the level of the complex phenomenological machine (i.e., including hierarchicality and multimodality as multipliers), with the addition of the phenomenological field of *linearity of temporality* — that is, the extent to which the music is experienced within a horizontal temporality, aligning in its temporality with the arrow of time.

Linearity of temporality as it applies to Research Area 3 — Applications of theory to music performance and analysis

Highly conceptual though it may be, it is my view that this concept has practical application to the performance and analysis of music, particularly improvised music. As such, this concept is the fundamental concept on which the alternative geometrical models of musical form — as *helix* and *vortex* — are based, as presented in Research Area 3. This is considered further in Chapter 3.

Practical applications to music analysis

As an example of the practical application to the *analysis* of music, I present the short (approximately six-minute) improvisation for fretless octave guitar, *Beginner's Mind*, as an example of a musical piece with relative vertical rather than horizontal temporality and having the musical form of *vortex* rather than *helix*.¹⁵⁷ This is also considered further in Chapter 3.

Extension of Zuckerkandl's (1956) wave theory of metre

[Regarding 2/4 metre] To be able to come back, one must first have gone away; now we understand why we count one-two, and not one-one. Here “two” does not simply mean “beat number 2” but also “away from”.¹⁵⁸

In summary, the presentation in this section of a conceptual model for the experience of directional motion in music — RP 1A — is an extension of a proposition originally arising from Zuckerkandl's (1956) wave theory of metre, explored in regard to underlying concepts and assumptions and generalised to other musical parameters via the process of a thought experiment.

Of special relevance to the dissertation's inquiry into the nature of directional motion in music is the implicit concept within Zuckerkandl's statement that *vectoriality* — the directionality inherent within the meaning of going away and coming back — *is contingent upon a dualistic representation of space and time*.

The concept of *going away and coming back* necessitates a minimum of two distinct conceptual places — a *home* to go away from (or come back to) and a different place — an *away* place to go to.

Such dualistic representation, I propose, reflects a deeper paradigmatic position — that of Western form-void mutual exclusivity, as opposed to Eastern form-void mutual inclusivity. This concept is graphically representable as Western form-void “switch” versus Eastern form-void “taijitu” in Figure 5.¹⁵⁹

¹⁵⁷ The octave guitar is described in Appendix 6.

¹⁵⁸ Zuckerkandl, *Sound and Symbol*, 168.

¹⁵⁹ The paradigmatic dualism within Zuckerkandl's statement is implicit within the meanings Zuckerkandl attributes to beat one and beat two of the bar. “One” and “two” thus function not as numbers in succession but rather as the musical representation of opposites. In this way, the 2/4 measure is emblematic for dualistic space and time. Considered as such, the opposition of beats “one” and “two” is a metaphorical representation of the opposition of form and void itself. The 2/4 measure is thus a form-void couplet — containing within its inherent structure, the essence of *Westernness* — premised upon the Western philosophical pillar of duality, and the implicit ontological position of form-void mutual exclusivity — as opposed to Eastern form-void mutual inclusivity.

This concept is, I propose, exquisitely useful for characterising an important distinction between Western and Eastern “ways of thinking” because such a distinction reflects Western and Eastern music forms. Appendix 2 examines this

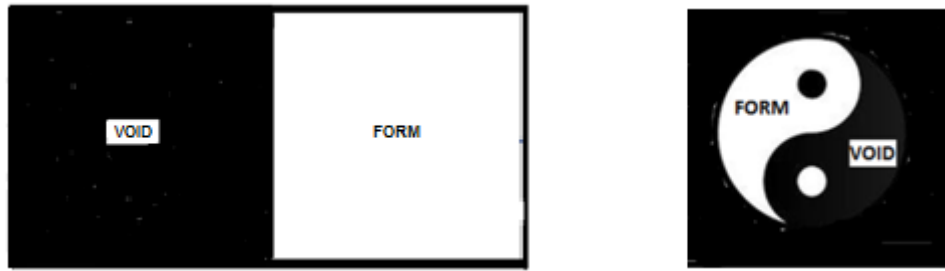


Figure 5: Western form versus void and Eastern form-void, represented as switch and taijitu, respectively

Extending from Zuckerkandl's concept, I have further used the term *phenomenological machine unit* to describe the experience of directionality as represented within an essential phenomenological unit. Such a simple phenomenological machine unit functions analogously to a simple physical machine, albeit within the phenomenological rather than the physical realm.

In describing how such a phenomenological machine may be conceptually represented to function, I have introduced the term *phenomenological mechanics*.

From these concepts, I have proposed a conceptual model of the way vectoriality is experienced at the compositional level in terms of overall forwards (void to form) movement, corresponding with the musical experience of *development*, and overall backwards (void to form) movement, corresponding with the musical experience of *resolution*.

Following the *Further concepts* section below, which introduces the concepts of the *quantum phenomenological machine* and *quantum phenomenological mechanics*, Research Area 1 concludes with a summary of this section of the thought experiment as it extends Zuckerkandl's concepts relevant to the experience of directional motion in metre. This is presented in the final segment of this section: *From wave theory to phenomenological mechanics — 10 steps*.

Further concepts

Although its consideration in detail is beyond the scope of the current dissertation, the model presented in RP 1A and RP 1B is arguably comparable and analogous in its structure and function to the atomic structure and behaviour, as proposed by Max Planck in his (1899) discovery of the quantum behaviour of light. Specifically, comparison is made to Planck's representation of atomic behaviour in terms of electrons *jumping* from a lower more stable to a higher more unstable electron orbital path — an observation that heralded the beginning of quantum mechanics.¹⁶⁰

Such a proposition invites consideration of the concepts of *quantum phenomenological mechanics* and *quantum phenomenological machine*, as briefly introduced as the final concept of this section of the dissertation.

paradigmatic distinction in further detail, specifically proposing how this intercultural distinction manifests in the disciplines that inform music and in Western and Eastern music itself.

Bringing attention to this distinction permits an expansion of the way improvised music is potentially approached, performed and analysed. It also provides a terminology and language for these processes.

From an artistic perspective, it permits improvised music to be performed from a rich palette of musical possibilities, as reflections of this Western-Eastern distinction.

¹⁶⁰ Rosenblum and Kuttner, *Quantum Enigma*, 56.

Final concept — the experience of directional motion in music as quantum phenomenological mechanics

As noted in the section *Development and resolution defined as “negative” and “positive” transformations of phenomenological energy and phenomenological entropy*, the concepts of musical development and resolution are representable as forwards and backwards movements between two alternative states, one of which (relative to the other) is stable, the other (relative to the first) unstable.

Referencing Zuckerkandl’s proposition that metre “to be able to come back, one must first have gone away”, such a representation of metre, for example, has a stable (home) position (beat 1) and an unstable (away) position (beat 2).¹⁶¹

As noted above, in the terminology of phenomenological mechanics, development and resolution may be considered as “negative” and “positive” transformations of phenomenological energy and phenomenological entropy, respectively. Expressed in plain English, development and resolution may be represented as respective movements between states of stability and corresponding states of relative instability.

This concept is represented from the analogous perspective of quantum mechanics, as follows:

An electron would vibrate for a while at constant energy ... Then randomly and without cause ... it would suddenly lose a quantum of energy, radiating it as pulse of light. [Rosenblum and Kuttner’s description of Max Planck’s discovery that light consisted of quantum particles — the *quantum hypothesis*].¹⁶²

Although, as noted in the previous section, its consideration in detail is beyond the scope of the current dissertation, the model presented in RP 1A and RP 1B in its final consideration is comparable in its structure and behaviour — that is, in its *mechanics* — to the atomic structure and function proposed by Max Planck in his (1899) discovery of the quantum behaviour of light.

In this model, a photon of light, carrying a quantum of indivisible energy, is absorbed when electrons jump from a stable orbit to a more unstable orbit further away from the atomic nucleus and released when the electrons jump back.

It is difficult to overestimate the significance of Planck’s scientific discovery. His proposition was “so violently in conflict with common sense” that it “violated ... the most fundamental laws of physics”, heralding the dawn of the “quantum revolution”.¹⁶³

Nonetheless, the concept that movements between stable and unstable states have the capacity to define directionality — physically or phenomenologically — is a direct application of the concept of phenomenological mechanics to characterising the experience of directional motion in music.

Quantum phenomenological mechanics

In essence, such a representation is one of *oscillation* between stable and unstable states.

The final concept of this section is the analogous consideration of the dissertation’s concept of a simple *phenomenological machine unit* in terms of Planck’s radical and revolutionary quantum hypothesis. Such a concept may be considered *quantum phenomenological mechanics*.

¹⁶¹ Zuckerkandl, *Sound and Symbol*, 168.

¹⁶² Rosenblum and Kuttner, *Quantum Enigma*, 56.

¹⁶³ Rosenblum and Kuttner, *Quantum Enigma*, 53.

Quantum phenomenological mechanics, as it applies to music, is thus the concept of the experience of directional motion in music being representable as a complex structure of indivisible units, each one having the capacity to function as a *quantum phenomenological machine* moving between phenomenological states that are, relative to one another, stable and unstable.

The experiences of musical development and resolution in terms of quantum phenomenological mechanics

Development and resolution in terms of quantum phenomenological mechanics — local level

Represented in terms of quantum phenomenological mechanics, the experience of musical development is characterizable both at the simple phenomenological machine unit level and the complex phenomenological machine level.

Represented at the simple phenomenological machine level, the experience of development occurs as *quantum jumps* between states of void and form that, relative to one another, are stable and unstable, respectively.

As noted in the previous section, referencing Zuckerkandl's proposition about metre (that "to be able to come back, one must first have gone away"), such a representation of metre has a stable (home) position (beat 1) and an unstable (away) position (beat 2).¹⁶⁴ The movement between these stable (home) and unstable (away) states — at least when metre is considered as a particle stream rather than a wave — accords directly with the quantum representation of movement between low and high energy states (electron orbitals) of the atomic structure.

The concept of *musical development* from a *quantum phenomenological mechanics* perspective (at the level of the simple phenomenological machine unit) is the concept of phenomenological energy transformation that occurs when a musical element, device or passage is experienced as moving from its stable (void) state to its unstable (form state).

Whereas in quantum physics such movement is understood to occur as electron jumps between inner and outer orbitals, acquiring or releasing in the process a quantum of energy, in quantum phenomenological mechanics, as it applies to the experience of directional motion in music, the *jump* that occurs is a jump between a stable musical void state and an unstable musical form state.

Using the example of 2/4 metre, the first beat functions as the stable *home* (or void) undeveloped state (analogous to the lower energy electron orbit), and the second beat functions as the unstable away (or form) developed state (analogous to the higher energy electron orbit),

Referencing concepts from Cage and others, Research Area 2 examines the specifics of this process — what constitutes musical form and musical void in different musical contexts.

Development and resolution at the *local* level — that is, within a single parameter, not hierarchically represented (e.g., within the experience of directionality as it arises, for example, in simple 2/4 metre) — is thus the negative and positive energy transition between void and form states as they are represented within the concept of a simple phenomenological machine unit.

The determination of direction between stable and unstable states accords with the concepts of *endothermic* and *entropy-reducing* transformations, as determined by the first and second laws of thermodynamics — *conservation of energy* and *order and chaos*, respectively.

¹⁶⁴ Zuckerkandl, *Sound and Symbol*, 168.

Development and resolution in terms of quantum phenomenological mechanics — *compositional level*

Development and resolution at the *compositional* level is the same concept, albeit subjected to the effects of multipliers. These multipliers (hierarchicality, multimodality, and linearity of temporality) are categorizable as *intra-musical organisational* multipliers and *extra-musical organisational* multipliers.

Intra-musical organisational multipliers — hierarchicality and multimodality

Intra-musical organisational multipliers are those multipliers that arise from *within* the structure of the music.

In the current conceptual representation, hierarchicality and multimodality are both *intra-musical organisational* multipliers because, as per the above characterisation, they arise from within the structure of the music. In the example of *Oscillation 1*, as analysed in Appendix 7, the three-level *hierarchicality* of the 24-beat metre is inherent in the structure of the composition. Similarly, the composition has inherent multimodality.¹⁶⁵

Appendix 7 demonstrates the composition's proposed *polar couplet cell* structures, and associated *form-void vectors*, and simple phenomenological machine units within five modalities: *metre* (dominant and non-dominant beats), melody (call and response), harmony (tonic and dominant) modulation (home key and away key), and global form (theme and variation).

Extra-musical organisational multipliers — linearity of temporality

The experience of directional phenomenological motion at the compositional level also occurs subject to the effect of extra-musical organisational multipliers.

In the dissertation, the extra-musical organisational multiplier proposed is that of linearity of temporality. This term, as used in this context, equates with the concept of a *phenomenological field* — the field of expectation.

The meaning of *extra-musical organisational multipliers* is thus the phenomenological field of expectation that a listener *brings to* the experience of music in the form of expectation.

As such, linearity of temporality in its *extra-musical organisational* sense is the phenomenological field of expectation that a listener brings to the experience of music, especially in the context of *individual exposure and conditioning within a cultural paradigm*.¹⁶⁶

From wave theory to phenomenological mechanics — 10 steps

The following section details the stepwise way in which Zuckerkandl's implicit concept of vectoriality in metre is explored, extended and generalised, to arrive at the final concept of the primary RPs — the concept that the experience of vectoriality in music can be considered in terms of the broader concept of *phenomenological mechanics*.

¹⁶⁵ To demonstrate the concept — noting that the model proposed considers musical experiences as they are phenomenologically determined — it is assumed that a listener experiences the compound metre and multimodality in the way described.

¹⁶⁶ This concept is graphically represented in Figure 14. Importantly, this is a different concept from the concept of *linear composition*, which arises *within the musical structure itself*. Although the concept of linear composition is deemed worthy of in-depth consideration, it is not the concept being described in the current section. Regardless of the intended linearity of compositional techniques used, such *linear composition* as relevant to the model depends on the extent to which it is *experienced* as linear by the listener — rather than the extent to which it is linear as a compositional technique — because the current model is a phenomenologically determined model.

The 10 steps from Zuckerkandl's initial proposition — reiterated below — to the dissertation's concept of phenomenological mechanics are summarised as follows:

1. The dissertation makes explicit its position that, in the experience of music, vectoriality is phenomenologically determined. Although Zuckerkandl doesn't describe musical movement as occurring in a vectorial way, *using that term*, in his description that (in 2/4 metre), there is an experience of movement away from one beat (and towards the other) the allusion to the experience of vectoriality is nonetheless there, albeit implied.¹⁶⁷
2. The dissertation extends Zuckerkandl's concept to propose that the experience of such movement is representable at a phenomenological level as the movement between phenomenological attributions of "form and void" states. The term I use for such experiences, arising from within music, is "phenomenologically determined form-void vector". In 2/4 metre, for instance, beat 1, having the attributional quality of home is a void state, and conversely, beat 2, having the attributional quality of away, functions as a form state.
3. The dissertation proposes the following as functioning as form and void, depending on context.
 - Sound and silence
 - Dominance and non-dominance
 - Steady state and change
 - Expectation fulfilment and surprise.¹⁶⁸

Thus, the phenomenological experience of 2/4 metre is one of alternation of "to and fro" movements between void and form states or "poles", as the representations of beat 1 and beat 2, respectively. In this example, beat 1 has the relative attribution of dominance, and beat 2 has the relative attribution of non-dominance. What is necessary to the experience of vectoriality represented in this way is not the number of beats in the bar but that *there is at least one level of non-equality* — for example, of dominance and non-dominance. Such a property is an inherent property of metre (as opposed to metreless pulse). Such differentiation and asymmetry permit the structure to be represented as a polar couplet cell.

4. The dissertation proposes that polar couplet cell structures — as has been described for 2/4 metre — are potentially *hierarchically organised*. This concept is consistent with Kramer's concept of tonal music being defined by "hierarchical closures".¹⁶⁹
5. Phenomenologically determined polar couplet cell structures are not a property unique to metre. Rather, polar couplet cell structures — facilitating the potential experience of directional motion — are experienceable across multiple musical modalities — including melody, harmony, modulation, and global form. Appendix 7 provides an example of this concept, for the parameters of metre, melody, harmony, modulation, and global form, as it applies to the artefact, *Oscillation 1*.

¹⁶⁷ Zuckerkandl, *Sound and Symbol*, 168, quoted in Clayton, *Time in Indian Music*, 20.

¹⁶⁸ This concept is discussed in further detail in *Research Area 2: Composition as Intercultural Metaphor* and in the literature review under *Musical phenomenologies* — Cage.

¹⁶⁹ Kramer, *The Time of Music*, 137–8.

6. The overall *compositional* experience of musical vectoriality — of a composition moving forwards or backwards — is an *aggregation* of phenomenologically determined, hierarchically organised vectorial experiences arising from the phenomenological representation of form-void polar couplets at multiple levels, including metre, melody, harmony, modulation, and global form. Such a representation is consistent with the concept, as presented in RP 1A, that music may be experienced as a *phenomenologically determined, hierarchically organised, multimodality, form-void vector field*.¹⁷⁰ Such a vector field is phenomenologically experienced as the *vectorial sum* of all contributing vectors, as they are experienced, to produce a net or *aggregate vector*.
7. RP 1B proposes that the musical terms *development* and *resolution*, as they apply to the experience of direction in a composition, correspond to the phenomenologically determined aggregate vector being net *positive* (nominally *forward moving*) and net *negative* (nominally *backward moving*), respectively.
8. The dissertation proposes that the phenomenological experience that arises from the representation of musical movement in terms of time and motion not only permits the possibility of vectoriality but also the possibility of other phenomenological vectorial concepts, including phenomenological charge, phenomenological force, phenomenological field, phenomenological energy, phenomenological entropy, and phenomenological work.
9. The analogous functioning of the experience of directional motion in music invites the concept that the experience of music is akin to that of a *phenomenological machine*. It is proposed that the concept of the experience of music being machine-like is appropriate for two reasons. Firstly, the conceptual structure of the form-void couplet cell is analogous to that of a simple machine. Secondly, the experience of directional musical is consistent in its conceptual representation with the behaviour of physical matter acting under the laws of nature. Such laws include Newton's third law of motion (that all actions beget an equal and opposite reaction) and the first and second laws of thermodynamics — the laws of *conservation of energy* and of *order and chaos*.
10. Collectively such concepts invite the concept of *phenomenological mechanics*. The dissertation defines phenomenological mechanics as *a novel concept that examines the experience of subjective phenomena such as time, directional motion and related parameters in terms of the laws of mechanics, which govern the behaviour of physical bodies in the natural world*. It is proposed that such a concept has potentially broad application within and beyond the discipline of music.

¹⁷⁰ Kramer has also used the term “vector field”, albeit without a detailed discussion of the concept (Kramer, *The Time of Music*, 46).

Kramer's use of the term *vector field* is comparable to how the term is used in the dissertation, the similarity arising from the position that a collection of vectors forms a *vector field*.

The concept of vector field is not in itself a novel concept — Kramer's application of the concept to temporal vectors (i.e., vectors of the experience of time that together are experienced as a vector field) is, however, novel. While Kramer's use of the term refers to the experience of directional *time*, the current dissertation applies the term to the experience of directional *movement* — a different concept.

It is not surprising that the same concept (i.e., vector field) should apply both to the experience of directional time and to the non-equal but related concept of directional movement. This is because of the inherent relatedness of the phenomenological experiences of time and motion.

Research Area 2: Composition as Intercultural Metaphor

Musical phenomenologies

Directional musical motion as spatial temporal metaphor

The cycle is a spatial-temporal metaphor used in order to clarify, mediate and communicate subjective musical experience, Musical metre is no more a cycle or a wheel ... than it is a ruler or tape measure.¹⁷¹

As previously noted, but worthy of reiteration, the *journey* transcribed in the experience of directional musical motion is not a physical journey. It is a conceptual journey. Using Clayton's words, the experience of directional musical movement is a *spatial-temporal metaphor*.

Furthermore, the musical journey transcribed by the experience of directional musical motion is a *subjective musical experience*. In the terminology of the dissertation, as described in the first sub-proposition of the model proposed in RP 1A, the *journey* — as mapped out by its conceptual reference points (such as those of home and away) — is *phenomenologically determined*.

Phenomenological determination

Research Area 1 applied concepts from mechanics to a phenomenological experience to propose a way to represent the experience of directional motion in music conceptually. Research Area 2 now examines the conceptual reference points themselves — the compositional devices to which the attributed meanings of void and form (or home and away) may apply to permit a conceptual journey from one pole to the other — and with it the experience of directional musical motion. These are presented as four musical devices, represented as polar couplet cells. As introduced earlier, they are silence and sound, non-dominance and dominance, steady state and change, and expectation fulfilment and surprise.

The current section also examines the nature of the phenomenological experience of transition between such conceptual reference points (i.e., the nature of the *journey itself*). Derived from Zuckermandl's (1956) wave theory of metre,¹⁷² the musical journey is thus examined both as a transition in *discrete* steps and as a *continuous* transition.

It does so by borrowing a concept from Einstein's 1921 Nobel-prize-winning discovery of the photoelectric effect — the dual wave and particle nature of light. In this section, as an application of phenomenological mechanics, I thus consider the phenomenological experience of the experience of musical movement from the alternative perspectives of wave and particle stream.¹⁷³

The examination is initially applied to simple metre, then to compound metre (representing the *hierarchical organisation* subcomponent of the model) and then to other musical parameters beyond metre (representing the *multi-parameter* subcomponent of the model) — those of melody, harmony, modulation, and global form.

¹⁷¹ Clayton, *Time in Indian Music*, 18–19.

¹⁷² Zuckermandl, *Sound and Symbol*, 168.

¹⁷³ A detailed discussion of this concept is beyond the scope of the dissertation. Further detail is, however, presented in Appendix 4.

At the end of this process, I present figurative (rather than literal) graphical representations of the conceptual model proposed in RP 1A, from “Cartesian”, “particle stream”, and “phenomenological wave” perspectives.¹⁷⁴

Compositional devices as polar couplet cells

In the terminology of the dissertation, I present four *specific polar couplet cells*. It is from such polar couplet cell structures, phenomenologically determined, that, I propose, *form-void vectors* conceptually arise. These compositional devices thus provide a framework for conceptualising the experience of directional music.

In no way do I suggest that these four compositional devices are an exhaustive list of the phenomenologically determined conceptual reference points within which directional musical motion may be represented — rather, the four chosen polarities are simply those that are most apparent in my own experience of directional musical motion.

The concept, however, is a transferable one — if a compositional device is representable as a polar cell couplet, then inherent within the phenomenological representation of its polar couplet cell structure is the capacity for the experience of directional musical motion.

Absolute and relative concepts of musical form and void

Because of their polar couplet cell structure, each of these couplets represent two contrasting states: a void state and a form state. As presented in more detail further in this section, these contrasting void and form states, in their broadest characterisation, may be considered *context-dependent non-salience* and *context-dependent salience*. These concepts are presented as broad definitions of musical void and musical form.

The advantage of such a broad definition of musical form is that it is as equally applicable to the conceptual representation of the experience of directional musical motion in *non-traditional* (including avant-garde and postmodernist) contexts as it is to traditional musical contexts.

The concept of *absolute* and *relative* (i.e., context-dependent) representations of musical form and void is examined in more detail further in the section.

Development and resolution as form-void vectors

Each of the previously described four compositional devices, by having a polar couplet cell structure, are representable as comprising a void (home) state and a form (away) state. Musical *movement* may thus be conceptually represented as the phenomenological experience associated with the transition between these two opposing states.

When the transition is from the void (home) state to the form (away) state, the transition is experienced as moving in a nominally *forwards* motion — an experience aligned with the experience of musical *development*. Conversely, when the transition is from the form (away) state to the void (home) state, the transition is experienced as moving in a nominally *backwards* motion — an experience aligned with the experience of musical *resolution*.

A quantum phenomenological mechanics perspective of musical development

Because the state of *void* or *home* is the default state of the system, conceptually the home state represents the stable state. In the example of metre, this is beat 1. Conversely, the *form* or *away* state

¹⁷⁴ Later in this chapter (Section B: Thought Experiment), I present a summary of the concepts from which these representations are derived. Further details are considered beyond the scope of the dissertation but suitable for further research.

is experienced as the unstable state of the pair. In the example of metre, this is beat 2 (or all other non-dominant beats).

Considered in this way, the experience of a single measure of 2/4 metre, in its *forwards* movement from beat 1 to beat 2, is a movement from a state of (relative) *stability* to a state of (relative) *instability* (and conversely for the beat 2 to beat 1 backwards movement).

The experience of metre as a succession of measures is thus representable as a repeated cycling between two states — one of which is phenomenologically experienced as stable (beat 1), the other as relatively unstable (beat 2).

As previously noted, such movement between stable and unstable states is analogous to quantum behaviour at the atomic level — namely, the *jumping* between inner and outer stable and unstable electron orbitals, as described by Planck and heralding the quantum “correction” of Newton’s classical mechanics.¹⁷⁵

In this section, the four compositional devices that I propose (i.e., *silence and sound*, *non-dominance and dominance*, *steady state and change*, and *expectation fulfilment and surprise*) function phenomenologically as polar couplet cells and are the musical representations of such stable and unstable states, on which the analogy with quantum mechanics is made.

Such a perspective may be considered a *quantum phenomenological mechanics* perspective of metre.

More generally, wherever there is the phenomenological experience of movement between the stable (void) and unstable (form) states of a polar couplet cell, there exists a phenomenological structure with the capacity to facilitate the experience of directional movement. Movement in the direction from stable to unstable state corresponds to the experience of *development*. Conversely, movement in the opposite direction corresponds with the experience of *resolution*.

Moreover, such development and resolution movements can occur both locally (e.g., at the level of melody, harmony, modulation, or global form) and, when aggregated, globally (i.e., at the level of the whole composition).

Such a perspective may be considered a *quantum phenomenological mechanics* perspective of musical development and resolution.

General and specific meanings of void (home) and form (away) concepts

The general concept of “home” is that of a resting point. This common concept of home as a void or an *at rest* state is a shared concept — the meaning is contained within the idea of home.

This is an ideal and impersonal concept.

In its *idealness*, it is effectively a *platonic* concept.

Specific phenomenological form and void objects

In contrast to this, the specific (i.e., personal) meaning of home — as *my home*, the conceptual place I understand or experience as a home or resting place *for me* — is determined by my own personal framework of concepts.

¹⁷⁵ Rosenblum and Kuttner, *Quantum Enigma*, 56.

The place that I call “home” is thus not a shared concept. In its specificness, it is an individual and subjective concept.¹⁷⁶ This concept is demonstrated in more detail in Appendix 3, where the various sections — seat, cabin/carriage, train — each function as either home or away for the Western commuter. The attribution of meaning of “home” to each of these states is self-evidently a personal (and transient) one. Further, these meanings of “home” are nested within one another — that is, they are hierarchically organised.¹⁷⁷

Conversely to this (also referencing Appendix 3’s exemplification of the concept), the experience for the Indian conductor is that, wherever she is on the train, she is *always at home*.

Culturally shared epistemology and individual phenomenology

The scenario described in Appendix 3 also provides an opportunity to distinguish between two related concepts that contribute to the experience of directional motion in music, at the level of phenomenological determination. Thus, the concept of “home” has both a *culturally shared epistemology* and an *individual phenomenology*.

The way one knows home is to some extent culturally determined. The actual experience of “my home” is nonetheless ultimately phenomenologically determined, albeit within a cultural context.¹⁷⁸

Form-void vectors

RP 1A proposes a *phenomenologically determined, hierarchically organised, multiparameter, form-void vector field* model for the experience of directional motion in music.

The prior section (phenomenological determination) introduced the dissertation’s position regarding the first of these propositions — that the experience of directional motion in music is ultimately *phenomenologically determined*. In other words, it is established in accordance with the individual and subjective meanings one attributes to the experiences of sound (or its absence) as music.

In this current section, I now consider the defining terms of the next proposition — that is, the nature of the *form-void vector* itself.

¹⁷⁶ The specific meaning of *my home* (as opposed to the general meaning of *home*) is individual and subjective for two reasons. Firstly, because my experience of being at home (or not) is a private experience. In philosophical terms, it has *epistemic privilege*. In the manner of *Cartesian* logic, only I can experience it and thus only I can know it. (The term *Cartesian* here is used in specific reference to Descartes’s principle *cogito, ergo sum* — *I think, therefore I am*.)

Secondly, the specific meaning of *my home* is individual and subjective, not because of my epistemic privilege of experiencing my own thoughts, but because the physical place experienced as home is itself individual and subjective. To use an example, if I was born in the city and lived my whole life in the city, a journey from city to country would be experienced as an adventure — in musical terms a *development* — based upon my phenomenological attribution of city as home. Conversely, the movement from the country back to the city would be experienced as a return to home — in musical terms a *resolution*. In principle, the same journey would be experienced in opposite terms if I lived in the country rather than the city — the concepts of home and away are thus only meaningful within a personal framework.

The concept of epistemic privilege is described in John Heil, “Privileged Access,” *Mind*, Volume XCVII, Issue 386 (April 1988): 238–251, <https://doi.org/10.1093/mind/XCVII.386.238>

¹⁷⁷ For the Western commuter, the *seat* is his home within the *cabin*, the *cabin* is his home within the *train*, and the *train* (inclusive of cabin and seat) is his home (for the night at least) within *India*. These nested concepts of home are presented as allegorical of the nested concepts of “home” as experienced in compound metre and are particularly relevant to the more complex metres of Indian classical music.

¹⁷⁸ This concept is equally applicable to the experience of music. For example, in the phenomenological experience of 2/4 metre, it may be said that experiencing beat 1 of 2/4 metre as “home” is a culturally shared experience — it is part of our musical education, exposure, and conditioning. Nonetheless, either in accordance with one’s culturally shared epistemology or despite it, the experience within 2/4 metre of “home” is ultimately an individual and unique one.

This concept is represented in Figure 15 at the end of this chapter, which functions as a summary. The concepts of culturally shared epistemology and individual phenomenology are described in the Interculturalities section of the figure, and its sub-sections of “cultural paradigm” and “individual condition and exposure”.

Reprising the concept, the form-void vector is the experience of directional motion that arises when one experiences a change of state between the poles of a polar couplet cell, one of which is phenomenologically represented as void, the other phenomenologically represented as form.

Musical form

In examining the specific nature of how the experience of directional movement is represented as a form-void vector — the experience of a directional movement between form and void — it is necessary to consider the following questions:

- What is musical form, and its converse, musical void?
- How are these musical concepts phenomenologically experienced?

These questions are addressed in the next section.

Absolute and relative concepts of musical form and void

In a simpler time in history, the answer to the question “What is musical form?” was a relatively simple one. Musical form could be considered the sound of an instrument or voice, and musical *void* was its absence, the silent space before and after a piece of music into which musical form, as audible sound, is introduced.

The essence of the meaning of musical form represented in this way is something akin to “intentional organised sound within a cultural setting” and the converse meaning of musical void was simply the silent space as defined by an *emptiness* of such sound.¹⁷⁹ Such a simplistic dichotomy is, however, limited and cannot easily explain musical concepts from the postmodern period onwards.

As was notoriously demonstrated by Cage in *4'33"*, *silence*, or more precisely *doing nothing*, in certain contexts has compositional significance. Thus, in contrast to what may be considered “traditional” concepts of musical form as “intentional organised sound”, I propose a conceptual representation of musical form and void that is *relative* rather than absolute.

Phenomenological form-void polarities

In contrast to the absolute concept of form and void as sound and silence, respectively, I propose there are *relative* concepts of musical form and void and that these are *context-specific*. As introduced in the prior section, I propose four alternative characterisations of musical form and void, as below, with examples following. Whereas the first of these pairs of musical void and musical form representations (i.e., “silence and sound”) is absolute, the remaining three are relative and context-specific.

Musical examples of these four proposed phenomenological form-void polarities are as follows:

- **Silence and sound** — for example, the absence of sound before and after the “intentional organised sounds” of instruments or voices and the presence of such sounds.
- **Non-dominance and dominance** (e.g., beats 2 and 1, respectively) within 2/4 metre.¹⁸⁰

¹⁷⁹ Implicit in the meaning of musical form is a cultural dimension. Thus, musical form in its traditional sense is more broadly definable as “intentional organised sound” *that occurs within a cultural setting*. For the purposes of the current section, the cultural dimension is noted but not discussed. The concept of cultural setting is, however, considered in the dedicated section on the subject, *Intercultural musical phenomenologies — Western and Eastern*.

¹⁸⁰ Beat 1 is louder than beat 2. Beat 1 is thus phenomenologically represented as dominant to beat 2. Beat 1 generally functions as *home* and beat 2 generally functions as *away*.

- **Steady state and change** — a consistent and persistent musical figure and a change to this consistent and persistent figure (e.g., a repeating chord followed by a chord change or, in a modal piece of music, an extended unchanging tonality, and the change of such tonality).¹⁸¹
- **Expectation fulfilment and surprise** — expected absolute musical form (i.e., expected sound or expected absence of sound) and unexpected absolute musical form (i.e., unexpected sound or unexpected absence of sound). An example of this representation of musical form and void is when the chord sequence of a 12-bar blues progression — regardless of having three principal harmonic movements (between I, IV and V chords) and therefore *change* — is nonetheless experienced as expectation fulfilment, and thus as void.¹⁸²

Form-void polarities in musical parameters — metre, melody, harmony, modulation, and global form

Thus far in the presentation of this thought experiment, I have used the example of 2/4 metre as a polar couplet cell.¹⁸³ In its structural form, its elements (beat 1 and beat 2) meet the conditions of a relationship of polarity.¹⁸⁴

As previously noted, among musical parameters, however, metre in the experience of its organisation is, in this respect, not alone. Such polar couplet structure also exists with the experience of multiple other musical parameters — such as those of metre, melody, harmony, modulation and global form.

The proposed polar elements for each of these polar couplet cells' musical devices are:

- Metre beat 2 and beat 1
- Melody resting note and passing note¹⁸⁵
- Harmony tonic and dominant
- Modulation home key and modulation key
- Global form theme and variation

Musical form as context-specific salience

As noted, musical void and musical form may be experienced in terms of expectation fulfilment and expectation non-fulfilment (i.e., surprise), a phenomenological representation that is context-specific.

¹⁸¹ Unchanging tonality in this context is experienceable as void even though it is sound — the reason being that it is a change not from silence but from a steady state.

¹⁸² In such a representation, although the chord progression has *sound* — and regardless of whether each chord changes from a musical steady state — the entirety of the chord's progression may be experienced as musical void because the sound and the steady state changes are expected sounds and expected changes.

¹⁸³ This is mentioned in the “From wave theory to phenomenological mechanics – 10 steps” segment in the previous section. The concept of polar cell couplet applies not just to 2/4 metre, but to any simple metre. In such a representation, the polar elements are not beat 1 and beat 2, but rather *beat 1* and *all other (non-dominant) beats of the measure*.

¹⁸⁴ For the purposes of the current dissertation, polarity is defined as in the previous section *The nature of polarity* as having *structure AB*, which has the following defined properties:

- (i) Asymmetry: $A \neq B$ (and conversely B is not A)
- (ii) Interdependency of meaning A and B have interdependent meanings. In the absence of B , A has no meaning (and vice versa)
- (iii) Opposition of meaning The meaning of $A = \text{not } B$ (and conversely)
- (iv) Combined frame entirety The entirety of the frame – $(A + B) = \text{zero}$.

¹⁸⁵ The terms “resting note” and “passing note” as they relate to melody are used analogously to the way Goldman uses the terms “non-harmonic tone” in *Harmony in Western Music*, albeit applied to melody rather than harmony. In this way, melody is represented functionally, similarly to functional harmony. (Goldman, *Harmony in Western Music*, 22.)

Referencing this concept, musical form is characterizable not as sound alone but *either* sound or silence, which is phenomenologically experienced as *context-dependent salience*.¹⁸⁶

Non-doing as musical form — Cagean silence

Within this broader characterisation of musical form, it becomes possible to conceptually represent *non-doing* as musical form. Within such a representation, Cage's 4'33" may be characterised as musical form because of having the property of context-dependent salience.

In the context of Maverick Hall as an expectation of doing, the *Cagean silence* of David Tudor's *non-doing* — the non-playing of a piano on a stage — is *salient* and thus functions as musical form.¹⁸⁷

Cultural expectation and musical parameter expectation

As noted also, *expectation* may be considered a phenomenological field. This is like the concept that theorists such as Kramer call "teleological listening".¹⁸⁸

Regarding the concept of expectation as a phenomenological field, I propose there are two distinctly different contexts within music where the phenomenological field of expectation affects the experience of musical motion.

The first may be called *cultural context expectation*. This is the phenomenological field of expectation that applies to the "silence" of Cage's 4'33", which has musical significance and functions as "musical form". The second may be called *musical parameter expectation* or, more precisely, musical parameter *anticipation*¹⁸⁹ — the phenomenological field that arises in the context of an expected musical event. Referencing the musical parameter of 2/4 metre, musical parametric expectation is the expectation of a soft beat 2 after having heard a loud beat 1.¹⁹⁰

Musical parameter expectation or *anticipation* and its converse — musical parameter memory — are discussed further in the current section.¹⁹¹

Form-to-void phenomenological transformations — switch and taijitu

In further characterising the nature of musical form and void, it is possible to examine form and void in relation to the phenomenological experience by which void changes or *transitions* or *moves* to form. Such an investigation is particularly valuable in the context of the current dissertation being an examination of the experience of musical motion from an intercultural perspective.

In such an examination it is proposed that the way in which musical void is experienced as transitioning to musical form is consistent with Western and Eastern contrasting form-void

¹⁸⁶ Musical void is then understood conversely as context-dependent *non-salience*.

¹⁸⁷ The concept of such *Cagean silence* is discussed in its musical historical and theoretical context in the literature review under *Musical phenomenologies* — *Cage*.

Cagean silence is also examined in further detail in Chapter 3 in two ways — firstly, the musical *directionality* of 4'33" is examined from the perspective of RP 1A, and secondly, *Cagean silence* is considered in a novel definition of minimalism as it applies specifically to music, and to fine arts more generally.

¹⁸⁸ Kramer, *The Time of Music*, 378–379; Phillip Glass, quoted in Wim Mertens, *American Minimalist Music*, trans J. Hautekiet (New York: Broude, 1983), 79 and cited in Kramer, *The Time of Music*, 370.

¹⁸⁹ Here, I use these terms interchangeably. When, however, expectation as a future event is contrasted with memory as a past event, I prefer to use the term "anticipation".

¹⁹⁰ Musical parameter expectation applies equally to other parameters. Regarding the musical parameter of memory, for example, it is the expectation of a "response" after experiencing a melodic passage as a "call". Applied to the parameter of harmony, it is the expectation of a I chord, having experienced a V chord.

¹⁹¹ This concept is also summarily considered in Chapter 3, in association with graphical representations of the concept, for the purposes of future research.

relationships as *mutually exclusive* and *mutually inclusive*, respectively.¹⁹² These concepts are represented graphically by the switch and taijitu as presented in Figure 5.

Metre as phenomenological periodic motion

As noted earlier, metre may be represented as a repeating process with a linear and a cyclic component. Represented in this way, the experience of metre may be considered as one of *phenomenological periodic motion*.¹⁹³ Such periodic motion may also be represented as a *particle stream* or a *phenomenological wave*.

Metre as particle stream

In the particle stream representation, the experience of metre is analogous to a stream of cannon balls fired out of a cannon such that at any one time, the particle stream can have one of two mutually exclusive states — either *sound*, functioning as *form* (analogous to the solidity of the cannon ball) or *silence* functioning as *void* (analogous to the *space* between the events of form — i.e., the beats as analogously represented by the space between the cannonballs).

Figure 6 below represents this concept graphically. Form states are vertical black lines — a heavy line for the dominant beat (beat1) and a fine line for the non-dominant beat (beat 2). The space between the lines is the representation of musical void. In such a representation, form and void are mutually exclusive states. The particle stream representation of metre is thus a *fixed, discrete and particulate* representation of metre. Events (beats) are either happening or not beyond the experience of emptiness. It does not capture anything dynamically changing in the space between the beats.

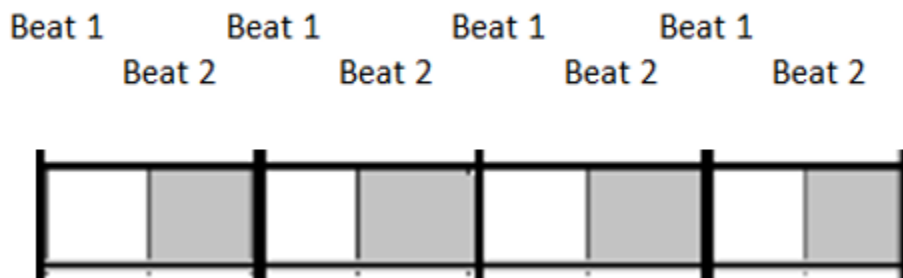


Figure 6: Metre as particle stream

Metre as wave

In *Sound and Symbol*, Zuckerkandl proposes an alternative representation of metre — as a wave. He describes this as follows:

With every measure we go through a succession of phases characteristic of wave motion: subsidence from the wave crest, reversal of motion in the wave trough, ascent toward a new crest, attainment of the summit, which immediately turns into a new subsidence, a new wave has begun.¹⁹⁴

¹⁹² This concept as it applies to Western and Eastern Music and music-informing disciplines is described in depth in Appendix 2. It is also discussed in further detail in the section that follows, *Intercultural musical phenomenologies — Western and Eastern*, which includes a summary of Appendix 2.

¹⁹³ These concepts were introduced in this chapter under *Linearity and cyclicity in compositional form and process/Particle and Wave representations of metre*. They are further discussed in the literature review.

¹⁹⁴ Zuckerkandl, *Sound and Symbol*, 168.

From a physics perspective, wave motion is a special kind of periodic motion. What makes it different from a stream of particles is that whereas particles are discrete entities, waves are continuous cyclic energetic phenomena that influence the position and movement of particles. A wave representation of metre may thus be represented as not a stream of discrete particles (beats) separated by space (like cannonballs separated by space) but rather as analogous to the movement of water particles exiting a garden hose that is being moved up and down.

In contrast to the particle stream representation of metre, the phenomenological wave representation of metre describes the phenomenological experience between the beats of metre as *flowing*, *continuous*, and *wave-like*, rather than fixed, discrete and particulate. Figure 7, contrasted with the previous figure, represents this concept graphically.

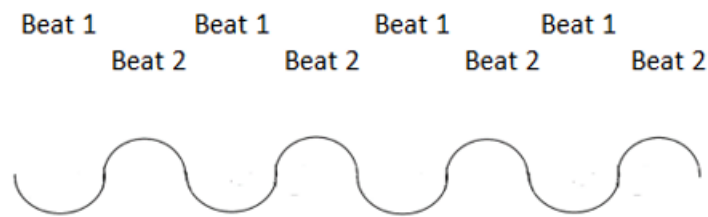


Figure 7: Metre as wave

Zuckermandl describes this quality of the experience of metre as wave motion in his observation that the space between beats, far from being empty and inert, is “the place where metre is born”.

Our interest is not in the dividing points [the beats], but in what goes on between them ... We discover that it is not in the demarcating beats but where at first we did not look at all, where nothing happens, where time simply passes – it is in the apparent vacuum between the demarcating beats that musical meter is born.¹⁹⁵

Expectation and memory as phenomenological fields — in metre and other musical parameters

Memory, expectation, and teleological listening

Referencing his 1964 composition, *Music in Twelve Parts*, Phillip Glass describes memory and anticipation as “the usual psychological devices of programmatic music”. Such a description is not specifically related to the experience of metre but rather to music more generally. Glass also describes his response to such memory-infused and expectant listening in terms of his compositional intent, as below:

When it becomes apparent that “nothing happens” in the usual sense, but that instead, the gradual accretion of musical material can and does serve as the basis of the listener’s attention, then he can perhaps discover another mode of listening – one in which neither memory nor anticipation, (the usual psychological devices of programmatic music, whether Baroque, Classical, Romantic or Modernistic), have a place in sustaining the texture, quality or reality of the musical experiences. It is hoped that one would be able to perceive the music as a ... pure medium of sound.¹⁹⁶

¹⁹⁵ Zuckermandl, *Sound and Symbol*, 168.

¹⁹⁶ Phillip Glass, quoted in Mertens, 79, cited in Kramer, *The Time of Music*, 376.

Metre as double wave of phenomenological periodic motion

Harmony must be understood with the ear, rather than the eye, and the ear is dependent on its recollection of previous sounds to make logical connection with present or anticipated ones.¹⁹⁷

In addition to *expectation* functioning as a phenomenological field, *memory* can also function as a phenomenological field. Whereas expectation is a *forwards-looking* phenomenological field, memory is a *backwards-looking* phenomenological field.

In the representation of metre as a phenomenological wave, there would appear to be two contributing components, that of memory and that of expectation or, more precisely, *anticipation* — memory of the most recent beat that has passed in time and anticipation of the beat to follow.

Considered in this way, the experience of metre as a phenomenological wave is representable as a *double wave of phenomenological periodic motion* where within each repeating cycle, memory and expectation *wane* and *wax* (i.e., fade and swell), respectively. These processes reset at each sounding of the beat, as graphically depicted in Figure 8 below. The concepts are then extended to consider the complex (hierarchically organised, multi-parameter) phenomenological machine in terms of particle stream and wave representations.

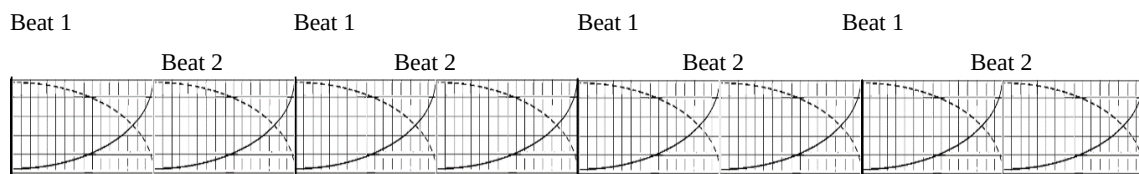


Figure 8: Metre as double phenomenological wave of fading memory and swelling anticipation of beats (memory represented by broken lines and anticipation by unbroken lines)

The next figure (Figure 9) offers a graphical representation of this concept.

Complex phenomenological machine architecture

As described in prior sections, RP 1A proposes a conceptual model for the experience of directional musical motion such that music is representable as a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field*. The model comprises two fundamental concepts — the concept of the unit of experienced *vectoriality being the form-void vector functioning as a simple phenomenological machine* and the *organisation* of such form-void vectors as they are experienced within a composition or section of music. Such organisation is proposed as potentially *hierarchically organised* — that is, occurring at multiple nested levels within a single parameter (e.g., compound metre) and *multimodal* — that is, spanning other musical parameters beyond that of metre, including (but not limited to) melody, harmony, modulation, and global form.

The next section presents, in text and figurative form, the concept of the experience of directional musical motion as a complex phenomenological machine.

The complex phenomenological machine — particle and wave representations

RP 1A proposes that the experience of directional motion in music is characterizable as a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field*.

¹⁹⁷ Goldman, *Harmony in Western Music*, 42.

Within this framework it is possible to consider the experience of directional musical motion both from a particle stream perspective and a wave perspective.

A comprehensive examination of this concept and its ramifications is beyond the scope of the current dissertation. However, I introduce preliminary concepts for characterising the experience of directional motion in music as phenomenological mechanics. Specifically, I present an analysis of metre from contrasting *particle stream* and *phenomenological wave* perspectives. Further, I present a conceptual representation for the experience of musical form and void within metre, based on the concept of *waning memory* of the beat that has passed and *waxing expectation* of the beat that is anticipated. Finally, I present figurative representations of this concept, beyond simple metre, including the complex phenomenological architecture concepts of *hierarchical organisation* and *multimodality* — that is, application of the concept beyond metre to other musical parameters — represented within the presented figures in relation to melody, harmony, modulation, and global form.

This is a visual representation of RP 1A — the representation of the experience of directional musical motion as a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field*. This model is graphically represented, first from a *Cartesian* perspective and then from contrasting *particle stream* and *phenomenological wave* perspectives, which further detail the nature of phenomenological movement as particle and wave, respectively.¹⁹⁸

Particle stream and wave representations

I have sought to represent these concepts *figuratively* only. Consistent with the caveat provided in the Conceptual Map, the concepts that follow, though referencing scientific concepts, arise from a consideration of my subjective experience. Although the models presented are informed by concepts from physics, the association is not literal but one of poetic analogy. The graphic representations presented here should thus be understood as *illustrations of concepts*.

In considering the research question, “What is the nature of the experience of directional motion in music, and how can it be conceptually represented?”, rather than being considered as *answers*, this section may be considered a starting point for the generativity of further ideas and *questions*. Such an approach is consistent with that taken by Kramer, as described at the start of this chapter.

Accordingly, the purpose here is not to describe musical phenomena in a literal sense but in a figurative sense, and in so doing *open up discussions, avenues of thought, and modes of perception*.¹⁹⁹

The section concludes with the contrasting figurative representations of the complex phenomenological machine as characterised by RP 1A, from *contrasting Cartesian, particle stream and phenomenological wave perspectives*.²⁰⁰ Figure 9 represents the complex phenomenological machine from those three contrasting perspectives.

¹⁹⁸ The term “Cartesian perspective” is used to describe the experience of music in terms of graphically represented dimensions — those of hierarchicality, multimodality and linearity of temporality.

¹⁹⁹ Kramer, *The Time of Music*, viii.

²⁰⁰ Appendix 4 demonstrates the derivation of these figures at a more stepwise and granular level.

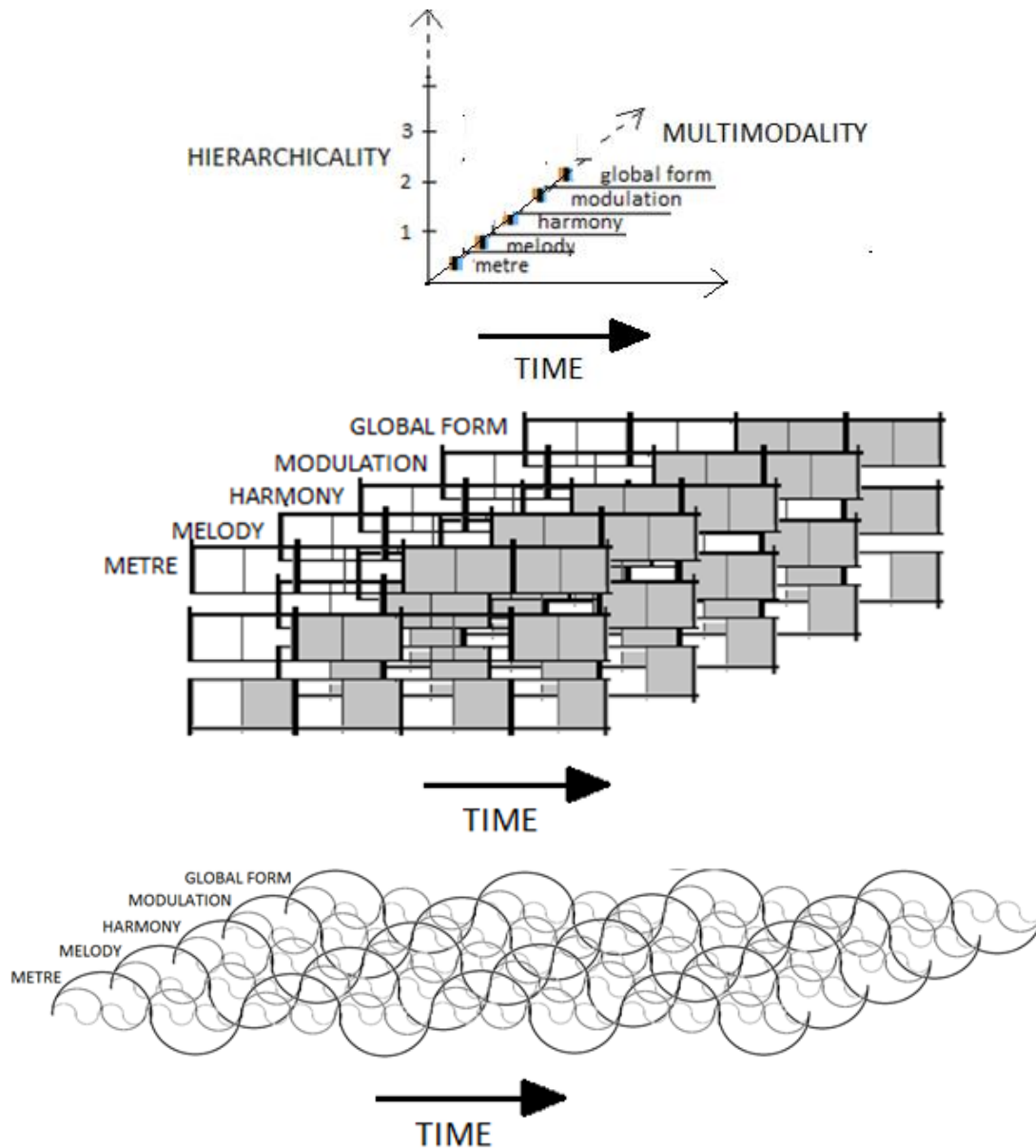


Figure 9: Primary RP 1A — the complex phenomenological machine as a phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field (Cartesian, particle stream and phenomenological wave representations)

Intercultural musical phenomenologies — Western and Eastern

In the previous section, as part of the thought experiment investigating the experience of directional motion in music, I described the concept of the form-void relationship in terms of two contrasting perspectives — that of form-versus-void *mutual exclusivity* and of form-void *mutual inclusivity*.²⁰¹ Form-void mutual exclusivity and form-void mutual inclusivity were presented as one of the philosophical foundations of contrasting Western and Eastern alternative *ways of seeing things*.

As represented earlier in Figure 5, the concepts of form-void mutual exclusivity and mutual inclusivity are graphically representable by the contrasting concepts of *switch* and *taijitu*.

²⁰¹ These concepts are also examined in Appendix 2.

I also proposed that contrasting representations of *Western and Eastern time* — as respectively, *linear* and *cyclic* — were consistent with the concepts of form-void mutual exclusivity and mutual inclusivity. I proposed that contrasting representations of *Western and Eastern time* — as respectively, *linear* and *cyclic* — were consistent with the concepts of form-void mutual exclusivity and mutual inclusivity. I have further proposed that linear and cyclic *musical forms* of Western and Eastern music are also consistent with this paradigmatic distinction.

Examples of how these contrasting concepts are reflected in Western and Eastern music were presented. These included the observation that in Western music, in accordance with form and void being mutually exclusive, Western music begins and ends with firm demarcation points between void (non-music) and form (music). Clayton characterises this concept²⁰² — that Western music *moves* “from A to B” in a linear manner in contrast to Eastern music where, in Clayton’s words, “the rag simply emerges naturally and effortlessly from the primordial cloud of the harmonics that is the drone” — as a musical representation of form-void mutual *inclusivity*. Further, Clayton describes the cyclicity of Eastern music as characterised by *cycles repeating indefinitely*.

Western and Eastern paradigms as they relate to the dissertation’s research propositions

Such dichotomous concepts — form-void mutual exclusivity and mutual inclusivity, linearity and cyclicity etc. — represent *alternative paradigms* or alternative ways of seeing things. These alternative paradigms are relevant to the dissertation’s primary, secondary, and tertiary theses and, more broadly, to the analysis and performance of music for the following reasons:

1. In its *primary* RPs, the dissertation is an examination via a thought experiment of a model for the experience of directional music. The philosophical assumptions underlying Western and Eastern ways of seeing things are reflected in Western and Eastern musical forms. It follows that Western and Eastern contrasting paradigmatic philosophical and cultural assumptions — especially those regarding time — can influence the experience of directional musical motion.
2. In its *secondary* RPs, the dissertation proposes that contrasting Western and Eastern linear and cyclic *concepts of time* are metaphorically reflected in contrasting Western and Eastern *musical forms*.
3. The *tertiary* RPs examine the application of the dissertation’s theoretical concepts to the analysis and performance of music. They present contrasting geometrical models of musical form as helix and vortex, reflecting contrasting Western and Eastern concepts of linear and cyclic time.

Consistent with Kramer’s position that it is possible to broaden and enhance the experience of music by considering “new listening strategies”, the alternative paradigms of Western and Eastern ways of seeing things provide an opportunity to expand the musical possibilities, especially in the field of improvised music.

In Research Area 3, such contrasting Western and Eastern ways of seeing things are examined as they inform other compositional parameters beyond that of linear and cyclic form. These include contrasting Western and Eastern *vectorial* and *non-vectorial* processes of development and contrasting Western and Eastern composer approaches to music — as music *creation* and music *discovery*, *distillation*, and *revelation*.

²⁰² Clayton, *Time in Indian Music*, 19.

Western and Eastern paradigmatic concepts as they relate to intercultural music

In the context of the dissertation being an *intercultural* musical perspective of the application of phenomenological mechanics to the research question “What is the nature of the experience of directional motion in music, and how can it be conceptually represented?”, it is useful to consider the question from the perspective of a *Western–Eastern* dichotomy.

This, however, is a pragmatic description — its purpose is not to propose that such concepts are geographically located. Rather, they are philosophically related since culture reflects an underlying philosophy. However, they are also culturally related, reflecting Western and Eastern paradigmatic concepts. The following list of concepts is thus presented as alternative Western and Eastern ways of *seeing things*, which have significant relevance to the experience of music:

Parameter	Western versus Eastern representations
Form-void relationship	mutual exclusivity v mutual inclusivity
Objectivity	objective outer v subjective inner
Ontology	dualistic materialistic v monistic idealistic
Teleology	teleological v non-teleological
Processing	sequential v gestalt
Temporality	linear v atemporal/ non-linear/ cyclic
Existentiality	becoming v being

These concepts as they apply to music are examined in detail in the literature review under *Musical processing — linear and non-linear — Kramer*.

Intercultural phenomenology as it applies to music — summary of appendices

Characteristics from the above list of contrasting Western and Eastern ways of *seeing things* are also examined in more detail in the following appendices:

- *Appendix 2: Form and Void — Western and Eastern Perspectives — Dualism and Monism*
- *Appendix 3: Time and Motion — Western and Eastern Perspectives — Train Journey as Allegory*
- *Appendix 4: Particle Stream and Wave Representations of the Experience of Metre.*

Summarising the content of Appendix 2 and Appendix 3 as they relate to the current section, the following is notable.

Appendix 2: Form and Void — Western and Eastern Perspectives — Dualism and Monism

The Western paradigm or way of seeing things is characterised by *dualistic materialistic form-void mutual exclusivity*. As this relates to Western music, such *dualistic materialistic form-void mutual exclusivity* manifests in the concept of composer as an agent separate in nature to the composition. Thus, the composer (or improvising musician) is representable as the manufacturer or *creator* of music.

In contrast to this, the Eastern paradigm or way of *seeing things* is characterised by *monistic idealistic form-void mutual inclusivity*. As this relates to Eastern music, such *monistic idealistic form-void mutual inclusivity* manifests as the concept of the composer being one and the same as the

composition. In the Eastern paradigm, music is “pre-existent”.²⁰³ The composer (or improvising musician) is an agent who *discovers*, *distills* or *reveals* that which is already there but hidden. The role of the composer (or improvising musician) in the Eastern way of seeing things is one of *discovery*, *distillation* and ultimately *revelation* of musical variation from within a pre-existent musical structure.

Appendix 3: Time and Motion — Western and Eastern Perspectives — Train Journey as Allegory

The contrasting nature of Western and Eastern concepts of time are allegorically represented by a description of motion on a train as subjectively experienced from contrasting Western and Eastern perspectives by two fictitious characters — a Western commuter and an Eastern conductor. A summary (and selected sections) of the allegorical representation is as below:

Western concepts raised by the Western commuter’s linear journey

Duality of form (away-ness) and void (home-ness)

The Western commuter has a home. He also has a *fixed destination*. In that sense, he has *somewhere to go to*. His definitions of home and away are polar and mutually exclusive — *that which is not home is away, and that which is not away is home*. In his states of motion, he is either moving *from home to away* or *from away to home*.

Finite, teleological, non-evolving movement

From the Western commuter’s perspective, the train journey has a start and end point. It is either going forward (from home to away) or backwards (from away to home). The train journey has a fixed endpoint in time and space.

Linearity of time and movement

From the Western commuter’s perspective, his movement occurs in lines. His experience of time is also that it is linear.

Eastern concepts raised by the Indian conductor’s cyclic journey

Non-duality — that is, monism of form (away-ness) and void (home-ness)

The Indian conductor has no home, apart from the home on the train where she lives. In that sense, there is *nowhere to go*. She is always at home. Any concept she has of being away is contained within her concept of home. Her phenomenological experiences of home and away are *monistic* and *mutually inclusive*.

Infinite, non-teleological, forward moving, evolving movement

From the Indian conductor’s perspective, the train journey never stops. It has no end destination. Each time she repeats the journey, there is variation towards an infinite unreachable goal of perfection.

Cyclicity of time and movement

From the Indian conductor’s perspective movement occurs in *cycles*. Her experience of time is also that it is *cyclic*.

Summary

It is proposed that within North Indian classical music, the experience of movement is cyclic, just as it is for the Indian conductor.

²⁰³ Clayton, *Time in Indian Music*, 2.

From a teleological perspective (i.e., in terms of a fixed endpoint), there is nowhere to go. Thus, the experience of North Indian classical music, be that as player or listener, is one not of *moving further* but of *going deeper*.

The consideration of such concepts provides possibility for the performance of music that is *cyclic in form, non-teleological, perpetually evolving, and infinite in variation*. Such a concept contrasts with the traditional Western view of music *as linear, teleological, fixed in form, and finite*.

These characterisations are proposed as allegorical for Western and Eastern musical forms, respectively reflecting the experience of Western time — primarily linear (as represented by the arrow of time) and Eastern time — primarily cyclic.

The concept of Western and Eastern musical forms as reflective of Western and Eastern concepts of time is further discussed below under Research Area 3.

Research Area 3: Applications of Theory to Music Performance and Analysis

This section of the Introduction concludes with the following propositions as applications of the theoretical part of the dissertation to the performance and analysis of music.

Phenomenological musical motion — linear and cyclic

As cited earlier in the Introduction, Clayton notes that “*relative to Western tonal music Indian music seems to display non-linear features more prominently and linear features less so*”.²⁰⁴

In RP 2A, I propose that Western and Eastern musical forms can be considered as metaphors for the philosophical and cultural paradigms in which they originate, especially for contrasting Western and Eastern representations of time.

In RP 2B, I propose that the submitted creative work and major artefact, *Oscillation 1*, in its harmonic organisation and global form, is a metaphor for the linear and cyclic reorientations of time in Western and Eastern paradigms. The way in which *Oscillation 1* is composed such that it is metaphorical of these concepts is described in detail in section 8 of Appendix 5.

Development processes — vectorial development and intensification

In accordance with their contrasting linear and cyclic patterns of musical motion, musical development in Western and Eastern music forms is characterizable as occurring by fundamentally different processes. Whereas musical development in Western musical form occurs by a process of vectorial development — linearly “from A to B” — musical development in Eastern musical form occurs by a process of *intensification*, a process described by Clayton as a “large-scale process ... proceeding by a process of expansion”.²⁰⁵

Geometrical forms — helix and vortex

In Chapter 4, I present contrasting geometrical models of musical form as helix and vortex, reflecting Western linear and Eastern cyclic concepts of time, respectively.

²⁰⁴ Clayton, *Time in Indian Music*, 25. [Italics are Clayton’s.]

²⁰⁵ Clayton, *Time in Indian Music*, 25.

Composer processes — creation and revelation

The Western and Eastern contrasting characterisations of the form-void relationship are arguably manifest in the relationship between composer and composition in contrasting Western and Eastern musical forms (see also Appendix 2).

Thus, whereas the Western composer *creates* music, the Eastern composer *reveals music*. Whereas the Western composer's role may be considered one of *creation*, the Eastern composer's role is one of *revelation* — the revealing of music from within that which is, in Clayton's terminology, "pre-existent".²⁰⁶

The major and minor artefacts, *Oscillation 1* and *Beginner's Mind*, are presented as examples of composition by *creation* and *revelation*, respectively.

Research Area 4: Newly Imagined Instruments and Novel Compositional Processes

The discussion of this research area is contained in *Appendix 5: Compositional Methods and Processes — Major and Minor Artefacts*.

Section C: Literature Review

Caveat: In commencing this literature review, I repeat my previous caveat that RP 1A, the model proposed for the experience of directional motion in music is simply that — a conceptual model. Further, from my own primarily *Western* methodological perspective, such a conceptual model has its own Western paradigmatic biases.

Nonetheless, the model proposed is presented as an internally consistent one, which proposes and integrates concepts that accord with what arose during the thought experiment.

One of the important utilities of the model is that it provides a conceptual language that permits the experience of directional motion in music to be investigated in terms of several phenomenological processes, each of which contributes to the experience that music is *going somewhere*. The model may thus be applied to compositional process, music performance, and musical analysis.

As it relates to compositional theory, the model provides a theoretical structure for the use of compositional mechanisms and devices that have the capacity to be experienced vectorially (i.e., in terms of directional motion).

In such a representation, the experience of music is comparable to that of a phenomenological machine, acting in accordance with the principles of what I have called *phenomenological mechanics* — a novel concept that characterises the experience of subjective phenomena such as time, directional motion, and related parameters in terms of the laws of mechanics, which govern the behaviour of physical bodies in the natural world.

The model can similarly be applied to music performance and musical analysis to bring awareness to and analyse, respectively, musical processes associated with the experience of directional motion.

This literature review thus presents the development of the dissertation's concepts from its primary, through its secondary, to its tertiary RPs, referencing in this process the relevant concepts from the existing literature to arrive at its conclusions. In essence, what this process does, is *situate* within the

²⁰⁶ Clayton, *Time in Indian Music*, 2.

existing literature, concepts that have, for the most part, directly arisen via a thought experiment. The thought experiment, plus this literature review, has four parts:

1. Examination of my own experience of directional motion in music
2. Establishing a conceptual language for the phenomena experienced
3. Integrating concepts into a theoretical framework
4. Reviewing the literature for similar or related concepts.

The thought experiment addressed the first three steps. The literature review now considers the fourth — a review of the literature for similar or related concepts. At the end of this process, it will be apparent where the dissertation belongs in terms of the concepts and ideas that have preceded it.

After revising the section's preliminary concepts, the literature review then considers the concept of phenomenological mechanics from Western and Eastern perspectives. I then address the following five contributing areas of the research as they are represented in the literature, each section organised around the work of the section's identified principal theorist:

- Musical mechanics — *Zuckerlandl*
- Musical phenomenologies — *Cage*
- Musical interculturalities — *Clayton*
- Musical processing — linear and cyclic — *Kramer*
- Musical interdisciplinarity — *Fraser*

Preliminary concepts

Order and chaos

To reiterate Primary RP 1A:

The phenomenological experience of directional movement in music composition is conceptually representable as a “phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field”.

This conceptual model for directional motion in music thus comprises the following sub-propositions:

- Phenomenological determination
- The form-void vector as the experiential unit of directional musical motion.²⁰⁷
- Multi-parameter application
- Hierarchical organisation
- Summation of the contributing phenomenological form-void vectors into a single vector field (which functions as a complex phenomenological machine).

²⁰⁷ In the model proposed, the form-void vector is the experiential unit of directional musical motion. Its relationship with other unit structures is as follows:

- *polar couplet cell* — the *structural* unit for the experience of directional motion in music
- *simple phenomenological machine unit* — the *functional* unit for the experience of directional motion in music. The simple phenomenological *machine* unit is thus the conceptual device through which the phenomenological representation of polarity of structure (the polar couplet cell) translates as a capacity to perform work
- *form-void vector* — the *phenomenological* experience of directional motion.

RPs 1B and 1C, as below, extend this concept:

Primary RP Corollary 1B

The phenomenological experience of development or resolution at a given point in the experience of music is representable as the vector sum of the contributing phenomenologically determined vectors, such that a net positive vector sum correlates with the experience of musical development at that time, and a net negative vector sum correlates with the experience of resolution.

Primary RP Corollary 1C

The phenomenological experience of directional motion in music, occurring at the phenomenological rather than material level, is representable in terms of the novel concept of phenomenological mechanics.

From a methodological perspective, the model assumes that the overall experience of vectoriality (i.e., directional motion) is equal to and representable by its contributing sub-propositions.

Expressed more generally, the model assumes that the *whole* of the experience of directionality is the *sum of its parts*. This is a conceptually pragmatic assumption — a detailed consideration of its philosophical justification would well exceed the scope of the research.²⁰⁸

Of the theorists whose work in the related fields *is* within the scope of the current research, of particular significance is Julius Thomas Fraser, the interdisciplinary theorist whose categorisations of human temporalities and their musical correlates are presented as the final concepts of the literature review.

Michon describes Fraser's concept of "levels of temporality" as follows:

Fraser's natural philosophy of time ... maintains that each stable integrative level of the universe manifests a distinct temporality and that these temporalities coexist in a hierarchically nested, dynamic unity.²⁰⁹

The alternative temporalities derived from Fraser's concepts are proposed as applicable to expanding the possibilities for both the analysis of music and the performance of music, especially improvised music. Based upon Fraser's classification, the *temporality* of a musical performance could (and some may say *should*) be considered with the same intentionality as consideration of the performance's key and tempo.

At the end of the literature review, I present Fraser's concept of *levels of temporality* as a graphical representation that may be used as a visual prompt to explore alternative temporalities in music, especially improvisation. The minor artefact *Beginner's Mind* is an example of such an application. Further in the dissertation, I consider and discuss this short (approximately six-minute) improvisation from the perspective of Fraser's "levels of temporality".

²⁰⁸ The concept of the whole *not* being the sum of its parts is relevant to the concept of system non-linearity and chaos as it applies to complex systems. Strogatz provides a further discussion of this concept. Such a consideration is fascinating, raising philosophical questions that address the very possibility *or not*, of a deterministic universe. Steven Strogatz, *Infinite Powers — The Story of Calculus, the Language of the Universe* (Houghton Mifflin Harcourt, 2019), 279–284.

²⁰⁹ John A. Michon, "J.T. Fraser's 'Levels of Temporality' as Cognitive Representations," chapter in *The Study of Time V Time, Science and Society in China and the West*, J.T. Fraser and N. Lawrence eds. (Amherst MA, University of Massachusetts Press), 51–56 [http://www.jamichon.nl/jam_writings/1986_flt_cognitrep.pdf]

Mechanics as the “how” of motion

[Newton’s] system depicted nature as a mechanism. In the years to come it would often be compared to a clockwork, its gears spinning, its springs stretching, all its parts moving in sequence, a wonder of cause and effect.²¹⁰

Mechanics may be considered the “how” of motion.

In 1687, Isaac Newton presented his comprehensive account of classical mechanics in *Principia Volume 2, The System of the World*.²¹¹ In his *Principia*, Newton provided a unified framework for conceptualising and predicting the motion of bodies acting under force. Applying the same concepts to gravity, he explained the motion of planets in terms of the same laws that governed movements on Earth.

Newton’s concepts dominated the science of motion up until the twentieth century when the thought experiments and empirical observations of Einstein developed and contextualised Newton’s classical mechanics within the broader spectrum of quantum mechanics.

Whereas Newtonian mechanics was a profoundly useful approximation of the laws of time, motion, and related mechanical concepts as they operated at the human or macroscopic level, quantum mechanics was a theoretically correct (in the eyes of its proponents and by empirical testing) system of laws that could also explain paradoxical findings at the subatomic level in a way that Newtonian mechanics could not.²¹²

Both classical and quantum mechanics are systems that seek to explain motion. Mechanics, whether quantum, Newtonian, or *phenomenological* in the metaphorical sense proposed in the dissertation, may be considered the “how” of motion.

Phenomenological mechanics as the “how” of phenomenological motion

In their classical and quantum systems of mechanics, the motion that Newton and Einstein seek to explain is the motion of material bodies. In Newton’s case, the objects are macroscopic and visible to the human eye. In Einstein’s case, the objects are invisible to the human eye — they exist at the atomic scale.

Whereas Newton’s classical mechanics defines such objects as fixed and durable, Einstein’s quantum mechanics defines objects of observation in terms of statistics and probability.²¹³ Nonetheless, both classical and quantum mechanics address the motion of what are, as they are colloquially understood to be, *real objects in a real world*.

In contrast to this, phenomenological mechanics addresses the experience of *motion of objects* whose *existence* is defined purely in *phenomenological* (i.e., experiential) terms. Phenomenological mechanics may thus be considered the “how” of *phenomenological* motion.

²¹⁰ Strogatz, *Infinite Powers*, 237.

²¹¹ Florian Cajori, ed., *Sir Isaac Newton’s Mathematical Principles of Natural Philosophy and his System of the World — Volume Two — The System of the World*. *Principia* (University of California Press, 1934).

²¹² “How the Quantum Was Forced on Physics,” chapter in Rosenblum and Kuttner, *Quantum Enigma*, 53–58.

²¹³ In his proposed *canonical forms of time*, Fraser provides both musical and scientific associated frameworks for each of his proposed temporalities, including both Newtonian and quantum mechanics. Fraser’s work is discussed in detail in the final section of the literature review (*Musical interdisciplinarity — Fraser*). It has relevance to the concepts of the current dissertation.

As proposed by theorists such as Zuckerkandl, the experience of directional motion in music is ultimately a phenomenological experience.²¹⁴ For this reason, music, and in particular the experience of *motion* in music, is an ideal subject on which to apply the concepts of phenomenological mechanics.

Phenomenology as the “what” of phenomenological motion

In this literature review, I have sought to express not only the “how” but also the “what” of the phenomenological experience of directional motion in music. The “how” is discussed below in the section *Musical mechanics — Zuckerkandl*, and the “what” is discussed in *Musical phenomenologies — Cage*. While the former focuses principally on concepts from Zuckerkandl, the latter references concepts of musical form and void implicit in Cage’s approach to composition, with specific reference to the “musical form” of 4’33”.

The “how” of phenomenological motion borrows concepts primarily from mechanics; the “what” of phenomenological motion borrows concepts primarily from phenomenology. The “what” of phenomenological motion thus encompasses the specific phenomenological structures through which phenomenological motion is proposed to be represented, as it applies to the experience of directional motion in music.

Accordingly, the *Musical phenomenologies — Cage* section of the literature review examines the previously described four musical compositional processes: *sound and silence*, *dominance and non-dominance*, *steady state and change*, and *expectation fulfilment and surprise*.

The model proposes that such compositional processes are potentially *hierarchically organised* (within a single parameter — as is the case in compound time) and have *multi-parameter* representation — that is, they are experienceable across multiple musical modalities, including those of metre, melody, harmony, modulation, and global form.

For each of these musical parameters, proposed examples of the respective *musical devices* through which these concepts are proposed to operate — thus facilitating the experience of directional motion in music — are metric asymmetry (metre — as opposed to metreless pulse — is, by definition, asymmetrical within a given measure), melodic resting and passing tones, harmonic tonic and dominant tonality, home and modulated key harmonic centre, and theme and variations within global form.

Each of these musical devices is a representation of the necessary phenomenological structures for the experience of motion. In the terminology I used in the thought experiment section, each can be represented as a *polar couplet cell*, experienced as a *form-void vector*, and be functionally represented as a *simple phenomenological machine unit*.

Time and temporality

As noted in the previous section, phenomenological mechanics does not address motion or, for that matter, any properties of objects in the real world (in the ordinary meaning of the term *real world*). Rather, phenomenological mechanics is a system of principles that describes the properties of an experience not in terms of *objective* parameters — such as time and motion — but in terms of their

²¹⁴ Zuckerkandl, *Sound and Symbol*, 68.

phenomenological correlates (i.e., phenomenological time and phenomenological motion). It describes the subjective *experiences* of these parameters.²¹⁵

The movements in mechanics and phenomenological mechanics thus occur in different *realms*, one being physical, the other phenomenological. The concepts and laws that define motion in the physical realm can be equally applied, it would seem, to the phenomenological realm.

This is a central tenet of the concept of phenomenological mechanics.

Accordingly, to investigate the experience of musical motion — an inherently *phenomenological* process — it is necessary to investigate not the mechanics of time itself but rather the mechanics of *temporality*: the *experience* of time. This is considered in the following section in accordance with five perspectives from within the music and related literature.

Musical temporality — five perspectives (Zuckerandl, Cage, Clayton, Kramer, Fraser)

This literature review presents characterisations of the experience of time as it relates to music, as this subject of inquiry has been considered according to five related perspectives from the relevant literature.

Specifically, within this section I initially examine musical temporality as described in the literature by Zuckerandl (1956), Cage (1959), Clayton (2000), and Kramer (1988, 1996, 2016); then, in the final section of the literature review, I examine musical temporality by referencing the alternative human temporality concepts of Fraser (1978, 1985, 1986, 1988, 1992).²¹⁶

Fraser's canonical forms of time — as presented in Table 4 in the final section of the literature review — can then be examined as *alternative temporalities* that have relevance to the performance of music.

In the case of *Zuckerandl*, musical temporality is examined from:

- the perspective of the 2/4 measure as a phenomenologically determined polar couplet cell by virtue of its beat 1–beat 2 asymmetrical structure

²¹⁵ The position of theoretical physics is that *time is neither absolute nor objective*. This has been empirically demonstrated by the 1971 Hafele-Keating test of Einstein's theory of relativity, where the time passed by an atomic clock in motion on a commercial airliner was compared with the time passed by an atomic clock not in motion, relative to the observer. The time *dilation* — that is, the difference in the elapsed time between the two clocks — demonstrated the relativity of time to the observer's state of motion. At the level of *normal* human activity (not approaching the speed of light), the measurable aspect of time is relatively constant. In the final section of the literature review, an examination of Fraser's work contextualises this position.

²¹⁶ Zuckerandl (1956), *Sound and Symbol*.

Cage (1959), 4'33".

Clayton (2000), *Time in Indian Music*.

Kramer (1988), *The Time of Music*.

Kramer (1996), "Postmodern Concepts of Musical Time," *Indiana Theory Review* 17, no. 2: 25.

<https://www.uh.edu/~tkoozin/rhythm/KramerPostmod.pdf>

Kramer with Robert Carl, eds. (2016), *Postmodern Music, Postmodern Listening*, (Bloomsbury Publishing).

Fraser with Nathaniel Lawrence and David Park, eds. (1978), *The Study of Time III*. Proceedings of the Third Conference of the International Society for the Study of Time (Alpbach, Austria: Springer-Verlag).

Fraser (1985), "The Art of the Audible 'Now,'" *Music Theory Spectrum* 7: 181–84.

Fraser (1986), "Levels of Temporality as Cognitive Representations." In *The Study of Time*, edited by Nathaniel Lawrence and Frances C. Haber (Amherst: University of Massachusetts Press).

Fraser (1988), *The Genesis and Evolution of Time: A Critique of Interpretation in Physics* (Boston: University of Massachusetts Press).

Fraser (1992), "Human Temporality in a Nowless Universe." *Time and Society*, 1, no. 2 (May): 159–173.

- its subsequent phenomenological functioning as a simple phenomenological machine unit
- its associated phenomenological experience as a form-void vector.

In the case of *Cage*, musical temporality is examined from the perspective of form and void — specifically, what constitutes musical content and thus functions as form rather than void, addressing the concept of musical form not as sound but as *context-specific salience*.

In the case of *Clayton*, musical temporality is examined through the lens of interculturality. Western and Eastern musical temporalities are considered in terms of Western linear dualistic versus Eastern cyclic monistic temporality. This concept is presented in further detail in Appendix 4.

In the case of *Kramer*, musical temporality is examined through the perspective of *musical processing strategies, linear and non-linear*. Such contrasting musical processing strategies are considered from the perspective of the existentiality of *becoming* verses the existentiality of *being*.

In the case of *Fraser*, musical temporality is examined from the perspective of Fraser's canonical forms of time, each level of temporality being expressed in terms of its relationship with the arrow of time and, in the case of more non-linear temporalities, its demarcated forms.

Fraser's classification of temporalities is particularly relevant to the current dissertation because it correlates both with contrasting scientific perspectives (such as the linear causality of Newtonian mechanics contrasted with the probabilistic processes of quantum mechanics) and with musical systems and concepts.

At the end of the chapter, Fraser's canonical forms of time are novelly and concisely graphically represented in a form that may be used as a visual guide for exploring improvisational processes in alternative temporalities. See Figure 16: Fraser's five temporalities.

Summary of preliminary concepts

Mechanics is a physical science predicting the behaviour of physical objects in the material world. In so doing, it relates motion to time.

In contrast to this, phenomenological mechanics is a phenomenological science. It does not *predict* a conceptual framework for the experience of phenomenological motion and time. It *represents* and *provides* it (metaphorically).

As it relates to music, phenomenological mechanics thus provides a conceptual framework for representing the experience of *musical motion* in terms of the experience of musical time (i.e., *musical temporality*).

This dissertation proposes that the experience of temporality *generally* and the *specific* experience of temporality as it relates to music are both *culturally shared* (as in the case of Western linear and Eastern cyclic temporalities) and *individual*. This concept is represented in Figure 15, which also includes the principal theorists of the sections of the literature review. The right column of the figure is thus a visual summary of the literature review, the theorists in whose work the dissertation is situated, and the relationship of their concepts within the broader structure of the dissertation.

Following on from the next section, which considers phenomenological mechanics from Western and Eastern perspectives, these concepts are considered in detail, as they are represented in the literature, organised around the principal theorists: Zuckerkandl, Cage, Clayton, Kramer, and Fraser.

Phenomenological mechanics — Western and Eastern

Scientific and metaphorical perspectives

Phenomenological mechanics may be considered as a phenomenological *science*. I propose that such a description of phenomenological mechanics is appropriate and justified. The reasoning for this is as follows.

By definition, a science necessitates objectivity (i.e., the scientific method). This objectivity, however, is an objectivity of *process*, not subject matter.

In Western science, both process and the object of study tend to be objective. In Eastern science however, including the science of China, Tibet and India, an objective process is typically applied to a subjective object of inquiry.²¹⁷

Although one could argue that applying a conceptual model (such as that described in RP 1A) to different systemic conditions of Western and Eastern, linear and cyclic cultural representations of time — and subsequent predictions of how Western and Eastern musical forms may embody and represent such contrasting representations of time — is a scientific process, such is not the primary reason for applying phenomenological mechanics concepts to music.

Rather, the primary orientation of the concept of phenomenological mechanics is *non-scientific*.

This orientation — a *metaphorical and poetic* one — is the orientation of this research. Concepts from mechanics are thus utilised to describe phenomenological experience — not the other way around.

Inner and outer systems mirroring

Unlike actual (i.e., *physical*) mechanics, the fundamental concept of phenomenological mechanics is not about the parameters themselves — it is about the similitude and *mirroring* between physical and phenomenological systems.

As an example of this, I have proposed that the experience of directional motion in music “obeys”²¹⁸ Newton’s third law of motion: the law of *action and reaction*. Such an observation immediately invites the question *Why should the sequence of an imperfect cadence followed by a cadence have the same dynamics as one of the fundamental laws of motion?*

One can imagine many responses to such a question, informed by widely interdisciplinary sources. These might include literary theory — Kermode’s concept of reflexive teleological interpretation;²¹⁹ psychology — Jung’s collective unconscious;²²⁰ and ethnomusicology — Rowell’s concept of *resonances* between a musical tradition and its controlling ideology.²²¹

To provide an answer to such a question is neither the focus of nor within the scope of this research.

²¹⁷ Malhotra, *Being Different*, 2011.

²¹⁸ The word “obey” is used in a purely metaphorical way. Its literal meaning is nothing more than both systems have the same conceptual structure.

²¹⁹ Kermode, *The Sense of an Ending*, title page.

²²⁰ Carl Gustav Jung, *Man & His Symbols* (New York, NY: Bantam Doubleday Dell Publishing Group, 1997).

²²¹ Lewis Rowell, “The Idea of Music in India and the Ancient West,” in V. Rantala, L. Rowell, and E. Tarasti, eds., *Essays in the Philosophy of Music* (Acta Philosophica Fennica vol xliii), Helsinki, as cited in Clayton, *The Time of Music* 17.

Consistent with the approach described at the beginning of this chapter, the value of such a question may simply be its *generativity* — not of answers, but of ideas and further questions, questions that, according to Kramer, “open up discussions, avenues of thought, and modes of perception”.²²²

Consistent with this approach to the research, the following section examines the meaning of music, as proposed by Zuckerkandl — a concept that has generality to both the *phenomenological* and the *mechanics* components of phenomenological mechanics.

The meaning of music

Zuckerkandl’s concept of the listener as pointer

The meaning of a tone ... lies not in what it points to but in the pointing itself.²²³

The experience of music is inherently and, some would say, *self-evidently*, a phenomenological one. It is therefore challenging to consider, in the absence of its perception, what music *could possibly be* or if, in fact, such *unperceived* music could be construed to be anything *musical* at all.

Even to describe “music” that is unperceived as “sound” would seem to be an overstatement — sound, after all, requires sensory perception. At the physical level, it requires an ear drum to “catch” the sound. At a higher level, it also requires, as a minimum, a cognitive framework from which to attribute the meaning of *sound* to what would otherwise be no more than physical vibrations. In the absence of this relationship, the concept of a “sound” has no meaning.²²⁴

The experience of sound as music requires much more — it requires consciousness. Consciousness gives such sound the richness of meaning that distinguishes the concept of music from the mere perception of sounds. Music can then be “heard” not literally as a sequence of vibrational events but evocatively such that the experience of the sounds has the meaning we know as *music*.

Aristotle purportedly proposed that “time requires a soul [to count on it]”.²²⁵ Physicists may or may not agree with this.²²⁶

Musical time, however — at least as it is understood by Zuckerkandl — *does* need a perceiver. Without a perceiver, the pointer to the experience, there can be no music as we understand the term.

In such a representation, Zuckerkandl is not describing the external sounds with which music correlates. He is describing the *psychological meaning* of music such that the experience of music is perceived not as sounds but as music — with the layer of psychological meaning that makes such an experience of music distinct from a purely sensory phenomenon.

Zuckerkandl describes this concept as: *the meaning of a tone ... lies not in what it points to but in the pointing itself*.²²⁷

²²² Kramer, *The Time of Music*, viii.

²²³ Zuckerkandl, *Sound and Symbol*, 68.

²²⁴ Theoretical physicist Carlo Rovelli, in *Helgoland — Making Sense of the Quantum Revolution*, takes this concept further, arguing that all reality is *relational* and that the concept of anything existing in an absolute way is an essentially meaningless proposition. Carlo Rovelli, *The Web of Relations that Weave Reality*, chapter in Carlo Rovelli, *Helgoland — Making Sense of the Quantum Revolution* (New York: Riverhead Books, 2021), 89–116.

²²⁵ Kermode, *Sense of an Ending*, title page.

²²⁶ The theoretical physics concept of relativistic time is addressed in the *Musical processing — linear and cyclic* — Kramer section.

²²⁷ Zuckerkandl, *Sound and Symbol*, 68.

As it relates to the proposed conceptual model for the experience of directional motion in music, Zuckerkandl's position regarding the *meaning of music* is consistent with the first sub-proposition of RP 1A — that the experience of music is *phenomenologically determined*.

Phenomenological mechanics of Western vectorial musical motion

In the model proposed, philosophically and logically, the concept of movement, as represented from the Western paradigmatic perspective, begins with the concept of form and void — that is, a distinction between two states. The attribution of non-equivalence between these two states, be it physical or phenomenological, is the process of “separation and division”.

In the absence of separation and division there is no “there” distinct from “here” to move to. This concept — the movement from “here” to a different place “there” — is the concept of *linearity* as it applies to *space*.

The same process of separation and division as the origin of linearity also applies to *time*. Rather than the movement in space from “here” to “there”, the linear temporal movement is the movement from “now” to “then”. As it is for space, so it is for time — in the absence of a process of separation and division, there is no “then” as distinct from “now” for music to “move” to.

This is the concept of linearity in temporality.

As a logical proposition, it is irrelevant whether such space or time is material in nature or a phenomenological experience. Thus, such a proposition is equally true for the *experience* of such phenomenological parameters as it is for their physical counterparts.

The principle of the necessity of separation and division for the possibility of movement is as true for phenomenological mechanics as it is for physical mechanics.

The phenomenological process of separation and division is a central process in the characterisation of movement — at least as such movement is characterised within a Western paradigmatic representation. The Westernness of this representation of space and time and the linearity of movement within space are addressed in further detail in the dedicated section, *Musical interculturalities* — Clayton.

Kermode's concept of tick-tock projection

Why when the alarm clock by our bed goes “tick, tick”, does the brain insist on hearing “tick tock”? The reason ... is our addiction to beginnings and ... endings.²²⁸

In the phenomenon described above by Kermode, humans hear *tick* as *tick-tock*.

According to Kermode, to *hear* sequential events in a human way is to *order and classify* them. Tick and tock are thus an imposition of ordering and classification that is not there in the stimulus itself.

The *tick-tockness* that, according to Kermode, we hear in *tick* clearly doesn't arise from the sound itself — it must arise from *within ourselves*.

Hearing *tick* as *tick-tock* is thus a projection. Furthermore, it is a *dualistic* projection. When we hear *tick-tock* in *tick*, we are hearing the world in accordance with our dualistic conceptual framework and its associated expectations. Such a proposition would suggest that, phenomenologically, to hear something — or for that matter to perceive something via any sensorial process — we need to experience it against its opposite.

²²⁸ Zuckerkandl, *Sound and Symbol*, 68.

Kermode's concept of tick-tock projection as it relates to musical form and void

In the terminology of form and void, Kermode's proposition implies that to know *form* — at least in its Western understanding, we must also know *void* — against which, we can distinguish it.

The hearing of tick-tock in tick, as described by Kermode, can be seen as superimposed dualistic projection. Further, such a projection functions, as described in the thought experiment, as a *phenomenological field*.

As this applies to music, to hear music as form we need to also hear its contrast as void. This concept is further examined in the section *Musical Phenomenologies — Cage*, where I propose four musical representations of form and void (silence and sound, dominance and non-dominance, steady state and change, and expectation fulfilment and surprise) based upon this assertion.²²⁹

Kermode's concept of tick-tock projection as a polar couplet cell

Referencing the concepts of the thought experiment, the phenomenological structure of *tick-tock* can also be seen to be a polar couplet cell structure. This is so because *tick-tock* meets the previously described conditions of polarity as *asymmetry, interdependency of meaning, opposition of meaning, and combined frame entirety*.

Kermode's concept of tick-tock projection as projection of metre onto metreless pulse

When we project *tick-tock* onto *tick* and represent it as a polar couplet structure, we are, effectively, projecting metre onto metreless pulse.

It would seem no coincidence that a tick-tock structure should be able to permit the experience of directional motion — the tick-tock structure is, after all, a polar couplet cell structure in the same way that the 2/4 measure is a polar couplet cell structure.

Regarding 2/4 metre, beat 1 may be considered the home or void position and beat 2 may be considered its away or form correlate. Conceptually, the same applies to tick and tock. Thus, hearing the clock's *tick-ticks* as *tick-tocks* is a projection of metre where (in the clock's actual sounds) there is only metreless pulse.²³⁰

Kermode's concept of tick-tock projection of vectoriality (directional motion)

According to Zuckerkandl, metre *goes away and comes back*,²³¹ implying that metre is an inherently vectorial concept.

Whereas metre is vectorial (beat 1 can move *towards* beat 2 and then *back to* beat 1), metreless pulse is a scalar entity. It is a measure of tempo only.

The projection of tick-tock onto tick, as described by Kermode, is effectively the same concept. The difference is that in metre, there is a physical difference in the sounds (beat 1 is louder than beat 2) — in the case of the experience of tick as tick-tock, however, the difference is purely a projection.

Such a projection is also an implicit projection of directional time — the possibility of forwards tick to tock and backwards, tock to tick conceptual directional motion.

²²⁹ This concept is an important one in the dissertation's proposition in Chapter 3 of an alternative definition of minimalism — one which both in music and more broadly in fine arts is a method of composition and listening where form and void have equal significance and compositional status as musical content.

²³⁰ The comparison of metre, pulse, and other rhythmical organisations is further discussed under *Clayton's universe of rhythm* below.

²³¹ Zuckerkandl, *Sound and Symbol*, 168.

Arguably it is within this paradigmatically Western dualistic projection that the linearity (as opposed to cyclicity) of Western musical form and the vectoriality (as opposed to development by intensification) of its musical development process comfortably align.

Kermode's concept of tick-tock projection as the projection of a phenomenological machine unit

Such directional linear movement is only possible if we have separated and divided our experience into a tick and a tock to compare tick against.

In such a separated and divided structure, the tick-tock polar couplet cell can function as a simple phenomenological machine unit. From within its polar structure, it can function in a machine-like way. Arguably, it does so because the metre of tick and tock take place within a phenomenological field — the phenomenological field of expectation in the experience of metre, after its beat 1–beat 2 duality.

In accordance with this expectation, if our experience of *tock* is delayed — if a beat is missed — the system becomes phenomenologically *charged*.

The tick and tock phenomenological representation, *even when tock is a projection*, thus permits the experience of forwards and backwards motion. The origin of this capacity for the experience of directional motion is dualistic representation or the experience of separation and division — in this case, the separation of tock from tick.

Tick-tock projection and the experience of form-void vector

As it relates to music, the experience of a clock alternatively ticking and tocking is effectively the experience of 2/4 metre. Consistent with the concept that directional motion is phenomenologically determined, it is immaterial whether the clock is producing metreless pulsatile time rather than 2/4 duple metre. For the possibility of a sound (or sounds) to be experienced as directional motion, what matters is the *phenomenological determination* — the *perception* of tick and tock, or more broadly the experience of duality (tick and tock) — rather than the nature of the *noematic correlate* with which the experience is associated.

Thus, in listening to music, just as, according to Kermode, we project *tick-tock* onto a ticking clock, the case may be made that we do this to music. Such *tick-tock* projection is a characteristically Western way of listening. It is a projection of *paradigmatic dualism* onto music.

Western musical listening

Kramer's concept of teleological listening

As *tick-tock perception* relates to the experience of music, Western music — or at least music experienced in a *Western way* — is heard in an expectant way, a similar concept to what Kramer calls *teleological listening*.²³² Furthermore, it would seem to implicitly follow that Western-composed music — be it formally composed or composed in an improvisational context — is characteristically written and performed from the position of an implicit assumption regarding temporality. The music is to be experienced in accordance with the presumed linearity of temporality. That presumed linearity of temporality is the Western linear temporality of the arrow of time.

In the context of the dissertation (it being an investigation of the experience of time), this would seem to be an important realisation. This is because such a unilateral approach to the experience of time must come with limitations. Arguably, this is particularly so in the field of improvised music, where

²³² Kramer, *The Time of Music*, 378–379.

we are free to compose and play music spontaneously in any kind of temporality we choose. This is a considerable freedom with a potential to be fully explored. In the same way that a painter is free to choose their lighting, perspectives, colour schemes etc., the improvising musician is free to choose the temporality in which an improvisation takes place.

As noted in the previous section, Fraser describes five levels of human temporalities relevant to music. One of the important purposes of the current literature review is to examine such alternative temporalities in the literature and to present them in a way that can be applied to the performance of music. This proposition is considered and discussed, including with a diagrammatic representation of the concept, further into the literature review. As previously noted, the submitted minor work, *Beginner's Mind*, an improvisation for the fretless octave guitar, is an example of such an application.

Clayton's universe of rhythm

In the concluding chapter of *Time in Indian Music*, Martin Clayton presents a model of the relationship between metre, periodicity, pulse and rhythm (Figure 10), describing the model as follows:

All music has rhythm; some but not all has a perceived pulse; of this “pulsed” music some but not all has this pulse organised periodically; and some but not all forms of periodic organisation may be described as metre. ...the term free rhythm applies to the area shaded.²³³

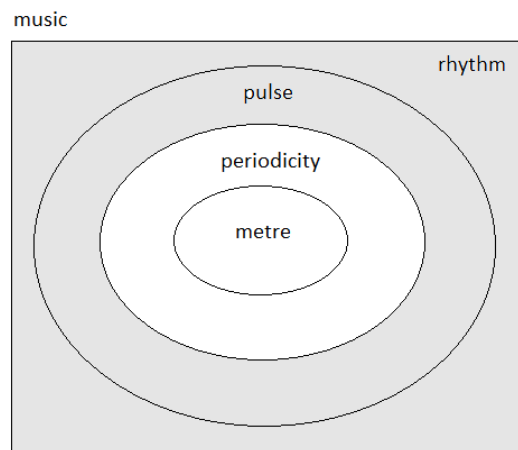


Figure 10: The organisation of rhythm in music

Source: Redrawn with Clayton's figure title from Clayton, *Time in Indian Music*.

Note: The shaded area is referred to as “free rhythm”.

Beyond the “wall” of rhythm:

If there is a purported boundary to the universe, we can toss a spear at it. If the spear flies through, it isn't a boundary after all; if the spear bounces back, then there must be something beyond the supposed edge of space, a cosmic wall that stopped the spear, a wall that is itself in space. Either way, there is no edge of the universe; thus, space must be infinite.²³⁴

²³³ Clayton, *Time in Indian Music*, 204.

²³⁴ In Lucretius, *De Rerum Natura* (951–987), in *Stanford Encyclopaedia of Philosophy* (1996) <https://stanford.library.sydney.edu.au/archives/fall2012/entries/thought-experiment/>

The above is a well-cited example of the application of a thought experiment by the Roman poet and philosopher Lucretius (circa 100 BC), as a means of “proving” that space is infinite. Just as Lucretius asked the question “What lies beyond?” in relation to the edge of the universe, one wonders what might lie beyond the “edge” or wall of rhythm.

In response to such a question, one could take the position of Lucretius in his thought experiment and conclude that perhaps there is no wall to rhythm after all — that rhythm is unlimited in its representations.

When one considers rhythm in this way, in its essence, it is no different from the question posed by Lucretius. For Lucretius to “contain” the concept of *universe*, he needed to present its opposite — the concept of *non-universe*. To conceive of form, he needed to conceive of void — *to compare it to*. His questioning thus invokes the necessity of opposites, a concept he refers to as an *edge*.

Effectively, however, the representation is like what I have called the previous tick-tock projection. To contain the concept of universe, Lucretius has invoked its opposite — that which lies *beyond* its edge. Such language implies the emblematically Western concepts of form-void mutual exclusivity and dualistic representation.

The following section addresses this concept further.

Form and void in Western and Eastern music

In Kermode’s description, to understand the nature of tick, we invoke *tock* to compare it against.

In Lucretius’s edge of the universe problem, the concept of a non-universe is invoked to understand the concept of a universe.

In both cases, neither of the comparisons exist in the physical world — they are purely conceptual. The analogy is relevant because it highlights the mutual exclusivity of the Western paradigmatic way of understanding things — and the paradigmatic lens through which Western music is arguably experienced. Viewed through such a *Western paradigmatic lens*, music is experienced relative to non-music.

As noted by Clayton, this is as much a practical description of one of the differences between Western and Eastern music as it is a theoretical position. As evidence of this, and as noted by Clayton, Western music has a definitive start point and end point.

In the form-versus-void terminology that I use in the dissertation, in Western music, void (non-music) transitions to music (the first note of a composition) in an unambiguous and clearly demarcated way. Such is not the case for Eastern music. Clayton poetically describes the form-void mutual *inclusivity* characterisation of Easternness, as it applies to Eastern (i.e., North Indian) classical music, as follows:

The rag simply emerges naturally and effortlessly from the primordial cloud ... that is the drone [functioning as void].²³⁵

From such a characterisation, it is possible to characterise Western and Eastern music as fundamentally different from Western music because of contrasting implicit assumptions regarding the relationship between form and void. It is for this very reason that, in the investigation of the experience of directional motion in music, form and void are the first concepts of the dissertation that I have considered. These concepts are detailed in Appendix 2. As concluded in Appendix 2, the Western paradigmatic way of seeing things, as such a perspective characterises music and music-

²³⁵ Clayton, *Time in Indian Music*, 25.

influencing disciplines, is characterised by a form-void relationship that is dualistic and mutually exclusive: *form versus void*.

In contrast, the Eastern way of seeing things is characterised by a relationship between form and void that is monistic and mutually inclusive: the single concept of *form-void*. This concept, I propose, informs an analysis of Western and Eastern music, especially contrasting Western and Eastern practices of improvisation. The analysis philosophically aligns with the Western concept of form-void *mutual exclusivity* and the Eastern concept of form-void *mutual inclusivity*.

As described in Section B: Thought Experiment, improvisation is approached in Western music from the perspective of music *creation*, while in Eastern music the approach is one of discovery, distillation, and revelation — that is, making apparent that which was hidden or *pre-existent*.²³⁶

Western and Eastern form-void relationships as switch and taijitu

The concept of form-versus void as a dualistic form-void mutually exclusive concept is, I propose, fundamental to the concept of directional musical motion, as defined in the Western way. It is relevant in the current dissertation beyond its application to ambiguous versus non-ambiguous transitions between form and void states of music, as highlighted in Clayton's description of Indian rag.

Regarding phenomenological mechanics, the representation of the form-void relationship applies to the phenomenological representations of such concepts as time, movement, charge, and energy.

From the Western perspective, without the phenomenological process of separation and division into mutually exclusive concepts of form and void, movement in the Western sense would not be possible. This concept is described in Appendix 4 — allegorically represented in the Indian conductor's experience of *going nowhere*, in contrast to the Western commuter's experience of going (linearly) *to or from home*.

The Eastern universe, by comparison, is monistic. It does not have the ontological problems that are raised in Lucretius's thought experiment. In the Eastern universe, at the ontological level, there is no wall because there is nothing to separate. There is no concept of a universe and a non-universe. This proposition is graphically represented in the contrasting representations of the form-void relationship in Eastern and Western paradigmatic settings as switch and taijitu, respectively, diagrammatically represented earlier in Figure 5. I now consider the positions of each of these theorists in detail — Zuckerkandl, Cage, Clayton, Kramer, and Fraser — as they are represented in the literature.

Musical mechanics — Zuckerkandl

Phenomenological mechanics perspectives of Zuckerkandl's wave theory description of 2/4 measure

[Regarding 2/4 metre] To be able to come back, one must first have gone away; now we understand why we count one-two, and not one-one. Here "two" does not simply mean "beat number 2" but also "away from".²³⁷

In this simple statement, Zuckerkandl is implying the inherent *experienceable vectoriality* of the 2/4 measure. Zuckerkandl's description is also implicit in many other simple but fundamental concepts of mechanics, albeit in the phenomenological rather than physical realm.

²³⁶ Clayton, *Time in Indian Music*, 2.

²³⁷ Zuckerkandl, *Sound and Symbol*, 168.

Zuckermandl's characterisation of the 2/4 metre is consistent with many of the fundamental themes and concepts of the primary RPs, as described in Section B: Thought Experiment. This includes the representation of the 2/4 measure as a polar cell couplet. Otherwise expressed, the relationship between phenomenological attributions of away and home states to beat 1 and beat 2, respectively, is one of *polarity*.

Similarly to what is described in the previous section, the concepts I have used in the thought experiment are consistent with Zuckermandl's concept of vectoriality within the 2/4 measure. Whereas Zuckermandl uses literary descriptive terms such as *going away* and *coming back*, in the proposed model, I reference the same concepts, albeit in the terminology of mechanics.²³⁸

The thought experiment in response to the research question, "What is the nature of the experience of directional motion in music?" thus originates in and is situated in the literature in Zuckermandl's concept of implicit directional motion within the 2/4 measure. These and related *phenomenological mechanics* attributes of the 2/4 measure, as they contribute to the experience of vectorial motion in music, are addressed in the next section.

2/4 metre as a form-void vector

Zuckermandl's concept of the experience of 2/4 metre as being one of implicit vectorial motion would, therefore, appear to be consistent with the dissertation's fundamental propositions, as presented in the primary RPs. These comparable concepts are characterizable in the following ways:

- Beat 1 and beat 2 of the *phenomenologically determined poles* function as *home* and *away* states, which are ultimately characterizable as states of *void* and *form*, respectively.
- The 2/4 measure is conceptually representable as a *polar couplet cell* whose poles are the void and form states of home and away, corresponding to beats 1 and 2 of 2/4 metre, respectively.
- Being representable as a form-void couplet, the described movements of *going away* and *coming back* (to and from beat 1) may be represented as *phenomenologically determined form void vectors*.

2/4 metre a phenomenologically charged cell

[Music] "becomes active" and carries with it a tendency or tension ("almost a will") that strives towards resolution.²³⁹

In his commentary of Zuckermandl's *Sound and Symbol*, US composer and music theorist Luke Dahn paraphrases Zuckermandl's description of the dynamic quality of music as above. Dahn uses the

²³⁸ In the thought experiment, in reference to the movement from beat 1 to beat 2, Zuckermandl uses the vectorial term of *going away*. Referencing the same directional movement, I use several terms from mechanics to refer to the same concept of *nominally forwards* movement. These include *energetically endothermic*, *entropically negative*, *chaos-to-order*, and *charging* movement. I also describe this same directional *nominally forwards* movement in musical terms, including *home-to-away* and *development* movement. More broadly, I describe this nominally forwards movement as a movement from *void* to *form*.

Conversely, for movement in the opposite direction, from beat 2 to beat 1, Zuckermandl uses the term *coming back*.

In referencing this same contrary *nominally backwards* movement, I use the following terms. From mechanics, I use the terms *energetically exothermic*, *entropically positive*, *order-to-chaos*, and *discharging* movement. As this *nominally backwards* directional motion correlates with music, I use the terms *away-to-home* movement and *resolution*. More broadly, I describe this *nominally backwards* movement as a movement from *form* to *void*.

²³⁹ Dahn, "A Summary and Reflection on Victor Zuckermandl's *Sound and Symbol*."

terminology that music *becomes active* and that inherent with such an activated state is a *tendency* towards *resolution*.

Similarly to Zuckerkandl, Dahn does not explicitly state his concept in the phenomenological-mechanics terminology of the dissertation. Dahn's proposition, however, that music "becomes active" is consistent with this dissertation's proposition that the 2/4 measure phenomenologically functions as a cell in which the music (in this case, metre) can become *active* with something akin to a *phenomenological charge*.

In this way, Dahn implies the human experience of metre is analogous to a battery cell. A battery cell can be charged with physical electrochemical energy, as described in Section B: Thought Experiment, "endothermically" charging and "exothermically" discharging.

Analogously, as a polar couplet cell, the 2/4 measure, in its void-to-form, beat 1 to beat 2 development process, the 2/4 measure becomes *endothermically* phenomenologically *charged*. Metaphorically, in simple machine terms, this is representable as the change of state that happens when a ball is rolled up an inclined slope.

Such a process — the phenomenological experience associated with the movement in 2/4 metre from beat 1 to beat 2 in mechanics terms, relating to energy, is a transformation of kinetic energy to potential energy.

In quantum mechanics, it is analogous to the movement of an electron from a low-energy inner orbital to a higher-energy outer orbital.

As it relates to entropy (randomness or disorder) the beat 1 to beat 2 movement is a transition from a state of higher entropy (higher disorder or lower order) to a state of lower entropy (lower disorder or higher order).

In all these analogous descriptions, the movement is characterizable as a movement between two states, one of which (the *destination* state), relative to the other (the *origin* state), is more unstable.

In musical terms, this is analogous to the concept of *development*.

In each of these examples, there exists the converse possibility — the movement from the unstable state back to the stable state. In musical terms, this is analogous to the concept of *resolution*.

2/4 metre as a linear development and resolution movement of cyclic phenomenological periodic motion

In musical terms (as proposed in Primary RP Corollary 2A), the mechanics terms of *charging* and *discharging* of energy within a simple machine such as a battery cell or inclined plane have equivalent phenomenological terms as they apply to music. These are musical concepts of *development* and *resolution*, respectively. Thus, the *tendency* of a 2/4 measure in its active state to move "towards resolution"²⁴⁰ is analogous to the tendency of a charged battery to move towards discharging, or a ball tending to roll back down the slope to the position it started from.

²⁴⁰ The concept of the 2/4 measure, having the structure of a polar couplet cell, functioning as a phenomenologically charged cell is a concept that, as described in the thought experiment, applies to any musical device or section that is phenomenologically experienceable as a polar couplet cell. As described in the section that follows, this includes the musical devices of imperfect and perfect cadence.

The meaning of *tendency* in such a description may be described by the alternative terminology of a *phenomenological charge*. In such a characterisation, a *phenomenological charge* is a vectorial entity. It has a magnitude and a direction.

As described in the thought experiment, metre may further be considered as a linear and cyclic phenomenological periodic motion. This concept, as it informs the compositional process of the major artefact, is described as follows.

Linear and cyclic phenomenological periodic motion as it relates to the major artefact

Combined, this movement constitutes a cyclically repeating linear movement of void to form, form back to void movement. The major artefact *Oscillation 1* may thus be seen as a composition that exemplifies this phenomenological mechanics concept of linear and cyclic phenomenological periodic motion.

Summary of musical mechanics

The concept of the experience of music as being akin to a phenomenological machine acting in accordance with the principles or *laws* of phenomenological mechanics is the central concept of the primary research propositions of the dissertation.

In classical mechanics, these are the concepts that describe motion, including vectorial or directional motion as described by Isaac Newton.²⁴¹ Within the musical literature, similar concepts are alluded to, albeit implicitly, in the concepts of Zuckerkandl and Kermode.²⁴²

In the primary research propositions, I have interpreted the experience of the directional movement in metre, as implied by Zuckerkandl in his 1956 wave theory of metre,²⁴³ in terms of the rudimentary concepts of mechanics, as described by Newton.

Because these experiences take place in the phenomenological rather than physical realm, I have coined the term *phenomenological mechanics* to describe the collection of these principles and laws as they apply to phenomenological experience, including the phenomenological experience of directional motion in music.

Whereas Newton's classical mechanics laws govern physical motion, analogous concepts as they apply to phenomenological mechanical provide a means of conceptualising the experience of motion in music.

Zuckerkandl describes the concept of implicit vectoriality as it applies to 2/4 metre. In RP 1A, arising from the process of the thought experiment, I propose a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field* model as a conceptual framework for representing the processes that contribute to this experience of directional motion in music. In this process, I extend Zuckerkandl's concept of implicit phenomenological vectoriality within metre to arrive at the concepts of the phenomenological machine and phenomenological mechanics.

In Newton's classical description of the laws of nature, time and motion are intimately connected.²⁴⁴ It is thus not surprising that an investigation into the experience of *phenomenological motion* should

²⁴¹ Sir Isaac Newton, *Principia Vol II: The System of the World*. Motte's Translation, revised by Florian Cajori (University of California Press, 1934).

²⁴² Zuckerkandl, *Sound and Symbol*; Frank Kermode, *The Sense of an Ending: Studies in the Theory of Fiction* (Oxford: Oxford University Press, 1967).

²⁴³ Zuckerkandl, *Sound and Symbol*.

²⁴⁴ *Principia Vol 2 — The System of the World*.

arrive at any examination of *phenomenological time*. This is, in fact, the way the dissertation has developed.

In the following sections of the literature review, I examine this model from the perspectives of Western and Eastern paradigmatic perspectives, especially in relation to Western and Eastern linear and cyclic concepts of time, as they are represented in the literature. I then examine the linear and non-linear compositional structures of Western and Eastern music, equating the related concepts of linear and cyclic temporality and linear and cyclic musical structures in Western and Eastern musical forms, respectively. In that regard, the concept of linearity versus cyclicity (or non-linearity) is not only a property of the organisation of the dissertation and of the composition. As described by Kramer, such linear and non-linear musical processes are an inherent property of our paradigmatic experience of music, our *way of seeing things* or, in the case of music, our experience of *hearing things*, especially our way of hearing things *in time*.²⁴⁵

The concept of linear and non-linear musical processing is by no means the same as the experience of Western linear and Eastern cyclic time in music. Nor is it the same concept as the Western and Eastern dualistic and monistic perspectives of experience, which extends beyond music because of, as described by Hoffman, the shared epistemologies of music and culture.²⁴⁶ They are, however, related concepts, and accordingly the following sections examine them in more detail as they have been represented in the literature. The begin with an examination of the nature of *musical phenomenologies*, referencing concepts from Cage and others. This includes examining the way form and void are represented in composition — both absolutely and relatively — beyond the simple dichotomy of form as sound, and void as silence.

In its primary and secondary RPs, the dissertation addresses not only the concept of *phenomenological mechanics* as it applies to the experience of directional motion in music but also the concept of composition as intercultural metaphor. Accordingly, after the section on Cage, I examine the same concepts organised around the concepts of Clayton. The literature review then concludes with an examination of the interdisciplinary concepts of Fraser.²⁴⁷ In this way we can see how the disciplines of music, science, and phenomenology interact, based on common temporalities.

In the tertiary RPs, these concepts are applied to the performance and analysis of music, introducing the novel concepts of musical form as *helix* and *vortex* — musical forms that accord with Western and Eastern linear and cyclic temporalities.

Musical phenomenologies — Cage

Musical phenomenologies of the form-void vector

Musical phenomenologies as the musical “what” of form and void

In the previous section, I described musical mechanics as the “how” of phenomenological mechanics. In contrast to this, the current section considers the “what” of phenomenological mechanics. More precisely, it examines the “what” of musical form and void representations to which phenomenological mechanics apply in a range of contrasting musical contexts. The section begins with the question: “What is musical form?” As it relates to the dissertation, the question is an important one.

²⁴⁵ Kramer, *The Time of Music*, 63.

²⁴⁶ Hoffman, “Epistemology and Music,” 69–88, quoted in Clayton, *Time in Indian Music*, 10.

²⁴⁷ Fraser, “Human Temporality in a Nowless Universe,” 159–173.

The reason is that in its primary RPs, the dissertation proposes a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field* model for the experience of directional motion in music. In accordance with such a model, the experience of directional musical movement arises out of the phenomenological attribution to the *structure* of music of polar form and void states represented as a *polar couplet cell*, whose inherent structure permits the *experience* of a polar couplet cell in a directional way (i.e., as a *form-void vector*).

Conceptually, the polarity of the polar couplet cell permits it to function, at the phenomenological level, analogously to a single battery electrochemical cell — a simple machine. In such a representation, void-to-form movement functions as *development* analogously to the charging of a battery — effectively, a movement against a gradient, resulting in a storage of energy. Such conceptual *storage of phenomenological energy* allows the *phenomenological battery* to *discharge*, releasing its stored *phenomenological* (potential) *energy*, a process that accords with the converse directional musical motion — that of resolution.

In the analogy of the polar couplet cell (e.g., as represented by the 2/4 measure), the development movement of void to form is the movement from the more stable, lower energy, higher entropy *undeveloped* state of beat 1 to the more unstable, higher energy, lower entropy *developed* state of beat 2.

Whereas the battery cell functions *literally* within an electrochemical *physical* field, the polar couplet cell functions *figuratively* within a *phenomenological field* — in Dahn’s terminology, a phenomenological field of “tension or tendency ... towards resolution”; in Kermode’s terminology, a field of “teleologically reflexive” expectation of “beginning and ending” — more simply expressed as a *phenomenological field of expectation*.

Thus, the *expectation* for a developed musical figure to resolve and release this “tension or tendency ... towards resolution” is analogous in its function to a battery’s electrochemical cell’s tendency or tension to discharge.

Conceptually, wherever there is within music a polar couplet cell structure, there is the possibility for the experience of directional movement to be conceptually representable as a simple phenomenological machine unit. In its broadest meaning, and its most reduced and elementary unit, musical form is characterizable as a polar couplet cell structure being in its developed state.

The simplest example of this is the absolute form-void representation of musical form as sound and silence. Within this couplet, sound functions as musical form because it is the *developed* state of the form-void couplet of sound and silence.

In this section, I present three further polar couplet cell representations of form and void, each of which has the capacity to be experienced vectorially and to function as a phenomenological machine, referenced against similar concepts from the literature.

Form and void beyond sound and silence — compositional devices

What is of significance for the possibility of phenomenological movement is not so much the nature of the poles themselves but that the relationship between them is one of polarity. Such distinction permits the conceptual possibility of *movement* from one state to another.

Whereas the polarity of the attributions (as a polarised couplet cell) determines the *capacity* for the experience of vectoriality (directional movement), the specific attributions themselves (what is

experienced as form and what is experienced as void) permit a composition to be represented in terms of compositional devices that function as representations of form and void states.

In that regard, each of the polar couplet cells proposed in this section as musical phenomenologies — that is, *sound and silence*, *dominance and non-dominance*, *steady state and change*, and *expectation fulfilment and non-fulfilment or surprise* — may be considered as variations of what are essentially paired representations of form and void, operationalised as musical devices.²⁴⁸

Accordingly, the current section examines the question: *How are musical form and musical void represented in composition beyond sound and silence?* This question is addressed by referencing concepts arising from the philosophical framework one can infer in the musical works of Cage, in particular Cage's use of form and void in non-traditional and *paradoxical* ways.

The musical phenomenology of silence as paradoxical form

The work [John Cage's 4'33"] highlights as it stimulates expectations on the part of the audience member who may well ask, where are the “musical” notes?²⁴⁹

In addressing the question *How are musical form and musical void represented in composition beyond sound and silence?* I begin by examining the concept of silence itself. The silence examined, however, is not silence as traditionally understood — as void — but is silence that paradoxically functions as form. In *Loading the Silence*, Linda Kouvaras calls such paradoxical *silent form* “Cagean silence”.²⁵⁰

For the purposes of the current dissertation, the term “Cagean silence” is used to mean any silence — or, more broadly, any other traditionally void state that *is paradoxically experienced as musical form rather than musical void*. In the case of 4'33", such paradoxical form was the incidental sounds of the audience and, depending how you interpret the “performance”, the act itself of “doing nothing”. Such “silence” is paradoxical because silence is *normally* understood to represent void.

Absolute and relative musical form — musical silence and Cagean silence

Though it has traditionally (pre-Cage) been understood as *absolute* — form being the presence of sound and void being the absence of sound (i.e., silence) — in more non-traditional music, including postmodernist and avant-garde music, musical form may be *relative* rather than absolute.²⁵¹

Arguably, silence functions as form in a relative sense in two distinct ways, the first of which may be considered “musical silence” to distinguish it from the concept of “Cagean silence”. Both are, however, instances where silence paradoxically functions as musical form.

The concept of musical silence is not a new one, nor is it particularly associated with postmodernist or avant-garde music. It is simply the concept of a musical event — such as a note or phrase — being omitted to create salience. “Musical silence” may thus be considered as void functioning paradoxically as form within two of the above examples of relative musical form.

²⁴⁸ The process of operationalisation of abstract concepts — in this case form and void — is the same process used as described in Appendix 5 to operationalise the abstract concepts of linearity and cyclicity.

²⁴⁹ Kouvaras, *Loading the Silence*, 56.

²⁵⁰ Kouvaras, *Loading the Silence*, 56.

²⁵¹ Although the experience of musical sound is also literally relative (musical sound is relatively louder than silence) and thus also literally context-specific, such relativity occurs at the level of sensation. Its context-specificity is, however, in its physical level of loudness. Such relativity of form and void may be called relative musical form at the level of *sensation or sensation silence*. Though it has literal meaning, it does not feature significantly in the experience of void as a relative (i.e., context-dependent) phenomenon.

Firstly, such *omission of an expected musical event* as a note or phrase functions as musical form because it is a *disruption of a steady state*. Secondly, it functions as musical form because it is experienced as expectation non-fulfilment (i.e., *surprise*).

In contrast, Cagean silence functions paradoxically as form, not because its context-specificity is in relation to a discontinuity of musical events, but in terms of the *context-dependency of its cultural meaning*. Rather than being an *omission of an expected musical event* — as a note or phrase — Cagean silence is the *omission of music itself*, an entirely different concept and one that is strongly cultural-context dependent.

Nothing is something.²⁵²

Such context-dependency of cultural meaning translates as *expectation*.

Thus, the Cagean silence of 4'33" functions as musical form because the form-void reference framework that the listener is deploying is not an absolute one of sound and silence but one that is relative and strongly context-dependent. Were this not to be the case, on the composition's first *playing*, the audience would have simply left the concert hall as if nothing had happened, which clearly was not the case.

On the contrary, in the experiencing of 4'33", something had happened — a different kind of something — a *something in nothing*, such that *nothing is something*.

Cagean silence, as the term is used in the dissertation, may thus be understood in the context of a conceptual framework where the concepts of form and void are strongly context-specific. In the example of 4'33", this is clearly apparent when one considers the scenario of the same composition “performed” in a different environment (i.e., a different cultural context). One can imagine, for instance, the very different reception — quite likely no *reception at all* — the “performance” might have received if the same “composition” was subsequently “played” unannounced on a public piano in a busy train station by a commuter looking for a place to sit, who, upon finding an unused piano stool in front of a public piano, sits on the stool, and, in the act of *doing nothing*, “performs” the composition. In such a scenario, absent of the cultural context of expectation, nothing would simply be — nothing. In contrast to this, in the cultural context of the Maverick Concert Hall, in Woodstock New York, where the composition was premiered, *nothing was something*.

Form and void representations — absolute and relative

In further expanding this concept (as noted at the beginning of this section), I present the following compositional devices as *couplet pairs* of form and void relationships, each of which, due to their polar couplet cell relationship, has the potential to function as the foundation for the phenomenological experience of movement in music. Each of these compositional devices thus has the capacity to be experienced vectorially and to function as a simple phenomenological machine unit:

- Silence and sound
- Dominance and non-dominance
- Steady state and change
- Expectation fulfilment and non-fulfilment (i.e., surprise).

²⁵² Lawrence Krauss, *A Universe from Nothing: Why There Is Something Rather Than Nothing?* (Free Press, 2012).

Whereas in the couplet pair of *sound and silence*, form and void are, for practical purposes, an *absolute* concept (with the previously noted qualifications²⁵³), in each of the other pairs, form and void are *relative* (i.e., context-specific).

In the couplet pair of *dominance and non-dominance*, although there is relativity at the level of loudness — beat 1, for instance, is louder than beat 2 — it is the *meaning* of the beats — beat 1 functioning as the *home* beat and beat 2 functioning as the *away* beat — where the more important relativity and *interdependence of meaning* lies.

Relativity and context-specificity in the couplet pair *steady state and change* determine what events function as form (and thus musical content) and what events function as void (absence of musical content). They are based on expectation. In such a representation, a steady state of movement is a void state.²⁵⁴

Otherwise expressed, in this representation of form and void, musical form is the *disturbance* of a steady state, functioning as void, by an interrupting event that functions as musical form. A simple example of such musical form arising as a change from a steady state is the change of mode that occurs in modal music.

Musical form as the “shock” of context-dependent salience

Finally, for the couplet pair of expectation fulfilment and non-fulfilment, any musical event that is unexpected constitutes musical form.

This would seem to be the case in two distinctly different situations. The first is when such “surprise” occurs within the music itself — for example, an unexpected change to a familiar chord progression. This is the previously described concept of musical silence as the omission (or discontinuation) of an expected musical note or event. The second situation is when surprise arises out of the broader expectation of music within a cultural context, a demonstrative example of which is Cage’s 4’33”.

In Section B: Thought Experiment, I introduced the concept of expectation as a *phenomenological field*. This concept accords well with expectation non-fulfilment (i.e., surprise) as a musical form.

Arguably, this definition of form and void is most suitable to analysis of postmodernist and avant-garde composition, where musical form, rather than being described in the modernist sense of the *shock of the new*,²⁵⁵ may be considered as the “shock” of *context-dependent salience*.

Other form-void couplets

In this dissertation, I have proposed four paired compositional devices, which as pairs or “cells” have the structure of form-void couplets. This is not to suggest that this is the entirety of such couplets. Clearly, there are many others. The examples presented are thus not exhaustive. Rather they are form-void couplets through which the conceptual representation of directional musical movement is

²⁵³ Conceptually, true “absolute” silence is a state of complete non-action of matter, in theory requiring a temperature of zero degrees Kelvin (minus 273.15 degrees Celsius). At zero degrees Kelvin, all the classical motion of atoms ceases (<https://www.newscientist.com/article/dn18541-what-happens-at-absolute-zero/>).

In the dissertation, absolute silence is used to mean “the experience of silence”. Although a relative concept, including to background noise, for the purposes of the dissertation, the term absolute silence is used to mean silence that is not context-specific in its *meaning*.

²⁵⁴ This is consistent with Newton’s first (as opposed to third) law of motion, which states that a body in a steady state (be that resting or at a fixed speed) will continue in this state unless acted upon by a force (Newton, *Principia: Vol. II: The System of the World*).

²⁵⁵ Robert Hughes, 1938–2012. *The Shock of the New — Art and the Century of Change* (New York: Knopf, 1991).

possible to demonstrate by familiar example. Examples of context-dependent form-void couplets at the level of metre are:

- **Sound and silence** — Silence (void) followed by the commencement of continuous regular metre (form).
- **Dominance and non-dominance** — A loud beat 1 functioning as home (void), followed by a soft beat functioning as away (form).
- **Steady state and change** — Steady continuous metre (void), interrupted by double time or half time (form).
- **Expectation fulfilment and surprise** — A drummer playing an electronic drum kit that, when hit, produces animal sounds rather than drumbeats.

Musical phenomenologies of Primary RP 1A other than form-void vector

RP 1A presents a conceptual model for the experience of directional motion in music as a phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field. Inherent in such a model is the concept of a *simple phenomenological machine* (the phenomenologically determined form-void vector) and the organisation of such simple phenomenological machines into a *complex phenomenological machine*. This section thus considers the architecture of the complex phenomenological machine — that is, the sub-proposition multi-parameter involvement, the vector field arrangement, and hierarchical organisation, as such concepts are represented within the literature.

Multi-parameter involvement: Form-void couplets within non-metre musical parameters

So far, I have provided examples of musical form using the above four representations of form and void (melody, harmony, modulation and global form) or the “musical what” of tick and tock beyond metre. The main reason for demonstrating this concept as it applies to the musical parameter of metre is that metre is arguably the simplest representation of the concept.

The 2/4 measure, for example, in its simple beat 1–beat 2 polar couplet structure exemplifies the concept of *division* and *separation*, which permits the experience of directional movement in metre in accordance with the propositions presented in Section B: Thought Experiment. Furthermore, the concept of vectoriality arising out of a polar couplet cell structure is implicit in Zuckerkandl’s proposition that (regarding 2/4 metre):

To be able to come back, one must first have gone away; now we understand why we count one-two, and not one-one. Here “two” does not simply mean “beat number 2” but also “away from”.²⁵⁶

In extending this concept, which arises out of Zuckerkandl’s implicitly vectorial characterisation of metre to other musical parameters, the following form-void couplets may be considered:

Parameter	Void and Form Representations
Metre	<i>Beat 1 and beat 2</i>
Melody	<i>Resting note and passing note</i>
Harmony	<i>Tonic and dominant</i>
Modulation	<i>Home key and modulation</i>
Global form	<i>Theme and variation</i>

²⁵⁶ Zuckerkandl, *Sound and Symbol*, 168.

Notably, for each of these non-metre musical parameter couplets, one of the couplet elements functions as *home* (i.e., void) and the other functions as *away* (i.e., form). Thus, for each of these musical parameters, there exists a phenomenological representation of a *polar couplet cell* from which can arise a *form-void vector*, giving rise to the possibility of directional musical movement either forwards (from void to form states) or backwards (from form to states).

The phenomenological machine unit within metre, melody, harmony, modulation, and global form

In phenomenological mechanics terms, each of these individual couplet cells contains the capacity for *development* (the movement from void to form) and *resolution* (the movement from form to void).

Further, in phenomenological mechanics terms, in accordance with the previously described concepts of Kermode, Dahn, and Zuckerkandl, the experience of development carries within it, in the manner of a *phenomenological field*, the expectation of resolution.

Musical development and resolution as kinetic-potential phenomenological energy exchange

In the process of *development*, phenomenological cells within each of these polar cell couplets have the potential conceptually to *store* phenomenological energy. Such charging is achieved through the process of musical *development* of the polar couplet cell from its void resting state to a developed state.

In the process of such development, each cell, conceptually functioning analogously to a simple machine (such as a battery), has the capacity to store phenomenological energy — a conceptual process that aligns with the concept of musical development. Conversely, in the process of *resolution*, the composition, functioning analogously to a discharging battery, *releases* phenomenological energy.

Referencing the concepts from Section B: Thought Experiment, development is thus a phenomenologically *endothermic* process — it *requires* phenomenological kinetic energy (the energy of *motion*), exchanging it for phenomenological *potential* energy (the energy of position). In the process, it transitions the cell from an undeveloped state to a developed state.

Conversely, the process of *resolution* is a phenomenologically *exothermic* process. It *releases* kinetic energy, exchanging the phenomenological *potential* energy that exists in the developed cell for the kinetic energy of phenomenological motion.

The same applies to phenomenological entropy.

Whereas musical development considered from the perspective of *energy* transformation (in accordance with the *first* law of thermodynamics) is movement *from low to high* (potential) *energy* (and conversely for musical resolution), development considered from the perspective of *entropy* transformation (in accordance with the *second* law of thermodynamics) is a movement *from high to low* entropy — a movement from chaos to order.

Conceptually represented in this way, wherever in the experience of music there exists a phenomenologically determined polar couplet cell, there also exists the capacity for *development* of the cell by the input or *deposit* of phenomenological energy or the removal of phenomenological entropy.

Associated with such an action is the capacity for this phenomenological energy to be released, and the entropy or disorder to be restored — a process that accords with the concept of musical resolution.

The polar couplet cell functioning as simple machine — electrochemical cell

Referencing another simple machine concept, if one *stretches* music via a process of development, phenomenologically, like a mechanical spring or rubber band, the developed state remains in a state of “tension ... or tendency”, until such tension is appeased.

Conceptually, each of the above musical parameter units thus has the capacity to move or charge (or *stretch*) from a stable resting state (functioning as void) to a developed or phenomenologically charged (or stretched) state where it functions as musical form. In this way, every polar couplet cell representation in the subjective experience of music has the capacity to transform from a resting (void) state to a phenomenologically charged state where it functions as musical form.

Figure 11 demonstrates the conceptual structure of the polar couplet cell structure. This figure also demonstrates the analogous structure of the polar couplet cell to that of a simple machine, represented by some simple machine structures, including the electrochemical cell. This is the origin of the concept that wherever phenomenologically determined polarity is experienced in the representation of music, there is the potential for the unit to become, like the electrochemical cell of a battery, phenomenologically charged — and thus to function as a simple phenomenological machine unit.

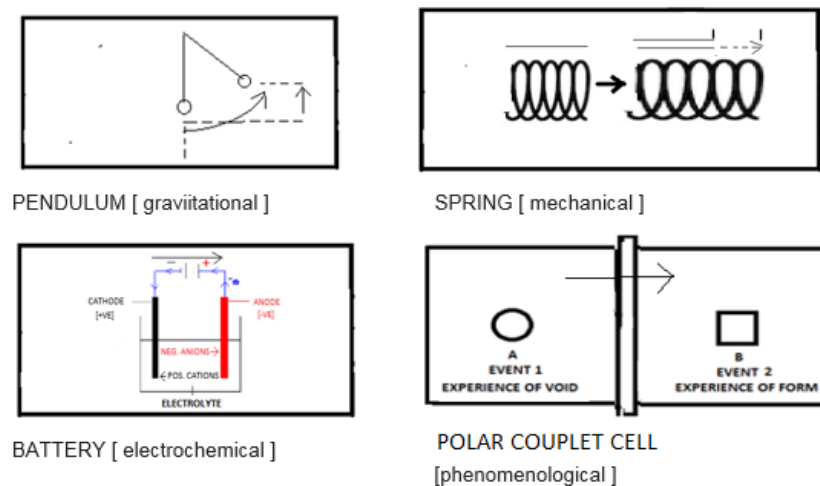


Figure 11: The polar couplet cell as a simple machine

Figure 12 below represents the concept of musical development and resolution as void-to-form and form-to-void phenomenological movements, respectively.

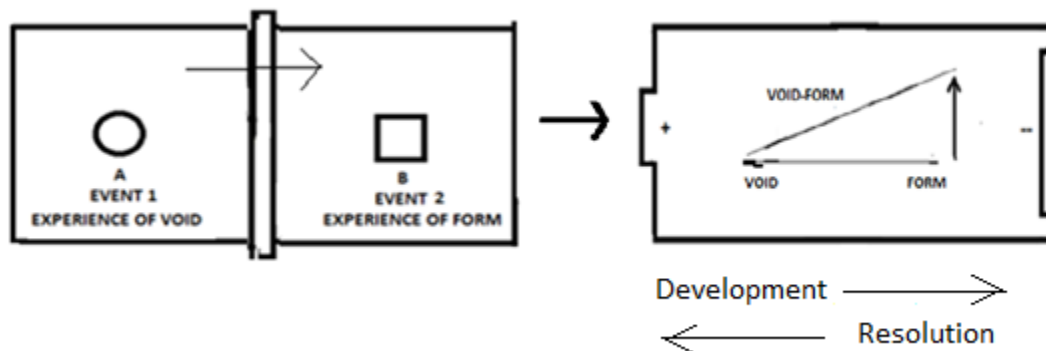


Figure 12: Musical development and resolution — form-to-void movements

The complex phenomenological machine — battery of cells representation

When the experience of music as a composition is considered across all its (potentially hierarchically organised) phenomenologically contributing parameters, each cell functioning analogously to a chargeable (by development) and dischargeable (by resolution) electrochemical cell, the entirety of the experience of directional musical motion is conceptually representable as akin to a *battery*. This is the origin of the concept of the polarized couplet cell having the capacity within it to function in its *entirety* analogously to a phenomenological *battery of cells*. Figure 13 (next page) demonstrates the concept of the complex phenomenological machine as a battery of phenomenological cells, each one capable of being charged and of discharging.²⁵⁷

The concept of the vector field

The fifth sub-proposition of RP 1A — the proposition that the experience of directional musical motion is representable as a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field* — is the concept of *vector field*.

As was noted in Section B: Thought Experiment, the concept of a vector field is not in itself a novel concept. It is a standard concept for describing the overall directional interaction of multiple entities, each of which has a directional component. As was also noted in that section, Kramer briefly mentions the vector field concept as it relates to time in the *Time of Music*.²⁵⁸

Figure 13, which demonstrates the concept of the complex phenomenological machine as a battery of phenomenological cells, may also be used to represent the concept of a musical vector field. In such a representation, each of the simple phenomenological machine units contain within their phenomenologically polar structure, the capacity for facilitating the experience of a form-void vector, either moving nominally forwards, akin to development with the cell, or backwards, akin to resolution within the cell. The vector field is then the summation of the contributing form-void vectors, including the summation of their directional components.

If, following the conceptual process of summation the net vector was *forwards (void-to-form)* moving, the composition may be considered as being in a state of development. Conversely, if the net direction of the vector field was *negative* (i.e., *form-to-void* moving), the composition may be considered as being in a state of *resolution*.

In such a representation, each of the simple phenomenological machine units would compose an individual form-void vector, either moving nominally forwards, akin to development with the cell, or backwards, akin to resolution within the cell. The vector field is then the summation of the contributing form-void vectors, including the summation of their directional components.

If, following the conceptual process of summation, the net vector was *forwards (void-to-form)* moving, the composition may be considered as being in a state of development. Conversely, if the net direction of the vector field was *negative* (i.e., *form-to-void* moving), the composition may be considered in a state of *resolution*.

²⁵⁷ For practical purposes (because of the difficulty of representing it graphically within an already complex figure), the concept of multimodality is not included in this figure. In imagining a visual representation of RP 1A as a complex phenomenological machine, Figure 13 may be imagined as representing a single modality — such as metre. One can then imagine this figure being multiplied for additional modalities, including, but not limited to, those of melody, harmony, modulation, and global form.

Appendix 4 provides further graphic representations of the complex phenomenological machine and its complex architecture.

²⁵⁸ Kramer, *The Time of Music*, 46.

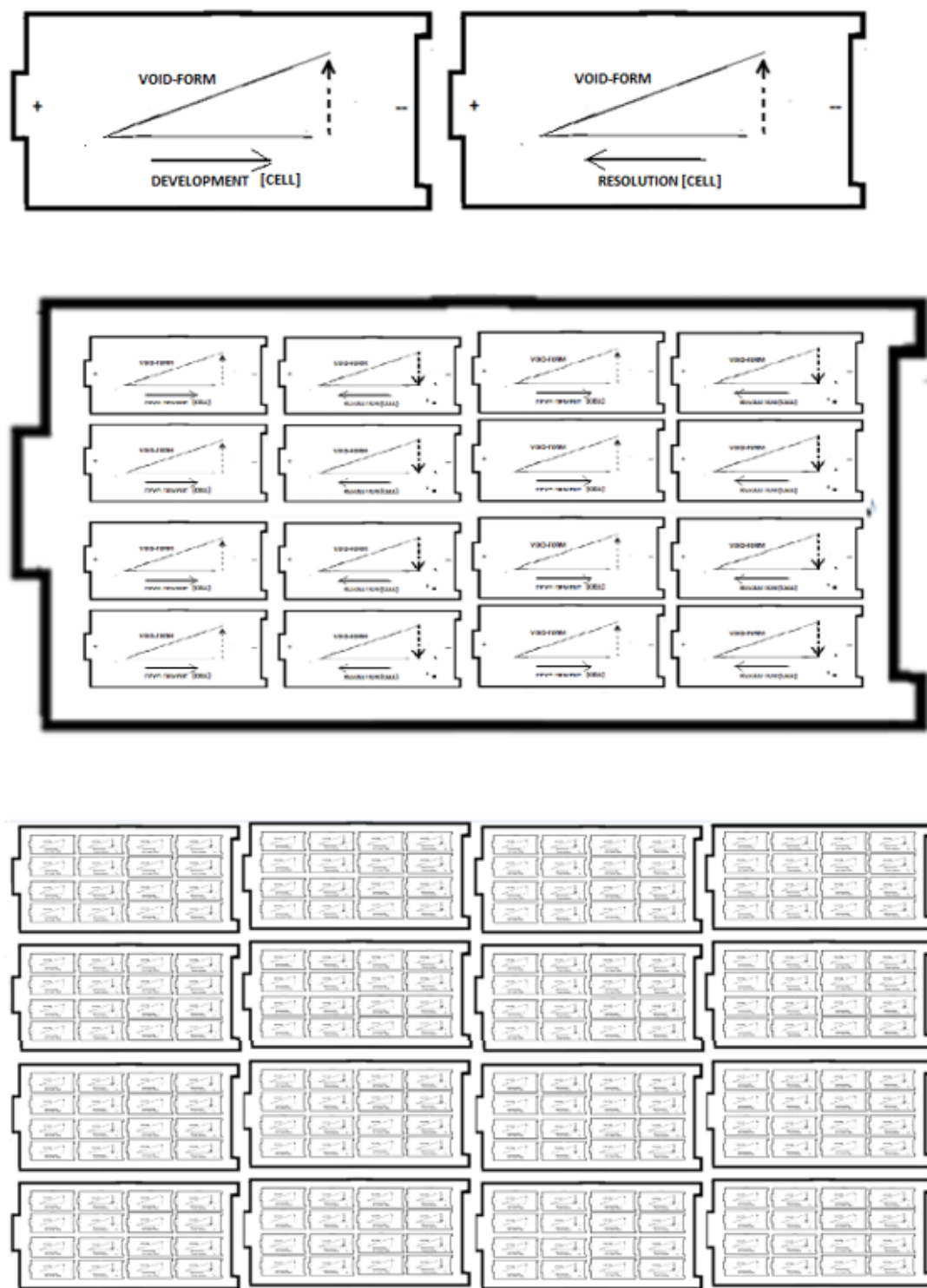


Figure 13: Battery-of-cells representation of the experience of directional musical motion as a complex phenomenological machine

Hierarchical organisation

A strong cadence tends to close off not only its phrase but also several preceding phrases ... a phrase group. Thus, closure like tonality itself is hierarchical.²⁵⁹

In the conceptual model for the experience of directional movement within music, as proposed in RP 1A, the concept of hierarchical closure is an important one.

In psychological terms, the concept of *hierarchical closure* would seem to contribute to the experience of directional motion in music through two cognitive processes. The first relates to the process of *chunking*. The second is the *hierarchical organisation* of parts.

The concept of hierarchical organisation has been well described in prior sections. It is also demonstrated in Table 8 (Appendix 7) regarding the submitted creative work, *Oscillation1*, where hierarchical organisation of form-void vectors is presented for metre, melody, harmony, and modulation. This section thus examines the concept of chunking as represented in the literature and as it applies to the experience of directional motion in music, described in the proposed model of RP 1A.

Psychological chunking

The American Psychological Association defines chunking as the “process by which the mind divides large pieces of information into smaller units (chunks) that are easier to retain”.²⁶⁰

The concept of chunking in musical organisation would seem to be somewhat ubiquitous. Examples of processes where musical content is experienced by chunking include sequential notes being experienced as a single measure (rather than as individual notes), sequential notes of an arpeggio being experienced as chordal harmony, and the experience of sequential chords being experienced as a *chord progression*.

The first Gestalt Principles were devised in the 1920s by German psychologists Max Wertheimer, Kurt Koffka and Wolfgang Kohler. ... They identified a set of laws which address the natural compulsion to find order in disorder. According to this, **the mind “informs” what the eye sees by perceiving a series of individual elements as a whole.**²⁶¹

In addition to its contribution to the proposed conceptual model for the experience of musical direction, the concept of chunking is also relevant to the dissertation for another reason. The experience of music takes place through both linear and gestalt processing methods.

Regarding gestalt processing, it is apparent that the experience of music, including the experience of its directional movement quality, is *more than* just a simple passive receipt of sound. The experience of music would seem *not* to conform to Karl Popper’s “bucket theory” of knowledge — that “all knowledge consists of information received through our senses”.²⁶² Rather, *knowing music* is more complex than *knowing facts*. Knowing music necessitates a certain kind of experiential involvement — an *appreciation* where the listener is actively involved and contributing to the process of *knowing*. Arguably, this is a different process from the process of passively acquiring facts or information.

²⁵⁹ Kramer, *The Time of Music*, 137–8.

²⁶⁰ See <https://dictionary.apa.org/chunking>

²⁶¹ See “The Gestalt Principles” <https://www.interaction-design.org/literature/topics/gestalt-principles> (bold in original).

²⁶² Karl R. Popper, *Objective Knowledge: An Evolutionary Approach* (Oxford, England: Clarendon Press, 1979), 61. <http://philosophybytheway.blogspot.com/2010/04/bucket-of-our-mind.html>

Such a position is consistent with Zuckerkandl's previously cited concept that "the meaning of a tone ... lies not in what it points to but in the pointing itself".²⁶³ The concept that Zuckerkandl calls *pointing* arguably involves several processes: a subjective experiencing, an active engagement, an attribution of meaning etc. Such processes may be collectively called *musical processing*.

Such musical processing is *inconsistent* with Popper's concept that knowledge is a passive receipt of facts — or, in the case of music, a passive receipt of sounds.

In the terminology of Kramer, music is heard not in terms of individual units of hierarchically organised *closures*. We hear music in terms of its closed groups, hierarchically organised (i.e., as a gestalt experience of multiply nested, hierarchically organised, and recognisable structures).

In that regard, music is experienced wholly rather than in parts.

Hierarchical and non-hierarchical organisation in Western and Eastern music

As a Westerner travelling in India, Graf Herman Keyserling described the non-Westernness of Indian music as "having no aim ... no beginning ... [and] no end".²⁶⁴ Such a statement not only describes Eastern music. Implicitly by the fact that such non-Western characteristics were worthy of remark, it also describes Western music.

This is consistent with Hoffman's position that music and general culture share the same epistemology — the Western way of knowing in general.

[Indian music is] a rushing and surging of the ever-glowing stream of life.²⁶⁵

Structurally and in terms of its perceived motion, Keyserling further describes Indian classical music as a "rushing and surging of the ever-glowing stream of life".²⁶⁶ Such a description focuses on the *intensity of activity* rather than an endpoint or purpose. Thus, rather than implying directional motion, the terms *rushing* and *surging* allude to waves of rising and falling *intensity*. Further, such a description is essentially non-hierarchical.

In the terminology of organisational management, whereas Western music tends to be hierarchically organised, Eastern music (i.e., Indian classical music) is characterizable by its contrastingly *flat* organisational structure. Such a comparison of organisation translates not only to the organisation of the music but also to the instrumentation and arrangements themselves.

Thus, while the Western orchestra is characterised by an organisation that is both *hierarchical* and *chunked* — commencing with the conductor and then instrumental sections (strings, wind, woodwind, brass, percussion) and even further sub-divisions (first violin, second violin etc.) — Indian classical music lacks this hierarchical organisation.

Vectoriality and intensification in Western and Eastern music

In examining the significance of such contrasting Western and Eastern epistemologies, cultural representations of time and hierarchical and non-hierarchical organisation of musical forms, the dissertation presents in its concluding RPs, the concepts of *helix* and *vortex* as geometrical

²⁶³ Zuckerkandl, *Sound and Symbol*, 68.

²⁶⁴ Graf Hermann Keyserling: *Das Reisetagebuch eines Philosophers* (Damstadt, 1921), 398–403, quoted in Peter Michael Hamel, *Through Music to the Self: How to Appreciate and Experience Music Anew* (Shambhala, 2002), 46.

²⁶⁵ Hamel, *Through Music to the Self*, 46.

²⁶⁶ Hamel, *Through Music to the Self*, 46.

representations of Western and Eastern musical forms, reflecting contrasting Western and Eastern concepts of times as linear and cyclic.

Consistent with these RPs, Western musical development is proposed as relatively *vectorial* in contrast with Eastern music. The latter develops by the relatively non-vectorial process of *intensification*, a term coined by Clayton and defined as “non-teleological large-scale processes ... proceeding by a process of expansion”.²⁶⁷

Keyserling’s experience of Indian classical music as “a rushing and surging of the ever-glowing stream of life” would seem to be consistent with Clayton’s concept of intensification.

These concepts are further discussed in the next section.

Musical interculturalities — Clayton

From the standpoint of time, ordinary experience confronts us with two types of phenomena: those that have a clearly delineated beginning middle and end ... and those that are cyclic, happening over and over again.²⁶⁸

While Western culture has come to embrace a linear conception of time, many other cultures have focused on time’s recurring cycles.²⁶⁹

Western music [is characterised by] music moving from beginning to end in a controlled and controllable manner whereas in Indian music, cycle ... follows cycle.²⁷⁰

In *Time in Indian Music*, Clayton asserts that, in terms of its global form, Western music is characteristically linear while Eastern (i.e., North Indian classical music) is characteristically cyclic. He describes this contrast of Western linearity and Eastern cyclicity of global forms as follows:²⁷¹

Any piece of music exhibits both linear and non-linear features ... Yet it does appear that, relative to Western tonal music, Indian music seems to display non-linear features more prominently and linear features less so. Thus, a single rag determines the melody of an entire performance, without modulation; a single tal remains in force, its cycles repeating indefinitely ... Indian music has no equivalent to the large-scale harmonic motion away from and back to a tonic chord; a piece of music in rag A continues in rag A and ends in rag A, thus there can be no resolution equivalent to a final cadence.

In this section, I consider this position, examining the association between the structural organisation of Western and Eastern musical forms as linear and non-linear (cyclic), respectively, and considering this in the context of contrasting Western and Eastern paradigmatic characterisations of time.

In addition to Clayton’s description of Western music as it “appears to go from A to B” (*a linear manner*), consideration is also given to the contrary concept — that Eastern music appears *not* to move from A to B in a linear manner. Further, Eastern music does *not* move from A to B in a linear manner because, it is proposed, Eastern time, or more specifically the *Eastern phenomenological*

²⁶⁷ Clayton, *Time in Indian Music*, 25.

²⁶⁸ Greene, *The Fabric of the Cosmos*, 404–405.

²⁶⁹ D. Falk, “Arrows of Time,” *Quanta Magazine*. <https://www.quantamagazine.org/what-is-time-a-history-of-physics-biology-clocks-and-culture-20200504/>

²⁷⁰ Clayton, *Time in Indian Music*, 25.

²⁷¹ Clayton, *Time in Indian Music*, 25.

experience of time, does not move from A to B in a linear manner. In presenting such a position, Clayton references multiple musical theorists who would appear to concur — these include Deshpande (1987),²⁷² Inayat Kahn (1991),²⁷³ and Pressing (1993).²⁷⁴

In his 1993 publication, *Relations between Musical and Scientific Properties of Time*, the late University of Melbourne composer, performer and researcher of music, Jeffrey Pressing, also described this position. He described Eastern cyclic time as:

The recurrence of the same or related sonic events in music is often considered to create a kind of cyclic time that stands in contrast to linear time. This idea is widespread in non-Western music.²⁷⁵

Western linear time as the arrow of time

The literature review began with an introduction to the Western concept of *the arrow of time*, a seminal concept that characterises the implicit properties of time as understood from the Western perspective. Theorists from the domains both of science and the arts describe the *arrow of time* as a concept definitive of the implicit understanding of time as both *linear and directional*, as understood in the Western paradigm.

The arrow of time — spatial duality as tail and head

Implicit within the concept of the *arrow of time* is the concept of duality. Duality is evident both spatially in its visual representation and *temporally* in the characterisation of time that the arrow represents, as understood within the Western paradigm.

Duality is *spatially* evident in the asymmetry of the arrow symbol. Clearly, the arrow has a head and a tail, and the head and the tail are diametrically opposed and polar concepts.

This graphic representation of the arrow as a line with an asymmetrical head — an arrow and a tail — is an important one in the presentation of alternative temporalities as they apply to music, presented at the end of this section.

The arrow of time — temporal duality as present and future

In terms of its meaning, the arrow of time references two non-equal points in time. Conceptually, one of these nonequal points in time is the *present* moment; the other is a *future* moment.

In its Western *arrow of time* representation, time is thus understood to *move* at the phenomenological level. In the terminology used by Greene, it *flows* between these two conceptually distinct and separate points.²⁷⁶ The arrow of time is a symbolic representation of the Western concept of time as dualistic, linear, and temporally vectorial.

This concept is presented in further detail via the process of allegory — specifically, by the described experience of the Western commuter in Appendix 4.

²⁷² Vamana Hari Deshpande. *Indian Musical Traditions — An Aesthetic Study of the Gharanas in Hindustani Music*, 2nd ed. (Bombay: Popular Prakashan, 1987).

²⁷³ H. Inayat Kahn, “The Mysticism of Sound and Music,” *A Sufi Message of Spiritual Liberty*, vol II (Shaftsbury, Dorset and Rockport, Mass, 1991), cited in Clayton, *Time in Indian Music*, 18.

²⁷⁴ J. Pressing, “Relations between Musical and Scientific Properties of Time: ‘Time in Contemporary Musical Thought,’” *Contemporary Musical Review* 7, no. 2 (1993): 105–22, cited in Clayton, *Time in Indian Music*, 21.

²⁷⁵ Pressing, *Relations between Musical and Scientific Properties of Time*, 111, quoted in Clayton, *Time in Indian Music*, 21.

²⁷⁶ Greene, *The Fabric of the Cosmos*, 143.

The arrow of time as it relates to Western “teleological listening” to music

Augmenting Clayton’s concept that Western music is relatively linear and Eastern music is relatively cyclic, Kramer further characterises the experience of Western music in terms of *teleological listening*.²⁷⁷ In contrast to this, Eastern music, in its listening experience, relative to its Western counterpart, would seem to be relatively *non-teleological*. This concept as it relates to the composition and experience of Eastern music, in the context of the current dissertation, is addressed below.

Eastern non-teleological time

As noted above, within the Western paradigm, in accordance with the *arrow of time*, time is conceived to move or *flow* in a linear way from present to future. Such, however, is not the case within the Eastern conceptual representation of time. Eastern time appears to be characterised by the contrary concepts of *non-duality* and *non-linearity*.

According to Falk, the paradigmatic representation of time such that the present and the past are not separate but “intimately connected” dates back around 50,000 years.²⁷⁸ Falk further states that the oldest known civilization in which time is characterised in this way is the indigenous inhabitants of Australia. According to Falk, such a non-dual understanding of time, characterised by *the non-separation of past, present and future*, characterises the time consciousness of the earliest Indigenous Australians.

Clayton notes a similar understanding by the late Australian musicologist, Catherine Ellis, as presented in Ellis’s (1984) publication *Time-consciousness of Aboriginal Performers*.²⁷⁹ Further, in her article “The Nature of Australian Aboriginal Music”, Ellis has noted that “All artistic creations [including music] are considered to be recreations of Dreamtime events”.²⁸⁰ In this context, the Australian Aboriginal concept of the *Dreamtime* may be understood as “a continuum of past, present and future ... a beginning that never ended”.²⁸¹ A concept of time described in this way is clearly monistic, and therefore consistent with the monistic concept of time that characterises North Indian classical music.

Eastern cyclic time as non-linear and non-teleological time

In contrast to Western music, Eastern music assumes a non-dualistic (i.e., *monistic*) representation of time, like that described separately by theorists such as Falk and Ellis. Furthermore, Eastern music, it is proposed, is reflective of this paradigmatic conception of time as cyclic in its compositional organisation and listening experience.

Monism and form-void mutual inclusivity in Eastern time

The Purusha sukta [Hymn 10.90 of the Rigveda] gives a description of the ... unity of the universe.²⁸²

²⁷⁷ Kramer, *The Time of Music*, 378–379.

²⁷⁸ Falk, “Arrows of Time.”

²⁷⁹ Catherine Ellis, “Time Consciousness of Aboriginal Performers,” in *Problems and Solutions: Occasional Essays in Musicology Presented to Alice M. Moyle*, J.C. Kessler and J. Stubington, eds. (Sydney: Hale & Iremonger, 1984), 149–85. Cited in Clayton, *Time in Indian Music*, 19.

²⁸⁰ Catherine J. Ellis, “The Nature of Australian Aboriginal Music,” *International Journal of Music Education* 4, no. 1 (1984). <https://journals.sagepub.com/doi/abs/10.1177/025576148400400110>

²⁸¹ Artlandish Aboriginal Art Gallery, “Aboriginal Dreamtime.” <https://www.aboriginal-art-australia.com/aboriginal-art-library/aboriginal-dreamtime/>

²⁸² See “Indian Philosophy” at <https://indiaphilosophy.wordpress.com/2016/02/25/purusha-suktam-rig-veda-10-90/>

As previously noted, Appendix 2 presents concepts that define and distinguish Western and Eastern paradigms, particularly as these disciplines inform Western and Eastern music composition.

The significant findings from the investigation include the characterisation of Western and Eastern paradigms as having the characteristics of *dualism and form-void mutual exclusivity* and *monism and form-void mutual inclusivity*, respectively.

The *monism of Eastern time* is consistent with the concept of *mutual inclusivity*.

In such a conceptualisation, the present and the future, as described by Falk, are not separate but “intimately connected”.²⁸³ The ultimate limit of such *intimate connection* is the monistic case — the paradigm where the future and the present are so *intimately connected* that one is understood to be the other — that is, they are one.²⁸⁴

Figure 14 below represents this conceptualisation of Eastern time compared with the arrow of time.

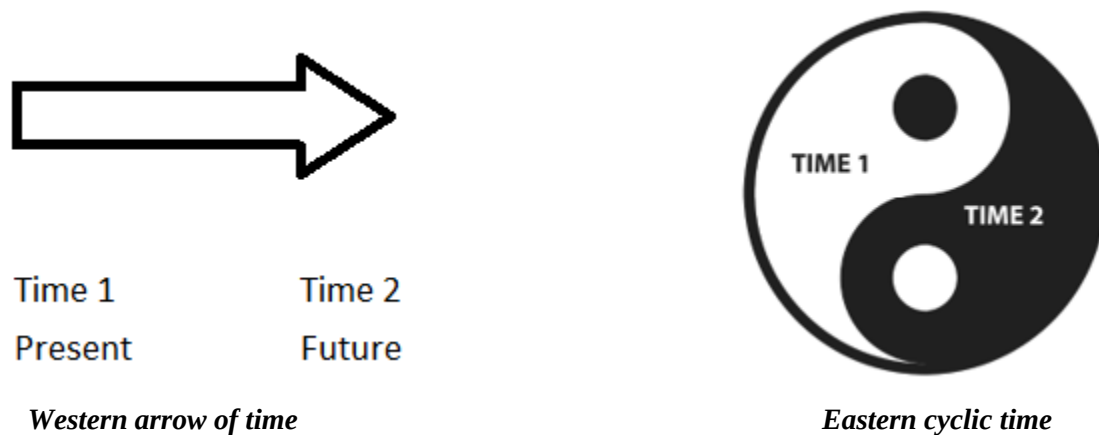


Figure 14: Conceptual representation of Western dualistic temporality as the arrow of time contrasted with Eastern monistic time

Relationship of Clayton’s concept of linear and cyclic time to the secondary RPs

In relation to the secondary RPs, the concept of linear and cyclic representations of time applies directly. Regarding RP 2A, the proposition that Western and Eastern musical compositions can be considered as metaphors for the philosophical and cultural paradigms in which they originate (and specifically, of their contrasting representations of time) has been considered by many musical theorists.

²⁸³ Falk, “Arrows of Time.”

²⁸⁴ Interestingly, such a concept is not a foreign idea to Western thought. In *The Fabric of the Cosmos*, for example, Brian Greene makes the case that at the cosmological level, the present and the future may not, in fact, be mutually exclusive states but that the present and the future may be deterministically connected as alternative “slices” of a multi-slice space-time universe (Greene, *The Fabric of the Cosmos*, 59).

In such a representation, the normally Western mutually exclusive concepts of present and future are considered as mutually inclusive in what is essentially a monistic representation of space-time. Such a concept of monistic time, however, arises from the realm of theoretical physics and not the experience of the typical Western paradigm. Further, it is a hypothesised property of literal time, not of temporality — the experience of time. In the context of the current dissertation, the concepts of dualistic and monistic time are considered both phenomenologically (i.e., at the level of experience) and metaphorically (as a concept that has the capacity to inform a musical composition). Neither of these are references to the literal nature of time itself. Thus, the dissertation does not seek to comment on the nature of time. Rather it references the work of theorists whose positions are that the Western paradigm assumes a linear representation of time, and the Eastern paradigm assumes a non-linear or cyclic representation of time. The dissertation’s submitted creative work is a metaphor for this concept.

Regarding the proposed anthropological mechanism as to why musical form should coincide with paradigmatic concepts of time, it is notable what Clayton considers to be the most convincing explanation of this relationship. According to Clayton, the best explanation is that provided by Rowell — that of *mutual feedback* between musical concepts and broader paradigmatic concepts such as time.²⁸⁵ Clayton describes these mutual feedback processes or “resonances” between a musical tradition and its controlling ideology.²⁸⁶

Regarding the investigation of *motion* in music, the concept of Western linearity and Eastern cyclicity of *motion* would seem to be consistent with the concept of Western and Eastern linear and cyclic *time*. The reason for this is that time and motion are intimately related concepts. Be it at the level of the mechanics of physical time and motion or the phenomenological mechanics of phenomenological time and motion, time and motion are effectively entangled concepts.

We hear music as we hear life

It is not possible to isolate something called music from something else called culture. Musical knowledge is cultural knowledge. Furthermore, the way a person knows music is not different to the way he knows in general. Musical knowledge is based on the same epistemology which underlies and pervades the entire culture.²⁸⁷

As described by Stanley Hoffman, musical epistemology and cultural epistemology share the same source. Thus, musical epistemology reflects broader cultural epistemology and vice versa.

Hoffman’s position is relevant to the current dissertation because it situates within the literature Secondary RP 2A — the proposition that Western and Eastern musical forms can be considered metaphors for the philosophical and cultural paradigms in which they originate, and specifically, for contrasting Western and Eastern representations of time.

This concept is further illustrated by way of allegory in Appendix 4.

Association of Clayton’s concepts of Western and Eastern linear and cyclic temporalities with Fraser’s human temporalities

The concept of the arrow of time also provides a conceptual mechanism for the representation of linear temporality as it applies to music. This concept, as it appears in the literature, is considered in the final section of the literature review under *Musical interculturalities* — Fraser, the foundation for the dissertation’s third area of research: *Application of theory to musical performance and analysis*.

In this final section, referencing the work of Julius Fraser, I consider alternative temporalities within which it is possible to undertake musical performance, especially improvisation, including within that analysis the temporalities of Western and Eastern music as they fit into Fraser’s five-tiered classification of the human temporalities associated with music.

Incorporating concepts both from Clayton and Fraser, in the concluding tertiary RPs of the dissertation, I present the concept of contrasting Western and Eastern musical global forms, reflecting contrasting Western linear and Eastern cyclic temporalities, as *helix* and *vortex*, respectively.

²⁸⁵ Lewis Rowell, “The Creation of Audible Time.” In *The Study of Time IV*, J.T. Fraser, N. Lawrence, and D. Park, eds. (New York: Springer Verlag, 1981), 192, quoted in Clayton, *Time in Indian Music* 17.

²⁸⁶ Clayton, *Time in Indian Music*, 17.

²⁸⁷ Hoffman, “Epistemology and Music,” 69, quoted in Clayton, *Time in Indian Music*, 10.

Such a concept has, I propose, utility to the performance of music, especially improvised music. I demonstrate this proposition with the presentation of the dissertation's minor artefact, *Beginner's Mind*, as an example of the application of RPs 3A and 3B to the performance of music.

Musical processing — linear and cyclic — Kramer

It is a fool's errand to try to define time. ... Any attempt at defining time ... is bound to be ridiculous, as there is nothing in this world that even remotely resembles time.²⁸⁸

In considering the above proposition, it becomes important to distinguish between different aspects of time. The first is external: the way time is considered to be. The second is internal: the way time is experienced. This section addresses this distinction and examines the concept of alternative temporalities (i.e., experiences of time). In so doing, it examines in its final content the interdisciplinary concepts of Julius Thomas Fraser, an engineer and founding editor of the *International Society for the Study of Time*.

First, however, it is important to characterise concepts of how time is experienced as described by other theorists. This section thus continues with a characterisation of time as physical time and phenomenological time. In so doing, it references some musical-processing concepts as described by several theorists, including theorists from the domains of science and music, notably the musical time concepts of Jonathan Kramer.

Physical and phenomenological time

What may be considered *ordinary time* and the experience of *musical time* have been defined in the literature differently. The positions and terminologies of relevant theorists regarding these variations are addressed here. In referring to these two phenomena, I use the terms *physical time* and *phenomenological time*, the reasons for which are presented below.

Where it is appropriate, for the more conceptual terminologies of the experience of time, the term *temporality* will also be used — for instance, when citing the work of J.T. Fraser and his five levels of temporality.²⁸⁹

Absolute and relative time in theoretical physics

As described by Einstein in his special and general theories of relativity, “time is neither absolute nor objective”. Furthermore, the relativity of time (to motion) has been empirically demonstrated by the 1971 Hafele-Keating test of Einstein's theory of relativity,²⁹⁰ where the time passed by an atomic clock in motion on a commercial airliner was compared with the time passed by an atomic clock not in motion, relative to the observer. The *time dilation* — that is, the difference in the elapsed time between the two clocks — demonstrated the relativity of time to the observer's state of motion.²⁹¹ Thus, physical time, is, according to the standard position of contemporary physics, ultimately

²⁸⁸ Masanao Toda, “The Boundaries of the Notion of Time,” in *The Study of Time III*, J.T. Fraser, Nathaniel Lawrence and David Park, eds. (New York, Springer-Verlag, 1978), 370–416, quoted in Kramer, *The Time of Music*, 6.

²⁸⁹ Along with the time concepts of Jonathan Kramer in *The Time of Music*, J.T. Fraser's temporality concepts as they relate both to music and to the concept of the phenomenological machine are addressed in the final section of this chapter. Fraser has also subsequently described a sixth level of temporality — sociotemporality. He does not, however, provide a musical correlate for this level. Kramer, in his analysis of Fraser's concepts, has thus excluded it from his discussion of the subject as it relates to music. In this dissertation, although briefly mentioned in the text, I have essentially done the same.

²⁹⁰ “Time Dilation,” Wikipedia. https://en.wikipedia.org/wiki/Time_dilation

²⁹¹ “Hafele–Keating Experiment,” Wikipedia. https://en.wikipedia.org/wiki/Hafele%E2%80%93Keating_experiment

subjective, albeit by what are normally insignificant amounts of subjective adjustment for factors such as the relative movement of the experiencer of time.

For this reason, however, the current dissertation uses the terminology of *physical* time rather than absolute time to describe the common concept of time, as distinct from phenomenologically experienced time or temporality.

Ordinary time and musical time

Citing Clifton, Kramer also describes contrasting aspects of time as ordinary lived time and musical time.²⁹² He explains the distinction as follows:

- Ordinary lived time is the time a piece *takes* (i.e., its duration in hours, minutes, and seconds).
- Musical time is the time in which a piece presents or *evokes*.

Interestingly, Kramer does not take the position that time creates music but the converse — that, at least in the phenomenological experience of time, music warps, distorts, and even creates time.²⁹³

Similarly, Langer has postulated that music “makes time audible”.²⁹⁴

Objective time and gestural time

Kramer, in *The Time of Music*, describes a similar concept, using his own terminologies of absolute time and gestural time. In such a representation, absolute time is defined as “objective time, the time that is shared by most people in a given society and by physical processes”.²⁹⁵

In contrast to this, Kramer refers to the concept of *gestural time*, where the structure of composition, through its musical gestures, affects the way time is experienced. Kramer thus describes gestural time as “time in which the conventional meanings of gestures (beginnings, endings, structural upbeats etc.), rather than the linear succession of events, determine the logic of the continuity”.²⁹⁶

The dissertation’s concepts of physical and phenomenological time

In presenting the dissertation’s final RPs, 3A and 3B (the geometric models of musical composition based on Western and Eastern concepts of linear and cyclic time), the terms *physical time* and *phenomenological time* are used.

- *Physical time* is essentially equivalent to Kramer’s concept of absolute time, noting, however, that from a theoretical physical perspective, the anomaly of the concept of *objective time*.
- *Phenomenological time* is, however, different from Kramer’s concept of *gestural time*.

While Kramer’s concept of gestural time refers to the causative effects of musical devices on the experience of time, phenomenological time (as the concept is used here) refers to *the quality of temporality*, particularly the *linearity*, one brings to the performance or experience of music.

²⁹² Thomas Clifton, *Music as Heard: A Study in Applied Phenomenology* (New Haven: Yale University Press, 1983), 55, cited in Kramer, *The Time of Music*, 7.

²⁹³ Ingrid Arauco, “Reviewed Work: *The Time of Music* by Jonathan D. Kramer,” *College Music Symposium* Vol. 30 No. 1 (Spring, 1990): 153–156.

²⁹⁴ Susan Langer, *Feeling and Form* (New York: Scribner’s, 1953), 110, quoted in Kramer, *The Time of Music*, 1.

²⁹⁵ Kramer, *The Time of Music*, 452.

²⁹⁶ Kramer, *The Time of Music*, 452.

The concept of phenomenological time, it is proposed, is of relevance to the performance of improvised music. The reason for this is that improvised music as spontaneous composition contains the freedom to play music within a spectrum of linear temporalities.

Left hemisphere versus right hemisphere neuropsychological processing

Kramer also refers to horizontal time and vertical time, categorizing them as left and right brain activities, respectively. For Kramer, horizontality and verticality are among several associated qualities attributed to left and right hemispheric musical processing.

Such grouped contrasting musical processes described by Kramer may be characterised in different ways. From a neuropsychological perspective, one could describe them (as Kramer does) as *left hemisphere* and *right-hemisphere* musical processes.²⁹⁷ Importantly, the extent to which such a categorization corresponds to neuropsychological processes is not the point in question — rather the purpose is to represent contrasting musical processes. With this caveat, left and right brain musical processes as they relate to the experience of music may be summarised as *logical, sequential and analytical* versus *intuitive, simultaneous and synthesizing*, respectively.

Information reductive versus information integrative

Noting the last of these qualities regarding the way information (including musical information) is processed, one could call these alternative approaches *information reductive* versus *information integrative*. Whereas the former processes musical input into musical meaning by dividing it into *smaller* sections, the latter processes musical input into musical meaning by integrating it into *larger* sections and, ultimately, a single whole.

An example of the former is the reduction of the information of a holistic concept — such as the singular concept of *rhythm changes* into a sequence of contributing *chords*, each of which is reduced to its contributing *notes*.

Reductive musical processing methods may be used, for example, in *playing the changes* in jazz, such as bebop, where vertical (chordal) improvisation is typically featured.

Information integrative musical processing in North Indian classical music improvisation

An example of information *integrative* musical processing is the improvisation of the first section of Indian classical music improvisation — the *alap*.

Clayton describes the listening process for the *alap* of Indian classical music improvisation as being one where the listener is required to “put aside any notion of analytical listening”.²⁹⁸

The *alap* has no fixed duration. Within the “rules” of the *raga*, which include constraints — in the words of Sabine Feisst, negotiated *controls*, including note choice, note sequence, note dominance and non-dominance relationships — the *raga* achieves its characteristic colour or mood via an integrative process.

The *alap* as a holistic concept is thus “completed” when the exploration of musical content *feels* completed. This process is not dissimilar to the art of painting when a painter processes visual information of the parts in deciding that the painting as a *whole and as a singular entity* is completed.

²⁹⁷ See <http://www.simplypsychology.org/left-brain-vs-right-brain.html>

²⁹⁸ Clayton, *Time in Indian Music*, 2.

Western versus Eastern musical processing

From an ethnomusicological perspective, one could describe such contrasting musical processes as *Western and Eastern* musical processing.

Clayton and Kramer (citing their own multiple sources) describe or imply Western and Eastern musical forms and the listening strategies that accompany them as *linear and teleological* versus *cyclic and non-teleological*, respectively.²⁹⁹

In that regard, and consistent with the contrasting dualistic and monistic metaphysical paradigms in which Western and Eastern music originate, reflecting Hoffman's position that "it is not possible to isolate something called music from something else called culture",³⁰⁰ Western and Eastern musical processing are respectively and relative to one another, *dualistic* and *monistic*.

Western versus Eastern musical processing as it relates to Primary RP 2A

Such descriptions of *dualistic, linear, and teleological* versus *monistic, cyclic, and non-teleological* arguably apply to Western and Eastern representations (respectively) not only of musical processing but also of cultural temporality and the Western and Eastern musical forms themselves.³⁰¹

This concept is presented and summarised in Appendix 4.

Linear and non-linear musical processing — the "divided mind"

Kramer, in a commentary he calls "the divided mind",³⁰² alternatively uses the terminologies of "linearity and non-linearity"³⁰³ and "left and right hemisphere"³⁰⁴ as the defining difference between these contrasting musical strategies.

To align with the comparison of linearity and cyclicity as one of the central concepts of the dissertation, I have chosen to represent these two contrasting musical processing activities as linear and non-linear processing.

The terminologies I have cited in the literature in this section thus far, for alternative musical processing strategies (i.e., *left-hemispheric and right-hemispheric, information reductive and information integrative, Western and Eastern, and linear and non-linear*) are by no means the same. As they relate to alternative musical processing strategies, however, they are, I propose, similar and related enough to collectively define and divide alternative musical processes that share several related properties.

The attributes of these contrasting linear and non-linear musical processing methods, as proposed by Kramer, are listed in Table 3 below.³⁰⁵

²⁹⁹ Clayton, *Time in Indian Music*, 24–25; Kramer, *The Time of Music*, 378–379; Clayton, *Time in Indian Music*, 2.

³⁰⁰ Hoffman, "Epistemology and Music," 69, quoted in Clayton, *Time in Indian Music*, 10.

³⁰¹ The citations for this position are included in the previous section — *Musical interculturalities*.

³⁰² Kramer, *The Time of Music*, 9–10.

³⁰³ Kramer, *The Time of Music*, 63.

³⁰⁴ Kramer, *The Time of Music*, 9–10 — originally cited in Clayton, *Time in Indian Music*, 24.

³⁰⁵ Kramer, *The Time of Music*, 63.

Table 3: Kramer’s categorization of left and right hemispheric activities as they apply to music

Linear musical processing	Non-linear musical processing
[Left-hemisphere processing]	[Right-hemisphere processing]
teleological listening	cumulative listening
Horizontality	Verticality
Motion	Stasis
Change	Persistence
Progression	Consistency
Becoming	Being
Temporal	Atemporal

In addition to these dichotomous concepts, Kramer further attributes the following distinctions to left and right hemispheric functioning, including regarding the experience of *time*.

- Whereas the left hemisphere is characterizable as either-or, the right hemisphere is characterizable as both-and.
- Whereas the left hemisphere has the full power of syntax, the right hemisphere recognises sentences and words (and larger units of musical organisation) as single units. (This is synonymous with the previously described psychological process of chunking.)
- Whereas the left hemisphere understands the whole as the sum of its parts, the right hemisphere recognises the whole from an essential individual part.³⁰⁶
- Whereas the left hemisphere processes data one piece at a time, the right hemisphere processes data all at once.
- Whereas the left hemisphere processes data in discrete entities, the right hemisphere processes data in a way that is continuous.³⁰⁷
- Whereas the left hemisphere understands time as containing a sequence of events, the right hemisphere understands music as a complex of events.

Kramer’s concept of the “divided mind” as it relates to RPs 3A and 3B

RP 3A: Incorporating the Western compositional concepts of vectoriality, linearity and horizontality of time, the dissertation presents the geometric model of music compositional form as a helix.

RP 3B: Incorporating the Eastern compositional concepts of intensification, cyclicity and verticality of time, the dissertation presents the geometric model of music compositional form as a vortex.

³⁰⁶ Kramer, *The Time of Music*, 9–10.

³⁰⁷ The concept of discrete versus continuous data processing is also discussed in Section B: Thought Experiment under *Complex phenomenological machine — particle and wave representations*.

Kramer's concept of the "divided mind" is an important source from the literature for situating RPs 3A and 3B. Kramer's classifications, as they apply to RPs 3A and 3B, the concluding applications of the dissertation's theory to the performance and analysis of music, are proposed as below:

- The concepts of *linearity* and *horizontality of time* are left-hemisphere activities.
- The associated psychological quality of *becoming* is a left-hemisphere activity.
- The psychological quality of *becoming* is a *teleological* concept and implies *dualistic time*. Thus, the concept of becoming is emblematic of the *Western* paradigm and characterises the directional movement of Western music.
- The concepts of *non-linearity* (as *cyclicity*) and *verticality of time* are right-hemisphere activities.
- The associated psychological quality of *being* is a right-hemisphere activity.
- The psychological quality of *being* is a *non-teleological* concept and implies monistic time.
- Thus, whereas Western music reflects the Western paradigmatic characteristic of *becoming*, Eastern music reflects the Eastern paradigmatic characteristic of *being*.

In summary, RP 3A — the proposition of the geometrical musical form of *helix* — has the qualities of *temporal horizontality*, *linearity of form*, *teleologicality*, and *the existentiality of becoming*. In contrast, the geometrical musical form of *vortex* has the qualities of temporal *verticality* *cyclicity* of form, *non-teleologicality*, and the existentiality of *being*.

Musical interdisciplinarity — Fraser

Fraser's hierarchical theory of temporality

In the concluding section of *The Time of Music*, Kramer cites the work of Julius Thomas Fraser and in particular Fraser's hierarchical theory of time and its relation to musical composition. Fraser's concepts of time, including their associated musical forms and their associated scientific frameworks, are summarised in Table 4.

The framework is noteworthy, even in the summarised form that I present it in, because of its relevance to situating the dissertation within a broad interdisciplinary context. This is so for the following reasons.

Fraser's framework as a phenomenologically determined system and concept of interdisciplinarity between music, phenomenology, and physics

Firstly, Fraser's framework is an inherently phenomenologically determined system. In making such a statement, however, it must be noted that Fraser's classification system — essentially a dual evolutionary *phylogeny* — attributes evolving properties not only to human temporality but also to *time itself*.³⁰⁸ Such a proposition regarding *time itself* — as opposed to temporality — is a radical and

³⁰⁸ Perhaps the most challenging, and intuitively difficult to imagine, concepts of Fraser's system in his thesis about the evolution not only of human temporality but also *time itself* — implications and discussion of which are most certainly not within the scope of the current dissertation.

Fraser posits that the universe has emerged into levels of temporality, beginning with the pure energy of the Big Bang, which he terms *atemporality* (without time).

Fraser continues that, as the universe cooled, the quantum physical universe emerged, giving rise to probabilistic *prototemporality*. With the emergence of molecules and macrophysical objects, the universe was characterised by deterministic *eotemporality*. The emergence of living things subsequently gave rise to a more forward direction of time

controversial one. It is not, however, the purpose, nor even remotely within the scope of the current dissertation, to further consider such a proposition; rather, it is the domain of theoretical physicists to further ponder such a proposition. Importantly, however, Fraser's classification of human *temporalities* is an independent concept of his proposition regarding time itself. As such, Fraser's representation of *temporalities* is immediately relevant to the dissertation, especially the application of the dissertation's related concepts to the analysis of music and the performance of music within a deliberate and consciously chosen temporality.

Secondly, Fraser's framework is particularly relevant to this dissertation because it presents an interdisciplinarity between music, phenomenology and physics. Specifically, in the manner of the *interdisciplinarian* that he was, Fraser proposes *connecting bridges* between the paradigmatic frameworks of music and physics, based on human temporalities. Importantly, this is a different concept to the association between music and physics phenomena — a concept that has been longstanding in history, commencing at least with Pythagoras³⁰⁹ and featuring prominently in the Renaissance in the concepts of Kepler, as *musica universalis* — the music of the spheres.³¹⁰ The difference with Fraser's system is that it proposes associations between the musical and scientific *systems of thought* or *paradigms themselves* — a much broader concept.

Relevance of Fraser's concepts to the dissertation's research propositions

In its proposed integration of scientific paradigms — essentially, physics (temporal experiences referenced against the arrow of time, phenomenology, and music), Fraser's canon of human temporality is relevant to the dissertation's RPs in several important ways.

Firstly, although it addresses the concept of time itself, Fraser's classification system would seem to be primarily a classification of *temporalities*. In that regard, his canon of human temporalities is implicitly consistent with RP 1A's primary sub-proposition that the experience of directional motion in music is *phenomenologically determined*.

Secondly, Fraser's framework contextualises a gradation of human temporalities (i.e., experiences of time) not only within associated scientific frameworks but also with correlating musical processes. This concept — succinctly captured in Hoffman's statement "it is not possible to isolate something called music from something else called culture"³¹¹ — is consistent with the dissertation's Secondary RP 2A — the proposition that Western and Eastern musical linear and cyclic processes are metaphorical for Western linear and Eastern cyclic concepts of time.

experience, or *biotemporality*, which is followed by the strongly directional time experience of human beings, or *nootemporality*.

The creativity and scope of the work of J.T. Fraser reflect that, in addition to being a philosopher and theorist, Fraser was also an engineer and inventor. It is thus not surprising that his concepts of temporality are framed within scientific concepts about the nature of time.

Although Fraser proposes that time itself has evolved as the universe has evolved, he nonetheless distinguishes between the nature of time and the nature of *temporality* — "the state of existing within or having some relationship with time".

The definition of "temporality" is taken from the Lexico dictionary at <https://www.lexico.com/definition/temporality>

³⁰⁹ Also called the harmony of the spheres.

³¹⁰ Strogatz, *Infinite Powers*, 48–49, 84; Johannes Kepler (1571–1630), "On the origin of the harmonic proportions and on the nature and differences of those things which are concerned with melody," chapter in *The Harmony of the World*, translated into English with an Introduction and Notes by E.J. Aiton, A.M. Duncan and J.V. Field (American Philosophical Society), 127–255.

³¹¹ Hoffman, "Epistemology and Music," 69, quoted in Clayton, *Time in Indian Music*, 10.

Thirdly, the dissertation's tertiary RPs — a geometrical representation of the contrasting musical forms of *helix* and *vortex*, representing horizontal and vertical phenomenological time, respectively — also accord with Fraser's proposition about the relationship between musical forms and temporalities.

Application of Fraser's concepts to music analysis — examples in the literature

The following is an example of the application of Fraser's concepts to the analysis of music as recognised by Kramer, citing compositions from Childs, Brown, and Stockhausen.³¹² In this example, Fraser proposes an association between *prototemporality*, *quantum mechanics*, and *moment time*, as it relates to musical processes, as follows:

[Prototemporality is the experience where] events [including musical events] are not necessarily simultaneous but their temporal position is distinguished only statistically. The science of prototemporality is quantum mechanics [where] the concepts of before and after have meaning only in a probabilistic sense. The musical metaphor for prototemporality is moment time [where] ... separate events ... are heard in what seems to be an arbitrary rather than a determined, order, yet there are global reasons — statistical causes — for their presence in a particular composition.³¹³

Kramer further clarifies and provides examples of the concept of such *moment time* as it relates to Fraser's temporality level of *prototemporality* as follows:

Moments are often defined by stasis rather than process. A moment, for example, may consist of a single extended harmony. Since there is no linear logic which connects moments, their order of succession *seems* arbitrary. Actually, the order may or may not be arbitrary, but it must seem so on the surface if the piece is to be heard in moment time. The extreme of moment form, in which the order of moments not only *seems* but actually *is* arbitrary is "mobile" form: the composer indicates that the sections of the piece may be put together in any of a number of possible orderings, from one performance to the next, perhaps within certain restraints.

A clear example is Barney Childs' *Music for Cello* (1964), which contains a number of fragments scattered on the page, to be performed in any order. Also important are Earle Brown's *Available Forms* (1961) and Stockhausen's *Moment* (1971–1972) and *Mixture* (1964). What such pieces may lack in linear logic the regain in non-linear logic of consistency (for example, similarity of texture or timbre) that makes the moments seem to belong to the same piece rather than being just a jumble of unrelated excerpts.³¹⁴

Application of Fraser's concepts to music — performance

Fraser's conceptualization of the phenomenological experience of temporality is thus multi-levelled. In referring to each of these levels, Fraser uses the terminologies of *atemporality*, *prototemporality*, *eotemporality*, *biotemporality*, and *nootemporality* (explained in Table 4 below).

³¹² Kramer, *The Time of Music*, 395.

³¹³ Kramer, *The Time of Music*, 395.

³¹⁴ Kramer, *The Time of Music*, 395.

Table 4: Fraser’s canonical forms of time — summary of concepts

Nootemporality	The time consciousness of man. Personal identity and free will exist on this level. Beginnings and endings are well defined, and they are anticipated and remembered. The science of nootemporality is ... psychology. The musical expression of nootemporality is linearity.
Biotemporality	Time characterized by a rudimentary consciousness which recognizes the present, distinguishes the past from the future and ... differentiates between beginnings and endings. Lacking rational thought, long-range prediction and hierarchically organized memory, biotemporality is the consciousness of animals. The sciences that study prototemporality are biology and physiology. The musical metaphor of biotemporality is nondirected linear time, in which one event progresses to another, yet there is no large-scale sense of direction.
Eotemporality	Time where events are predictably linked by causation, and the principles of cause and effect. The umwelt of young children. Two events can be linked by causation, but this relationship is symmetrical, A past-present-future ordering is indistinguishable from a future-present-past ordering. Action is wedded... to an equal and opposite reaction The science that studies eotemporality is Newtonian mechanics. The musical analogue of eotemporality is multiply directed time, in which the order of events is important, but several different successions, moving in different directions are presented as it were, at once, in the same composition.
Prototemporality	Time where events are distinguished, not by their simultaneous occurrence, but by their statistical probability, where events are related to one another not by causation but probability. In such a conception of time, <i>form is understood cumulatively as the totality of constituent parts.</i> The science that studies prototemporality is quantum mechanics. The musical metaphor for prototemporality is moment time, in which there “are” separate events (in pure vertical time on the other hand, an entire composition is a single extended event.)
Atemporality	Time where the concepts of past, present and future do not exist, but the relationship between events is one of [monistic] simultaneity. In the physical world, atemporality exists on the levels of particles that travel at the speed of light and have no mass. The science that studies atemporality is Einstein’s special theory of relativity. In music, the most uncompromisingly vertical compositions suggest the timelessness of atemporality.

At the practical level, such a broad characterisation of the nature of time provides myriad possibilities for the way a musician approaches composing or playing music, based on contrasting temporalities that accentuate different qualities of the experience of time. This is particularly so in the case of improvised music, where the musician’s conception and experience of time can directly influence not only *how* one plays music but also the *content*.

Further, in examining Fraser’s hierarchical system, it is apparent that Fraser takes the view that linear musical time is simply the time consciousness of the current (Western) paradigm. This association

between Fraser's levels of temporality and Western and Eastern concepts of time is discussed in the next section.

The Western concept of linear time in Fraser's hierarchical theory of time

Fraser's pinnacle level of hierarchical classifications of time as they relate to music is that of *nootemporality* — a temporality that aligns well with the current dissertation's concept of *Western linear temporality*. This is so because nootemporality is characterizable "as the time consciousness of [modern] man, and as having the musical expression of linearity".³¹⁵

The Eastern concept of cyclic time in Fraser's hierarchical theory of time

The level of Fraser's hierarchical representation of time, which would seem to correlate most closely with the concept of Eastern cyclic time (as represented in the dissertation), is that of *biotemporality*. Further, the most significant characteristic of biotemporality is that of being in the present. As described by Fraser, the associated musical metaphor of biotemporality is one of "nondirected linear time, in which one event progresses to another, yet there is no large-scale sense of direction".³¹⁶ In that sense, Fraser's concept of biotemporality is arguably — at the level of global form at least — both *non-linear* and *non-vectorial*.³¹⁷

This would seem to be the case, regardless of the observation that Fraser describes the temporality of biotemporality as being one of linear time. This is because Fraser qualifies his statement with the caveat that such linearity of time is *nondirected* (thus non-vectorial) and despite one event "progress[ing] to another, there is no large-scale sense of direction".³¹⁸ Such a description aligns well with Clayton's description of Eastern music (i.e., North Indian classical music) — specifically, that it lacks the teleological *large-scale* global linearity that characterises Western music.³¹⁹

The musical generativity of Fraser's concept of time conflicts

The biological self that understands only the moment is in perpetual conflict with the intellectual self that conceives of past, present, future ... This, then, at its root is the conflict that underlies the tension of time *felt* and time *understood*. ... we live in the moment, but dream of the eternal.³²⁰

In his (1978) *Time as Conflict: A Scientific and Humanistic Study*, Fraser further posits that as each level of complexity in the universe encounters unresolvable paradoxes, a new level of complexity emerges, each with its own paradoxes.³²¹ Arguably, such conflicts in how time is experienced are more broadly human paradigmatic conflicts. Again, this is consistent with Hoffman's position that we experience music as we experience culture — this would include the experience time.³²²

Similarly to the dichotomies listed by Kramer, this conflict may be characterised in various ways.

³¹⁵ Kramer, *The Time of Music*, 396.

³¹⁶ Kramer, *The Time of Music*, 396.

³¹⁷ Specifically, Clayton proposes that North Indian classical music has elements of linearity; however, these are at the local rather than the global level. Clayton, *Time in Indian Music*, 25.

³¹⁸ Clayton, *Time in Indian Music*, 25.

³¹⁹ Clayton, *Time in Indian Music*, 25.

³²⁰ See Wikipedia article on Julius Thomas Fraser at https://en.wikipedia.org/wiki/Julius_Thomas_Fraser

³²¹ Fraser, "The Art of the Audible 'Now,'" 181–84, quoted in Kramer, *The Time of Music*, 394–396.

³²² Hoffman, "Epistemology and Music," 69, quoted in Clayton, *Time in Indian Music* 10.

- From an *intercultural* perspective, Fraser's theory of time conflicts is an ontological conflict — the conflict between Western and Eastern ontological dualism and monism as it manifests in the experience of Western and Eastern time.
- From a *musical processing* perspective, Fraser's time conflicts are a *conflict between linear and non-linear processing* of musical information, where linear musical processing characterises what Kramer calls the *teleological listening* of Western music, as opposed to non-teleological listening.
- From a *phenomenological* perspective, Fraser's time conflicts in the current *umwelt* of nootemporality — “the temporality ... of [modern] man” — are an *existential* conflict between *becoming* and *being*.

According to Fraser, this tension of “time *felt* and time *understood*” is that “we live in the moment, but dream of the eternal.”³²³

The concepts of Fraser in the musical literature

Application of Fraser's concepts to music in the literature — analysis

Jonathan Kramer, in the final pages of *The Time of Music*, provides a focused analysis of J.T. Fraser's concepts as they apply to music.³²⁴ Primarily, however, Kramer's concepts are directed towards *analysis*. Where they apply to musical *performance*, Kramer's commentaries essentially relate to composition — albeit across a wide range of compositional examples, consistent with Kramer's mastery of this area of music appreciation.

Application of Fraser's concepts to music in the literature — performance

Besides Kramer, other musical theorists who have sought to incorporate Fraser's concepts more comprehensively include American composer and music theorist Emir Bejo. Bejo's commentary on Fraser's work in *J.T. Fraser's Theory of Time as Conflict* echoes the utility of Fraser's concept of levels of temporality as it applies to music. Bejo asserts that Fraser's “system and vocabulary re-orient the listener's attention so that one may experience the stratification of time's passing”.

Application of Fraser's concepts to music — improvisation

In contrast to Kramer's application of Fraser's concepts, mainly to analysis and composition, my intent is to examine how Fraser's concepts of human temporality may be applied to *improvisation*. The presentation in RP 3A and RP 3B of the contrasting geometric models of musical form as helix and vortex, as representations of Western linear and Eastern cyclic temporalities, is an example of this application.

A second example of the application of Fraser's concepts to the improvisation is provided in the final diagram of this section — the representation of Fraser's five levels of human temporality as graphic variations of the degradation of the symbol of the arrow of time. These five graphic representations of alternative temporalities are my “pictorial translations” of Fraser's descriptions of his temporalities as they relate to the arrow of time. These graphic representations may be provided as a visual stimulus for musicians, inviting their improvisations to align with the temporality represented by these graphic figures — directly based upon Fraser's description of the relationship between each of the temporalities and the arrow of time, as described in the final citation of this section.

³²³ Wikipedia article on Julius Thomas Fraser: https://en.wikipedia.org/wiki/Julius_Thomas_Fraser

³²⁴ Kramer, *The Time of Music*, 394–397.

Referencing Bejo's description, such *stratification of time's passing* into qualitatively distinct categories of temporality provides the improvising musician with diverse options for the time setting in which he or she approaches and performs music. In Bejo's words, it provides the musician with opportunities to explore an alternative state of time, including "those which are dark in the mind ... primitive, determinate, and unfree".³²⁵

Conclusion

Graphically represented as nested universes, the dissertation's proposal about the contribution of mechanics, phenomenologies, musical processing, interculturalities, and interdisciplinaries to the experience of directional motion in music is summarised below in Figure 15.

As previously noted, the inclusion of principal theorists in Figure 15 (as contrasted with Figure 1) provides a visual overview of the literature review, summarising its scope and highlighting the principal theorists in whose philosophical positions the dissertation's concepts are situated and grounded.

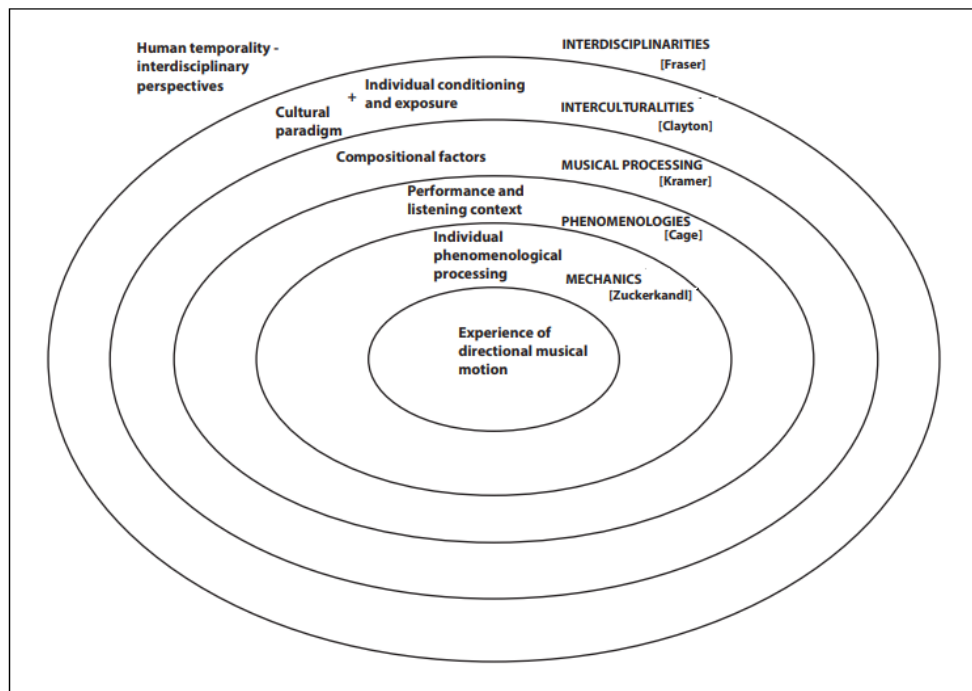


Figure 15: Proposed contribution of mechanics, phenomenologies, musical processing, interculturalities, and interdisciplinaries to the experience of directional motion in music

Final concept: Time's arrows — Fraser's levels of temporality graphically represented

In his 1992 work, *Human Temporality in a Nowless Universe*, Fraser describes the temporalities of his five canonical forms of time.³²⁶ For each, he provides a corresponding musical association, as summarised in Table 4.

In characterising these varying temporalities, Fraser invokes not an arrow of time but *arrows* of time.

For each of these temporalities, Fraser supplies a visual metaphor based upon the concept of the arrow of time. Thus, each of Fraser's five described levels of temporality invoke (respectively) an arrow, a

³²⁵ Bejo, J.T. "Fraser's Theory of Time as Conflict."

³²⁶ Fraser, "Human Temporality in a Nowless Universe," 159–173.

decaying arrow, a line (i.e., an arrow shaft without head or tail), a shattered line and finally a state of complete randomness of form.

This chapter ends with J.T. Fraser's vision of human temporality in a nowless universe.

Fraser's vision of human temporality in a nowless universe

Imagine a long, well-defined arrow, drawn on a piece of paper: head, shaft and tail. The picture stands for nootemporality, a kind of time that is unique to the human mind. It is characterised by a sharp distinction between future and past as well as by long-term expectations and memories in respect of the mental present.

Let the head and tail of the arrow become ill-defined, amounting to distinct but short portions of the shaft. This picture is the metaphor for biotemporality with its limited horizons of future and past referred to the organic present. Biotemporality is the temporal reality of all living organisms, including humans, as far as their biological functions are concerned.

The head and tail of the metaphorical arrow may be absent. What remains is the shaft of the arrow, a line, an image of eotemporality. It was named after Eos, the goddess of dawn, for in the history of the cosmos this is the earliest and simplest form of continuous time. It differs from the directed temporalities of life, mind and society in that it does not have a present ... neither can it have aspects describable as future and past, and therefore a preferred direction. This is the time of the astronomical world of galaxies and stars, that is, of the macroscopic world of both Newton and Einstein.

The shaft of the arrow may disintegrate into disconnected fragments but is still laid out, as it were, along a line. This is a visual metaphor of prototemporality, the time of elementary particles. In that world, one cannot speak of events happening at certain instants, but only of the likelihood of events happening within certain spans of time.

Finally, [representing atemporality] even the remaining fragments of the arrow may vanish. We are left with a blank sheet of paper. Its blankness stands for the temporal world of electromagnetic radiation, a world to which none of our ideas of time, such as before-and-after or future-past-present, or continuity, or discontinuity in time may apply.

It stands for a universe of absolute chaos.³²⁷

Figure 16 (next page) is my graphical interpretation of Fraser's five described temporalities.

³²⁷ Fraser, "Human Temporality in a Nowless Universe."



Figure 16: Fraser's five temporalities

From top to bottom — nootemporality, biotemporality, eotemporality, prototemporality, and atemporality

CHAPTER 2: METHODOLOGY

Arts-based research is almost impossible to define. It occurs like an improvised piece of music.³²⁸

As noted earlier in the Conceptual Map, I have used a hybrid approach to the research methodology, referencing three distinct methodologies. I have done this because each suits a different part of the dissertation.

A *thought experiment*, for example, was the best way to conceive the conceptual model for the experience of directional motion in music, as described in RP 1A, in terms of concepts from phenomenological mechanics.

Similarly, *interpretative phenomenological analysis* — as a method for determining how a “given person, in a given context, makes sense of a given phenomenon”³²⁹ — was particularly useful for understanding the “personally situated” lens through which I viewed and formulated the research question.

Finally, *practice-led research* was critical not only for producing the artefacts but also, via the *emergent process*, for transforming the dissertation from an artefact-centred exegesis to a theoretical essay on the broader subject of phenomenological mechanics, for which the artefacts were exemplifications.

In the following sections, I describe the role of the three main research methodologies that guided the dissertation, addressing them in the order they are introduced in the dissertation, commencing with the thought experiment, followed by interpretative phenomenological analysis and then practice-led research.

Thought Experiment

Kant was understood by his followers and successors to have proven that a slightly more intelligent person than Newton himself could have come up with Newtonian physics without any empirical import. And if this worked so well with Newtonian physics, we should be optimistic that some true genius would soon find out all the other things about nature by mere philosophical speculation. This was the beginning of so-called “German Idealism.”³³⁰

Pure thought can grasp reality.³³¹

As introduced in the Conceptual Map, and noted above, a thought experiment was the methodology used for generating the conceptual model for the experience of directional motion in music, as described in **RP 1A**.

³²⁸ Beth Rankin, “Arts-based Methods in Music Education,” in *Research Methodologies in Music Education*, ed. Kay Ann Hartwig (Newcastle upon Tyne: ANZARME, Cambridge Scholars Publishing, 2014), 7.

³²⁹ Brocki and Wearden, “A Critical Evaluation of the Use of Interpretative Phenomenological Analysis (IPA) in Health Psychology,” 87–108.

³³⁰ Ulrich Kühne, *A Short History of the Method of Thought Experiments in Science*. http://philsci-archive.pitt.edu/16464/1/TE_Toronto090522_kuehne.pdf

³³¹ Albert Einstein, “On the Method of Theoretical Physics,” in *Ideas and Opinions* by Albert Einstein (New York: Bonanza Books, 1954), 233.

The next section summarises and contextualises the role of the thought experiment in the dissertation from different perspectives. These are:

- History of thought experiments as a methodology
- Thought experiments in philosophy, science, and music
- The advantages of thought experiments as a methodology
- Types of thought experiments
- The types of inquiries suitable for thought experiments
- Thought experiments as conceptual models.

History of thought experiments as a methodology

The concept of a thought experiment, or *Gedankenexperiment*, as it is known in German and used most famously by Einstein, seems to have originated with Hans Christian Ørsted around 1811 and not, as is frequently said, with Ernst Mach. Witt-Hansen describes the term's origins as follows:

In 1897, the Austrian physicist and philosopher, Ernst Mach, published an essay, “Über Gedankenexperimente”, in *Zeitschrift für den physikalischen und chemischen Unterricht*. The article was rewritten, enlarged and published in *Erkenntnis und Irrtum* in 1905. Here several thought experiments, known from the history of modern science, were presented and analyzed, and attempts were made to distinguish thought experiments from “real” or “physical” experiments. Since this essay aroused great interest among contemporary physicists and philosophers, and stimulated the discussion of basic methodological problems in science, it became a widespread and almost generally accepted view that the term “Gedankenexperiment” was introduced into the scientific and philosophical vocabulary by Ernst Mach. This view is incorrect, however. It may be uncertain when the term “Gedankenexperiment” came into use in scientific and philosophical discourse, but it can be substantiated that it was used in the modern sense as early as 1811, in an essay, *Prolegomenon to the General Theory of Nature*. The author was the Danish chemist and physicist, Hans Christian Ørsted (1777–1851). He discussed its role in creative scientific work in some detail and related it to the use of hypotheses and conjectures in science. [footnotes removed]³³²

Thought experiments in philosophy, science, and music

The Stanford Encyclopaedia of Philosophy describes thought experiments as devices of the imagination “... employed for various purposes such as entertainment, education, conceptual analysis, exploration, hypothesizing, theory selection, [and] theory implementation”. The Stanford encyclopaedia further notes that thought experiments are often seen in philosophy and science. No mention is made of their application to music.

The concept that thought experiments can be played out in the mind *in a sensorial way* — that is, where one is required to imagine something — is typically seen and occasionally (as in the case of the dissertation's thought experiment) heard. Thought experiments thus arise from the imagination of

³³² Johannes Witt-Hansen, “H.C. Ørsted: Immanuel Kant and the Thought Experiment,” in *Kierkegaard and His Contemporaries: The Culture of Golden Age Denmark*, ed. Jon Stewart (Berlin, New York: De Gruyter, 2008), 62–77. <https://doi.org/10.1515/9783110200881.1.62>

scenarios that are ultimately linked to the senses, albeit hypothetically. In contrast to counterfactual statements or deductions of pure logic, *something is experienced* in thought experiments (i.e., seen, felt, heard) “... not literally, but in the imagination”.³³³

The advantages of thought experiments as a methodology

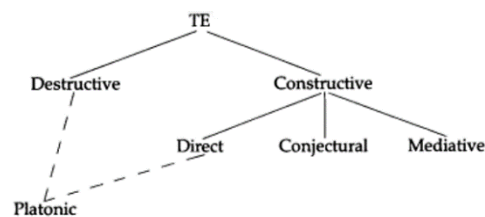
Thought experiments provide advantages over empirical testing of a concept in scenarios where empirical testing would be inefficient, impossible in the current state of technology, or likely impossible in principle. Examples of these (respectively) are:

- Galileo’s thought experiment (further described below) that all bodies (excluding air resistance) fall to earth at the same speed.³³⁴
- The deduction of the Boson Higgs particle by Peter Higgs in 1964 before its empirical demonstration in 2012 when the technology was advanced enough to build the necessary equipment for its demonstration — the Large Hadron Collider in Geneva.³³⁵
- The discovery of the relativity of space and time by Albert Einstein imagining what he would see — an electromagnetic field at rest — if he were able to observe a beam of light while travelling himself at the speed of light.³³⁶

As such concepts relate to the thought experiment of the dissertation, the empirical testing of the phenomenological experience of directional motion in music is effectively impossible — because it is phenomenological rather than physical. If the concepts of phenomenological mechanics are in any way *testable*, then such testing cannot be done by empirical methods. The thought experiment is thus an appropriate methodology — both for developing a conceptual model and for testing it or, more appropriately, considering its implications and the questions it raises.

Types of thought experiments

Reiterating what was summarised in the Conceptual Map regarding types of thought experimental processes, Brown provides the following classification system (TE = thought experiment):³³⁷



In Brown’s classification system, thought experiments are either destructive or constructive — a terminology that, in Brown’s terms “corresponds roughly” to Karl Popper’s (1959) “critical and ...

³³³ “Thought Experiments” chapter in the Stanford Encyclopaedia of Philosophy (2019). <https://plato.stanford.edu/entries/thoughtexperiment/#:~:text=Thought%20experiments%20are%20basically%20devices,are%20more%20controversial%20than%20others>

³³⁴ Brown, *Laboratory of the Mind*, 1–2.

³³⁵ Brian Greene, “How the Higgs Boson Was Found: Before the Elusive Particle Could Be Discovered — A Smashing Success — It Had To Be Imagined,” *Smithsonian Magazine* (July 20): 13. <https://www.smithsonianmag.com/science-nature/how-the-higgs-boson-was-found-4723520/>

³³⁶ Walter Isaacson, “The Light-Beam Rider,” *The New York Times* (Oct 20, 2015). <https://www.nytimes.com/2015/11/01/opinion/sunday/the-light-beam-rider.html#:~:text=While%20there%2C%20Einstein%20tried%20to,the%20wave%20would%20seem%20stationary.>

³³⁷ Brown, *Laboratory of the Mind*, 1–2.

heuristic uses of thought experiments”.³³⁸ Destructive thought experiments defy, thus disproving and destroying an existing theory; constructive thought experiments are a new conceptual proposition.

An example of a destructive thought experiment is Galileo’s proof that objects fall to the earth at the same speed, which destroyed Aristotle’s preceding theory that objects fall to the earth at a speed proportionate to their weight.

Brown describes this as follows:

[Galileo’s proof by thought experiment] begins by noting Aristotle’s view that heavier bodies fall faster than light ones ($H > L$). We are then asked to imagine that a heavy cannon ball is attached to a light musket ball. What would happen if they were released together? Reasoning in the Aristotelian manner leads to an absurd conclusion. First, the light ball will slow up the heavy one (acting as a kind of drag), so the speed of the combined system would be slower than the speed of the heavy ball falling alone ($H > H+L$). On the other hand, the combined system is heavier than the heavy ball alone, so it should fall faster ($H+L > H$). We now have the absurd consequence that the heavy ball is both faster and slower than the even heavier combined system. Thus, the Aristotelian theory of falling bodies is destroyed.

The thought experiment in this dissertation proposes a new conceptual model for the experience of directional motion in music. Thus, in Brown’s terms, it is a constructive rather than a destructive thought experiment.

Brown’s classification system further divides constructive thought experiments into three categories: direct, conjectural, and mediative. Conjectural thought experiments, as proposed by Brown, are those that “establish some (thought-experimental) phenomenon [and] then hypothesize a theory to explain that phenomenon”.

This describes well the thought experiment methodology I have used in this dissertation. Specifically, the thought-experimental phenomenon of the thought experiment is the experience of directional musical motion. The theory is hypothesized in the dissertation’s RPs, in particular RP 1A: the proposition that the experience of directional musical motion is representable as a *phenomenologically determined, hierarchically organised, multimodality, form-void vector field*.

The types of inquiries suitable for thought experiments

Thought experiments can teach us something new about the world, even though we have no new empirical data, by helping us to re-conceptualize the world in a new way.³³⁹

The Stanford Encyclopaedia of Philosophy further describes thought experiments as “most often ... communicated in narrative form, frequently with diagrams”,³⁴⁰ which accords with Brown’s description that thought experiments are typically “visualizable” or “picturable”.³⁴¹

³³⁸ K. Popper, “The Logic of Scientific Discovery,” in Brown, *Laboratory of the Mind*, 33.

³³⁹ “Thought Experiments” chapter in the Stanford Encyclopaedia of Philosophy (2019).

<https://plato.stanford.edu/entries/thoughtexperiment/#:~:text=Thought%20experiments%20are%20basically%20devices,are%20more%20controversial%20than%20others>

³⁴⁰ “Thought Experiments.”

³⁴¹ Brown, *Laboratory of the Mind*, 17.

In a way relevant to the current research as a dissertation in music, Brown then qualifies this statement in the following way:

Perhaps “sensory” would be a more accurate term. After all, there is no reason why a thought experiment couldn’t be about imagined sounds ... tastes, or smells. What is important is that it be experienceable in some way or other.³⁴²

The thought experiment used in the current dissertation aligns with this. The question *What is the nature of the experience of directional motion in music?* may thus be aptly described as a thought experiment of “imagined sounds”.³⁴³

The second methodology used was that of *interpretative phenomenological analysis*, described in the next section.

Interpretative Phenomenological Analysis

ANZARME (Australian and New Zealand Association for Research in Music Education), in its defining document *Research Methodologies in Music Education*,³⁴⁴ lists multiple categories of music research as follows:

- historical research
- quantitative research
- narrative inquiry
- action research
- ethnography case study research
- interpretative phenomenological analysis
- arts-based methods
- mixed methods.

From this list, the category that best describes the methodology used for understanding how a “given person [myself], in a given context [the current time and place and the educational, musical and experiential events which preceded my arrival here] makes sense of a given phenomenon [the experience of directional motion in Western and Eastern music]” is interpretative phenomenological analysis.³⁴⁵

Derived from the work of such theorists as Edmund Husserl, Martin Heidegger, and Maurice Merleau-Ponty,³⁴⁶ interpretative phenomenological analysis has been described as “a combination of

³⁴² Brown, *Laboratory of the Mind*, 17.

³⁴³ Brown, *Laboratory of the Mind*, 17.

³⁴⁴ Kay Ann Hartwig, ed., *Research Methodologies in Music Education* (Newcastle upon Tyne: ANZARME, Cambridge Scholars Publishing, 2014), 1.

³⁴⁵ Brocki and Wearden, “A Critical Evaluation of the Use of Interpretative Phenomenological Analysis (IPA) in Health Psychology,” 87–108.

³⁴⁶ J.J.M. Brocki and A.J. Wearden, “A Critical Evaluation of the Use of Interpretative Phenomenological Analysis (IPA),” in *Health Psychology*, *Psychology and Health*, 21, no. 1 (2006): 87–108.

psychological, interpretative, and idiographic components [which ultimately determines] how [as described above] a given person, in a given context, makes sense of a given phenomenon”.³⁴⁷

The important characteristics implicit in such a description are the following:

- (i) The nature of the research is phenomenological and thus arises directly from the researcher’s experience.
- (ii) The research is specifically situated within the context in which it is experienced.
- (iii) The research seeks to make sense of a given phenomenon.

As a phenomenological research methodology, the interpretative phenomenological analysis, far from trying to negate the influence of the observer, *includes* it, purposefully framing the findings of the research in the context in which it takes place. Such a characterisation — explicitly inclusive of the *observer effect* — is notably in contrast to non-arts-based research methodologies, which typically prioritise objective rather than subjective processes. When interpretative phenomenological analysis is applied to music research, the given person in whom the research is subjectively situated is the musician-researcher. Thus, the current research is subjectively situated in the context of my own experience.

The given context of a dissertation within an interpretative phenomenological analysis is multifactorial. Firstly, the research takes place in a *geographical-temporal contextual place*. Secondly, as practice-based research, the exploration of music must also occur in a *physical place* — such as a studio. Thirdly, such research is undertaken from a *metaphorical place* — the *home* of the research question — to which the researcher iteratively returns.

Regarding each of these, the geographical-temporal context in the current research was primarily Melbourne, Australia, from 2017 to 2022.

In the case of the production of the artefacts and the musical processes that preceded them, the physical place was Four4ty Recording Studios — the studio of my sound engineer, Jarred Doueal — in Eltham, Australia. Over some years at Four4ty Recording Studios, my research was contextualised within a regular regimen of protected time each week or fortnight to record musical ideas. The ideas sprang from two main sources of inspiration:

- my experience as a guitarist in the Western classical tradition and a clarinet/saxophone player in the Western jazz tradition
- my experience learning North Indian classical music, which I had learnt for some years as a student of the bansuri both in India and Nepal.

Initially, I recorded these musical ideas solo with the assistance of Jarred. Then, as the research project developed, I recorded them with guest musicians. It was in such a meeting, specifically with Dr Sam Evans at the studio, that the foundational structure for *Oscillation 1* originated and subsequently manifested as the artefact.

In the current dissertation, the *metaphorical place* — the *home* of the research question to which I repeatedly returned — was the question: *What is the nature of the experience of directional motion in music?*

³⁴⁷ Brocki and Wearden, “A Critical Evaluation of the Use of Interpretative Phenomenological Analysis (IPA) in Health Psychology,” 87–108.

Thus, the artefacts were composed (or improvised) and recorded at Four4ty Recording Studios, Eltham Australia — the *physical* place that gave rise to the artefacts. The *metaphorical place* — the *home* of the research question — gave rise to the written dissertation.

Practice-led Research

The third methodological process I used in this dissertation in the production of the artefacts was practice-led research. I used it both to explore musical ideas within the recording studio and to format the overall orientation of the dissertation.

Regarding the former, I used *iterative revisitation*, a process undertaken both at the physical level (attending the studio regularly and repeatedly) and the metaphorical level (revisiting the research question). Regarding the latter, the research underwent an emergent process, allowing the theoretical concepts, composition, and recording to “evolve” simultaneously through multiple stages, ultimately arriving at the format presented in this dissertation. This particularly relates to the dissertation being a theoretical essay on the novel concept of phenomenological mechanics, with the compositional and improvisational artefacts functioning as exemplifiers of the dissertation’s theoretical concepts.

Regarding exploring musical ideas within the recording studio, this process involved (at the physical level) the regular and repeated return to the studio to undertake the practice regimen of recording musical compositional ideas, as well as listening to and reflecting on these ideas in between sessions. What became apparent in this process was the mutual interplay throughout the research between the *iterative revisitation of physical practice* (i.e., writing, playing and recording music) and the *iterative revisitation of research reflections* that occurred between such sessions.

It was this *iterative revisitation* at physical and metaphorical levels that served as the crucial methodological process that led me to collaborate with Dr Sam Evans. Sam’s musical and academic contribution regarding the extended role of the tabla in intercultural music (particularly its capacity as a melodic instrument³⁴⁸) served as a foundation for the major artefact, *Oscillation 1*.

This process of iterative revisitation is characterizable in several ways. Firstly, it is characterised by the iterative revisitation of inquiry typically via a repeated practice regimen. Secondly, and perhaps more importantly, it is characterised by an iterative revisitation of the committed research question, as well as repeated reflection on what generates from revisiting the research question.

Another characteristic of practice-led research is the extension of the mutual generativity relationship to include the academic context, so the practice both *feeds from* and *feeds into* the discipline’s existing body of knowledge. This three-way generative relationship between artistic practice, research, and academic knowledge is succinctly captured in Smith and Dean’s Iterative Cyclic Web model, described in more detail below.³⁴⁹

Smith and Dean’s Iterative Cyclic Web model

In their 2010 Iterative Cyclic Web model of practice-led research, theorists and musicians Hazel Smith and Roger Dean elegantly represent the characteristics of iterative revisitation and mutual generativity of practice-led research in an academic context. Importantly, their conceptualization explicitly characterises the relationship that links and contextualises the findings of practice-led

³⁴⁸ Evans, *Tabla without Borders*.

³⁴⁹ Hazel Smith and Roger T. Dean, eds, *Practice-Led Research, Research-Led Practice in the Creative Arts* (Edinburgh: Edinburgh University Press, 2010).

research in the existing academic literature. In their model, this relationship between academic research, artistic practice-led research, and research-led artistic practice is a three-way mutually generative relationship, benefiting all contributing parties. (See Figure 17 for a depiction of their cyclic web.)

For the current dissertation, the model is an apt representation of the research method undertaken to produce the artistic works and (associated with it) the academic findings, broadening, deepening and strengthening the content of the academic reference point from which the research originated. The specifics of this are discussed below.

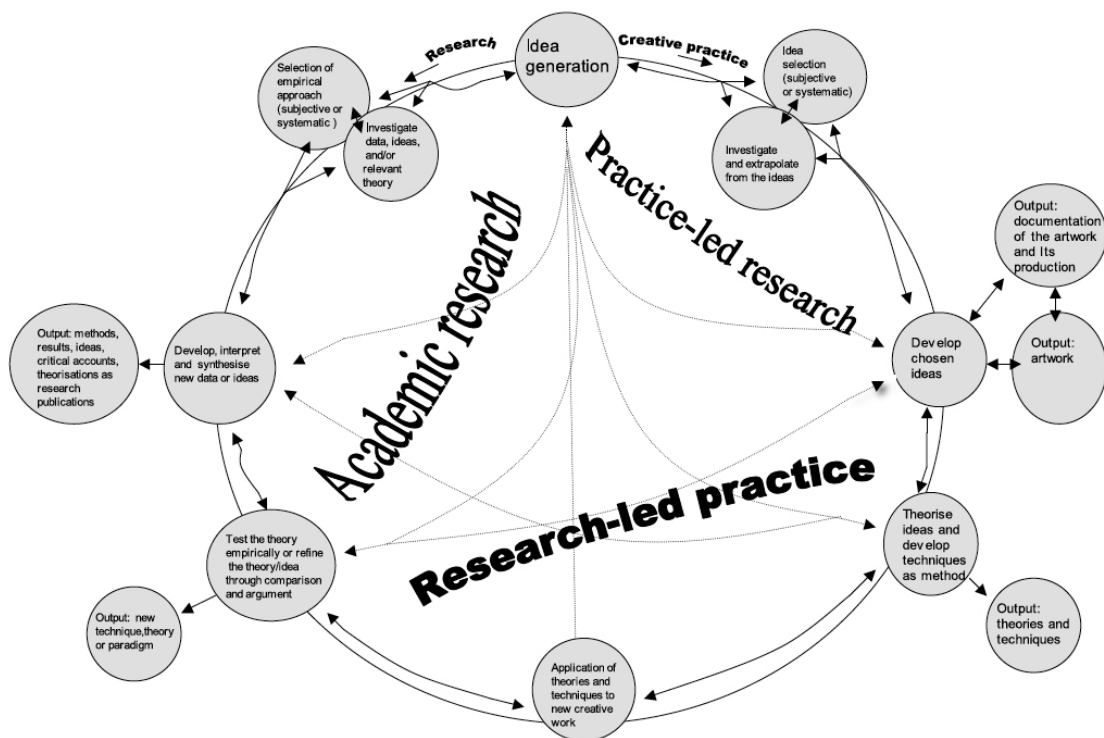


Figure 17: Smith and Dean's Iterative Cyclic Web

Source: Evans, "Tabla without Borders," 40.

Origin of research — Clayton's analysis of Zuckerkandl's wave theory

Clayton's analysis of Zuckerkandl's wave theory is the academic reference point for the current research. Regarding the discipline of intercultural music composition, the origin and academic reference point of the current research was Clayton's reflection on the implications of Zuckerkandl's description of the experience of metre: "to return one must first have gone away".³⁵⁰ To that extent, the academic literature helped generate the current research, providing it with a reference point to situate, contextualise, and accommodate it.

Reciprocally, the current research, through its practice-led research method, *contributes* to Clayton's analysis. It broadens its application to other musical phenomena beyond metre and positions the

³⁵⁰ Zuckerkandl, *Sound and Symbol*; Clayton, *Time in Indian Music*.

research findings within a broader framework of a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field* model for the experience of vectoriality in music.

As is characteristically the case with practice-led research, the academic literature (in this case, Zuckerkandl's conceptual framework) is both *the benefactor* and the *beneficiary* of the research methodology.

Associated characteristics as proposed by Barrett and Bolt

Other theorists who have similarly described the significance of *situatedness of knowledge* (i.e., inclusivity of context in practice-led research) include Estelle Barrett and Barbara Bolt.³⁵¹ In addition to the property of situatedness of knowledge, Barrett and Bolt describe practice-led research as having the following properties:

- iterative revisitation process
- interdisciplinary relevance
- presentational rather than representational focus
- process rather than product orientation
- emergent process.³⁵²

In combining the process of physical and metaphorical *revisitation* (described above) with the property of the emergent process, Estelle Barrett describes the process of contextualised “iterative evolution” of the research question as the typical process of practice-led research.³⁵³ According to Barrett, exegesis and its presentation can, therefore, be conceived as a “unity of problem, context and solution”.³⁵⁴ Such a characterisation aptly characterises the broad process for the dissertation.

Methodological process of iterative revisitation: physical level

Throughout the research, an important methodological step was the regular (weekly or fortnightly) assignment of protected time in the Eltham music studio to record musical ideas, consider them from a theoretical perspective, and then re-record them in the studio.

Methodological process of iterative revisitation: metaphorical level

The iterative revisitation process of the current research at the *metaphorical* level was the persistent return to the idea of a conceptual model for the experience of directional motion in music. In the manner of practice-led research, it was this *iterative* revisitation at both the physical and metaphorical levels that led me to my collaboration with Dr Sam Evans, whose musical and academic contributions were fundamental to establishing the final direction of the dissertation.

Interdisciplinary relevance

Interdisciplinary study or enquiry creates a new discipline that “belongs to no one”.³⁵⁵

The primary contribution of new knowledge resulting from the research is the development of a language and conceptual framework for the experience of directional motion in music (RP 1A) and,

³⁵¹ Barrett and Bolt, *Practice as Research*, 4.

³⁵² Barrett and Bolt, *Practice as Research*, 1–13.

³⁵³ Barrett and Bolt, *Practice as Research*, 1–13.

³⁵⁴ Barrett and Bolt, *Practice as Research*, 5.

³⁵⁵ The view of Roland Barthes as described by Estelle Barrett in Barrett and Bolt, *Practice as Research*, 7.

more broadly, the concept of phenomenological mechanics, which arguably has a wide array of potential interdisciplinary applications.

Originating in the work of Zuckerkandl, the conceptual model of RP 1A and the broader concept of phenomenological mechanics is outlined in the section *From wave theory to phenomenological mechanics — 10 steps* (Chapter 1). This section demonstrates the relationship (as described by Smith and Dean) between existing academic knowledge and its extension via practice-based research — a relationship that both situates new research in the existing literature and extends existing research into a present-day context such that it remains contemporary and relevant.

This includes extending the research into interdisciplinary settings — a hallmark of the practice-based research approach. Accordingly, the current research has interdisciplinary relevance to disciplines such as philosophy, psychology and other fine arts. Chapter 3 considers the relevance of the research to disciplines beyond music.

Presentational rather than representational focus

The proposed *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field* model of music composition is presented as a conceptual model that has utility both for the compositional process of music and for the analysis of the listener experience at the phenomenological level.

Consistent with the methodology being phenomenological research, the model is proposed as *one conceivable way* of understanding the structure of the musical composition and its phenomenological experience — one that has *utility for the processes of composition and musical analysis*. To that extent, the research findings are presentational rather than representational.

Process or product orientation

The endpoint of the research is to present a model that shows a possible way to conceptualise the vectorial properties of music composition experienced at the phenomenological level under contrasting Western linear and Eastern cyclic representations of time. In moving to this endpoint, the research has evolved its process of inquiry to examining the experience of time itself, as it applies to music. To this end, Chapter 1 culminates in the presentation of Fraser's levels of temporality and their novel application to improvisation. It is thus contended that the research is both product-oriented and process-oriented.

Emergent process

Throughout the research, a methodology for the emergent process occurred. It would not be accurate to say this was intentional. It simply became apparent that the research questions, orientations, and findings that were initially considered important underwent a regular process of being discarded and replaced by new questions, orientations, and findings.

An important milestone of this *emergent process* was crystalized when it became possible to link the 12 RPs of the dissertation developed through Eastern and Western contexts and represented as the dissertation's primary, secondary and tertiary RPs in terms of a single concept via the unifying concept of phenomenological mechanics.

Emergent process of the concept of phenomenological mechanics

Following this, the most significant emergent process was the re-orientation of the dissertation away from one that was exegetical and towards a theoretical essay with artefacts as examples.

The artefacts, originally central to the dissertation, thus became secondary as the broader unifying concept of phenomenological mechanics became more primary. As a result of such an emergent process, the method of composition of the artefacts — including the highly structured composition of the major artefact, *Oscillation 1* — shifted from being a seminal part of the dissertation to something that, though novel, was no longer the primary objective of the research.

For this reason, and in the manner presented in the Conceptual Map, the compositional methods for the artefacts are contained in appendices to this dissertation rather than included in the dissertation's main text. Such a decision, however, does not make the dissertation any less “musical”. What it does do is move the priority away from the dissertation's (secondary) exegesis RPs (the ones that specifically reference the artefacts) and towards the general (primary) RPs (the ones that pertain to the nature of music itself).

For this reason, and as documented in the Conceptual Map, the method for the composition and production of the artefacts, including the highly structured operationalisation of concepts and composition process for *Oscillation 1*, is now contained in the appendices, namely:

- *Appendix 5: Compositional Methods and Processes — Major and Minor Artefacts*
As the production of the minor artefact *Beginner's Mind* is the much simpler method of the two compositional methods, it comes first.
- *Appendix 6: Background Information and Rationale for Guitar and Tabla* is the comprehensive method for the operationalization of concepts, composition and production of the major artefact, *Oscillation 1*.

CHAPTER 3: DISCUSSION

Overview

Theoretical essay versus exegesis perspective

In STEM³⁵⁶ research, a dissertation is structured around the questions of what, why and how the research was done, what was found, and the meaning and significance of the findings; in humanities research, the structure is determined primarily by the *argument* of the study.³⁵⁷ The questions of meaning and significance are still addressed but not in isolation — rather, in the context of the *story* the dissertation presents.

In *creative practice* works, Hamilton and Jaaniste point out that a dissertation typically accords with the following structure or pattern:

- discussion of relevant theoretical ideas and concepts
- analysis of the practice/work of relevant practitioners
- discussion of the researcher's practice/work.³⁵⁸

Hamilton and Jaaniste also note that besides an introduction and conclusion, the structure of creative-work dissertations typically has the following:

- situating concepts (conceptual definitions and theories)
- precedents of practice (traditions and exemplars in the field); and
- researcher's creative practice (the creative process, the artefacts produced, and their value as research).

They further describe the structure of their *connective model of exegesis* as follows:

Such a [*connective model of exegesis*] dissertation structure provides a dual orientation, which allows the researcher to both situate their creative practice within a trajectory of research and do justice to its personally invested poetics.³⁵⁹

Regarding the dissertation I have presented, and as noted in the Introduction and Methodology chapters (via the emergent process that characterises practice-led research,) the dissertation evolved from an exegesis style to what has become essentially a theoretical essay. The dissertation has *invested poetics*. In the Conceptual Map, I state the following:

Although its terms are in places scientific, and it is informed by concepts from physics, the association is not literal but one of poetic analogy.

Scientific research is both a crucial discipline and a journey of inquiry. It would be, however, a gross misreading of the dissertation — and limit the inspiration that the dissertation's scientific concepts

³⁵⁶ Science, technology, engineering and mathematics.

³⁵⁷ Monash University's Learn HQ. See <https://www.monash.edu/learnhq/write-like-a-pro/how-to-write.../thesis-chapter/thesis-structures>

³⁵⁸ Jillian Hamilton and Luke Jaaniste, "A Connective Model for the Practice-led Research Exegesis: An Analysis of Content and Structure," *Journal of Writing in Creative Practice* 3 (2010), 31–44. 10.1386/jwcp.3.1.31_1.

³⁵⁹ Hamiltonian and Jaaniste, "A Connective Model for the Practice-led Research Exegesis," 34.

can provide to music and the fine arts more broadly — to evaluate the dissertation within such a framework. Rather, the dissertation should be understood as one firmly situated in the creative arts.

The creative arts, however, do not originate in a vacuum — they are born in a paradigmatic context that is social, historical, and geographic. The *Encyclopedia Britannica*, in its very definition of humanities, implicates the broader context of humanities in creative arts inquiry as follows:

[Humanities are] those branches of knowledge that concern themselves with human beings and their culture or with analytic and critical methods of inquiry derived from an appreciation of human values and of the unique ability of the human spirit to express itself.³⁶⁰

If nothing else, this dissertation is evidence of the unique ability of the human spirit to express itself. Accordingly, the following discussion aligns itself primarily with a theoretical essay whilst also, where appropriate, discussing the dissertation's artefact in an exegesis-like way to exemplify its concepts. This is discussed further in the next section.

The artefacts as exemplars of theoretical concepts

As noted above, and in accordance with the dissertation evolving, by an emergent process, into a theoretical essay, the artefacts have appropriately become exemplars of the dissertation's theoretical concepts rather than central creative works. Nonetheless, they *do* have their own historical and theoretical context.

This chapter addresses the artefacts from both perspectives — primarily as exemplars of the *story* the dissertation presents (in Hamilton and Jaaniste's terminology, the "argument of the study") and secondarily, from an exegesis-like consideration as creative works in their own right. However, because the study is primarily a theoretical essay, the discussion prioritises the theoretical work. This is achieved by prioritising the meaning and significance of the dissertation's most central RP — the concept of phenomenological mechanics as pertaining to musical performance and analysis.

The major artefact as exegesis — minimalism and intercultural symbiosis perspectives

This chapter examines the major artefact, *Oscillation 1*, as a stand-alone composition within a historical, musical, and fine-arts context. Firstly, it examines it from a musical perspective in terms of the concepts of minimalist music. Secondly, it examines it from a broader fine-arts perspective in terms of the composition's *interculturality* considered from the perspective of the *philosophy of symbiosis*, as proposed by internationally acclaimed Japanese architect Kisho Kurokawa.

The discussion of *Oscillation 1*'s situatedness in musical minimalism is a discussion of the artefact from the dissertation's primary RPs (*music as phenomenological mechanics*). The consideration of how the composition manages its *interculturality* is a discussion of the artefact from the dissertation's secondary RPs (*composition as intercultural metaphor*).

³⁶⁰ See <https://www.britannica.com/topic/humanities>

Minimalism and intercultural symbiosis in the zeitgeist of the twentieth century

Both minimalism and the philosophy of symbiosis have, however, emerged as artistic positions that inform music and the fine arts from within a broader context — that of the twentieth century.

Just as a fish may not appreciate (or even be aware of) the existence of water *unless the water disappears*, the artistic milieu of the twentieth century is more apparent now that it has passed and we find ourselves in a new concept of “contemporary”, where concepts once considered futuristic are now memories.

It is a remarkable achievement for a single individual to define the zeitgeist of a century of human living by putting all the artistic positions and movements of such an extended period neatly in their positions, like toys in a box — or perhaps jigsaw pieces in a puzzle.

In *The Shock of the New*, Hughes captures this in a single paragraph. His synopsis is of particular significance to this dissertation because it highlights the profound scientific and cultural significance of the twentieth century’s paradigm shift from classical Newtonian mechanics to the mechanics of Einstein, viewed from a non-technical humanities perspective.

The speed at which culture reinvented itself through technology in the last quarter of the nineteenth century and the first decades of the twentieth, seems almost preternatural. Thomas Alva Edison invented the phonograph, the most radical extension of cultural memory since the photograph. In 1877, two years later, he and J.W. Swan, working independently, developed the first incandescent filament lightbulbs, the technical sensation of the Belle Époque. The first twenty-five years of the life of the archetypical modern artist, Pablo Picasso — who was born in 1881 — witnessed the foundation of twentieth-century technology for war and peace alike: the recoil-operated machine gun (1882), the first synthetic fibre (1883), the Parsons steam turbine (1884), coated photographic paper (1885), the Tesla electric motor, the Kodak box camera and the Dunlop pneumatic tyre (1888), cordite (1889), the Diesel engine (1892), the Ford car (1893), the cinematograph and the gramophone disc (1894). In 1895 Roentgen discovered X-rays, Marconi invented radio telegraphy, the Lumière brothers developed the movie camera, the Russian Konstantin Tsiolkovsky first enunciated the principle of rocket drive, and Freud published his fundamental studies on hysteria. And so it went: the discovery of radium, the magnetic recording of sounds, the first radio transmissions, the Wright brothers’ first powered flight (1903) and the *annus horribilis* of theoretical physics, 1905, in which Albert Einstein formulated the Special Theory of Relativity, the photon theory of light, and ushered in the nuclear age with the climactic formula of his law of mass-energy equivalence, $E = mc^2$. One did not need to be a scientist to sense the magnitude of such changes. They amounted to the greatest alteration in man’s view of the universe since Isaac Newton.³⁶¹

³⁶¹ Hughes, *The Shock of the New*, 15.

Application of concepts to the performance and analysis of music — composition and improvisation

The discussion now moves towards its conclusion by discussing the dissertation's tertiary RPs — the application of the dissertation's concepts to the performance and analysis of music. It presents this in two sections, the first being an application of concepts of phenomenological mechanics to *composition*, the second being an application of concepts to *improvisation*.³⁶²

The first presents a characterisation of the concepts of musical development and resolution from a phenomenological mechanics perspective and discusses this concept as it applies to musical composition.

The second applies the dissertation's concepts of alternative temporalities to improvisation from two perspectives. The first is the application of Fraser's canonical forms of human temporality to musical improvisation, and the second is the application to improvisation of the dissertation's concepts of contrasting Western and Eastern musical forms, reflecting Western linear and Eastern cyclic temporalities as helix and vortex.

The discussion ends with an examination of the meaning and significance of the dissertation's central RP — the concept of *phenomenological mechanics* as it pertains to the performance, composition, improvisation, and analysis of music more broadly.

The chapter is presented in the way described to achieve Hamilton and Jaaniste's requirements for examining *meaning and significance* in the dissertation's findings whilst, in the manner of a humanities dissertation, preserving the *argument of the study* (i.e., the story it tells). Further, presenting the discussion in this way concurrently examines (albeit in a lesser way) the dissertation's artefacts — principally the major artefact, *Oscillation 1* — from an exegesis perspective (i.e., in terms of the historical, theoretical, and fine-arts perspectives that inform its composition) and in terms of its *personal invested poetics*.

Summary of Findings

Reiterating the corresponding segment from the Conceptual Map, the following section summarises the dissertation's major findings as they relate to the aims and objectives, areas of research, research questions, and research propositions.

Aims and objectives

The dissertation's *theoretical* aims and objectives were as follows:

- To investigate the phenomenological experience of directional motion in music.
- To generate via the process of a thought experiment, a conceptual model for the representation of the phenomenological experience of directional motion in music. (This is presented as RP 1A.)
- To apply this conceptual model to characterise the contrasting directional musical motion experiences that have been attributed to Western and Eastern musical forms.

³⁶² I acknowledge that the distinction between composition and improvisation is fluid and, in some ways, artificial. Improvisation may be considered spontaneous composition; conversely, a composition may comprise sections of improvisation. Nonetheless, I use these terms to distinguish between the two main applications.

- To apply the concepts presented within the research to the performance and analysis of music, and in particular improvised music.

The *creative* aims and objectives were:

- To compose and produce a musical artefact/s that *exemplified* or could be a *metaphor* for the concepts of the theoretical work, or both.
- To situate the composition within music and fine-arts theory.

In my own assessment of these goals, I believe that, on the whole, they have been achieved, as demonstrated below.

Theoretical aims and objectives

Conceptual model in Primary RP 1A

RP 1A proposed a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field* model for the experience of directional motion in music. This model is presented, considered and analysed throughout the dissertation. In Chapter 1, the model is also graphically represented in three formats — *Cartesian*, *particle stream*, and *phenomenological wave* (Figure 1 and Figure 9).

In the discussion, I further present the application of this model to musical composition and analysis. It is presented in three examples of analysis.

- Firstly, the major artefact, *Oscillation 1*, is examined from the perspective of the model. This is presented in Table 8 (Appendix 7) and further described in Figure 32 and Figure 33.
- Secondly, a 12-bar blues progression is examined from the perspective of the model (refer to Figure 34).
- Thirdly, Cage's 4'33" is examined from the perspective of the model, demonstrating the concept that such structure, though apparent in compositional form is ultimately a property of the perceiver — in Zuckerkandl's terms, it is contained within the "pointing"³⁶³ (i.e., the act of listening to the music) rather than in the music itself.

Application of conceptual model

Theorists such as Deshpande (1987), Inayat Kahn (1991), and Pressing (1993) have noted that whereas Western music is characteristically linear in form, Eastern music is characteristically cyclic.³⁶⁴ The experience of musical motion in Western and Eastern musical forms — as linear and cyclic — also accords with Western and Eastern cultural representations of time, respectively. The representation of Western and Eastern musical forms, as respectively helix and vortex, is a visual representation of these concepts.

In the dissertation, I propose that, from a conceptual perspective, such Western linearity and Eastern cyclicity of musical form are consistent with, and arguably predicted by, contrasting representations in Western and Eastern philosophy of the relationship between form and void. Specifically, whereas

³⁶³ Zuckerkandl, *Sound and Symbol*, 68.

³⁶⁴ Vamana Hari Deshpande, *Indian Musical Traditions — An Aesthetic Study of the Gharanas in Hindustani Music*, 2nd ed. (Bombay: Popular Prakashan, 1987); H. Inayat Kahn, "The Mysticism of Sound and Music," *A Sufi Message of Spiritual Liberty*, vol II (Shaftsbury, Dorset and Rockport, Mass, 1991), cited in Clayton, *Time in Indian Music*, 18; J. Pressing, "Relations between Musical and Scientific Properties of Time: 'Time in Contemporary Musical Thought,'" *Contemporary Musical Review* 7, no. 2 (1993), 105–22, cited in Clayton, *Time in Indian Music*, 21.

Western dualism characterises the relationship between form and void as one of form-void *mutual exclusivity*, Eastern music characterises this relationship as form-void mutual inclusivity. These contrasting paradigmatic characterisations of the relationship between form and void are visually representable as the *switch* and the *taijitu*, respectively, as portrayed in Figure 5 (Chapter 1).³⁶⁵

The concept of linear movement as it characterises Western music is analogous with this.

Thus, the linear movement from A to B is only meaningful when A and B are separated and divided states — which is the case in the Western paradigm but not the Eastern.

When such a metaphysical proposition is applied to the phenomenological representation of motion — be that in the representation of the *experience of motion in music* or otherwise — the concept of linear motion is possible.

Such movement from A to B fits within the dualistic Western paradigmatic representation of time, where time moves from A to B, but not within the Eastern monistic representation of time, where B is *already contained within A*.

Application of the concepts to the performance and analysis of music

Application to composition

In applying the theoretical concepts to musical composition (as discussed below), musical development and resolution terms derived from phenomenological mechanics are considered. These terms (introduced in Chapter 1) arise from the natural laws — namely, Newton's third law of motion and the first and second laws of thermodynamics, colloquially characterizable as the *laws of action and reaction*, *conservation of energy*, and *order and chaos*.

Referencing the dissertation's novel concepts — phenomenological energy and phenomenological entropy — the dissertation proposes a conceptual representation of development and resolution framed in terms of phenomenological mechanics. Musical development is characterizable as a *negative phenomenological energetic or negative phenomenologically entropic movement*.³⁶⁶

A negative phenomenological *energetic* movement is analogous to an *endothermic* process in physical mechanics. It *requires* rather than releases phenomenological kinetic energy. It is a movement from the energy of movement (kinetic energy) to the energy of position (potential energy). Such movements are analogous to physical movements uphill or upstream against a current.

³⁶⁵ These concepts are discussed in detail in Appendix 2.

³⁶⁶ As noted in Chapter 1 (Research Area 1), I use a nominal convention where the positive direction of phenomenological energy and entropy transformation is the spontaneous direction of transformation of a system for which energy input is not required.

Positive energy and entropy movements are analogous to *downhill* movement. They move the system from a *high* to a *lower energy* state and from *order* to *chaos*.

Positive phenomenological energy and entropy movement thus correspond with the musical concept of *resolution*. Conversely, the *positive* direction of phenomenological energy and entropy transformation is the *non-spontaneous* direction of transformation of a system for which energy input is required.

Negative energy and entropy movements are analogous to *uphill* movement. They move the system from a lower potential energy state (i.e., lower energy of position) to a higher energy state and from *chaos* to *order*.

Positive energy and entropy movements thus correspond to the musical concept of *development*.

Negative and *positive* phenomenological energy and phenomenological entropy movements thus correspond (respectively) to the musical concepts of *development* and *resolution*.

A negative phenomenological *entropic* movement is analogous to movement from chaos to order in physical mechanics. It is a movement against the natural direction or change of state from order to chaos in what Greene calls the *entropic arrow of time*.³⁶⁷

Thus, from a phenomenological mechanics perspective, the musical concepts of *development* and *resolution* may be represented as *negative* and *positive* phenomenological energetic and phenomenological entropic transformations, respectively.

Application to improvisation

The concept of alternative musical temporalities is considered in the final section of this chapter. It is considered firstly from the perspective of Fraser's *canonical forms of human temporality* and then from the perspective of the tertiary RPs (the proposition of contrasting musical forms as *helix* and *vortex* as geometric representations of Western and Eastern musical forms).

In further examining this concept, I also present the concept of *gradations* of horizontal and vertical temporalities. I examine the improvisation temporality of the minor artefact, *Beginner's Mind*, from this *Cartesian* perspective.

Creative aims and objectives

As stated above, the first creative aim of the dissertation was to compose and produce a musical artefact that exemplified or could be a metaphor for the concepts of the theoretical work. The second creative aim was to situate the composition within music and fine-arts theory. The major artefact, *Oscillation 1*, is proposed as both *exemplifying* and *metaphorically* representing the dissertation's theoretical concepts.

Regarding the composition *exemplifying* the dissertation's theoretical concepts, *Oscillation 1* is examined in Appendix 7 from the perspective of RP 1A — an analysis of the composition as a phenomenologically determined, hierarchically organised, multimodality, form-void vector field.

Regarding the composition being *a metaphor*, *Oscillation 1* (as tendered in Secondary RP 2B) is a metaphor for the concept of Western linear and Eastern cyclic representations of time.

As described in Appendix 5, *Oscillation 1* is a metaphor for this Western linear–Eastern cyclic representation of time in two major capacities. The first of these is in terms of the composition's *global form*, where the global form of the tabla part is linear — in contrast to the cyclic form of the guitar part. The second of these representations lies in the alternating linear–cyclic modulation pattern, as evident in the composition's equi-harmonic cycle. The specifics are described in Appendix 5 and graphically represented in Figure 2 (Chapter 1).

The Artefacts as Exemplars of the Theoretical Concepts

Exemplars of Fraser's canonical forms of human temporality

This section examines the major and minor artefacts as exemplars of Fraser's nootemporality.

Secondary RP 2A (which the dissertation finds in the affirmative) states the following proposition:

The submitted creative work *Oscillation 1*, because of its harmonic organisation and global form, is a metaphor for the linear and cyclic representations of time in Western and Eastern paradigms.

³⁶⁷ Greene, *The Fabric of the Cosmos*, 161.

As opposed to the temporalities (Western linear and Eastern cyclic) for which the composition's global form and modulating pattern are *metaphorical*, the *actual* temporality of *Oscillation 1* is linear.

In a process that at first may seem paradoxical, *Oscillation 1* may be seen to achieve its alternating linear and cyclic harmonic form (as represented by the equi-harmonic cycle) in an essentially linear way.

Harmonically, what is happening in the composition is that, via a repeating succession of twelve linear modulation movements — each one to the subdominant key — the composition is continuously cyclically modulating.³⁶⁸ Such *cyclicity* is thus an *approximation* of cyclicity using a repeating progression of twelve conceptually linear movements between tonic and subdominant.³⁶⁹

Regardless of the linearity and cyclicity of its global form and harmonic movement, the temporality of *Oscillation 1* is a Western linearity — thus, its temporality within Fraser's system may be considered *nootemporality*. Such nootemporality, as described by Fraser, includes the following attributes:

- The time consciousness of [modern] man.
- Beginnings and endings are well defined, and they are anticipated and remembered.
- Having the musical expression of linearity.³⁷⁰

The minor artefact, *Beginner's Mind*, may also be assessed from the perspective of Fraser's canonical forms of human temporality. In so doing, *Beginner's Mind* may be seen as having a temporality, closely approximating *biotemporality*.³⁷¹

Referencing Fraser's description of biotemporality, as listed in Table 4, *Beginner's Mind* is assessed as having the temporality of biotemporality for the following reasons:

- It differentiates between beginnings and endings.
- One event progresses to another.
- There is no large-scale sense of direction.

Of these three characteristics of biotemporality, the first two are *positive* attributes in that they are stated in terms of what the music is rather than what it is not. In my assessment, *Beginner's Mind* has a *biotemporal temporality* that primarily accords with the above positive attributes.

The third attribute is a *negative* attribute in that it states the absence rather than the presence of a characteristic. Such a proposition warrants a brief further clarification as the concept of large-scale direction can be interpreted in many ways. In my experience of improvisation, *Beginner's Mind* doesn't demonstrate a large-scale sense of direction — it doesn't definitively move *from A to B* in a linear manner.³⁷² It does, however, demonstrate considerable recognition of and alignment with the arrow of time. It does this primarily in how it explores two melodic themes in a call-and-response

³⁶⁸ The compositional process by which this is achieved is detailed in Appendix 5.

³⁶⁹ In the same manner of expressions, the cycle of fifths is not a circle, but rather a cycle connected by linear movements. If one wished to accurately describe it as a shape rather than a cycle, we would need to introduce the dodecagon of fifths, a terminology that, while literally true, is inferior to the simplicity of the concept of the circle. Strogatz provides proof that the dodecahedron is a reasonable approximation of the circle (Strogatz, *Infinite Powers*, 4–8).

³⁷⁰ Julius Thomas Fraser, "The Art of the Audible 'Now,'" *Music Theory Spectrum* 7 (1985) 181–84, quoted in Kramer, *The Time of Music*, 394–396.

³⁷¹ See also Figure 19, which presents a similar concept, if graphically and quantitatively rather than qualitatively as Fraser does in his classification of distinct and separate temporalities.

³⁷² Clayton, *Time in Indian Music*, 19.

style — thus, it *does* move from A to B in a linear manner but at the *local* level only. In its *global* form it does *not* move from A to B — rather it moves from A to B to A' to B' to A" to B" etc.

The progression of AB to A'B' to A"B", however, is a movement that aligns with the arrow of time, allowing us to tell there is overall movement. This concept is recognised within the property of biotemporality that “differentiates between beginnings and endings”. In the global form of the improvisation, the A" B" that concludes the improvisation is *differentiable* from the AB that commenced it.³⁷³

The tertiary research propositions — musical forms as helix and vortex

Western and Eastern musical forms as helix and vortex

One way of characterising music, especially improvised music, is through the concepts of freedom and control. Sabine Feisst addresses this concept,³⁷⁴ including via discussion of the place of graphical scores and sketches as the basis for improvisation. In deference to this concept, the tertiary RPs are a proposition of contrasting models of Western and Eastern musical forms as, respectively, *helix* and *vortex*, as captured in RPs 3A and 3B, reiterated below:

RP 3A presents the model of the *helix* as a geometric model incorporating the Western compositional concepts of *vectoriality*, *linearity* and *horizontality* of time.

RP 3B presents the model of the *vortex* as a geometric model incorporating the Eastern compositional concepts of *intensification*, *cyclicity* and *verticality* of time.

Geometrical forms versus graphic scores

The geometric models as helix and vortex are not, however, graphic scores. Rather, they can be (and are intended to be) used as a visual stimulus for exploring alternative temporalities. Used in this way, rather than a score, such geometric representations function more like a *memo* — a succinct mechanism for drawing one’s attention to an alternative representation of phenomenological time. Referencing Kramer’s concepts, the models may be used to conceptually present “new temporalities” and subsequently, “new listening [and new playing] strategies”.³⁷⁵ Thus, the models presented are deliberately simple, open, and widely interpretable.

Western and Eastern paradigmatic representations

In presenting these contrasting musical forms as *helix* and *vortex*, I have sought to capture contrasting aspects of Western and Eastern philosophical and cultural paradigms as they inform musical forms and processes. These include the following:

- linear versus cyclic temporality
- horizontal versus vertical temporality
- development by vectorial processes versus development by intensification.

³⁷³ Additionally, in relation to pitch movements, *Beginner’s Mind* has a secondary ABA form. This form arises from the pitch ranges used in the improvisation. The improvisation commences in the instrument’s middle octave (the A-section for pitch range), moves to its higher octave (the B-section for pitch range), and then returns to its middle octave (the A-section for pitch range).

³⁷⁴ Feisst, “Negotiating Freedom and Control in Composition,” 212.

³⁷⁵ As evident in the full title of Kramer’s book: *The Time of Music — New Meanings, New Temporalities, New Listening Strategies*.

Cartesian representations of temporalities — horntail and vertical

Presenting temporality in this *Cartesian* way has benefits. These include the possibility of describing musical improvisation not only in terms of horizontal (Western linear) and vertical (Eastern vertical) temporalities but also in terms of *degrees of deviation* from such temporalities.

The concept of degrees of deviation from horizontal and vertical temporalities

The concept of *degrees of deviation* from horizontal and vertical temporalities is a more nuanced description of the concept. As an example of the application of this concept to the artefacts, the following section provides self-determined estimates of the temporalities of the artefacts, referencing the concept of degrees of deviation.³⁷⁶

Application of models to improvisation

In summary, the models are graphic representations of contrasting models for improvisation, based on contrasting concepts of Western linear and Eastern cyclic representations of time. As a graphic representation, the models may be used as visual tools to invite the exploration of the playing of music in alternative temporalities, especially within musical improvisation. Like all graphic models used as reference points for improvisation, the models refer to loosely stipulated freedoms and restraints.

The Artefacts as Exemplars of the Dissertation's Tertiary RPs

The major artefact as an exemplar of RP 3A

As described in Figure 2 (Chapter 1), the global form of *Oscillation 1* comprises two parts — a linear tabla part and a cyclic guitar part. The linear tabla part has an ABA' form. In moving from A to B to A', it develops *from A to B* in a linear manner.³⁷⁷

This is apparent when the graphic representations of the guitar and tabla parts are separated, as demonstrated in Figure 18 (next page). The global form of the combined composition, including both tabla and guitar parts, is shown in the figure.

The minor artefact as an exemplar of Tertiary RP 3B

The minor creative work, *Beginner's Mind* is an example of application of the concepts of Tertiary RP 3B. In accordance with the concept described in the previous section (the concept of degrees of deviation from horizontal and vertical temporalities), *Beginner's Mind* has an estimated self-assessment of deviation from the horizontality of the arrow of time.

With such a deviation from Western horizontal temporality, from an intercultural perspective, *Beginner's Mind* has a temporality that *deviates* from Western towards Eastern temporality. The deviation of the improvisation's temporality from Western horizontal temporality towards Eastern temporality is estimated at 20 degrees. This concept, which demonstrates the application of the tertiary RPs to musical analysis), is graphically represented in Figure 19.

³⁷⁶ Such assessment of deviation is subjective and ordinal — the “meaning” of 20 degrees does not have any objective correlate. It is simply a way of characterising the experience of deviation from linear temporality. The meaning of “20” should not be over-interpreted. Thus, 20 degrees is more than 10 degrees and less than 30 degrees in the same way that a house number 20 comes after a house number 10 and before a house number 30. That is the limit of the meaning of the concept, as a subjective ordinal estimate.

³⁷⁷ Clayton, *Time in Indian Music*, 19.

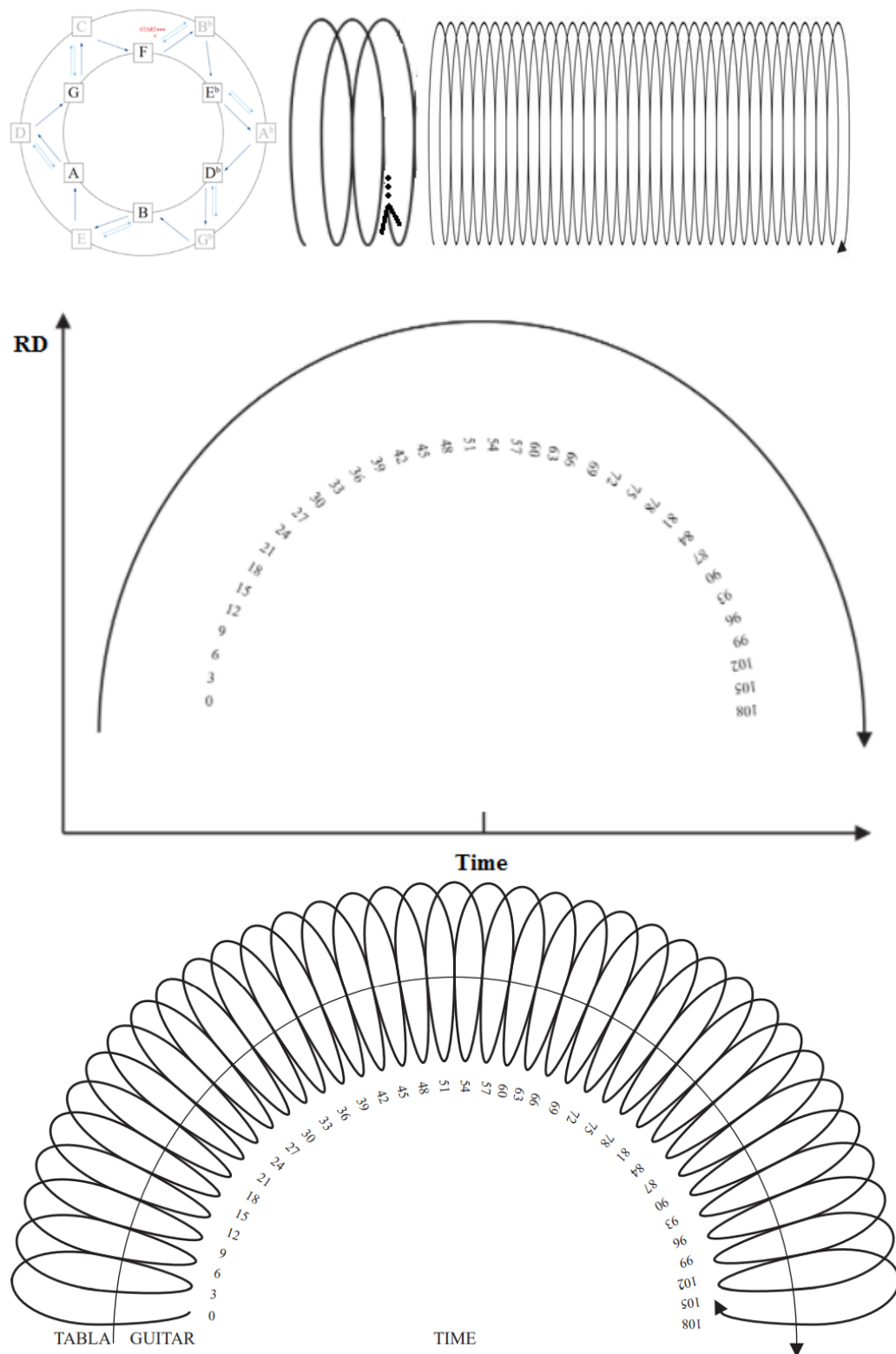


Figure 18: (upper) Guitar part (l to r): equi-harmonic cycle, equi-harmonic cycles x 3, total of 36 cycles;
(lower) Tabla part: Oscillation x 1

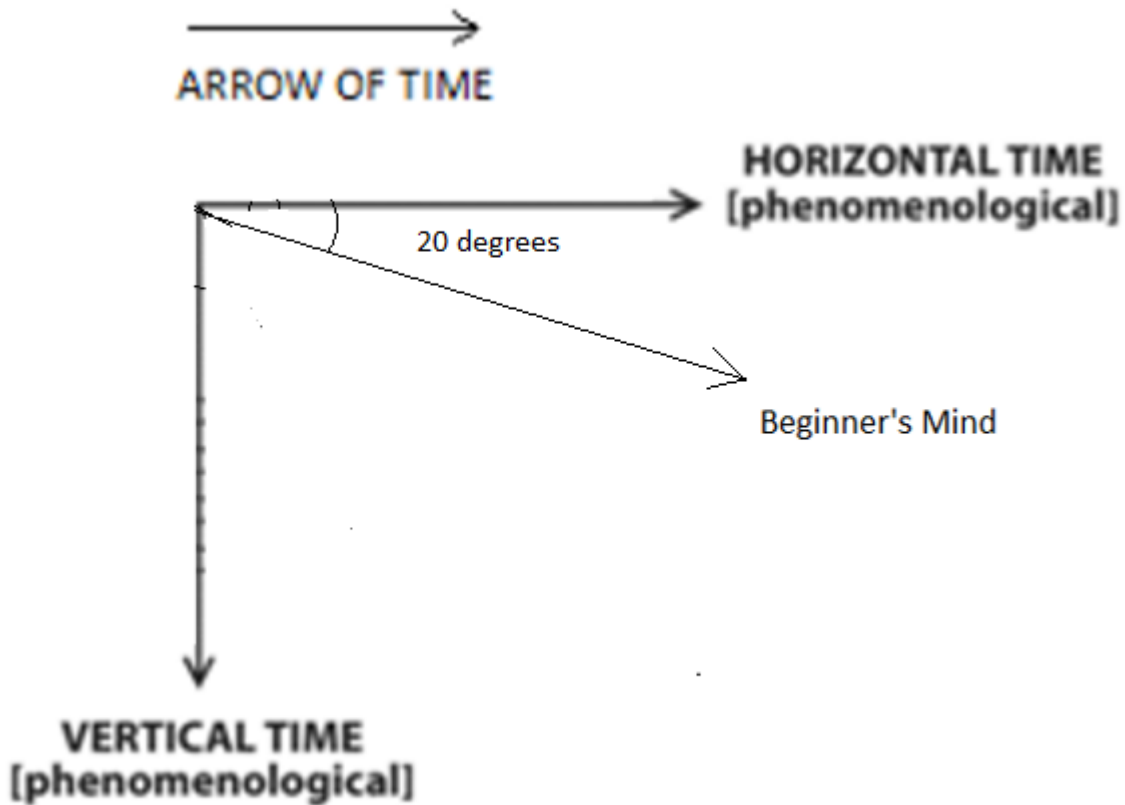


Figure 19: Application of the tertiary research propositions to musical analysis

Exegesis Perspective — Minimalism and Intercultural Symbiosis

Minimalism

Table 5 below lists Johnson's characterisations of minimalist music and their proposed applicability to *Oscillation 1*.

Table 5: Johnson's characterisations of minimalism

Piece that may be considered minimalist	Exemplified in <i>Oscillation 1</i> ?
Uses limited or minimal materials.	yes
Uses only a few notes.	yes
Uses few words of text.	not applicable
Is written for very limited instruments.	yes
Sustains one basic electronic rumble for a long time.	no
Is made exclusively from recordings.	no
Moves in endless circles.	yes
Has an unmoving wall of ... sound.	no
Takes a very long time to move gradually from one kind of music to another.	yes
Permits all possible pitches — provided they fall between C and D.	no

Based upon the affirmatives listed, it is reasonable to propose that *Oscillation 1* has compositional characteristics that could be considered minimalist. Importantly, the list provided by Johnson is essentially just a list of *examples*. It does not state nor imply a definition of any sort.

This observation is addressed in the section below.

Minimalism as characterised by form-void equivalence

In ... [Claude Monet's] paintings emptiness matters as much as fullness ...

[Stéphane] Mallarmé conceived of poetry as being a structure of words *and* absences.³⁷⁸

Louis Armstrong famously said, “If you have to ask what jazz is, you’ll never know.”³⁷⁹ Possibly the same applies to minimalist music.

As noted in the previous section, the list provided by Johnson provides examples of minimalistic processes and ideas but does not imply a definition. In seeking to address this, the current section proposes a novel characterisation of minimalism and one that unifies the concept of what constitutes a minimalist composition at the most fundamental level of the characterisation of form and void.

Seeking a common defining characteristic for Johnson’s instances of minimalism, it is thus proposed that, at the conceptual level, *minimalist composition is characterizable by the property of form and void having equal significance*. In other words, at the conceptual level, minimalism does not attribute the *absence of positive content*, be that in the visual context as “empty space” or in the sonic context as silence, as having any less compositional significance than the *presence of positive content*.

Applied to visual and spatial media, such as painting, sculpture and architecture, in the proposed characterisation, *empty space within the frame or containing space* is attributed equal significance to *occupied space*.

The same concept may be applied to music as *sonic space*.

By this definition, a minimalist musical composition may be considered a musical genre where the *sonic space* or *frame* in which the audible music happens — the silence — is attributed equal significance to the audible music itself.

Minimalism as the fullness of silence

Miles plays silence better than most guys play notes.

Guitarist, Jim Hall, 2006³⁸⁰

As proposed earlier, for the current research, *minimalism* is an alternative way of composing or listening characterised by the property of *form and void having equal significance*. Within such a characterisation, space may be understood to perform an active rather than purely passive function.

As it applies to music composition, *sonic space* is understood as silence. Thus, in minimalist music, silence within a composition may be understood to perform a function that is both passive and active. In other words, as noted in the earlier section introducing the concept, minimalism may be understood as a temporospatial reframing of *absence* as a *fullness of emptiness*. Spatially, the

³⁷⁸ Hughes, *The Shock of the New*, 121.

³⁷⁹ See https://www.goodreads.com/author/quotes/85528.Louis_Armstrong

³⁸⁰ *Legends of Jazz — The Great Guitars*. <https://www.youtube.com/watch?v=kpXsgiv0Jw0>

empty frame may be re-represented as “full of space”. *Temporally*, as it applies to music composition, the empty soundscape may be re-represented as being “full of silence”.

Minimalism as it applies to Oscillation 1

As noted in the previous section, the characteristics of *form-void equivalence*, *reduced musical material* and *compositional freedom within a framework of rules, patterns, and formulas*, which characterise the Western minimalist composition, are also evident in *Oscillation 1*.

These concepts are addressed individually below.

Oscillation 1 — minimalism as form-void equivalence

Figure 20 below provides a visual analogue of the linear development and resolution process that characterises the tabla part.

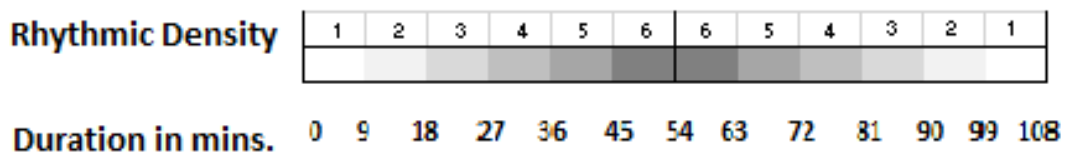


Figure 20: Form-void equivalence as it applies to *Oscillation 1*

The tabla part of *Oscillation 1* can, however, be equally analysed from a minimalist perspective. In such a process, the figure is also a useful visual analogue. When rhythmic density (RD) is represented as the visual density of shade, as it is in Figure 20, form-void equivalence is clear in the distribution of RD throughout the composition.

This evidence ranges from the extremes of almost silence, marking the first beat of the bar when the tabla enters (Bars 169–170) to a high level of RD in the middle of the composition (Bars 3032–3033). See Figure 21.



Figure 21: Comparison of form and void at start and middle of the composition

Oscillation 1 — form-void symmetry

In addition to form-void equivalence, the composition has the property of *form-void symmetry*. This is evident in the visual recognition that the first 54 minutes of the tabla section — a movement from void to form — is *balanced* by the mirror-image process of the form to void movement, also evident in Figure 21 above.

Oscillation 1 — reduced musical material

As described in Appendix 5, for the guitar part, the entirety of musical content arises from seven-bar-long A and B sections related melodically in terms of call and response and harmonically in terms of the B section being in the subdominant key of the A section, modulated through all 12 keys such that

the composition is equi-harmonic. In that regard, the composition derives from reduced musical material.

The tabla part arises out of 12 paired tunings for the monotonal tabla and bayan drums. The use of monotonal percussion instruments, even in the extended capacity that *Oscillation 1* required, is nonetheless a use of reduced musical material.

Oscillation 1 — minimalism as compositional freedom within a framework of rules, patterns, and formulas

Of the compositional characteristics where *Oscillation 1* aligns with minimalism, the most significant for defining the essence of the composition is Sabine Feisst's concept of "compositional freedom within a framework of rules, patterns, and formulas".³⁸¹

Oscillation 1 may be understood as a composition that, in its fundamental structure, is an assembly of 216 uniquely defined 15-second tabla recordings, constituting the first 54 minutes of the tabla part, this process being reversed at three-minute intervals (i.e., at the timing of a single completed equi-harmonic cycle). Each of these 216 improvisations is identified by a unique and non-repeating combination of values (between 1 and 6) for three parameters: key, CDP (compositional development parameter), and RD (rhythmic density). This structure is evident in Figure 20 and Figure 21 and in three dimensions in

Figure 22.

With the possibility of six values for three parameters, each of these improvisational units are uniquely identifiable as the unique manifestation of a rule, pattern, or formula. Each of these concepts is discussed separately as it applies to the recording and mixing method used to produce *Oscillation 1*.

Rules play an important part in defining the constraints of improvisation for each 15-second recorded segment. Examples of such rules as they apply to the three parameters are:

[Recording]

Key:

Regarding the six tabla-bayan pairs of drums available, choose the pair whose tabla drum tuning fundamentally (as tabla) corresponds with the key being recorded at that time. The first of the 216 recordings are thus recorded in the key of F.

Compositional development parameter

Regarding the six CDP values specified, structure the form of the 15-second improvisation to match the rules of the parameter at that value. The first of the 216 recordings are thus recorded such that the tabla outlines the ten 10-4 metric divisions of the 24 beats. Thereafter, it progresses in order through the remaining CDP variations (total of six), as outlined in Appendix 5.

Rhythmic density

Regarding the six compositional development parameters specified, improvise the rhythmic pattern in line with the rules of the parameter at that value. The first of the 216 recordings are thus recorded such that the tabla plays with a low level (value of 1 on a scale of 1 to 6) of RD. Thereafter, it progresses through the remaining levels of RD (total of six), as outlined in Appendix 5.

Overall recording process

³⁸¹ Feisst, "Negotiating Freedom and Control in Composition," 206.

Continue this process, each time incrementally changing the value of one parameter by one step, until all 216 x 15-second recordings have been completed. In this process, first incrementally increase the CPD parameter, then when all six values have been exhausted, do the same for the next RD value (i.e., move up from level 1 to level 2 of the six levels). When these processes have been completed for the CPD and RD parameters, change to the next key (E^b) and repeat the process. Do this for all six keys until 216 units have been recorded individually.

Mixing/Assembly

Assemble the segments in the order specified in Figure 62. A visual summary of such rules, both for the recording and the mixing processes, is as follows:

Patterns. The easiest way to demonstrate the existence of patterns in *Oscillation 1* is to draw attention to the numerous geometric figures whose forms clearly display the nature of the patterns that determine the form of the composition.

In *Oscillation 1*, such is the primacy of graphic representation that graphic notation is included in Appendix 5. See Figure 22 for three examples of such patterns.

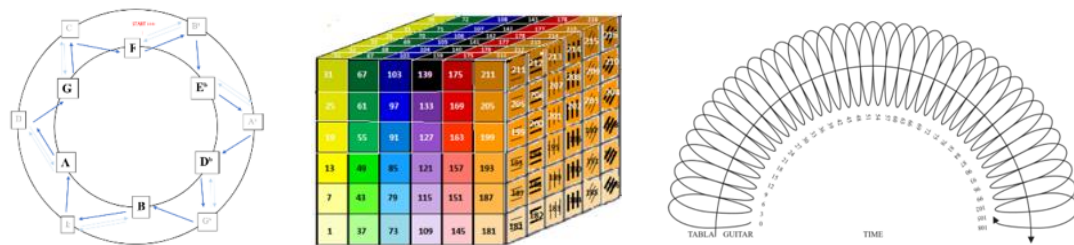


Figure 22: Three examples of patterns

Formulas. From a mathematical perspective, graphic figures and formulas are linked. Their relationship is, in fact, a one-to-one correspondence. Thus, a graphic is commonly represented as a formula, and vice versa.

From a compositional perspective, however, graphic representations of patterns and formulaic representations are different approaches to composition. From a mathematical perspective, formulas are an alternative way of representing what is *the same information*. Such information specifies and applies the “rules” (algorithmically determined processes). For this reason, minimalist music has also been called *process music*.

It is noted that both Stockhausen and Reich have used this term to describe algorithmically determined compositional processes.³⁸²

Formulas as they relate to *Oscillation 1* are discussed in brief in Appendix 6, especially in relation to the guitar section. Further discussion on formulaic composition is beyond the scope of the current dissertation.

Oscillation 1 and minimalism as intercultural composition

The dissertation is an investigation of the concept of interculturality as it applies to Western and Eastern musical forms. Hence, minimalist music would seem to provide a useful reference point for both Western and Eastern compositional forms. The reason for this is that the compositional processes that characterise minimalist music are evident in both Western and Eastern musical processes.

³⁸² “Process Music,” Wikipedia. https://en.wikipedia.org/wiki/Process_music

Examples are *form-void equivalence*, the use of such *reduced musical material* and improvisation as *compositional freedom within a framework of rules, patterns, and formulas*.

Regarding *form-void equivalence*, the processes are evident when minimalism is characterised as a compositional style that gives equal significance to positive and negative content (e.g., form and void in the musical devices of sound and silence). Arguably, this is also exemplified in the alap section of North Indian classical music.

Regarding *compositional freedom within a framework of rules, patterns, and formulas*, the algorithmic explorations of variations that characterise the gat section of North Indian classical music are also evident in Western music within the genre of minimalism.

These processes are also exemplified within the compositional processes that define *Oscillation 1*.

- Regarding *form-void equivalence*, the composition is symmetrical and its compositional process assigns equal priority from maximum void (no notes) to maximum form (maximum rhythmic density of notes).
- Regarding *reduced musical material*, this is evident in the 108-minute composition being entirely constructed from the harmonic variations arising out of the A and B sections as seven-bar music fragments (the three-minute equi-harmonic cycle), and the incremental progressive increase and decrease in the tabla's RD: the 108-minute tabla oscillation.
- Regarding *compositional freedom within a framework of rules, patterns, and formulas*, the tabla part comprises 216 x 15-second tabla improvisations, each 15-second improvisation having a unique combination of six possible values from three different parameters: key, CDP, and RD.

These concepts are further detailed in Appendix 5.

Criticisms of minimalism

Criticisms of minimalism are not hard to find. They would seem to arise from the concepts of *preference* and *taste*. Some critics of minimalist music are not only of the opinion that they don't like it but also seem to think that a person of taste has a *responsibility not to like it*. Scruton, for example, describes his well-known position regarding comparable musical genres in *The Aesthetics of Music*.³⁸³ Examples of such taste-based criticism include that minimalism:

... can be understood as a kind of social pathology, as an aural sign that American audiences are primitive and uneducated (Pierre Boulez); ... that traditional Western cultural values have eroded the liberal wake of the 1960s (Samuel Lipman); ... and that the commodity-fetishism of modern capitalism has fatally trapped the autonomous self in minimalist narcissism (Christopher Lasch).³⁸⁴

It could thus be argued that the purpose of minimalist music has nothing to do with it being liked or likable — its purpose arguably transcends the music itself.

The sound of void as it relates to Oscillation 1

Oscillation 1 does not use or refer to silence or incidental sounds in the way that Cage historically has in *4'33"*. Nor does the composition use or refer to silence or incidental sounds in the way that

³⁸³ Roger Scruton, *The Aesthetics of Music* (Oxford: Clarendon Press, 1997): 502.

³⁸⁴ Robert Fink, *Repeating Ourselves: American Minimal Music as Cultural Practice* (Berkeley: University of California Press, 2005), 19. https://en.wikipedia.org/wiki/Minimal_music

composers such as Stephen Vitiello (Virginia Commonwealth University Professor of Kinetic Sound) does in the contemporary setting of recording natural sounds. His position is given below:³⁸⁵

[Music as sound experience is] really about one's own specific appreciation.

Whether it's a perfectly pitched note on a cello or a perfectly pitched bird in your tree singing through the night.

[It is] to do with what we're receptive to.

The composition does, however, give significance to the sound of void for the full duration of its development and resolution. At the level of the compositional process, this is achieved via the deliberate *restraint* of the tabla. In the full 108-minute version of the composition, it takes 54 minutes and 3024 bars (as 18 equi-harmonic cycles) for the tabla to reach the peak of its rhythmic density.

Such a description is apparent when one compares the tabla section at full RD — the *sound of form at its peak* (at time = 54 minutes, excluding the three-minute introduction) — with its role at the beginning of the piece (the *sound of void*).³⁸⁶

This comparison between the tabla's "sound" as void (at time = zero minutes) and its "sound" as form (at time = 54 minutes) is illustrated in the transcripts of the two sections as follows:

6 S-001

The musical score for Figure 23 consists of two systems of staves. Each system includes three staves: Guitar (bass clef), Tabla (treble clef), and Bayan (bass clef). The time signature is 3/4. The first system (bars 1-14) shows the 'sound of void' with sparse notes and rests. The second system (bars 15-28) shows a more developed 'sound of form' with more active melodic lines. The Tabla part is marked with 'dhin' notes.

Figure 23: Time = 0 mins: Bars 1 to 14 [after introduction] — the sound of void

³⁸⁵ Professor Stephen Vitiello on His Work at <https://www.youtube.com/watch?v=eqryqeWluy8>

³⁸⁶ In the music-video format of the composition, the same concept is visually evident. A recognisably visible form does not appear on the screen until a few minutes into the composition. Thus, the video follows an analogous process of revealing form from form-void, as occurs in the manuscript and the audio recording.

S-905
3025 54:00 min

3025

Guitar

Tabla

Bayan

ge te ge dhe te te dha ge dhii na ge na dha te te dhe te te dha te dhe te te dhe te te

3029

Guitar

Tabla

Bayan

dha ti dha te te dha te te dha ti dha te te dha dha te te dha dha te te dha

3032

Guitar

Tabla

Bayan

dhii ne ge ne dha ti ge ne dha ti ge ne dhii ne ge ne dhii na ge ne dha te te dhe te te dha ti

3035

Guitar

Tabla

Bayan

dha te re ke te dhe te te dha ge dhii na ge na dha ge tre ke dhii na ge na dha tre ke dhii na ge na

Figure 24: Time = 54 mins: Bars 3025 to 3192 — the sound of form

A reprise of the concept of minimalism as form-void attributed equivalence

In some ways, the concept of minimalist composition as *form and void attributed equality* fits more easily within the Eastern philosophical paradigm of form-void inclusivity than it does within the Western paradigm of form-void mutual exclusivity. The reason for this is that in the Eastern context of form-void mutual inclusivity, void is contained within form, represented not as its opposite but as a *variant state* of form.

Clayton elegantly captures this concept by noting that “Indian theorists have sought to emphasize music’s value as a state”. Thus, a rag “simply is”.³⁸⁷

Kramer also characterises such a distinction, attributing *cyclic* musical processes (as characterise Eastern music) with *linear* processes (as characterise Western music) as a state of *being* and a process of *becoming*, respectively.³⁸⁸

³⁸⁷ Clayton, *Time in Indian Music*, 26.

³⁸⁸ Kramer, *The Time of Music*, 63, quoted in Clayton, *Time in Indian Music*, 24. These concepts are also included in the final part of Chapter 1 — the extended concepts of Jonathan Kramer and J.T. Fraser.

Regarding the proposition that minimalist composition may be understood as a compositional approach that attributes equal significance and importance to form and void, a characterisation of minimalism is possible that addresses the singular monistic concept of form-void.

Figure 25 captures this concept in the form of the Eastern representation of the form-void relationship as being one not of a switch but *taijitu*, as also visually represented in Figure 5 (Chapter 1).

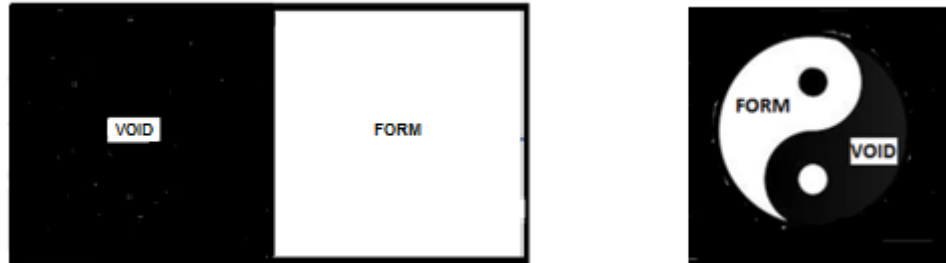


Figure 25: Eastern representation of the form-void relationship

In such a characterisation, minimalist compositions may thus be understood as a stream of variant states of a singular property that, within the monist Eastern philosophical paradigm, may be called *form-void*. In such a representation, regardless of their outward appearance, form and void are always in equal balance. Hence, form-void equal significance is not just a proposed characterisation of minimalism but the principle that underlines the very paradigm of Easternness.

Form-void attributed equivalence in *Oscillation 1*

In its compositional construction, *Oscillation 1* applies an algorithm that progressively increases rhythmic density from the commencement of the composition at time = zero, maximising RD at the exact midpoint of the piece at 54 minutes and thereafter progressively decreasing it such that at the end of the composition, the RD of the tabla is at the same minimal point where it began.

In “traditional” terminology, the tabla part may thus be understood as *increasing* its musical content from the sparse outline of the 24-beat complex metre at the start of the composition, increasing to a point of maximum musical content at the exact midpoint of the composition at 54 minutes, and then decreasing its musical content back to the *minimum* at the end of the composition at time = 108 minutes.

From a minimalist perspective, however, musical content is, at any point within the composition, *equal*.

The difference between such sections of the composition is thus characterised not as differences in form but as *form variants* and *void variants* of an unchanging form-void reservoir. Thus, when the composition commences and RD is low (i.e., sparse), the composition is in a *void-variant state*. Conversely, at the peak of RD in the middle of the composition, form-void is primarily in the *form-variant state*.

From a minimalist perspective, at any point in the composition, form-void within *Oscillation 1* may be considered as *always full*. The only differentiating factor about such fullness is that the composition varies not in terms of its fullness but in terms of what, at any moment, it is full of. On some occasions, it is full of *emptiness*; on other occasions, it is full of *non-emptiness*.

This concept is consistent with the Eastern concept of *taijitu* as being *always full* of complementary elements, the relationship between such complementary elements being one of perpetual dynamic transition between its two complementary variants. Such a concept is also analogous with the first law

of thermodynamics — that the total energy within a closed system is fixed, and that energy can be neither created nor destroyed.

Intercultural symbiotic minimalism — Secondary RP 2C

Secondary RP 2C holds these three positions:

- *Oscillation 1* is a composition for which it is appropriate to assign the term *minimalist*.
- *Oscillation 1* has characteristics of interculturality.
- The *interculturality* inherent within *Oscillation 1* is characterizable as *symbiotic*, such that the contributing musical resources retain their cultural identities effectively unchanged (as opposed to the *altermodernistic* concept of having the quality of creolization or homogenization to create a new hybrid form³⁸⁹).

In the next section I propose that *Oscillation 1*, as well as being a minimalist composition (according to the definition of minimalism as described in the previous section), is symbiotic rather than creolistic. This relationship is one of Eastern–Western *symbiotic re-contextualization* in a manner consistent with the process of *symbiosis*, as described by Kurokawa (1991).³⁹⁰

In laying the groundwork for the discussion of this RP, it is first necessary to examine two contrasting positions of interculturality as they relate to musical composition— the subject of the section that follows.

Intercultural Perspectives

A “bad translation” is one that conducts a systematic negation of the strangeness of the foreign work.³⁹¹

This section examines the concept of interculturality as it applies to music and specifically to the artefact *Oscillation 1*. It mainly discusses the nature of interculturality in composition, focusing on two contrasting intercultural perspectives: altermodernism, as proposed by Nicolas Bourriaud, and the philosophy of symbiosis, as proposed by Kisho Kurokawa.

Altermodernism

The concept of *altermodernism* as a movement was introduced in 2005 during Bourriaud’s presentation at the 2005 Art Association of Australia & New Zealand Conference.³⁹² *Altermodernism* later became the title of Tate Britain’s fourth [2009] Triennial exhibition, also curated by Bourriaud (see Figure 26).³⁹³

³⁸⁹ Jazz is an example of such a creolised hybrid form. The specific details of contrasting characterisations of interculturality are the purpose of the discussion in the following section.

³⁹⁰ Kisho Kurokawa, *Intercultural Architecture — The Philosophy of Symbiosis* (London: Academy Editions, 1991).

³⁹¹ A. Berman, *The Experience of the Foreign: Culture and Translation in Romantic Germany*, trans. Stefan Heyvaert (Albany, NY: Suny Press, 1992), 5, cited in Michael Larson, *Altermodernity and the Ethics of Translation* Lecture at Point Park University, Pittsburgh, 2011 at <https://journals.uvic.ca/index.php/peninsula/article/view/683/1923>

³⁹² QUT ePrints. <https://eprints.qut.edu.au/6996/> in Kouvaras.

³⁹³ See: <https://www.hisour.com/altermodern-34628/>



Figure 26: Liquid Crystal Environment as an example of altermodernist art

Source: Metzger, Gustav 1965, remade 2005 © Gustav Metzger. Altermodernist visual installation at Tate Modern.
<https://www.tate-images.com/preview.asp?image=T12160>

At the 2005 Art Association of Australia & New Zealand Conference, Nicolas Bourriaud described altermodernity and its associated creolization of cultural inputs as follows:

Artists are looking for a new modernity that would be based on translation: What matters today is to translate the cultural values of cultural groups and to connect them to the world network. This “reloading process” of modernism according to the twenty-first-century issues could be called altermodernism, a movement connected to the creolisation of cultures and the fight for autonomy, but also the possibility of producing singularities in a more and more standardized world.³⁹⁴

Whereas the tenets of altermodernism arose in the first decade of the 21st century, the philosophy of symbiosis was conceived some decades prior.

In characterising these contrasting positions, it would seem not to be coincidental that intercultural symbiosis is a movement originating in the pre-internet 1970s, and altermodernism is a movement of the internet-enabled 2000s.

The reason for such a supposition is that altermodernism is a movement founded within the free flow and gathering of ideas from culturally diverse origins facilitated by information technology.

Additionally, along with the globalisation of ideas that characterised the decade of 2000 to 2009, this period in history was also characterised by associated physical human movement after international

³⁹⁴ See <https://aaanz.info/aaanz-home/conferences/2005-conference/>, quoted at <https://www.hisour.com/altermodern-34628/>

human transportation (by commercial airlines) becoming widespread and relatively affordable. The age of altermodernism may thus be understood as an age of globalisation, both at the level of international human movement and at the level of information transfer.

Altermodernism has been further characterised as follows:

If modernism in the early twentieth century is characterized as a widely Western cultural phenomenon, and postmodernism is based on the ideas of multiculturalism, origins and identity, Altermodern is expressed in the language of global culture. Altermodern is a kind of “synthesis” between modernism and post-colonialism.³⁹⁵

Michael Larson asserts that “altermodernity emphasizes a spirit of open communication through which [cultural] meaning and subjectivity are neither lost to the wind nor bound by stable positions and traditions”.³⁹⁶

Altermodernism would thus seem to concern itself with the fluidity that arose in the intercultural setting that characterised the global and internet-driven 2000s. The concepts that arise in such a setting would seem to include, from the perspective of the art-produced globalisation of physical forms (as the artefacts of global art), the perspective of the artist and the globalisation of cultural identity. In such a situation, the multicultural, multi-temporal, multi-geographical process by which art is created becomes definitive of the genre itself. Thus, the global *processes by which art is created* arguably become definitive and recognisable as a genre — perhaps more than the artefacts themselves.

Intercultural symbiosis

In contrast to altermodernism, which is characterised by its process of intercultural creolization, *intercultural symbiosis* is characterised not by creolization but by *pluralistic re-contextualization*. Such *pluralism*, be it of cultures or forms, is a characteristic that intercultural symbiosis would seem to share with postmodernism. The similarity between the genres is clear in postmodernism’s tolerance of contrasting and conflicting forms, as characterised by its *multivalency* — that is, its resistance to the totalization of forms.

Hence, within the sphere of artistic composition, as per Kurokawa’s philosophy of symbiosis, culturally disparate contributing elements within intercultural symbiosis are re-contextualized. Importantly, such re-contextualization occurs not at the loss of the original identity of the contributing parts.

The philosophy of symbiosis is thus an explicit rejection of the supremacy of the whole at the expense of the parts. To that extent, intercultural symbiosis is, in part, postmodern. As described by Kurokawa himself, the philosophy of symbiosis is a rejection of modernism’s hierarchical prioritisation of the entire unit — that is, the superstructure or macrostructure being above that of its parts.³⁹⁷

³⁹⁵ See <https://www.hisour.com/altermodern-34628/>

³⁹⁶ Michael Larson, “Altermodernity and the Ethics of Translation” (Pittsburgh: Point Park University, n.d.) <https://journals.uvic.ca/index.php/peninsula/article/view/683/1923>

³⁹⁷ Kurokawa, *Intercultural Architecture*, 43.

Geometrically, the aesthetics of modernism can be represented as a pyramid — a hierarchical top-down, orderly, command-and-obey process. As previously noted, theorist Sabine Feisst describes this relationship — as it applies to music — as an “author-performer-listener hierarchy”.³⁹⁸

In its original application (architecture), such modernist *subservience to the whole* manifests itself in designing cities to perform functions, against which individual human aspects such as residential living may feel like a secondary consideration.

The philosophy of symbiosis does not assume such a top-down hierarchy. It proposes, instead, equal recognition of the whole and the individual autonomies of the contributing parts from which the whole is imagined.

In the terminology of form and void, intercultural symbiosis is characterizable as a process where the phenomenological experience of music changes not by radical alteration of the musical content itself but by *altering the frame in which it is presented*.

An example of such intercultural symbiosis, and its described *pluralistic re-contextualization*, is Kurokawa’s own work office — a space that includes the juxtaposition of a sixteenth-century Edo tearoom “Room of Consciousness Only” within the office of a skyscraper in the middle of Tokyo.³⁹⁹

The arrangement exemplifies *intercultural symbiosis* because the two historically disparate entities — the modern skyscraper and the ancient tearoom — co-exist undisturbed within their novel re-contextualization. Importantly, at no time is any attempt made by the artist/architect/interior designer to transform either of the contrasting inputs — the skyscraper or the traditional tearoom — into a single *totalised* morphological entity. Instead, each is allowed to exist within the other’s physical space, retaining its unique identity.

At the compositional level, intercultural symbiosis thus allows the contributing elements of a composition to be equally important in their singular identities and the contributions they each make to the whole.

Figure 27 shows Kurokawa’s skyscraper office and traditional tearoom.

³⁹⁸ Feisst, “Negotiating Freedom and Control in Composition,” 207.

³⁹⁹ Kurokawa, *Intercultural Architecture*, 14.

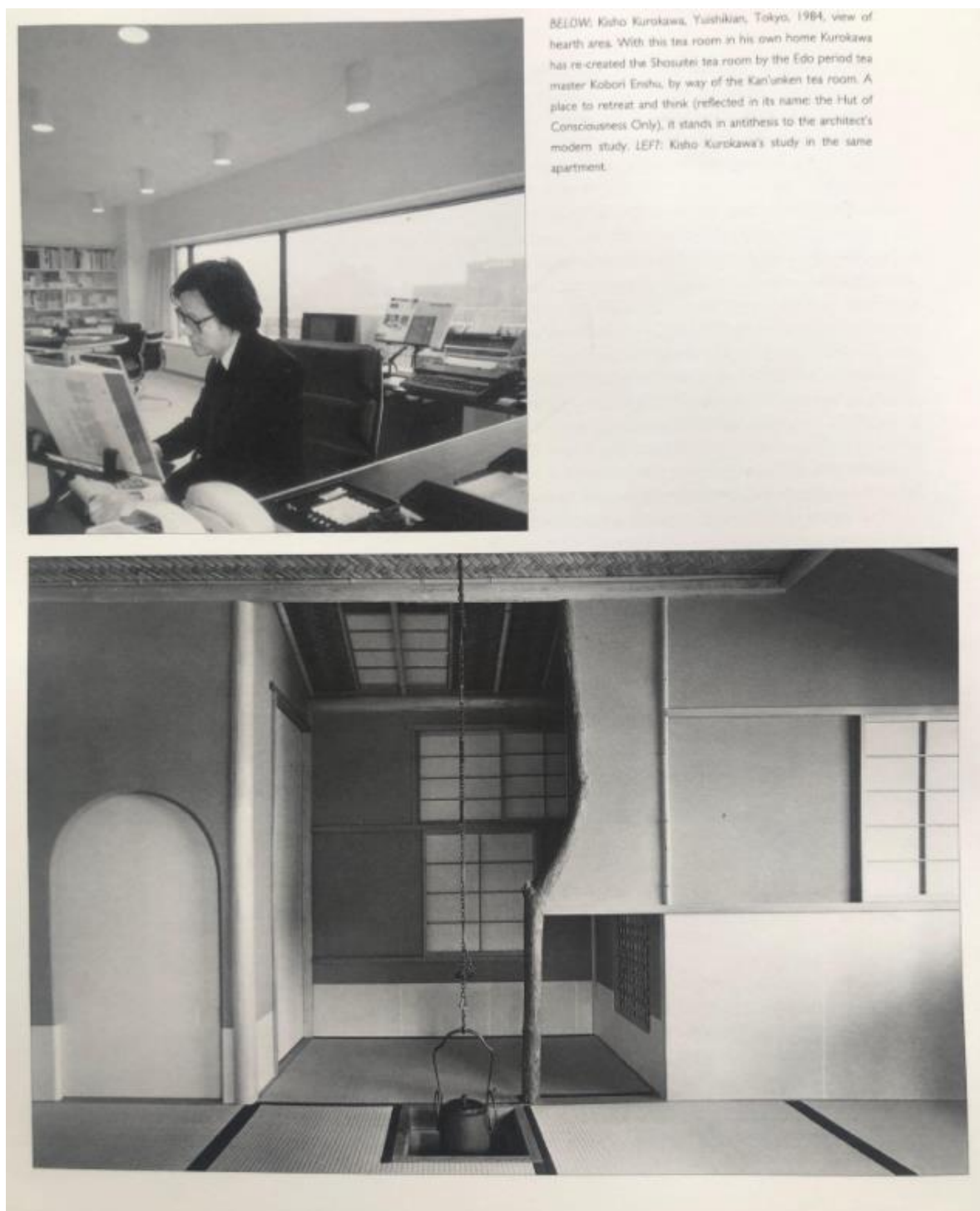


Figure 27: Kurokawa's office in a skyscraper (top); sixteenth-century Edo tearoom (bottom)

Melbourne Central as an example of intercultural symbiosis in architecture

The current dissertation is submitted at the University of Melbourne. The university is located about a kilometre from one of Kurokawa's most iconic works — Melbourne Central. Though not the focus of the current dissertation, the familiarity of the location to the university provides a convenient reference point for demonstrating the concept of intercultural symbiosis.

I well recall my first experience of Kurokawa's creation. Although at the time I didn't have the specialist vocabulary to describe my experience in such terms, what was clear to me, and the overwhelming memory of that first experience, was the extraordinary *absence of totalization*.

In retrospect, it was not something I had met before when experiencing art or, for that matter, any intentionally created work. Nonetheless, it was clear to me then that there was something unusual about the presence of Japanese stores (Shibuya style — I had previously lived in Japan so recognised the aesthetic) side by side with the iconic Australian RM Williams brand.

Furthermore, these shops and multiple other equally *unrelated neighbours* surrounded an 1889, fifty-metre shot tower (Coops shot tower), pluralistically and peacefully co-existing, each unit independently contributing its own identity in an uncompromising way. In retrospect, what I was seeing was the absence of totalization of Kurokawa's architectural style of *metabolism*, the architectural movement from which Kurokawa's philosophy of symbiosis emerged.

Figure 28 (next page) is a photo of Melbourne Central that I took from the base of the shot tower around the time of completing this dissertation. The image captures the juxtaposition of East and West, ancient and modern, and transient and permanent structures. While contributing, in a non-totalising, non-heterogeneric way, to the whole, each element keeps its essential origin and unchanged identity.

In the form of Melbourne Central, such intercultural symbiosis persists in contemporary Melbourne some thirty years after its original conception as a metabolist/symbiotic creation.

Analogy of intercultural symbiosis of artefact to intercultural symbiosis of Melbourne Central

Oscillation 1 shares the same organisational principles as Melbourne Central. This is made apparent when one examines the compositional intent of Melbourne Central, as described on the website of Kurokawa's company, Kisho Kurokawa Architect & Associates.⁴⁰⁰ Kurokawa's company states that the basic concept of Melbourne Central consists of four targets:

1. The symbiosis of history and the present (and thus the peaceful co-existence of concepts non-totalized in time)
2. The crystal-cut office tower, introduced to avoid uniformity (and thus to avoid totalization or creolization)
3. Abstractions or pure geometry — noting that abstraction can be freely interpreted to produce multivalent meaning
4. The symbiosis of various functions.

⁴⁰⁰ See <https://www.kisho.co.jp/page/226.html>



Figure 28: Melbourne Central

Source: photographed by me

A detailed analysis of such concepts, as they are shared with *Oscillation 1*, is beyond the scope of the current dissertation. Nonetheless, the case may be made that the above concepts, being characteristic of Kurokawa's philosophy of symbiosis, apply equally to *Oscillation 1*, in support of the proposition that the composition is an instance of intercultural symbiotic minimalism as it applies to music.

Proposed parallel interpretations are as follows:

1. *The symbiosis of history and the present*

The tabla and guitar both have a significant lineage in that both represent the past. Re-imagined in the form of a 12-drum tabla set and an 8-string guitar, such instruments are contemporary and, in these formats, part of the zeitgeist of the present.

2. *Avoidance of uniformity*

The concept of avoidance of uniformity is a distinctly postmodern one rather than a characteristically interculturally symbiotic one. In contrast, *Oscillation 1* has a profound uniformity of form. In this regard, the composition is modernist rather than postmodernist and unlike the interculturally symbiotic avoidance of uniformity that characterises Melbourne Central.

3. *Abstractions or pure geometry*

Like the architectural principles of Melbourne Central, *Oscillation 1* has abstractions of pure geometry, which allow *multivalent meaning*. Whereas Melbourne Central uses various abstract forms, such as rectangle, cone, inverted cone, and sphere (dome) with the deliberate intent to create multivalent and ambivalent architecture, the abstract forms that arise in *Oscillation 1* follow the composition's orderly compositional processes. These abstractions of pure geometry include the following:

- circle (equi-harmonic cycle — guitar part)
- cube (6 x 6 x 6 algorithmic design with three development parameters — tabla part)
- linear development and resolution movement (development and resolution of intensification via incremental increase and decrease of rhythmic density — tabla part).

4. *The symbiosis of various functions*

Melbourne Central is characterised by a symbiosis of various functions — thus diverse and potentially unrelated symbols, processes and functions co-exist, keeping the characteristics of their origin and avoiding creolization. Such is clear in Figure 28, which demonstrates the symbiosis of the structures of a shot tower, an electronic signboard and a glass dome.

In *Oscillation 1*, such symbiosis is present in the Westernness retained by the guitar and the Easternness retained by the tabla, regardless of the re-contextualization in the described intercultural setting. Such symbiosis is, by definition, absent of creolization. The cultural inputs are re-contextualized with their contributing cultural characteristics retained.

Intercultural symbiosis as it applies to visual and aural art forms — the case for pidginization

As an aural art form, musical composition has a peculiar and important distinction from the visual arts — a distinction that originates from fundamental differences between the physics of sound and the physics of light.

In simplest terms, while light waves (within a vacuum or homogeneous medium, such as air) travel in a straight line (*linear*), sound waves travel three-dimensionally outwards in concentric spheres of vibrated air particles (*cyclically* or, more accurately, *spherically*).

The practical difference in this distinction is that co-existing aural elements (simultaneous sounds) impose themselves differently on the listener, compared with the way simultaneous light waves as visual stimuli impose themselves on the observer. Because of this difference of linear versus concentric spherical propagation of its light waves, it is possible to sensorially negate (i.e., shut out) visual stimuli by simply changing one's direction of visual orientation. This is, however, not the case for sound waves.

The significance of this difference is that simultaneous sounds impose themselves on the listener *regardless of his/her intent to hear them*, this phenomenon being distinctly different from visual stimuli.

In simple terms, because in aural art forms there is the unintended interference of stimuli, which is not the case in visual art forms, the concept of *plurality* (i.e., peaceful co-existence) in aural art forms such as music functions differently from the way it functions in visual art forms.

It is thus proposed that interculturality, as it applies to musical composition, tends towards *pidginization* — a mechanism that adjusts the language used by native speakers when they need to communicate with a person who speaks a different language.

Pidginization is hence characteristic of intercultural musical composition by the unique properties of sound (relative to visual stimuli), as previously described.

Importantly, within the context of intercultural symbiosis, *pidginization* as a linguistic concept is distinct from *creolization* because pidginization, by definition, does not produce a new first language.

These two concepts are defined below:

- **Pidgin language:** “a simplified speech [in the current context, a simplified musical language] used for communication between people with different languages”.⁴⁰¹
- **Creolised language:** “a language resulting from the acquisition by a subordinate group of the language ... serving as the mother tongue of its speakers, not solely for communication between people of different languages”.⁴⁰²

Steph Koyfman explains the fundamental difference between the processes of pidginization and creolization as secondary and primary languages as follows:

Pidgins and creoles are both the result of what happens when you blend two or more languages ... [The difference is that] a pidgin is the first-generation version of a language that forms between native speakers of different languages — a makeshift communication bridge [whereas] a creole is a pidgin with native speakers (underline added) or one that's been passed down to a second generation of speakers who will formalize it and fortify the bridge into a robust structure with a fully developed grammar and syntax.⁴⁰³

⁴⁰¹ See definition at <https://www.merriam-webster.com/dictionary/pidgin>

⁴⁰² See definition at <https://www.merriam-webster.com/dictionary/creolized%20language>

⁴⁰³ Steph Koyfman, “What’s the Difference between a Pidgin and a Creole?” *Babbel Magazine* (22 November 2017). <https://www.babbel.com/en/magazine/whats-the-difference-between-pidgin-and-creole>

The processes of *creolization*, *pluralism*, and *pidginization*, as they apply to intercultural music, particularly intercultural symbiosis within such music, are addressed below.

Intercultural symbiosis and the special case of music as language — creolization, pluralism and pidginization

As noted earlier, one of the unique features of the experience of music is that pure pluralism is practically impossible when the composition is constrained by the physical properties of sound-wave propagation. While three visual artists with three easels can happily share a room *doing their own thing*, three musicians in one room *doing their own thing* may have a rather different set of consequences.

Without considering what is happening within the *pluralistic* space of the room, such acts of passive pluralism have the unintended consequence of *cacophony*, a vastly different outcome from what in visual equivalents is peaceful re-contextualization of diverse cultural inputs. Such a reality positions intercultural music in the unique situation of looking to find some harmonious (literally and figuratively) common ground.

The challenge is for intercultural music is thus to retain the authenticity of its diverse components and avoid what Berman describes as “bad translations” — translations that result in a “systematic negation of the strangeness of the foreign work”.⁴⁰⁴

In *Oscillation 1*, two outwardly similar but conceptually markedly different Western and Eastern musical systems confront one another. In the manner of intercultural symbiosis, the composition’s Western and Eastern musical systems *meet at the doorstep* but do not venture into one another’s inner abode. Such is plain when one asks the following question as an assessment of the process of totalization: In *Oscillation 1*, in terms of its representation as a genre, is the whole composition significantly more than the sum of its parts? The answer to this, in my assessment, is no.

Rather, *Oscillation 1* may be considered an instance of intercultural symbiotic minimalism. It is considered an instance in the same way that altermodernism has instances. Otherwise expressed, while such instances may not be recognizable as outwardly similar, they share the same process of creation as altermodernistic art forms.⁴⁰⁵

Pidginization in Oscillation 1

In Cambridge University’s *Annual Review of Applied Linguistics*, pidginization is described as “a linguistic process that occurs when people who do not speak the same language come into contact”.⁴⁰⁶ The review further notes that pidginization “involves the simplification of the contacting language and the exploitation of linguistic common denominators”. Of significance is that linguistic *common denominators* are sought to permit the *commonality of language*.

In *Oscillation 1*, such commonality of language is achieved in the following ways:

- the attributed interchangeability (if not equivalence) and tolerance of approximation between (Eastern) non-tempered and (Western) tempered musical systems

⁴⁰⁴ Berman, *The Experience of the Foreign*, cited in Larson, *Altermodernity and the Ethics of Translation*.

⁴⁰⁵ The term “instances” is used in this context to describe examples of a genre related not by the similarity of their outward appearance but by the commonality of the process through which they are manifested.

⁴⁰⁶ A. Mackey, ed., *Annual Review of Applied Linguistics*, Volume 1 (March 1980), 19–24.
<https://www.cambridge.org/core/journals/annual-review-of-applied-linguistics/article/abs/pidginization-and-creolization/090E6ED2AE887B994CCA6C63F462DE7D>

- the simplification of Eastern musical notes such that they are functionally considered as pitches, absent of their more esoteric associations
- the introduction of rudimentary harmony into the tabla part by playing tonic, fifth, and ninth tones of the scale, permitting playing within the 12-drum tabla set to modulate with the 12-key equi-harmonic cycle that defines the equi-harmonic and cyclic harmony of the composition.

Within such an arrangement, there are elements between the Western and Eastern musical systems that share a commonality of language and others that do not. Those that do share a commonality of language include the above three items, these being minimal compromises. In these three considerations, the commonality of language and its *necessary* compromises are akin to a pidginization of the Eastern and Western original musical languages.

In enabling such pidginization, the intent has been to remain aware that such a process should seek to retain the characteristics of its cultural inputs and to avoid Berman's concept of a "bad translation ... a systematic negation of the strangeness of the foreign work".⁴⁰⁷

Intercultural symbiosis in Oscillation 1

In *Oscillation 1*, the idiosyncratic features of the Eastern and Western cultural inputs, during the composition, have essentially remained intact and, for the most part, true to their original cultural origins. The tabla part keeps the essential Easternness of its cultural origins and its tabla-specific properties. Such Easternness is, however, to a certain extent assimilable into a Western staff, using the notation employed by Evans in "Tabla without Borders".⁴⁰⁸

Significantly, however, such assimilation occurs without any compromise to the *bols* — the distinctive vocal-inspired tabla rhythms that characterise the instrument. Such is clear in a sample of the notation for the score, represented in hybrid tabla notation (refer to Figure 29).

Thus, the tabla in *Oscillation 1* functions and sounds like a North Indian classical music tabla. It remains *uncreolised* in this intercultural setting and *true* to its cultural origin as an Eastern instrument. The tabla part retains (to the Western ear) its "strangeness as a foreign work".⁴⁰⁹

Similarly, the guitar in *Oscillation 1* functions like a Western guitar, plays like a Western guitar, and mostly sounds like a Western guitar, remaining true to its recent cultural origin as a Western instrument.⁴¹⁰

Interestingly, Indian classical music has assimilated the guitar into traditional Eastern music — although this instrument is, in the way it is played (on the lap and with a metal slide), a decidedly different instrument. Such an instrument may be considered creolised because it is learned as a first and native instrument by subsequent generations of Indian musicians whose families and lineages, rather than themselves, were personally exposed to the original instrument. An example of an artist who plays what is essentially a creolised guitar is Pandit Debashish Bhattacharya.

What is notable, and meets the definition of intercultural creolization, is that the instrument has become hybridised (specifically, the Indian slide guitar has transformed into hybrid instruments such

⁴⁰⁷ Berman, *The Experience of the Foreign*, 7.

⁴⁰⁸ The tabla notation used in *Oscillation 1* is described in Appendix 5.

⁴⁰⁹ See Appendix 5.

⁴¹⁰ This contrasts with alternative uses of the guitar in intercultural music. See https://en.wikipedia.org/wiki/Debashish_Bhattacharya

as the 24-string chaturangui) and the instrument is now taught as a primary musical language (Hindustani slide guitar).

Figure 29 below shows that the 8-string regular interval guitar, which is played in *Oscillation 1* (second from left) is decidedly closer to the standard classical guitar (far left) than it is to either the Indian lap guitar (second from right) or the chaturangui (far right). The guitar part in *Oscillation 1* is thus notably *Western*, and the tabla part is notably *Eastern*.



Figure 29: Standard classical guitar, my 8-string regular interval guitar, Indian lap guitar, Indian chaturangui

Regarding the tabla, such idiosyncratically Eastern characteristics include the playing of rhythmic *bols*. Regarding the guitar, such idiosyncratically Western characteristics include the capacity for full harmonic movement.

In support of such a claim, the note sequence of the guitar part implies at times triadic harmony and at other times quartal harmony, as is evident in the proposed harmonisation of the guitar part in the lead sheet. Such concepts are seminally Western. Figure 30 below illustrates them in the form of the notations for tabla and guitar.

Figure 30: *Oscillation 1* showing retention of Western harmony and Eastern bols in guitar and tabla parts

Intercultural symbiotic minimalism — summary

Oscillation 1 is thus tendered as an example of intercultural symbiosis as it may apply to intercultural composition.

In *Oscillation 1*, there are novel extensions applied to traditional instruments. These include the tabla being recorded as a 12-drum system and the guitar being custom-built as an 8-string regular interval instrument. Nonetheless, the tabla plays essentially like a tabla and the guitar plays essentially like a guitar.

Hence, in *Oscillation 1*, the tabla fundamentally keeps its Easternness, and the guitar fundamentally keeps its Westernness. The composition does not compromise its parts to the whole, nor does it forgo its “strangeness as a foreign work”.

This is the essence of intercultural symbiosis.

Oscillation 1 may thus be appropriately described as *interculturally symbiotic*. Such a description is consistent with Charles Jencks’s characterising of intercultural symbiosis as below:

East and West are not resolved in some totalistic synthesis, but played against each other, staccato like, to keep their identity and autonomy.⁴¹¹

Because *Oscillation 1* is also consistent with musical minimalism, the composition may be appropriately described as an instance of *intercultural symbiotic minimalism*.

Other examples of intercultural symbiotic minimalism

Philosophy and music ... are two forms of the same enterprise – the inquiry into the inner spaces of the human condition.⁴¹²

Intercultural symbiotic minimalism, having the characteristics of symbiosis, is likely to be represented in musical compositional examples by somewhat eclectic compositions. This is the nature of the pluralism that characterises the style.

In searching for examples of musical recordings that may be characterised as instances of intercultural symbiosis, I present two contrasting examples. The first of these is a 2016 performance in Sydney, Australia by Riley Lee (shakuhachi) and Marshall McGuire (harp). The title of the composition is *Feather on the Breath of God*.⁴¹³

Regarding the appropriateness of the term *minimalist*, the composition would seem to meet Johnson’s described characteristics on several levels. Additionally, my experience of the composition is one where musical form and musical void seem to have an equivalence of significance — thus, in accordance with the novel characterisation of minimalism proposed, the composition is *minimalist*. Further, my experience of the composition is that the interculturalities of the shakuhachi and harp are not totalized — that is, they do not coalesce or creolise to evoke something that is more than the sum of the contributing musical parts. Thus the composition, as well as being minimalist, is also *interculturally symbiotic*.

The second example of such intercultural symbiotic minimalism is the 1964 album “Music for Zen Meditation”, by jazz clarinetist Tony Scott, shakuhachi player Hozan Yamamoto, and koto player

⁴¹¹ Charles Jencks, “Foreword” in Kurokawa, *Intercultural Architecture*, 7.

⁴¹² Nietzsche, quoted in Daniel Albright, ed., *Modernism and Music: An Anthology of Sources* (Chicago: University of Chicago Press, 2004), 112.

⁴¹³ See <https://www.youtube.com/watch?v=PcSIyzi-CkE>

Shinichi Yuize.⁴¹⁴ Regarding aspects of symbiosis, the three instruments (clarinet, shakuhachi, and koto) that contribute to all ten recordings on the album are clearly playing within their traditional capacity. Regarding interculturality, the music is characterised not by hybridisation but the mutual *co-existence* of diverse musical sources. The overall impression is that there is no apparent *totalization* of the music, consistent with the tenets of intercultural symbiosis. Regarding the appropriateness of the term *minimalist*, the composition would also seem to meet Johnson's described characteristics in various ways. Regarding the newly proposed definition of minimalism — as giving equal significance to form and void — such an aesthetic would seem to be clear in the music also.

Finally, the calligraphic circle that makes up the album cover (Figure 31) would seem to be consistent with this aural aesthetic, albeit visually expressed. The calligraphic circle — a measured use of dark and light — may be interpreted as capturing the spirit of eternal cyclic regeneration. This regeneration is the same eternal cyclic regeneration typically represented by the taijitu, symbolising form-void equivalence as the perpetual, cyclically dynamic transformative principle that guides and transforms energetic phenomena, both physically and phenomenologically.

The concept of inner and outer systems of time and motion being analogous to one another is the central proposition of phenomenological mechanics, as presented in the dissertation. The music presented in the dissertation is a metaphor for this concept.



Figure 31: Music for “Zen Meditation” album cover

⁴¹⁴ Tony Scott — Music for Zen Mediation — 1964, 44:33. <https://vimeo.com/74570593>

Application of the Research to Music Performance and Analysis

Application to analysis

This section applies the research to the performance and analysis of music, both composition and improvisation, beginning with a rudimentary phenomenological mechanics analysis of the following three highly contrasting music pieces:

- *Oscillation 1*
- 12-bar blues
- Cage's 4'33''

Oscillation 1

Appendix 7 presents a phenomenological analysis of the major artefact *Oscillation 1*, culminating in a representation of the three-minute equi-harmonic cycle in terms of its form-void vectors, as shown in Figure 32 and again in Appendix 7. This representation of the equi-harmonic cycle also demonstrates the cyclic global form of the guitar part. In contrast to this, the linear global form of the tabla part is represented in Figure 33.

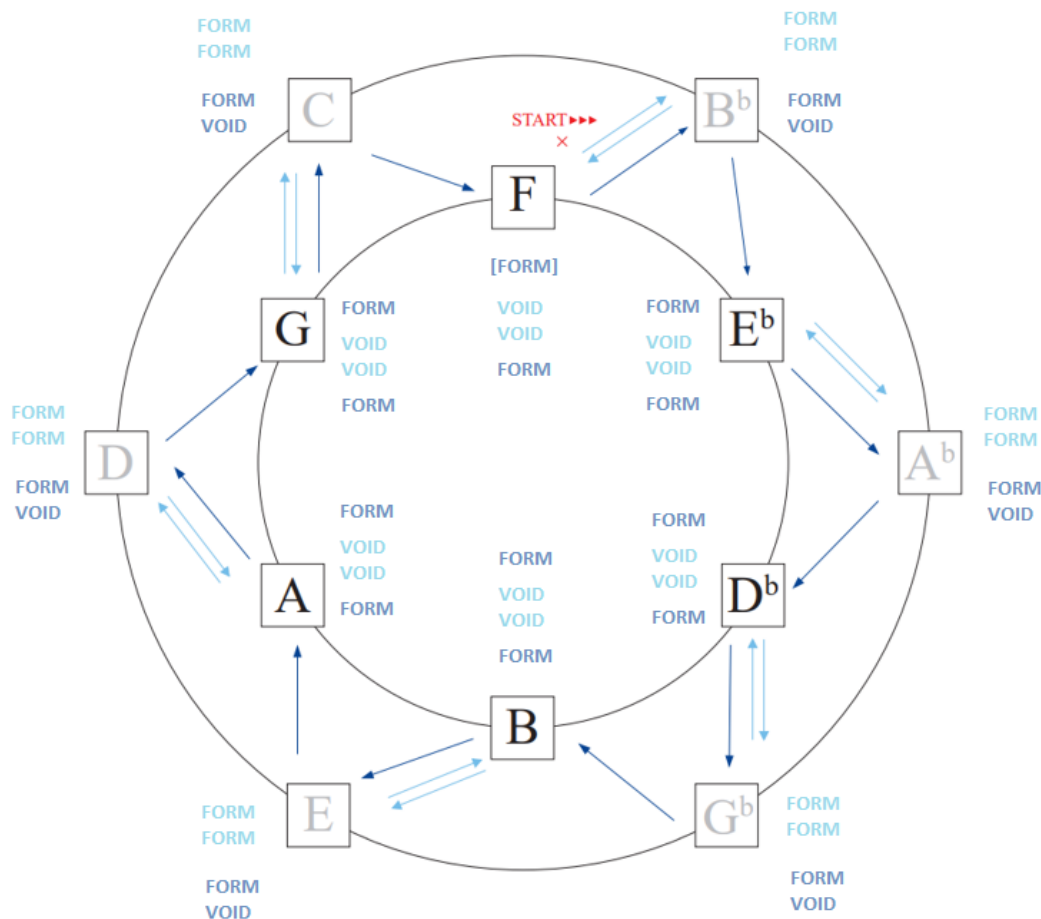


Figure 32: Form-void vectors in the equi-harmonic cycle

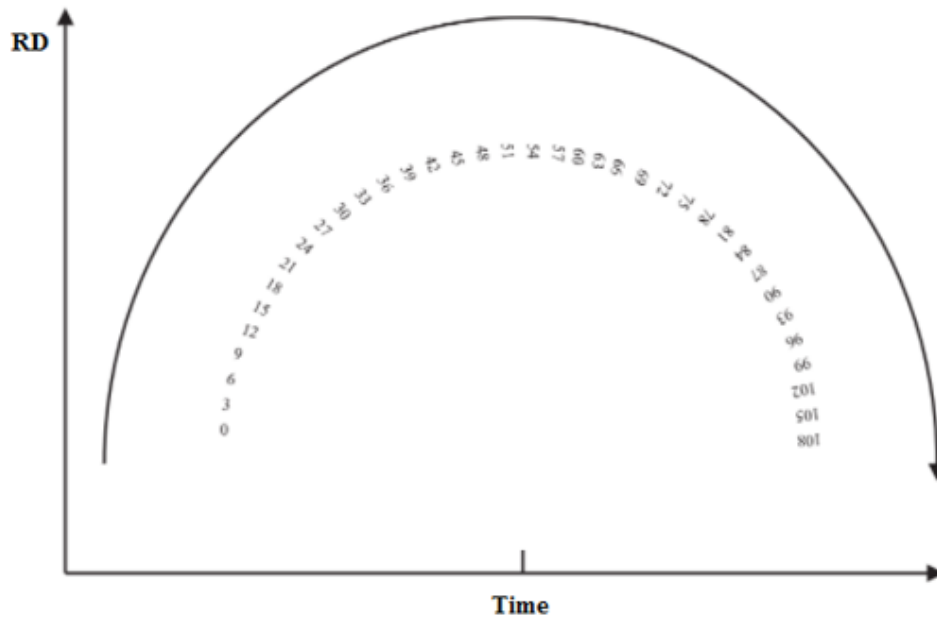


Figure 33: Linear global form of the tabla part

The proposed form-void phenomenological vectors of *Oscillation 1* are presented in Appendix 7.

In describing the musical figures that correspond to the proposed form-void structures, I start with the first 28 bars of the composition — the first ABAB — A' section, and then to the first 168 bars — the first equi-harmonic cycle.⁴¹⁵ Then, in the final figure of Appendix 7, I present the “overall” form-void vector of the composition — the linear global form of the tabla part.

The following section thus summarises the compositional devices that, in the manner of an exegesis, illustrate the dissertation’s theoretical concepts, as presented in Appendix 7. A more detailed description of these compositional devices is presented in Appendix 5.⁴¹⁶

Based on its structure, the composition invites the experience of 13 main form-void vectors across five musical parameters: metre, melody, harmony, modulation, and global form.⁴¹⁷ The *hierarchically organised, multimodal, complex phenomenological machine architecture* of these proposed form-void vector structures is summarised in Table 8 (Appendix 7). In each of these vectors, one musical figure functions as a home or void pole of a polar cell couplet, and another figure functions as an away or form pole.⁴¹⁸

⁴¹⁵ These terms are defined in Appendix 5.

⁴¹⁶ As previously noted, the description of the compositional methods and processes of the artefacts was relegated to an appendix when the dissertation became principally a theoretical essay rather than an artefact-centric exegesis.

⁴¹⁷ The model proposes that form-void vectors are phenomenologically determined — in Dahn’s terminology, located within the listener or “pointer”. Nonetheless, such form-void vectors may be understood to correlate with composition figures. Although the form-void vector structures are analysed at the level of the object of perception (the external compositional structure), such a structure is ultimately phenomenologically “mapped”. Compositional structures may thus be considered the “triggers” for the phenomenological experience of directional musical motion. For practical purposes, I analysed the “external” compositional structure. The implicit understanding, however, should be that what is really being analysed is the phenomenological representations of these compositional structures.

⁴¹⁸ In Appendix 7, the parameter of “Song Form” is noted. For the sake of analysis, “Song Form” is considered a high-level form-void vector at the level of melody. Effectively, it comprises two melodic fragments, phenomenologically experienced as “call” and “response” — typically as the highest level of melodic organisation, as is the case (in the form of the composition’s A and B sections) in *Oscillation 1*.

At the level of *metre*, *Oscillation 1* (having a complex compound metre) has three hierarchically organised levels of metric structure. Its metric groupings are thus at the levels of 3 + 3 + 4 + 3 + 3 - 4 + 4 beats, 10+10+4 beats, and 24 beats. These three levels of metre are demonstrated, respectively, in the first three figures of Appendix 7.

Similarly, at the level of *melody*, the composition's melodic structure may be seen to have four nested, hierarchically organised, form-void vector structures. The respective durations of these nested melodic structures from low to high hierarchical organisation are 4 bars, 5 bars, 7 bars, and 14 bars. These four levels of melodic organisation are demonstrated in Figure 104 and Figure 105.

At the level of *harmonic movement within a single key centre* (i.e., not including modulation), the compositional structure may be seen to contain two form-void vector structures. The first of these is the “perfect cadence”, which occurs in the first two bars of each of the A and B segments.⁴¹⁹ In the A-section of the opening 28 bars (ABAB section) of the composition, in the key of F Major,⁴²⁰ is the movement from C to F, in bars 1 to 2, as implied by the triadic movements in the guitar's melody during this section. In the first B-section, in bars 8 to 9, this harmonic movement is the movement from F to B^b. This is demonstrated in Figure 106.

The second of these harmonic movements is the ii-V-1 harmonic progression, which occurs when the A-section transitions into the B-section — *in the first sounding*, prior to the AB-section repeating. The first example of this is in the harmonic movement in bars 6 to 8: from G⁷ to C⁷ to F. This is demonstrated in Figure 107 (which also includes the harmonic movement of the perfect cadence, as demonstrated in Figure 106).

At the level of *modulation*, the composition may be seen to contain its 10th and 11th form-void vectors — as *linear* modulation and as *cyclic* modulation, respectively.

The first *linear* modulation (ABA — refer to Appendix 5) occurs in the F⁷ *back to C* movement, which occurs between bars 1 and 15 when the first AB section commences its repeat. As detailed in Appendix 5, this harmonic movement is termed *linear* modulation because, like the *bi-directional*, *one-dimensional* linear movements of a pendulum moving back and forth, its harmonic movement is the *to and fro* movement *between* keys, returning to the key from where the modulation started. The concept of linear modulation is described in detail in Appendix 5 and graphically summarised in Figure 73. Linear modulation is also demonstrated in Figure 108.

In contrast to this, the first *cyclic* (ABA' — refer to Appendix 5) modulation occurs between bars 15 and 29 when the ABAB-section in F Major *after its second repeat* modulates *through B^b* and onwards to E^b. This harmonic movement is termed *cyclic* modulation because it is a *uni-directional*, *two-dimensional perpetually forwards cyclic movement*. Referring to the previous example of the pendulum, if the pendulum were moved not back and forth but rather in a circle, and viewed from above, such movement would be cyclic movement. Cyclic modulation is thus the *cyclic movement*

⁴¹⁹ I have used the term “perfect cadence” here to demonstrate the harmonic effect. Referencing the very first two bars of the composition, one may “hear” the C to F movement as a modulation from a key centre of C to a subdominant of F — or as a perfect cadential movement in the key of F. This experience differs depending on whether the A or B segment is being played the first or the second time. In the first playing, the tonality is not yet firmly established, whereas in the second, it is. Thus, the same musical structure is experienced differently depending on the harmonic context that precedes it. I call this harmonic movement a “perfect cadence” in both instances.

⁴²⁰ In the first 28 bars of the composition, the sounding of the first ABAB-section, the key for this entire section is considered to be F Major — rather than an alternation of keys between F Major in the A section and B^b Major in the B-section. This distinction is made for the simplicity of describing the harmonic movements — not as an absolute statement about tonality. Appendix 5 further describes this concept.

around keys, moving onwards to a new key at the end of its cyclic process. The concept of cyclic modulation is described in detail in Appendix 5 and summarised in Figure 74. Figure 109 also demonstrates cyclic modulation.

Figure 110 demonstrates the total combined harmonic movement of the equi-harmonic cycle. This includes the harmonic movement within a single key centre and modulation, linear and cyclic.

Figure 111 is an alternative demonstration of the linear and cyclic modulation movement of the equi-harmonic cycle, presenting the equi-harmonic cycle in terms of movements between phenomenologically represented *void* (functioning as “home” position) and phenomenologically represented *form* (functioning as “home” position).

Commencing from the “START” position, the first modulation is a *linear* modulation from F to B^b and back to F again, as represented by the two small parallel arrows between F and B^b. This is represented as a phenomenological movement from void (or “home”) to form (or “away”) and back to void again. Following this, represented by the larger arrows between the inner and outer circles, the next modulation is a *cyclic* modulation — from F to B^b — then not backwards but *onwards* to the new key centre of E^b, where the new home key functions as a *new void* position.

This alternation of linear and cyclic modulation continues throughout the equi-harmonic cycle until, after 168 bars, the cycle returns to its starting position. This return marks the completion (and thus return to void position) of the equi-harmonic cycle — a process I have called *equi-harmonic resolution*.

The structure of *Oscillation 1* also invites the experiencing of form-void vector at the level of *global form*. As described in the *Operationalisation of philosophical concepts to the compositional process* (section 8 of Appendix 5), the global form of *Oscillation 1* is a combined linear-cyclic form — the guitar part is cyclic, and the tabla part is linear.

Form-void vector 12 is thus the experience of equi-harmonic resolution — the return to the original key from where the equi-harmonic cycle process commenced (key of F Major) after 168 bars, during which the composition has modulated in a pattern of alternating linear and cyclic modulations through all 12 keys. Equi-harmonic resolution is demonstrated in Figure 111. This is the demonstration of the overall cyclic organisation of the guitar part, as introduced at the start of the section. This is the same figure that introduces this section, demonstrating the cyclic global form of the guitar part.

Finally, Table 8 (Appendix 7) also lists, for completeness, form-void vector 13 — the resolution that occurs at the end of the entire full-length compositional process. This ending point is the starting point of the tabla part prior to its 6048 bar (32 x 168 bar equi-harmonic cycles) linear excursion from minimal to maximal rhythmic density and back again, as demonstrated in Figure 112, which also introduces this section, demonstrating the linear global form of the tabla part. (Further details of this compositional process of linear development and resolution are described in Appendix 5 under section 9: *Specifics of the compositional process — tabla*).

This global linear movement is the *oscillation* from where the composition acquires its name.

12-bar blues

Figure 34 presents a phenomenological mechanics analysis of the representations of the phenomenological fields of memory and expectation vectors in the musical parameters of metre and harmony of a standard 12-bar blues progression. (Refer also to Appendix 4 for further analysis.)

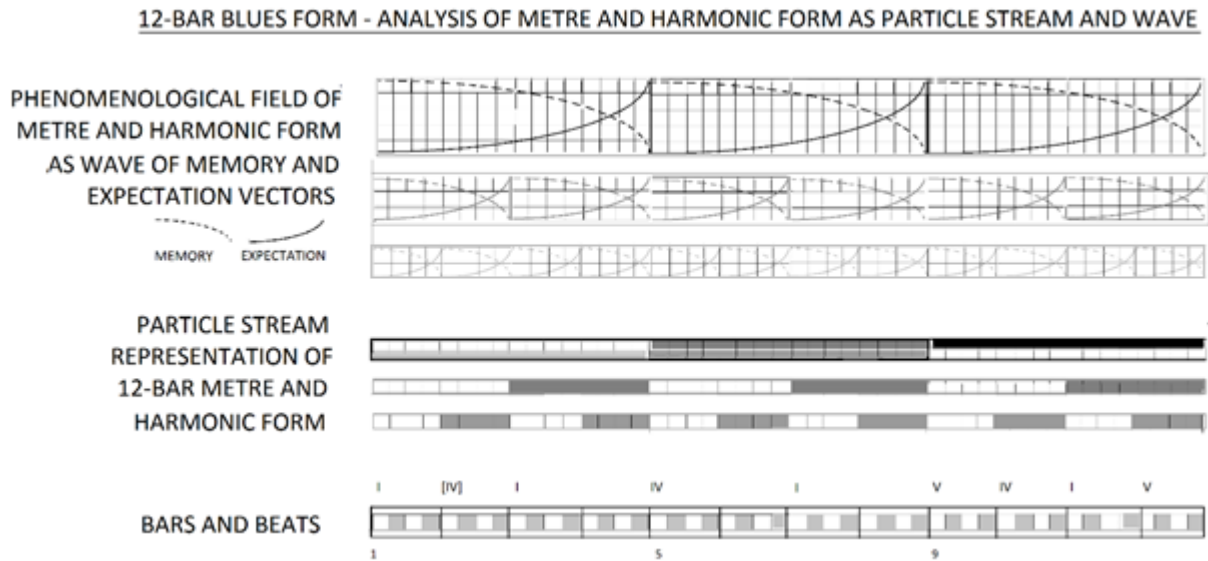


Figure 34: Phenomenological mechanics analysis of 12-bar blues chord progression

The lower part of the diagram represents metre in the form of beats and bars. It also lists the chords of the progression.

The middle part of the diagram is a presentation of metre and harmonic form from a particle stream perspective.

The upper diagram is a representation of changes in memory (of the *preceding* metric or harmonic event) and expectation (of the *forthcoming* metric or harmonic event) represented as a phenomenological wave.

Hence, the experience of metre — or of any musical passage phenomenologically representable as a polar cell couplet — can be represented as a dual phenomenological wave of memory and expectation.

As presented, memory of the preceding beat fades while expectation of the forthcoming beat increases, these processes becoming more pronounced as time moves nearer to the anticipated beat. This concept is seen in the first representation of the dual wave of memory and expectation at the level of metre.

In the figure, at the level above these (two measures long), a simultaneous dual wave of memory and expectation process is occurring — albeit with a wavelength twice the size. This is the memory and expectation of harmonic changes when *12-bar blues* is experienced as 6 harmonic sections, each section two measures long.

Finally the uppermost dual wave of memory and expectation is at the level of four-bar sections. This is the memory and expectation process of harmonic changes when *12-bar blues* is experienced as three major harmonic sections, each section four measures long.

Figure 34 thus represents three concepts. The first of these concepts is the experience of directional motion in music in terms of hierarchical organisation across multiple musical parameters. Thus, the figure represents the compositional organisation sub-propositions of RP 1A — those of hierarchical organisation of form-void vectors, and multi-parameter representation of such hierarchical form-void vectors.

The second of these concepts is the phenomenological experience of a musical parameter as a dual phenomenological wave of simultaneous processes — that is, memory (of a preceding event) and expectation (of a forthcoming event). This is presented both at the parameter of metre and the parameter of harmony.

The third of these is the representation of the experience of a musical parameter in terms of wave-particle duality. Demonstrating this concept, Figure 34 represents the experience of metre and harmony as both a particle stream and as a wave. Appendix 4 represents these concepts in further detail.

Cage's 4'33"

Void in Cage's 4'33"

In the example of Cage's 4'33", void (i.e., nothing) would seem to have at least two possible contrasting meanings. The first is the traditional meaning that void is *silence*. The second is that void is context-dependent non-salience, and form is context-dependent salience. Such interpretations refer to the absolute and relative definitions of form and void outlined in Chapter 1 as *silence* and *context-dependent non-salience*, respectively.

In the context of the expectation of sound — the sociological setting for Cage's 4'33", silence (i.e., absence of playing the piano) functions as context-dependent salience. Silence by its unexpectedness is thus significant as artistic content because of its metanarrative.

Form-void vectoriality in Cage's 4'33"

Regarding the "vectoriality" of 4'33", it is proposed that the phenomenologically determined vectoriality in the *composition* arises from the unmet expectation of sound. *The phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field* model proposed in RP 1A is referenced for this purpose.

As described in Chapter 1 under *Musical phenomenologies — Cage*, in such a conceptual analysis, form-void vectors are defined in terms of context-dependent salience and context-dependent non-salience. Such an analysis achieves two purposes.

Firstly, it shows how the model proposed in RP 1A can be used broadly across different musical styles and genres, based on the changing definitions of form and void. When form and void are defined in this extended way, the model is equally applicable to the analysis of *non-traditional* music, including postmodernist music — where vectoriality arguably arises not from culturally understood musical devices (traditional cadences) but rather (as proposed in Chapter 1) context-dependent expectations.

Secondly, it shows that silence can be vectorially significant, based on the listener's conditionings, expectations, and projections.

In such an analysis, form-void vectors are apparent in the process of listening to *silence*. They arise *purely from within the listener* experienced in the context of expectation.

This concept is addressed in the next section from the perspective of RP 1A.

Cage's 4'33" from the perspective of Primary RP 1A

How is it possible that a composition as absent of content as 4'33" can be experienced in a vectorial way? In consideration of this intriguing question, the following discussion is proposed.

Vectoriality in music composition is phenomenologically determined. The experience of time in a composition such as 4'33", as is the case for the experience of time in any composition, occurs at the phenomenological level. What is of significance in such an experience is not what is happening externally at the level of the physical sound (or its absence) but what is happening *internally* within the listener's phenomenological framework.

Arising from the findings of the thought experiment in Chapter 1, it is proposed that the experience of vectoriality in music composition depends on the listener's capacity to recognise within musical structure, phenomenologically determined polar couplet cells. Such structures arguably function (as the term is used broadly) in a *cadential* way. The use of the terms *cadence* and *cadential* in this context aligns with the way Kramer uses such terms — where cadence is characterised as anything that tends to close off a preceding event.⁴²¹

The experience of vectoriality in a composition such as 4'33" thus occurs when the listener brings with them (and projects onto the silence) a temporality that is strongly linear and expectant — a process Kramer calls *teleological listening*.⁴²²

What is thus significant is not whether there exists a musical structure externally, akin to a polar couplet cell, but whether such a structure exists *internally* at the level of phenomenological representation.

Regarding Western temporality (i.e., the Western paradigmatic experience of time), such an internal structure is contained within the Western concept of the arrow of time — its poles being present (void) and future (form).

In the postmodernist sense where form and void are characterised, as described in Chapter 1, not as absence and presence of musical content but as "context-dependent salience" and "context-dependent non-salience", it is apparent that "silence" (in the case of 4'33", the non-playing of the piano) constitutes musical form.

Such form-void couplets arguably occur in other musical parameters besides metre. They may also be hierarchically organised. All such representations occur internally (i.e., phenomenologically) rather than externally in the sounds (or their absences).

A composition such as 4'33" does not have "metre" or other musical parameters such as melody, rhythm, modulation, or form in the traditional sense. It does, however, have a phenomenologically determined, hierarchically organised, polar couplet cell structure — even if all of this is occurring at the level of expectation and projection.

Examples of such *phenomenological fields of expectation* include the expectation of sound after the performer sits down at the piano; the expectation of sound after the performer shuffles the "score"; the expectation of sound after the performer shifts position on the piano stool.

Further, such expectations may be hierarchically arranged somewhat like non-silent sounds.

⁴²¹ Kramer, *The Time of Music*, 137–138.

⁴²² Kramer, *The Time of Music*, 63.

Such a hierarchical arrangement of expectations is comparable to the hierarchical arrangement of the Western commuter's phenomenological representation of movements described in Appendix 3.

Similar also to this, such hierarchical arrangement is phenomenologically determined and thus meaningful only in relation to the participant's own frame of reference. Thus it would seem, even within the experience of silence, at a phenomenological level, in the form of a musical listener's *complex projections of expectations*, hierarchical organisation is apparent.

A phenomenological mechanics analysis of Cage's 4'33" thus demonstrates that the experience of silence itself is, like "non-silent music", representable as a phenomenologically determined, hierarchically organised, form-void vector field. In such a representation, form and void are phenomenologically determined. Specifically, form arises out of expectation and is phenomenologically coded not as sound but rather as context-dependent salience.

In such a representation, musical form as context-dependent salience is essentially a *projection* onto silence, in the form of listener expectation — in Kramer's terms, "teleological listening".⁴²³

Application to composition

In considering the application of the dissertation's concepts to composition, this section examines the research in relation to the concept of musical development and resolution as characterised by phenomenological mechanics.

Metre as periodic motion of alternating development and resolution cycle

Metre, when considered from the perspective of phenomenological mechanics, is representable as an alternating process of linear and cyclic movements. Within a single measure, in the movement from beat 1 to beat 2 and then from beat 2 back to beat 1 again, metre conceptually *develops* and *resolves*. Such development and resolution within each measure constitutes the linear component of metre. The repetition of this process from one measure to the next constitutes the *cyclic* component of metre.

Thus, like a pendulum, the experience of metre is representable as *phenomenological periodic motion* — the cycling of a repeating linear development and resolution processes.

Development and resolution as the phenomenological movement between stable and unstable states

Still considering the simplest representation of the polar couplet cell as 2/4 metre, in phenomenological mechanics terms, such metre's *development* movement (from beat 1 to beat 2) is *negatively phenomenologically energetic* and *negatively phenomenologically entropic*.

The "negative" direction of the movement means it moves *against* the direction in which the system would spontaneously move, in the absence of the intervention of any controlling action. The negative movement is thus analogous to the charging (as opposed to the discharging) of a battery cell. In electrochemical terms, it is like current moving from cathode to anode against the repulsive force of the negatively charged anode.

In gravitational mechanical terms, such negative phenomenological energetic and phenomenological entropic movement is analogous to the "upswing" of the pendulum movement from low to high potential energy positions. Both these representations capture a common concept — the movement *against* the natural order of movement from a stable state to a relatively unstable state. In the case of

⁴²³ Kramer, *The Time of Music*, 63.

phenomenological energy transformation, such “developmental” movement is a movement from a state of low energy to a state of higher energy. In the case of phenomenological entropy transformation, such “developmental” movement is a movement from a state of relative chaos to a state of relative order.

All such representations share a common dynamic — the movement from a stable state to a relatively unstable state. Such musical development movements, represented within the experience of metre, are thus phenomenological movements in the direction of an *overcoming of resistance*. In the case of the movements of a pendulum, such resistance is gravity. In the analogous case of metre, the resistance is the movement from beat 1 (the stable state of home or void) to beat 2 (the relatively unstable state of away or form).

Resolution as a directional musical motion is the converse. It is the returning from the unstable or away state of form to the stable or home state of void.

The dissertation’s primary research propositions applied to composition

The novel concept of development and resolution described in terms of phenomenological mechanics extends beyond metre. It applies to any musical device that is conceptually representable and phenomenologically experienceable — as is metre as a polar couplet cell.

RP 1A is the proposition that such phenomenological representations of development and resolution are simultaneously occurring at multiple hierarchical levels across multiple musical parameters.

Appendix 7 is a demonstration of this concept as it applies to the major artefact *Oscillation 1* — specifically across the five musical parameters of metre, melody, harmony, modulation, and global form.

The novel concept of musical development as “phenomenological work”

In classical mechanics, the concept of “work” is defined by the equation $W = Fs$, where W is work, F is force, and s is displacement.

In such a representation, displacement is a similar concept to distance. It is, however, different from the concept of distance in two ways. Firstly, unlike distance, which is a purely numerical scalar concept, displacement is a vectorial concept — that is, inherent within its meaning is the concept of direction (the distance moved in a specified direction). Secondly, the concept of displacement contains an implicit reference to an understood *zero point*. Displacement has been defined in colloquial terms as a measure of “how far out of place an object is”.⁴²⁴ If we replace “an object” with “a musical event”, musical displacement may be understood as a measure of how far out of place a musical event is relative to the place (zero point) from where it began.

If we include the concept of phenomenological force in this definition, representing the *gradient* or *slope* where musical change occurs, the concept of development as musical work assumes a familiar meaning.⁴²⁵

Represented in this way, development as musical work is conceptually the product of the rate at which the music changes and the duration for which such change has been occurring — effectively, displacement in time from the zero point when the development process began to its current position.

⁴²⁴ The Physics Classroom at <https://www.physicsclassroom.com/>

⁴²⁵ This structure is a commonly seen one in mechanics. In its broadest characterisation, it is represented by the general equation: Change = rate of change x duration (displacement in time).

Considered in this way, a composition's musical development is conceptually representable as the product of two factors — the *phenomenological force* (against resistance) *undergone to arrive at a given position of development*, and the extent of displacement in time from the void or home state from where the development process began.

The concept of musical displacement does not, however, relate only to time — it can refer to directional movement in any parameter, away from the zero point from where it began.

The following section demonstrates this concept in relation to *harmonic* rather than temporal displacement.

Example of musical development as “phenomenological work”

A simple practical example of this concept of development as phenomenological work is the consideration of the development of a chord progression as the product of the phenomenological force against resistance that a process has undergone, and the displacement (i.e., how far out of place it is because of the development process).

The chord sequence below demonstrates this concept:

$$\begin{aligned} &D - D^7 - D^{7b13} - D^{7b13b9} - G - G^7 - G^{7b13} - G^{7b13b9} - \\ &C - C^7 - C^{7b13} - C^{7b13b9} - F - F^7 - F^{7b13} - F^{7b13b9} \end{aligned}$$

Within each of the chord variations in D, G, C, and F Major, there is progressive movement *against resistance* from the triad to the 7th to the 7 b13 to the 7 b13 b 9 tension of the chord.

The harmonic movement through such progressive additions of tensions conceptually involves the input of a *phenomenological force* to *resist* the natural inclination to resist the “tendency or tension ... towards resolution”.⁴²⁶

When this progression through tensions further undergoes an *excursion* in the form of progressive modulations, the tonality of the composition becomes increasingly *displaced*. Conceptually, with each modulation, the composition's musical state or position moves further “out of place” away from its beginning reference point.⁴²⁷

Together, these concepts contribute to the experience of the development of the harmonic sequence.⁴²⁸

Conceptually represented, development when considered as phenomenological work is characterizable in the following way:

Where D is musical development, F(p) is phenomenological force and s (p) is phenomenological displacement, musical development as characterised by the concept of *phenomenological work*, may be conceptually defined as follows:

$$D [\text{Development}] = F(p) \times s (p).$$

⁴²⁶ Dahn, “A Summary and Reflection on Victor Zuckerkandl's *Sound and Symbol*.”

⁴²⁷ George Russell's concept of “tonal gravity”, as described in his Lydian Chromatic concept of tonal organisation, aligns with these concepts. Like Zuckerkandl and Fraser, Russell's concepts imply phenomenological mechanics, albeit applied to jazz harmony.

⁴²⁸ This concept is exemplified in the major artefact, *Oscillation 1*. As described in Appendix 5, the intra AB harmonic movements accord with *phenomenological force*, and the inter AB harmonic movements (modulation around the equi-harmonic cycle) accord with *phenomenological displacement*.

Application to improvisation

In this section, I discuss how to apply the dissertation's theoretical concepts to improvised music. I refer to concepts of temporality as they pertain to improvisation originating from two sources that are interrelated in their significance but independent of one another.

The first of these sources is Fraser's concept of levels of temporality, arising from his concept of the canonical forms of human temporality. The second is the concept presented as RPs 3A and 3B — the proposition of helix and vortex as alternative geometrical global forms of music, characterising (respectively) Western and Eastern musical forms, as metaphors for their respective representations of linear and cyclic time.

Non-linear temporalities as they relate to improvised music

Regarding improvised music, there is ample capacity with existing approaches to improvisation for goal-directed musical processes. Such musical intentions are achieved typically through established, culturally recognised vectorial musical devices such as cadences, forward-moving chord progressions, leading tones etc.⁴²⁹ However, in improvised music, there is also the possibility of bringing non-linear, non-teleological temporalities to the performance of music. In deference to this contrast, this section examines the application of such alternative temporalities to improvisation.

Firstly, this section considers the practical application of Fraser's canonical forms of human time to the process of improvisation. This is presented as graphical representations of Fraser's alternative temporalities (*nootemporality*, *biotemporality*, *eotemporality*, *prototemporality*, and *atemporality*). These alternatives are presented in the form of visual translations of Fraser's portrayal of each of these temporalities — as progressive degradations of the integrity of the arrow of time. (See Figure 16.)

The structure of the arrow of time is that it is asymmetrical and polar — it has an arrowhead at one end and a tail at the other. Further, inherent within its conceptual meaning is the phenomenological representation of present moment and future — as mutually exclusive states.

The arrow of time with its arrowhead and tail is thus more than just a line — it is a temporal vector.

Secondly, this section considers the concepts in RPs 3A and 3B to improvisation. As described in the previous section, this includes the following four contrasting concepts:

- Musical form as *helix* versus *vortex*
- Musical temporality as *horizontal* phenomenological time versus *vertical* phenomenological time⁴³⁰
- Musical development by *vectorial process* versus *intensification*
- Musical composition by *creation* versus musical composition by discovery of that which is “pre-existent” — composition by *revelation*⁴³¹

⁴²⁹ Such musical devices are particularly apparent in jazz, especially in the vertical forward-moving chord progressions of jazz styles such as bebop.

⁴³⁰ Horizontal phenomenological time, as the term is used in this context, refers to musical temporality that moves in a direction conceptually parallel to and in accordance with the “arrow of time”. Conversely, vertical phenomenological time refers to temporality that moves conceptually perpendicularly to and thus is uninfluenced by the arrow of time.

⁴³¹ Clayton, *Time in Indian Music*, 14.

Relevance of Fraser's concepts to the dissertation

The concept of the arrow of time, and alternative phenomenological experiences of time, was introduced in the final sections of Chapter 1 (Introduction) as Fraser's framework of canonical forms of time. This framework presents the concepts of *atemporality*, *prototemporality*, *eotemporality*, *biotemporality*, and *nootemporality*.⁴³²

Fraser's framework has special application to the current dissertation for several reasons.

Firstly, Fraser's framework represents the experience of time in terms of *linearity* and *non-linearity*.

Secondly, Fraser's framework proposes a *range* of paradigmatic linearities of temporality across multiple experiences or *umwelts*.

Thirdly, Fraser's framework provides both scientific and musical correlates to his proposed levels of temporality, thus associating science, music, time, and phenomenology consistently with the core proposition of the dissertation's primary concept of phenomenological mechanics, as it applies to the experience of directional motion in music. In this way, Fraser's concepts align with the *primary* RPs of the dissertation — the concept of phenomenological mechanics.

Fourthly, by referencing concepts of linear and non-linear time, Fraser's phylogeny of human temporalities accords with *intercultural* (i.e., Western and Eastern) concepts of time. Thus Fraser's canonical forms of human time may be viewed from the perspective of interculturality. In this way, his concepts align with the *secondary* RPs of the dissertation — the concept of composition as intercultural metaphor.

Fifthly, Fraser represents his levels of temporalities, referencing the concept of the arrow of time, in a visual language that permits graphic representation and the use of symbols rather than words to convey the essence of different temporalities. Such symbolic representations are listed in Figure 16 (Chapter 1) as Fraser's five temporalities. The graphical representations of *atemporality*, *prototemporality*, *eotemporality*, *biotemporality*, and *nootemporality* presented in there are thus tendered as visual cues that may be used to express or invite musical improvisation within the above temporalities.

Visual representations of alternative temporalities and non-linguistic gestalt musical processing

In Kramer's terminology, such symbolic representations are, like music, non-dominant hemispheric — that is, they are, like music (and unlike the written word) processed in a gestalt rather than sequential way. Visually represented in this way, such symbolic concepts are musically interpretable in a *direct* way, as opposed to being first translated into verbal constructs.

Otherwise expressed, when represented as visual symbols, as has been done in Figure 16, Fraser's levels of temporalities are communicated into musical understanding *directly*, bypassing the analytical filter of interpretive language.

In principle, such symbolic visual representations of the experience of time facilitate — in a way that oral or written language does not — a direct musical response in accordance with *immediacy of meaning*.

⁴³² Fraser, "Human Temporality in a Nowless Universe."

Fraser's levels of temporality visually represented are thus potentially powerful and direct catalysts for the creation of improvised music in temporalities other than Western linear temporality.⁴³³

The next section examines the relationship between physics, phenomenology, and music. It presents concepts that are the substance of the dissertation and concepts that go beyond the scope of the current dissertation. The latter are potential topics of inquiry for future research.

Phenomenological Mechanics — An Intercultural Musical Perspective

This final section of the Discussion examines the relationship between physics, phenomenology, and music. It presents concepts that arise from the substance of the dissertation and concepts that go beyond its scope. The latter are potential topics of inquiry for future research.

The phenomenology of physics

That physics has encountered consciousness cannot be denied.⁴³⁴

As the dissertation commenced with this quotation, from which the concepts developed, it is appropriate that it is also where the dissertation resolves.

As radical as the concept of “phenomenological interference” in the behaviour of matter is, it remains the current position of theoretical physics (albeit in different interpretations).

In Rosenblum and Kuttner's words, the fact that such a proposition is so “violently in conflict with common sense” has not persuaded physicists to abandon what they have observed.⁴³⁵ Iterations of conceptual interpretations have provided a variety of spins on what Einstein called “the quantum problem” — the term used to describe the appearance of interdependence between the physical behaviour of matter and its observation.”⁴³⁶ The most generally accepted of these “accommodations” is the “Copenhagen interpretation”.⁴³⁷

None, however, has fundamentally challenged its empirical voracity.

Theoretical physicists will no doubt continue to try to “make sense” of what appears, at least in the first instance, to be nonsensical but nonetheless true observations of the way matter behaves.

The current dissertation, however — as a subjective phenomenological inquiry into the experience of directional motion in music — does not contribute to this process. Nor is it necessary to do so. Such an outrageous proposition was made more than a hundred years ago and remains, in principle, the current status quo of theoretical physics.

As noted in the Conceptual Map, this dissertation is not, however, about quantum mechanics or even physics. It simply borrows terms from these disciplines to investigate and describe a subjective

⁴³³ As graphic representations of temporality, such visual symbols are distinct from graphic scores. Both, however, share this property of musical directness and immediacy. Referencing examples such as Roman Haubenstock-Ramati's *Poetics I and II* for James Joyce (1971–1973) and *Act-if* (1971–1973), Feisst describes the place of such graphic scores as they are situated within “open form” compositions in general (Feisst, *Negotiating Freedom and Control in Composition*, 213).

⁴³⁴ Rosenblum and Kuttner, *Quantum Enigma*: 4.

⁴³⁵ Rosenblum and Kuttner, *Quantum Enigma*, 53.

⁴³⁶ Rosenblum and Kuttner, *Quantum Enigma*, 6.

⁴³⁷ Rosenblum and Kuttner, *Quantum Enigma*, 99–115.

phenomenological experience — the subject of the research question — the nature of the experience of directional motion in music.

The mechanics of music

The relationship between physics and music is certainly not new. It dates back at least to Pythagoras, culminating like many other scientific discoveries in the renaissance and pre-empting the age of reason. Most notable of these is Kepler's *musica universalis* — the music of the spheres.⁴³⁸

The phenomenological mechanics of music

The phenomenological mechanics of music is the central area of the dissertation's inquiry. It is presented and explored mainly in the primary RPs, which address the research area of music as phenomenological mechanics.

After presenting the concept of phenomenological mechanics more broadly, the dissertation presents in its primary RPs examples of its application to music. These are:

- The proposition that musical form and compositional processes are comparable with the laws of nature, in particular:
 - Newton's third law of motion — the law of *action and reaction*
 - The first law of thermodynamics — the law of *conservation of energy*
 - The second law of thermodynamics — the law of *order and chaos*.
- The proposition that musical temporalities are comparable with paradigms of science. This concept is examined in the dissertation, and in the form of visual representations of Fraser's canonical forms of time, extended, and — with the intent of making such concepts simple and readily applicable to improvised music — represented in the visual translations of Fraser's concepts (see Figure 16 in Chapter 1).

Conceivably, there are many other applications of phenomenological mechanics to musical composition, improvisation, and analysis.

The intercultural phenomenological mechanics of music

In Chapter 1, I proposed that Western and Eastern musical forms are metaphors for their respective representations of time as linear and cyclic. Such a proposition spans from *Research Area 1: Music as phenomenological mechanics* to *Research Area 2: Composition as intercultural metaphor*.

Furthermore, the graphic representations of contrasting Western and Eastern musical forms — *helix* and *vortex*, respectively — extend this concept to the tertiary RPs.

Finally, in how the major artefact *Oscillation 1* exemplifies and represents these concepts metaphorically, this proposition extends to the exegesis RPs as well.

With such a broad representation across the dissertation's RPs, it is worthwhile reiterating the question that arises from such a proposition and responding to it. Accordingly, quoting directly from Chapter 1, the dissertation's position is as follows:

Regarding the proposed anthropological mechanism as to why musical form should coincide with paradigmatic concepts of time, it is notable what Clayton considers to be the most convincing explanation of this relationship. According to Clayton, the best

⁴³⁸ Strogatz, *Infinite Powers*, 48–49, 84; Kepler, *The Harmony of the World*, 127–255.

explanation is that provided by Rowell — that of *mutual feedback* between musical concepts and broader paradigmatic concepts such as time. Clayton describes these mutual feedback processes as “resonances” between a musical tradition and its controlling ideology.

Phenomenological mechanics — further interdisciplinary applications

The concept of phenomenological mechanics, as presented, is a broad idea.

In this dissertation, I have explored the usefulness of this concept to music as a means of conceptualising and communicating a phenomenological experience of musical motion. As Clayton rightfully notes, the cycle — or any characterisation of musical movement — is a “spatial-temporal metaphor” ... no more a cycle or a wheel ... than it is a ruler or tape measure”.⁴³⁹ The experience of direction in music is thus none other than an elaborate phenomenologically accommodated and generally culturally shared illusion.

The application of concepts of phenomenological mechanics to characterise and communicate such “illusions” — or more generously, *phenomenological constructions* of movements forwards (as development) or backwards (as resolution) — is nonetheless, a relatively simple and useful conceptual tool.

One of the major advantages of communicating such concepts is that such a tool — or more precisely, *toolkit* — characterises abstract concepts such as the nature of musical motion in terms of familiar and relatively more tangible concepts — namely, the terms, laws and principles of mechanics. In so doing, it provides a familiar language for the communication of highly abstract concepts, thus translating their esotericism into a system of concepts — mechanics — whose terms are common, grounded, and understood with a high level of consensus.

Such an application, though relevant to music, also has the potential for interdisciplinary application. This would seem to be particularly so for fields within fine arts where any discipline or study that includes the phenomenological experience of time or motion can equally have applied to it the concepts of phenomenological mechanics. In fine arts, this includes any artistic endeavour for which time plays an integral part, including *literary narrative* (as shown by Kermode’s examples), *film and multimedia* (as demonstrated in the music video that accompanies the abridged version of *Oscillation 1*), and performance art. Such further applications are limited only by the imagination of future researchers and artists.

⁴³⁹ Clayton, *Time in Indian Music*, 18–19.

CHAPTER 4: SUMMARY AND CONCLUSION

Reprisal of Sources — Physics, Phenomenology, and Music

Situated in the literature, the mechanics of this dissertation arise principally from the work of Brian Greene, especially as presented in *The Fabric of the Cosmos*. The specific concepts of quantum mechanics, as applied to the dissertation, arise mainly from the work of Bruce Rosenblum and Fred Kuttner in *Quantum Enigma: Physics Encounters Consciousness*.

As the mechanics relate to the experience of directional motion in music, the dissertation begins with Zuckerkandl's (1956) *wave theory of metre* as described in *Sound and Symbol: Music and the External World*.

The concept of interculturality, as it applies to music, has arisen from the work of Martin Clayton, especially *Time in Indian Music: Rhythm, Metre, and Form in North Indian Rag*.

Phenomenological concepts, as they relate to music, have arisen directly or by implication and interpretation from the work of John Cage, including *Composition in Retrospect and Silence: Lectures and Writings*.⁴⁴⁰

Concepts of linearity and cyclicity of time have arisen principally from the work of Jonathan Kramer, particularly in *The Time of Music: New Meanings, New Temporalities, New Listening Strategies*.

Concepts of interdisciplinarity — between physics, phenomenology and music — have arisen primarily from the work of J.T. Fraser, including in “Human Temporality in a Nowless Universe”, *The Genesis and Evolution of Time: A Critique of Interpretation in Physics*, and *The Study of Time III: Proceedings of the Third Conference of the International Society for the Study of Time*.

Concepts of control and freedom in improvisation have arisen primarily from the work of Sabine Feisst in “Negotiating Freedom and Control in Composition: Improvisation and Its offshoots, 1950 to 1980”.

Scope and Processes

In essence, this dissertation comprises the following scope and processes:

1. An inquiry into my own experience of music — specifically, the experience of directional movement in music.
2. The positing of the research question: *What is the nature of the experience of directional motion in music, and how can this experience be conceptually represented?*
3. The conducting of a thought experiment as a phenomenological inquiry into this question.
4. Based upon this thought experiment, the generation of a conceptual model for the experience of directional motion in music — as represented in RP 1A.
5. A consideration of how this experience of directional motion is different in Western and Eastern cultural settings, and the representation of this contrasting experience in terms of

⁴⁴⁰ John Cage, *Composition in Retrospect and Silence: Lectures and Writings* (Middletown, Conn.: Wesleyan University Press, 1961).

contrasting Western linear and Eastern cyclic concepts of time, as represented within the conceptual model.

6. The characterisation of Western and Eastern philosophy, culture and musical forms in terms of contrasting Western and Eastern paradigmatic representations of the relationship between form and void — specifically as *form-versus-void mutual exclusivity* and *form-void mutual inclusivity*, respectively.
7. A proposed representation of this observation, expressed in terms of the conceptual model.
8. A review of the literature as it relates to the ideas that arose from the thought experiment.
9. The generation of theoretical research propositions in relation to this research question, progressively developed through primary, secondary, and tertiary phases.
10. The composition and improvisation of a major and minor artefact as metaphors for or examples of the concepts of these research propositions (or both).
11. During production of the artefacts, the establishment of physically achievable paired tunings for tabla and bayan drums, which permitted playing in 12 major keys.
12. During production of the artefacts, the design, construction and recording of two new guitar configurations — the 8-string regular interval guitar and the 6-string fretless octave guitar.
13. During production of the artefacts, the demonstration of the concept of *equi-harmonic* composition — that is, a composition whose harmonic movement is equally distributed across all 12 keys.
14. The consideration of the artefacts in a historical and theoretical framework incorporating the dissertation's theoretical work.
15. The integration of the dissertation's concepts originating in physics and phenomenology into a single conceptual discipline that I have called "phenomenological mechanics".
16. A consideration of the application, relevance and utility of the concept of phenomenological mechanics — as applied to music — including in relation to the original research question and, more broadly, to other disciplines.
17. Specifically, as the application of phenomenological mechanics applies to music, as a characterisation of musical development and musical resolution as, respectively, *negatively* phenomenologically energetic and phenomenological entropic, and *positively* phenomenologically energetic and phenomenological entropic, transformations of musical states, in accordance (analogously) with the first and second laws of thermodynamics — the laws of *conservation of energy* and of *order and chaos*. (The glossary further defines these terms.)
18. The novel characterisation of minimalism, as it applies to music and to the fine arts more generally, as a compositional method that attributes the same compositional significance to void as it does to form.
19. The generation of visual representations of Fraser's canonical forms of human temporality for the purpose of exploring musical improvisation in alternative temporalities.

20. The novel conceptual definition of musical development in terms of “phenomenological musical development” — where D is musical development, F(p) is phenomenological force and s (p) is phenomenological displacement: $D [\text{Development}] = F(p) \times s (p)$.
21. The generation of geometrical models of Western and Eastern musical form as helix and vortex and the representation within these models of the concepts of horizontal and vertical phenomenological time, vectorial development, and development by intensification, as well as composition by creation versus composition by discovery and revelation.

Major Findings and Applications

The dissertation’s major findings for each of the 12 RPs may be gleaned from Table 1. The concepts described have application to the analysis and performance of music in the manner described in Chapter 3. The dissertation applies these theories to both composed and improvised music.

Conclusion

Exploring concepts from mechanics could potentially inform the research question: *What is the nature of the experience of directional motion in music?* This dissertation is preliminarily founded on the work of Zuckerkandl — specifically, in an analysis of the implicit vectoriality of *motion* within Zuckerkandl’s description of metre as below:

[Regarding 2/4 metre] To be able to come back, one must first have gone away; now we understand why we count one-two, and not one-one. Here “two” does not simply mean “beat number 2” but also “away from”.⁴⁴¹

In further investigating this concept, the dissertation has traversed associated concepts arising in the areas of phenomenology, interculturality, and interdisciplinarity, as these relate to music and as characterised by the dissertation’s principally cited theorists in these areas — Cage, Clayton, and Kramer, respectively. The outcome of this inquiry was a return to the concepts from mechanics, arriving at the end of this research journey with the interdisciplinary work of Fraser, whose levels of human temporalities link and inter-relate concepts from physics, phenomenology, and music.

The intent of Fraser’s concepts would seem to be far-reaching. In the words of ethnomusicologist Bruno Nettl, Fraser’s intent appears to be, in some ways, a search for universals.⁴⁴²

Common to all inquiries that cross intercultural boundaries, however — either intentionally or implicitly — such inquiries are subject to methodological limitations that make such universality near impossible. Fraser’s perspective is thus (like my own) a study of intercultural concepts viewed, however, from a primarily Western methodology — that of mechanics. Fraser’s concepts thus align well with the central concept I have proposed in the dissertation — that of phenomenological mechanics.

Time as the subject of Fraser’s inquiry is inherently an intercultural one. Fraser’s levels of temporality thus accord with relative ease with the concept of Western linear and Eastern non-linear (i.e., cyclic) concepts of time, as represented in the final summarising figure of the dissertation — Figure 35. The

⁴⁴¹ Zuckerkandl, *Sound and Symbol*, 168, quoted in Clayton, *Time in Indian Music*, 20.

⁴⁴² Bruno Nettl, “The Universal Language: Universals of Music.” Chapter in Bruno Nettl, *The Study of Ethnomusicology: Thirty-one Issues and Concepts* (University of Illinois Press, 1983, 2005).

figure shows RPs 3A and 3B representing contrasting Western and Eastern musical forms as helix and vortex.

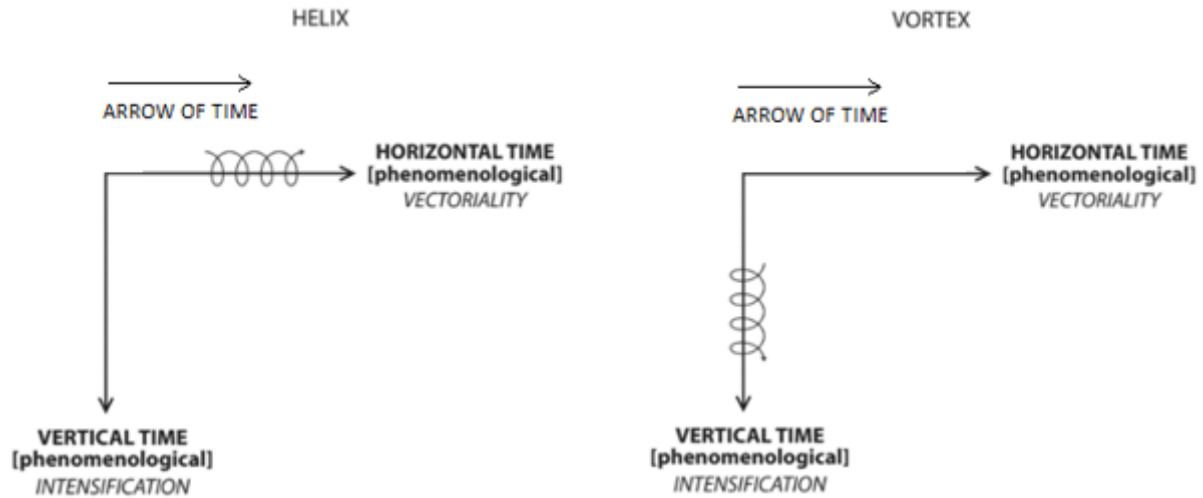


Figure 35: Summary of models

Regarding this, Fraser’s pinnacle level of hierarchical classifications of time as it relates to music is that of *nootemporality*, which aligns well with the current dissertation’s concept of *Westernness* as this informs Western music. This is so because nootemporality is characterizable “as the time consciousness of [modern] man, and as having the musical expression of linearity”.⁴⁴³

Conversely, the level of Fraser’s hierarchical representation of time that most directly correlates with the concept of Eastern cyclic time, as proposed by theorists such as Clayton, Deshpande, and Pressing, would seem to be that of *biotemporality*. The most significant characteristic of time at this level is being in the *present*; its associated musical metaphor is one of “nondirected linear time, in which one event progresses to another, yet there is no large-scale sense of direction”.⁴⁴⁴ In that sense, Fraser’s concept of biotemporality is arguably both *non-linear* and *non-vectorial*.⁴⁴⁵

Such a description aligns well with Clayton’s description of North Indian classical music’s linearity at the local level of metre, which lacks the teleological *large-scale*⁴⁴⁶ global linearity that characterises Western music.

Further, Fraser characterises biotemporality as lacking rational thought and long-range prediction and calls it “hierarchically organized”.⁴⁴⁷ He presents a model constructed significantly from phenomenological mechanics, including rudimentary phenomenological concepts such as phenomenological time and phenomenological motion.

⁴⁴³ Kramer, *The Time of Music*, 396.

⁴⁴⁴ Kramer, *The Time of Music*, 396.

⁴⁴⁵ This would seem to be the case, regardless of the observation that Fraser describes the temporality of biotemporality as one of linear time because the statement is qualified with the caveat that such linearity of time is *nondirected* (thus non-vectorial) and despite one event “progress[ing] to another, there is no large-scale sense of direction” (Kramer, *The Time of Music*, 396).

⁴⁴⁶ Clayton, *Time in Indian Music*, 25.

⁴⁴⁷ Kramer, *The Time of Music*, 396. In referencing biotemporality as the *umwelt* of animals, such a description does not necessarily imply judgment. Rather, one gets the impression that by using this expression Fraser is aiming to capture the pre-intellectuality and perpetual state of the present that humans attribute to animals — a state (because Fraser’s levels are nested within one another) that is also available to human experience.

Fraser's concepts extend, however, further than this — in two distinct directions. Firstly, his classification system not only describes mechanics concepts in terms of the phenomenological representations (phenomenological time, phenomenological motion etc.) but also in terms of the *relationships* that connect such concepts. In that manner, Fraser's concepts are reminiscent of the natural laws — *action and reaction*, *conservation of energy* and *order and chaos* — that characterise the central concept of phenomenological mechanics.

Secondly, and more deeply, however, Fraser's representations of time also describe such relationships in terms of the broader scientific *paradigms* within which such relationships are held to be true.

Final summarising concept — the known and the unknown

As an example of this, Fraser associates the concept of musical linearity with *nootemporality*, within the scientific paradigm of psychology. Conversely, Fraser associates musical *atemporality* within the scientific paradigm of Einstein's Special Theory of Relativity.

Whereas the former of these is implicitly a relationship of linear causation at the human scale — in the manner of classical Newtonian mechanics — the latter invokes the unknown on a cosmically almost unimaginable scale. The former is consistent with a deterministically predictable universe, while the latter begets a universe defined by the boundaries of imagination.⁴⁴⁸

Considered in these terms, the composition and improvisation of music may be written, performed, and analysed within an infinite choice of positions between these extremities of the known and the unknown. Such concepts accord with Sabine Feisst's representation of improvised music as the inherent tension between the musical processes of *control and freedom*.⁴⁴⁹

⁴⁴⁸ Strogatz, *Infinite Powers*, 281–282.

⁴⁴⁹ Feisst, "Negotiating Freedom and Control in Composition," 209–229.

APPENDICES

Appendix 1: List of Artefacts

Composition: <i>Oscillation 1</i> – for 12-drum tabla set and 8-string regular interval guitar	1. Full Manuscript (277 pages, 6384 bars) 2. Lead sheet and chord chart for guitar (4 pages, 168 bars) 3. Audio recording (1 hour 54 minutes) Note: A (non-examinable) abridged (1 hour) music video version of the composition is also included as an example of application of the compositional concepts to other media (video) — a subject for further research.
Improvisation: <i>Beginner's Mind</i> – for fretless octave guitar	4. Audio recording (5'56")
New/Modified Instruments	5. 8-string regular interval guitar – photograph and tuning 6. 6-string fretless octave guitar – photograph and tuning 7. 12-drum harmonic tabla set – photograph and tuning

Appendix 2: Form and Void — Western and Eastern Perspectives — Dualism and Monism

This appendix lists the characterisations of form and void across music composition disciplines, as I understood these characterisations to be before starting to draft the dissertation.

The suppositions accord with the usual definition of “supposition” as something that is held as an opinion.⁴⁵⁰ They are not presented as provable or disprovable positions. Rather, they are presented in two capacities. The first of these represents the concepts of *Westernness* and *Easternness*, as I have understood them in my experiences as a student of philosophy, science and music in Western and Eastern cultural environments. The second is the way Kramer characterises knowledge as it relates to music — that its purpose is not to be right but to “open up discussions, avenues of thought, and modes of perception”.⁴⁵¹

The disciplines the suppositions relate to are ontological philosophy, epistemology, cultural mythology, science and empiricism, language and linguistics, mathematics, geometry, perceptual psychology, art theory and compositional aesthetics, and ethnomusicology.

Within each of these selected music-influencing disciplines, the suppositions summarise how the Western *mutually exclusive* concept of *form-versus-void* and the Eastern *mutually inclusive* concept of *form-void* manifest in the Western and Eastern characterisations of the selected disciplines.⁴⁵²

The background research for the current dissertation began here with this list of suppositions. The purpose of the list was to capture the concepts of *Westernness* and *Easternness* by examining the relationship between form and void, as it manifests in Western and Eastern musical forms and related disciplines that inform and influence Western and Eastern music.

The decision to try to capture the essence of the Western-Eastern distinction via examining the concept of form and void was considered appropriate for the following reasons.

The concept of form-versus-void is an essential and enduring one, albeit implicit, in *the experience of being a human in the world*. In the same way that Heidegger notes (as referenced in Chapter 3) that “temporality gets experienced in a phenomenally primordial way”, form and void are also experienced in a *primordial way*.⁴⁵³

To that extent, it is possible to examine the essential *Westernness* and *Easternness* of Western and Eastern paradigms through the lens of the contrasting way the concepts of form and void are represented. Thus, the ways in which Western and Eastern paradigms represent the concepts of form and void provides a conceptual mechanism for analysing Western and Eastern music.

Hoffman describes this relationship between culture and music as “the way in which a person knows music is not different from the way he knows in general”.⁴⁵⁴ Because of its *primordial* nature, the way a person *knows form and void* is the way a person knows *in general* and the way a person *knows*

⁴⁵⁰ Merriam-Webster dictionary: <https://www.merriam-webster.com/dictionary/supposed> Definition 2a.

⁴⁵¹ Kramer, *The Time of Music*, viii.

⁴⁵² The disciplines chosen are not intended to be an objective or definitive list of music-influencing disciplines. Rather, in the manner of Wittgenstein’s concept of *family resemblances* (quoted in Dupre, *50 Philosophy Ideas*, 147), the selected disciplines are proposed as belonging to a group or family of disciplines that inform musical composition in related but different ways. They are proposed as one of several such selections that may be considered reasonable for this purpose.

⁴⁵³ Heidegger, *Being and Time*, 304.

⁴⁵⁴ Hoffman, “Epistemology and Music,” 69, quoted in Clayton, *Time in Indian Music*, 10.

music. Thus, the distinction between Western and Eastern ways of seeing things is profoundly reflected in the distinction between Western and Eastern representations of the form-void relationship.⁴⁵⁵

In summary, the distinction may be characterised as follows: in the Western paradigm, the relationship between form and void is one of *mutual exclusivity* — the Western paradigm is *dualistic and materialist*. Conversely, in the Eastern paradigm, the relationship between form and void is one of *mutual inclusivity* — the Eastern paradigm is *monistic and idealist*.

List of suppositions

1-(i) Within the domain of philosophy, specifically ontology, an essential ontological difference between Eastern and Western dominant paradigms regarding form-versus-void is:

S1 [1-(i)-(a)]: Ontologically, Western philosophies are characterised by *materialism* — that is, by the proposition that an external universe exists, independent of one's perception of it.

Subsequent definitions of form and void:

S2 [1-(i)-(a)]: In Western philosophies, *form* (that which exists) has independent material existence. *Void* (that which does not exist) does not have independent material existence.

S3 [1-(i)-(b)]: Ontologically, Eastern philosophies are characterised by *idealism* — that is, by the proposition that an internal universe exists, and that this universe is the same as one's perception of it.

S4 [1-(i)-(b)]: In Eastern philosophies, *form* (that which exists) is perceived or experienced by the perceiver to exist. *Void* (that which does not exist) is not perceived or experienced.

1-(ii) Within the domain of philosophy, specifically epistemology, an essential epistemological difference between Eastern and Western dominant paradigms regarding form-versus-void is:

S5 [1-(ii)-(a)]: Epistemologically, Western philosophies are characterised by *materialism* — that is, by the proposition that the properties of the (external) universe exist independently of an observer's perception.

Subsequent definitions of form and void:

S6 [1-(ii)-(a)]: In Western philosophies, *form* (that which exists) has independent stable external properties that are independent of their perception by a perceiver. *Void* (that which does not exist) does not *externally* exist and does not have independent stable external properties that are independent of their perception by a perceiver.

S7 [1-(ii)-(b)]: Epistemologically, Eastern philosophies are characterised by *idealism* — that is, by the proposition that the properties of the (internal) universe are the same as one's perception of such properties.

Subsequent definitions of form and void:

S8 [1-(ii)-(b)]: In Eastern philosophies, *form* (that which exists) has properties that are the same as the perceiver's perception of such properties. *Void* (that which does not exist) is not experienced or perceived and does not have such properties.

⁴⁵⁵ See <https://www.vocabulary.com/dictionary/paradigm>

2. Within the domain of cultural mythology, an essential difference between Eastern and Western dominant paradigms regarding form-versus-void is:

S9 [2-(a)]: Western cultural mythologies are characterised by *dualism* — that is, by the proposition that the universe exists in two distinct forms: (i) a form that is *self* and (ii) a form that is *not-self*. In other words, Western cultural mythologies are characterised by the proposition that the universe exists in two distinct forms — the form of *self* and the form of *other*.

Subsequent definitions of form and void:

S10 [2-(a)]: In Western cultural mythologies, *form* (that which exists) exists in one of two forms: either (i) in the form of “self” or (ii) in the form of “not-self”. *Void* (that which does not exist) does not exist in either of these forms — neither (i) as self nor (ii) as not self. Void is thus separate and distinct from form.

S11 [2-(b)]: Eastern cultural mythologies are characterised by *monism* — by the proposition that the universe exists in a *single form only*.

Subsequent definitions of form and void:

S12 [2-(b)]: In Eastern cultural mythologies, all is form. Void is contained within form and is not separate from form.

3. Within the domain of science and empiricism:

S13 [2-(a)]: In Western science and empiricism, the essential difference between Western and Eastern perspectives regarding form-versus-void is that Western science, being founded on the principle of *objective extrospective verification*, uses *objective extrospection* to verify the properties of a universe presupposed to exist external to the observer.

Subsequent definitions of form and void:

S14 [3-(a)]: In Western science and empiricism, *form* is verifiable by objective extrospection to exist external to the observer. *Void* is verifiable by objective extrospection to *not* exist external to the observer.

S15 [3-(b)]: Eastern empiricism (i.e., Eastern science), being founded on the principle of *subjective introspective verification*, uses *subjective introspection* to verify the properties of a universe presupposed to exist within and be *synonymous with the existence of* the observer’s perception of this universe.

Subsequent definitions of form and void:

S16 [3-(b)]: In Eastern science and empiricism, *form* is verifiable by subjective introspection to exist within the observer’s perception. *Void* is verifiable by subjective introspection to *not* exist within the observer’s perception.

4. Within the domain of language and linguistics, an essential difference between Eastern and Western perspectives regarding form-versus-void is:

S17 [4-(a)]: Reflecting a philosophy of *dualistic materialism*, Western language, rather than being absolute, is comparative and referential (i.e., *relative*). This means that descriptive parameters (adjectives) conceptually have opposites (big exists relative to small, light to dark, good to evil etc.).

Subsequent definitions of form and void:

S18 [4-(a)]: In Western language and linguistics, *form* (that which exists) exists relative to void (form being the relative absence of void). *Void* (that which does not exist) exists relative to form (void being the relative absence of form).

S19 [4-(b)]: Reflecting a philosophy of *monistic idealism*, Eastern language (in particular, Sanskrit) is *absolute* such that descriptive concepts exist independently of a comparative reference (e.g., इन्फिनिटे [infinite], एन्लिच्तेनेद [enlightened], दिविने [divine]).

Subsequent definitions of form and void:

S20 [4-(b)]: In Eastern language, *form* (rather than being relative to void) contains and accommodates void. *Void* (rather than being relative to form) exists within and is accommodated by form.

5. Within the domain of mathematics and geometry, an essential difference between Eastern and Western perspectives regarding form-versus-void is:

S21 [5-(a)]: Reflecting a philosophy of dualistic materialism, the dominant paradigm in Western mathematics and its associated geometry is one of *binary* mathematics.

Subsequent definitions of form and void:

S22 [5-(a)]: In Western mathematics and geometry, *form* is that which is not void, and *void* is that which is not form. (Reflecting a philosophy of *dualistic materialism*, form is representable mathematically by the binary digit “1”. Void is representable by the binary digit “0”).

S23 [5-(b)]: Reflecting a philosophy of *monistic idealism*, the dominant paradigm in Eastern mathematics and its associated geometry is one of *unitary mathematics* (i.e., mathematics and geometry are characterised by an indivisible whole).

Subsequent definitions of form and void:

S24 [5-(b)]: In Eastern mathematics and geometry, *form* (rather than being distinct from void) contains and accommodates void. Reflecting a philosophy of subjective monism, in Eastern mathematics and geometry, form is representable by the number “infinity”. *Void*, being contained within form, does not have a separate mathematical representation; rather, void is accommodated within the mathematical representation of form as the number “infinity”.

6. Within the domain of perceptual psychology, an essential difference between Eastern and Western perspectives regarding form-versus-void is:

S25 [6-(a)]: Reflecting a philosophy of *dualistic materialism*, Western perceptual psychology seeks to explain the properties of (objective, external) form — that is, the properties of the external world in terms of the *influence of external stimuli upon perception*, particularly the mechanisms by which external stimuli “distort” the perception of the “true” properties of the external world.

Subsequent definitions of form and void:

S26 [6-(a)]: In Western perceptual psychology, *true void* (external, objective) begets *true form* (external, objective). In other words, the (conscious and actively perceived) perception of true (objective, external) form is contingent upon the (unconscious and passively perceived) perception of true (objective, external) void. Form cannot be accurately perceived (in the *external* world) unless it is perceived within the context of true void (i.e., in the absence of *externally* distorting influences).

Concomitantly, it follows that (unconscious and passive) perception of true void (objective, external) is contingent upon (active and conscious) perception of true form (objective, external).

S27 [6-(b)]: Reflecting a philosophy of *idealistic monism*, Eastern perceptual psychology seeks to explain the properties of (subjective, internal) form (i.e., the properties of the internal world) in terms of the *influence of internal stimuli upon perception*.

Subsequent definitions of form and void:

S28 [6-(b)]: In Eastern perceptual psychology: *true void* (internal, subjective) begets *true form* (internal, subjective). In other words, the (conscious and active) perception of true (subjective, internal) form is contingent upon the (unconscious and passive) perception of true (subjective, internal) void — that is, form cannot be accurately perceived (in the *internal* world) unless there is true void (i.e., no *internally* distorting influences).

Similarly, a “truly” red apple only *appears* as a red apple if its void (in this case, the background *internal* psychological state of the perceiver) is true void (empty and without influence upon perception). If the void for instance is not true void (e.g., the mind is angry), the apple is not perceived as having true form (simply redness); rather, its appearance includes the projections and distortions that the perceiver projects upon and assigns to the object. The perceiver thus sees the apple in a subjectively distorted way (e.g., as being a gratification of hunger, a symbol of temptation, a potential weapon etc.). The same applies to aural perception within musical composition, to be elucidated later.

Concomitantly, (unconscious and passive) perception of true void (subjective, internal) is contingent upon the (active and conscious) perception of true form (subjective, internal).

7-(i) Within the domain of art theory and compositional aesthetics, an essential difference between Western and Eastern perspectives regarding form-versus-void is:

S29 [7-(i)-(a)]: Western art theory, reflecting a philosophy of dualistic materialism, conceives of art as a creation (art) by a creator (artist) whose nature (self) is different from the nature of the art created (not-self). The creation of art as something that is “not self” is thus metaphorically consistent with the Western artist’s own cultural mythology.⁴⁵⁶

Subsequent definitions of form and void:

S30 [7-(i)-(a)]: In Western art theory, *form* is that which, within an artwork, is the perceivable consequence of the active and deliberate action of the artist to impose within the physical space (visual-spatial or, in the case of music composition, sonic-temporal), before creating the art, an action that has the intent of being creative and original.

Void is the physical empty space or *tabula rasa* (spatial or aural/temporal or both) within which art can be created by an artist.

S31 [7-(i)-(b)]: Eastern (specifically Indian) art theory, reflecting a philosophy of *idealistic monism*, conceives of art not as a creation (by an individual of *something* new and original) but rather, as a *distillation* of a new variation from a pre-existent and perfect source.

Subsequent definitions of form and void:

S32 [7-(b)-(i)] In Eastern art theory, form is *manifested void*. Void is *unmanifested form*. Form is thus that which is distilled from a pre-existent source into a (humanly) perceivable form. In so doing, it manifests the previously invisible (void) as apparent (form). Void *existing within* form is unmanifested form (and not apparent to the senses).⁴⁵⁷

⁴⁵⁶ Refer to **S9** [2-(a)].

⁴⁵⁷ Refer to **S20**.

7-(ii) Within the domain of art theory and compositional aesthetics, an essential difference in compositional aesthetics between Western and Eastern perspectives regarding form-versus-void is:

S33 [7-(a)-(ii)]: Western compositional aesthetics (particularly formalist aesthetics — Kant, Gerard, Beardsley etc.⁴⁵⁸) consider the aesthetics of an artwork to be the aggregate of its contributing aesthetics-determining parameters.

Subsequent definitions of form and void:

S34 [7-(a)-(ii)]: In Western compositional aesthetics, *form* is the perceivable consequence of the artist's deliberate intention to impose on the physical space (visual-spatial or, in the case of music composition, sonic-temporal), before creating the art, an action that, relative to the space left empty (i.e., void), is proportionate. The balance between form and void, for each of the artwork's aesthetics-determining parameters, produces artwork of maximal aesthetic quality. See Beardsley's, "three criteria for aesthetic value".⁴⁵⁹

Void is that which is (intentionally) left to remain (spatially or, in the case of music, sonically) empty such that the balance between form and void, for each of the aesthetics-determining parameters, produces an artwork of maximal aesthetic quality.

S35 [7-(b)-(ii)]: Eastern (in particular) Indian aesthetics considers the aesthetics of an artwork as the artwork's power to induce in the observer or listener (transcendental) "spiritual or philosophical states".

Subsequent definitions of form and void:

S36 [7-(b)-(ii)]: In Eastern compositional aesthetics, *form* is that deliberate *action* within an artwork that, via its state of compositional balance with void, serves the purpose of inducing (transcendental) spiritual or philosophical states.

Void is that deliberate *absence of action* within an artwork that, via its state of compositional balance with form, serves the purpose of inducing (transcendental) spiritual or philosophical states.

8. Within the domain of ethnomusicology, an essential difference between Western and Eastern music regarding form-versus-void is:

S37 [8-(a)]: Reflecting a philosophy of materialistic dualism⁴⁶⁰ and a cultural mythology that presupposes the fundamental duality of nature between the creator and the created — refer to propositions S9 [2-(a)] and S10 [2-(a)] — and thus the separation between self and other (and between artist and art) ethnomusicologically, Western music may be characterised as an expression by a creator (artist/composer) of a creation (art/composed music) such that the creation (art/composed music) is fundamentally different in nature and separate from the creator/composer.

Subsequent definitions of form and void:

S38 [8-(a)]: *Form* in Western music is the musical invention of a composer, materialised in the external world, as musical art. *Void* in Western music is the physically empty (or *tabula rasa*) sonic-

⁴⁵⁸ In the case of Gerard, the aesthetics of an artwork is the aggregate of its simplicity, variety, and uniformity (uniformity being defined as the "similarity of its correspondent parts"). See <http://faculty.philosophy.umd.edu/jhbrown/Uniformity/index.html>

In the case of Beardsley, an artwork's aesthetics are the aggregate of its three canons of aesthetics (i.e., its intensity, complexity, and unity). William C. Child, "Monroe Beardsley's Three Criteria for Aesthetic Value: A Neglected Resource in the Evaluation of Recent Music," *Journal of Aesthetic Education* 34, no. 2 (2000): 49–63.

⁴⁵⁹ William C. Child, "Monroe Beardsley's Three Criteria for Aesthetic Value: A Neglected Resource in the Evaluation of Recent Music," *Journal of Aesthetic Education* 34, no. 2 (2000): 49–63.

⁴⁶⁰ Refer to propositions S1 [1-(i)-(a)], S2 [1-(i)-(a)], S5 [1-(ii)-(a)], and S6 [1-(ii)-(a)]

temporal space within the external world, into which music can be physically materialised after its invention by a composer.

S39 [8-(b)]: North Indian classical music reflects a philosophy of *idealistic monism*⁴⁶¹ and cultural mythology that presupposes the *singularity* of the nature of the one who creates (with the form of “self”) and what is created (also with the form of self, but appearing as other).⁴⁶² It may be characterised ethnomusicologically as a *distillation* by an artist from a pre-existing source of, or *potential for*, manifested music (whose fundamental nature is *the same as* the artist’s) of a new manifested variation from within what *pre-exists its apparent creation* (albeit unmanifested).⁴⁶³

Eastern (particularly North Indian classical) music, when being played by an artist, be that by composition or improvisation, is thus not (in the Western sense) an *invention*. Nor is it a creation manifested into an external realm separate from the realm of self. Rather, it is a *discovery* discovered in an existing singular universe. This singular universe is common to and includes both the self (creator/artist) and the music (creation/art).

Subsequent definitions of form and void:

S40 [8-(b)]: *Form* in North Indian classical music is manifested musical variation, *discovered* by the composer/musician from within an existing singular universe that includes both the artist (composer/musician) and the art (composition/music) during the process of composition or improvisation.

Void is unmanifested musical variation, yet undiscovered.

⁴⁶¹ Refer to propositions **S3** [1-(i)-(b)], **S4** [1-(i)-(b)], **S7** [1-(ii)-(b)] and **S8** [1-(ii)-(b)]

⁴⁶² Refer to propositions **S11** [2-(b)] and **S11** [2-(b)]

⁴⁶³ “A rag is pre-existent” — Clayton, *The Time of Music*, 14.

Appendix 3: Time and Motion — Western and Eastern Perspectives — Train Journey as Allegory

Eastern and Western perspectives of time and motion

In this appendix, the proposed contrasting experiences of directional motion in Western and Eastern musical forms — and their correlation with Western linear and Eastern cyclic concepts of time — is allegorically represented by the contrasting experiences of motion on a train, from Western and Eastern perspectives.

In presenting this allegorical representation, two contrasting perspectives of motion are presented — those of a fictional *Western commuter* and a fictional *Indian conductor*.

In relation to the dissertation's listed RPs, the train journey analogy addresses RP 1A, RP 1B (Corollary), and RP 2A. The allegory also demonstrates the theoretical concepts on which RPs 3A and 3B (i.e., the application of concepts to the performance of music) are based.

It is noteworthy that allegory is a demonstrative literary device. It is used here strictly within this capacity — that is, to demonstrate a concept. There is no intention to use it to prove any proposition in any literal sense.

Why an allegory?

The purposes of the allegory are multiple.

Comparing the experience of musical motion with the experience of travel provides a way of contrasting implicit understandings of motion within Western and Eastern paradigmatic frameworks, particularly regarding monistic and dualistic concepts of time, and linear and cyclic concepts of Western and Eastern time and motion.

In the case of the Western commuter, the use of allegory permits the demonstration of RP 1A — the concept that experience of direction in music is representable as a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field*.

In particular, the example provides an allegorical demonstration of specific concepts of the model — those of *phenomenological determination* and *hierarchical organisation of form-void vectors*, which collectively may be considered a *vector field* whose net direction and magnitude is conceptually representable in terms of vector addition.⁴⁶⁴

The phenomenological experience of musical direction as being either forward moving (in a state of development) or backwards moving (in a state of resolution) based upon the vectorial addition of the contributing form-void vectors is a concept that lends itself to allegorical representation in terms of movement within the material realm — for example, the experience of movement on a train journey. The allegory thus also lends itself to demonstration of RP 1B (Corollary).

Correlation between Primary RP 1A and Appendix 7

Appendix 7 is an analysis of the submitted creative work *Oscillation 1* in terms of the components of RP 1A (i.e., phenomenological determination, hierarchical organisation, multi-parameter contribution,

⁴⁶⁴ The concept of multiparameter contribution is not demonstrated in the example. In theory the allegory could also include a *stationmaster's* perspective — that is, the inclusion of multiple trains representing the multiple parameters of musical parameters that are representable as form-void vectors (the parameters of metre, melody, harmony, and, in more complex musical organisation, modulation and global form).

and representation of the experience of vectoriality in terms of form-void couplet cells), collectively representable as a *vector field*.

The representation of form-void vectorial motion on the train journey described in the allegory as it is from the Western commuter's perspective is thus comparable to the form-void vectorial motion described in the analysis of directional motion in the artefact, *Oscillation 1*, as described in Appendix 7.

Demonstration of concepts of Secondary RP 2A

Secondary RP 2A proposes that Western and Eastern musical forms may be considered metaphors for Western dualistic and linear concepts of time and Eastern monistic and cyclic concepts of time.

In reflecting the concepts in Secondary RP 2A, the allegory illustrates the concepts of Western *form-void duality, finiteness, teleologicality reproducibility rather than evolution of forms, and linearity of time* and the Eastern correlates of *form-void monism infiniteness, non-teleologicality, evolution of forms, and cyclicity of time*. These concepts are detailed in the sections that follow.

Rationale for the use of allegory and personification

The concept that contrasting experiences of motion in Western and Eastern musical forms may be seen as reflections of contrasting Western and Eastern representations of time is an abstract concept.

The purpose of presenting this concept in allegorical form — as the contrasting experiences of the same movement on a train, understood from Western and Eastern perspectives — serves the purpose of making this abstract concept more tangible.

The use of allegory and personification to *humanise* the representation of complex concepts in art and music is not a new thing. Pjait notes that “in fine arts personification is used for a variety of purposes” and that since “ancient times, artists evoked images to represent natural phenomena and abstract concepts in an attempt to help others as well as themselves understand these intangible ideas”.⁴⁶⁵

This appendix thus presents the contrasting experiences of directional motion on a train journey, as experienced by a *Western commuter* and an *Indian conductor*.

A Western commuter and an Indian conductor

The first perspective examined via the use of the allegory of a train journey is that of the experience of motion in *Western* music. In the example, this experience is represented as the phenomenological experience of music from the perspective of a Western commuter.

The second perspective is an allegory of motion in *Eastern* (i.e., North Indian) classical music. This experience is represented as the phenomenological experience of music from the perspective of an Indian conductor.

The experiences of these representative characters of the overall directional movement of the described train journey are proposed as analogous to the Western and Eastern perspectives of movement in each of their respective musical forms — Western-composed art music and North Indian classical music.

The following sections provide analysis of each of these contrasting perspectives.

⁴⁶⁵ Pjait, *The Personification of Abstract Concepts in Art and Animation, Crossing Domains* (Blog, 2005).
<https://medium.com/crossing-domains/the-personification-of-abstract-concepts-in-art-and-animation-6fc1b9ed7282>

The Western perspective — a business commuter

The example begins with an analogy of the experience of musical direction as a “phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field”.

In this analogy, a Western man has recently arrived at Mumbai International Airport in India to attend a conference in New Delhi. He takes the overnight train from Mumbai to New Delhi, and he is now *returning* on the overnight train back to his airport hotel at Mumbai.

During the return train journey, the man leaves his sleeper compartment to go to the dining carriage. On the way down the aisle, he passes the conductor. He then sees an open window and leans over the seats to close it. As he does so, he asks himself:

Am I moving forwards [going somewhere] or backwards [returning home]?

This question is allegorical for the concepts of musical development and musical resolution.

There are three directional movements in the described scenario:

1. returning from a conference
2. walking to the dining car
3. leaning over to open a window

It is notable that the first of these movements is a *returning from* movement and the second and third movements are *going to* movements.

The analysis is thus presented as a way of examining the experience of vectoriality from the Western perspective in terms of the sub-propositions of RP 1A — the proposal that the experience of vectoriality in music is representable as a phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field.

Sub-proposition 1 — The experience of vectoriality is phenomenologically determined

In the example described, for each of the three listed movements (returning by train from a conference, walking to the dining car, and leaning over to open the window) the Western commuter can represent these actions as directional movements.

Each of the phenomenologically determined positions have a home (*void*) position and an away (*form*) position.

Each of the movements are then phenomenologically represented as being movements either *towards something* or *away from something*.

Furthermore, that described *something* is phenomenologically attributed as functioning as either a home (*void*) or away (*form*) state.

The movements are thus representable within a polar couplet cell structure, within which there is a phenomenologically determined movement between a conceptual place represented as void and another conceptual place represented as form. Thus, each of the movements are representable as a form-void couplet cell, through which movements are possible *from void to form* or *from form to void*.

Notably, all conceptual movements are referenced against *phenomenologically determined* — and thus individual, personal, and subjective — concepts of home (as void) and away (as form).

It is thus apparent that each of the three described movements have a “home” state (functioning as void) and an “away” state (functioning as form).

From the perspective of the Western commuter, the concept of movement in each of these cases is represented as the *transition* that occurs between two states — one state phenomenologically functioning as home (void), the other state phenomenologically functioning as away (form).

It is apparent that the attributions of the meanings of “home” to the concepts of “airport hotel”, “sleeper compartment” and “aisle” and the contrary attributions of the meaning of “away” to the concepts of “conference”, “dining car” and “window position” are individual, personal, and subjective attributions within the commuter’s own phenomenological framework.

Otherwise expressed, home and away are meaningful only within the Western commuter’s own frame of reference.

As such, it is apparent that the experiences of directional motion, be that between cities, between train carriages or between aisle and window positions, are ultimately defined against the individual, personal, and subjective significances of *home* or *away* that the Western commuter attributes to them.

When the movements are *away* from a position that the Western commuter has attributed as *home* — and *towards* a position that the Western commuter has attributed as *away* — the movement is perceived as having moved in a *forward* direction.

Conversely, when the movements are *away* from a position that the Western commuter has attributed as *away* (or conversely, *towards* a position that the Western commuter has attributed as *home*) the movement is perceived as having moved in a *backwards* direction.

As such concepts relate to the experience of directional motion in music, the experiences of forward and backwards motion (at the local level) correspond to the experiences of musical *development* and musical *resolution*.

If the Western commuter changes his concept of what he attributes as home, then the direction to which he attributes his movement also changes.

Hence, the concept of direction is individual, personal, and subjective, and phenomenologically determined. It is relative rather than absolute.

The Western commuter’s concept of direction being forward or backward moving is based upon his own individual, personal and subjective map of his attributions of the concepts of home and away, and the phenomenological meanings they signify for him.

Regarding the *Am I moving forwards or backwards* question, the meaning can only be assigned relatively — that is, in reference to the Western commuter’s personal concepts within his own phenomenological framework. Sub-proposition 1 is thus consistent with Zuckerkandl’s (1956) proposition, reiterated below:

[Musical tones] bring to ... knowledge the things they signify ... the meaning of a tone lies not in what it points to but in the pointing itself.⁴⁶⁶

The Western human condition of “going somewhere”

Within his Western nature, the Western commuter is always “going somewhere”. The “going” may involve either “developing” movements towards a goal or “resolving” movements towards a completion. Either way, the nature of going somewhere reflects the dualism and linearity implicitly understood within Western time, as characterised by the Western concept of the arrow of time. The

⁴⁶⁶ Dahn, “A Summary and Reflection on Victor Zuckerkandl’s *Sound and Symbol*.”

nature of going somewhere defines the essence of the Western commuter's vectorial experience. The concept would seem to be a defining characteristic of the nature of the Western human condition. Such a characterisation reflects the *cultural conditioning* that characterises the Western paradigm itself. The Western commuter is thus always "going somewhere" — to another moment.

He is never still.

It is his very experience of *being and time*.⁴⁶⁷

The Western human condition of "going somewhere" in Western music

Just as the Western human condition of going somewhere is paradigmatic for Western culture, so too does it characterise Western music. Theorists such as Clayton and Dahn (referencing Zuckerkandl) have described this peculiarly Western concept in various ways. Clayton, for instance, asserts that Western music has the property of "going somewhere" when he notes that "[Western] music appears to go from A to B in a measured manner".⁴⁶⁸

Dahn's description (referencing Zuckerkandl) is as follows:

Meaning rests for VZ [Victor Zuckerkandl] in music's syntactical structure ... Tones succeed one another in a sensical manner. Scale degree 2 leads to scale degree 1 in the same way that a transitive verb leads to a direct object.⁴⁶⁹

The characteristic within Western music of "going somewhere", as described by theorists such as Clayton and Dahn, would thus appear to characterise Western music in the same way that it characterises the human experience of the Western human condition itself.

Sub-proposition 2: — hierarchical organisation of phenomenologically determined form-void movement

In the allegory described, the Western commuter undertakes the following three vectorial movements during his train journey:

1. returning from a conference
2. walking to the dining car
3. leaning over to open a window.

In addressing the Western commuter's question (*Am I moving forwards or backwards?*), both properties of vectoriality (i.e., magnitude and direction) must be considered.

Considering the property of *direction*, the three described movements may be characterised as:

- *returning from a conference* — movement in the *backward* direction: *away* (form) to *home* (void)
- *walking to the dining car* — movement in the *forward* direction: *home* (void) to *away* (form)
- *leaning over to open a window* — movement in the *forward* direction: *home* (void) to *away* (form)

Considering the property of *magnitude*, the same three described movements may be characterised as:

⁴⁶⁷ Martin Heidegger, *Being and Time*, trans. John Macquarrie and Edward Robinson (New York: Harper and Row, 1962).

⁴⁶⁸ Clayton, *Time in Indian Music*, 19.

⁴⁶⁹ Dahn, "A Summary and Reflection on Victor Zuckerkandl's *Sound and Symbol*."

- *returning from a conference* — movement in the *backward* direction, high magnitude
- *walking to the dining car* — movement in the *forward* direction, medium, magnitude
- *leaning over to open a window* — movement in the *forward* direction, low magnitude.

Considered in this way, the three movements may be understood to be, relative to one another, *hierarchically arranged*.

Net forward or backward movement as aggregate vector

Conceptually, the answer to the question is determinable by the vector addition of the contributing phenomenologically determined form-void vectors. Such a process incorporates consideration of both magnitude and direction.

For the case of the Western commuter and the three phenomenologically determined form-void vectorial experiences of movement between cities, carriages, and aisle-window positions, it is reasonable to assume (for the purposes of illustrating the concept) that the magnitude of the movement from Delhi back to the hotel in Mumbai — a *backwards* direction — is greater than the *combined magnitudes* of his movements experienced in the *forward* direction (i.e., the movements from sleeping car to dining car and from aisle to window).

In other words, the sum of the backwards movements (in this example there is only one backwards movement) is greater than the sum of the forwards movements. Thus, the Western commuter *overall* experiences himself as moving backwards (i.e., *returning home*).

Conceptual representation of movement as form-void couplet cells

In the example of the Western commuter, each of the three experiences of vectoriality share the same conceptual structure — that of a polarised couplet cell. This is because each of the movements are representable as movements between phenomenologically determined form and void states, the conceptual structure within which movement is represented.

Hierarchical organisation of form-void couplet cells

What is significant within such a representation is that form-void couplet cells are not equal in their vectorial capacity — rather, they would seem to be hierarchically organised. In demonstrating this concept, it is reasonable to assume that the sense of *arriving home* (in the case of arriving back in Mumbai) is more significant than the movement of *going away* from the aisle to the window, or of *going away* from the commuter's sleeper compartment to the dining car. Such hierarchical organisation is evidently phenomenologically determined. It is individual, personal, and subjective, thus meaningful only within the subject's frame of reference. So, too, it is proposed, is this the case in the experience of net vectoriality in music. Kramer describes this concept as follows:

A strong cadence tends to close off not only its phrase but also several preceding phrases ... a phrase group. Thus, closure like tonality itself is hierarchical.⁴⁷⁰

In the example described, there are three hierarchically arranged movements.

- The first, at the lowest level of the hierarchy, is the level of movement at the *aisle-window level*, the level at which the movement from aisle to window occurs.
- The second, at the middle level of the hierarchy, is the level of movement at the *carriage level*, the level at which the movement from sleeper compartment to dining car occurs.

⁴⁷⁰ Kramer, *The Time of Music*, 137–8, quoted in Clayton, *Time in Indian Music*, 24–25.

- The third and highest level is the level of movement at the *city level*, the level at which the movement from Delhi to Mumbai occurs.

In addressing the Western commuter's questions (*Am I moving forwards or backwards?*), the hierarchical organisation of the phenomenologically determined movements must thus be considered. Conceptually, such a *calculation* may be represented as the aggregation to produce a net directional result of the phenomenological vectors of *leaning over to open the window*, *walking to the dining car*, and *returning from a conference*.

Because the movements described are vectorial entities, their vector addition produces not only a net magnitude but also a *net direction*. Following the principles of vector addition, as such apply to the example, a vector addition of the contributing phenomenological vectors that is *positive* is associated with the experience of *forward* movement. Conversely, a vector addition of the contributing phenomenological vectors that is *negative* is associated with the experience of *backward* movement.

In accordance with RP 1B, as such concepts relate to the experience of directional motion in music, such experiences of *net* forward and backwards motion at the global level (i.e., at the level of overall experience of a composition) correspond to the concepts of musical *development* and musical *resolution* at the overall compositional level. Referencing the artefact, *Oscillation 1*, this concept is further explained in the following section.

Demonstration of hierarchical organisation of form-void couplet cells in Oscillation 1

Arising from RP 1A, the concept that musical vectoriality may be analysed as a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field* is demonstrated in Appendix 7. This concept, for which the experience of overall movement on a train journey is allegorical is the central concept of RP 1A.

In the same way that the experience of directional motion on a train is conceptually determinable as the aggregate of the phenomenologically determined, hierarchically organised, form-void vectors, so too can this concept be applied to propose a conceptual model for the determination of net directional movement being forwards or backwards in the experience of music. RP 1B proposes such a concept as follows:

The phenomenological experiences of development and resolution at a given point of a composition are representable as, respectively, net positive (forward moving) and net negative (backward moving) aggregate vectorial sum of the phenomenologically determined vectors at that given point within the music.

For the analogy, and for demonstrating the application of the model to the conceptual representations of the musical concepts of development and resolution, the following substitutions can be made:

Material vector	Phenomenological musical vector	Magnitude
<i>leaning over to open a window</i>	<i>level 1 metre</i>	low
<i>walking to the dining car</i>	<i>level 2 metre</i> (evident in compound metre)	medium
<i>returning by train</i>	<i>level 3 metre</i> (evident in more complex compound metres)	high

In such a characterisation, metre is considered a *hierarchically organised* musical parameter.

As a conceptual framework for the musical concepts of development and resolution, the conceptual framework of RP 1B may be used both for intentional composition (i.e., the deliberate use of compositional devices for the purpose of creating the capacity for experience of directional motion) and for the purpose of analysing the development and resolution processes that may occur when experiencing a composition. This concept is discussed in Chapter 3.

Primary RP 1A as extension of Zuckerkandl's wave theory of motion

To be able to come back, one must first have gone away; now we understand why we count one-two, and not one-one. Here “two” does not simply mean “beat number 2” but also “away from”.⁴⁷¹

As previously noted, RP 1A is an extension of Zuckerkandl's concept of vectoriality in metre.⁴⁷² Though Zuckerkandl does not describe his theory using such terms, his concept is inherently vectorial. Thus, the concept of vectorial movement in music is not in itself novel. The current dissertation, however, in RP 1A and its associated RPs, extends the concept in several ways.

This extension of Zuckerkandl's concept is discussed in detail in Chapter 1 under *From wave theory to phenomenological mechanics — 10 steps*.

Western linear and Eastern cyclic musical motion

The perspective of the Indian conductor demonstrates the Eastern perspective of cyclic time, in contrast to the experience of linear time from the perspective of the Western commuter.

Western teleological and Eastern non-teleological musical motion

The current dissertation is *an intercultural musical perspective* of the novel concept of *phenomenological mechanics*. As such, the concept of linearity versus cyclicity of musical form — reflecting linear and cyclic concepts of cultural time — is an important concept in characterising the differences between Western and Eastern musical forms.

In reference to Secondary RP 2A, the submitted creative work, *Oscillation 1*, is a metaphor for this concept. Specifically, this is metaphorically represented in the linear and cyclic global forms of the tabla and guitar parts, respectively, and in the alternating linear and cyclic modulation that defines the equi-harmonic cycle.

Teleological nature of movement Western commuter as allegory for the teleological nature of Western music

In the allegory of the experience of vectoriality on a train from the perspective of the Western commuter, the *movements* represented are characterizable as teleological.

Teleological movement has a purpose and endpoint, ultimately arriving at a known fixed entity — *a finite and recognisable point of arrival*. Teleological motion is thus defined by its goal — the intent of the movement. In that regard, the movements described are teleological in way that is analogous to the experience of Western music, as described by Kramer.⁴⁷³

⁴⁷¹ Zuckerkandl, *Sound and Symbol*, 168, quoted in Clayton, *Time in Indian Music*, 20.

⁴⁷² These concepts, and the process of the extension of Zuckerkandl's concept of vectoriality in metre to the dissertation's concept of the experience of direction in music as akin to that of a phenomenological machine, are discussed in detail in Appendix 5.

⁴⁷³ Kramer, *The Time of Music*, 378–379.

In the same way, the three vectorial movements experienced by the Western commuter in the allegory are teleological movements — they are defined by the endpoint of their purpose.

In the case of the Western commuter, whether the *finite and recognisable point of arrival* is the airport hotel at Mumbai, the dining car on the train, or the window at the end of a seat, all his movements, as phenomenologically represented, are teleological in this way — they are all characterised as having defined or fixed starting points and endpoints.

Dahn's choice of analogy of music with language (as cited earlier in the appendix) is a suitable one because such an analogy invokes the concept of a *musical syntax*. The musical syntax that Dahn is referring to is *Western* musical syntax. Thus, it is proposed, just as Western language is characterizable by its syntax, so too is Western music characterizable by a musical syntax.

Inherent within the implicit teleological syntax of Western music is the representation of polarity of forms as characterised by the polar couplet cell and, with it, the concept of duality, which characterises the Western paradigm itself.

Additionally, for the Western commuter, movement is always explicitly forwards or backwards — a concept that invokes the representation of *time as linear*.

Such linearity corresponds with the concept of the *arrow of time*, representable on a Cartesian plane as horizontal time.⁴⁷⁴

Artefact RPs 3A and 3B

Referencing the concept of *horizontal* time, Artefact RP 3A proposes a geometric model of musical form incorporating Western linear time as *helix*.

Referencing the Eastern concept of *cyclic* time, Artefact RP 3B proposes the alternative representation of musical form as *vortex*.

Eastern perspective — Indian conductor

Time and movement

In the example provided, the Western commuter, in walking to the dining car, passes an Indian conductor in the aisle. Just as the Western commuter is an allegory for Western music, the Indian conductor is an allegory for the Eastern perspective.

Whilst the Western traveller is a commuter returning to Mumbai from a business trip to Delhi, the Indian conductor has just commenced the first leg of her weekly round trip around India. On each weekly journey, the Indian conductor's travel itinerary is the same.

She starts her round trip each week on a Monday morning in New Delhi. From there, she travels south to Mumbai, then easterly across the continent via Hyderabad to Chennai. From Chennai, her train heads back north through Patna to Kolkata. From Kolkata, she heads West again, arriving back in New Delhi on the following Monday morning. On her arrival, and after the departure of passengers, she starts another round trip. The Indian conductor thus repeats the journey over and over as she has for many years.

One morning, in the course of her work, the Indian conductor walks the same path as that of the Western commuter, as he makes his way to the dining car. Since he is returning to his airport hotel in Mumbai, the Western commuter understands himself to be travelling in the backwards direction.

⁴⁷⁴ Greene, *The Fabric of the Cosmos*, 143.

From the perspective of the Indian conductor, momentarily walking the same path, the train is simply travelling around India, without any endpoint. She does not have the impression that she is going somewhere — at least not to a fixed and defined destination. Nor does she feel that she is returning from anywhere.

The motion she experiences from her perspective is one of perpetual travelling around and around the continent. Furthermore, from her perspective she will continue to travel this round trip, repeatedly, over and over, week after week, year after year.

Over the years, however (despite, in her experience, not going anywhere), the repetition of the journey means that she will come to know the trip with more and more familiarity.

She will notice subtle differences in the way the journey is experienced over time.

She will make subtle changes here and there in the way that she conducts herself.

Over time, she will make progressively finer and more nuanced adjustments in the way she undertakes the journey.

She will aim for a kind of perfection in undertaking the journey, while understanding that such an endpoint does not exist.

Western and Eastern concepts raised by the Western commuter's and Indian conductor's linear and cyclic journeys

The concepts that characterise Western and Eastern musical forms via the described allegory of the contrasting experiences of a train journey from the perspectives of a Western commuter and an Eastern conductor are presented next.

Western concepts raised by the Western commuter's linear journey

Duality of form (away-ness) and void (home-ness)

The Western commuter has a home. He also has a *fixed destination*. In that sense, he has *somewhere to go to*. His definitions of home and away are polar and mutually exclusive — *that which is not home is away, and that which is not away is home*. In his states of motion, he is either moving *from home to away* or *from away to home*.

Finite, teleological, non-evolving movement

From the Western commuter's perspective, the train journey has a start and end point. It is either going forward (from home to away) or backwards (from away to home). The train journey has a fixed endpoint in time and space.

Linearity of time and movement

From the Western commuter's perspective, his movement occurs in *lines*. His experience of time is also that it is *linear*.

Eastern concepts raised by the Indian conductor's cyclic journey

Non-duality — that is, monism of form (away-ness) and void (home-ness)

The Indian conductor has no home, apart from the home on the train where she lives. In that sense, there is *nowhere to go*. She is always at home. Any concept she has of being away is contained within her concept of home. Her phenomenological experiences of home and away are *monistic* and *mutually inclusive*.

Infinite, non-teleological, forward moving, evolving movement

From the Indian conductor's perspective, the train journey never stops. It has no end destination. Each time she repeats the journey, there is variation towards an infinite unreachable goal of perfection.

Cyclicity of time and movement

From the Indian conductor's perspective movement occurs in *cycles*. Her experience of time is also that it is *cyclic*.

Western and Eastern musical forms as metaphors for Western and Eastern concepts of time and motion.

The experiences of time and motion and the associated vectorialities of the Western commuter and the Indian conductor are allegories for Western and Eastern paradigmatic representations of time and motion. Such characteristics also correlate with Western and Eastern musical forms.

Western and Eastern musical forms would thus seem to coincide in their structural organisation with these vectorial concepts, an idea consistent with the proposition of Secondary RP 2A. Thus, the Western commuter — or more precisely, the phenomenologically determined *vectoriality* of the Western commuter's experience of motion — is an allegory for the experience of Western music, reflecting the Western paradigm, including its representation in the Western paradigm of the linearity of time. Similarly, the Indian conductor's experience is an allegory for the cyclic nature of Eastern music (in the context of the dissertation, North Indian classical music). Such cyclicity corresponds with the representation of time within the Eastern paradigm.

The Western paradigm, reflected in its musical form, is characterizable by the qualities of *form-void duality, finiteness, teleologicality, reproducibility rather than evolution of forms, and linearity of time.*

Conversely to this, the Eastern paradigm and its music is characterizable in terms of *form-void monism infiniteness, non-teleologicality, evolution of forms, and cyclicity of time.*

Western and Eastern musical forms as cultural metaphors

From the Western perspective, the polar separation of the concepts of present and future permits, at the conceptual level, the possibility for movement "from A to B in a measured manner".⁴⁷⁵ Such a representation is a linear phenomenological representation of time, consistent with the understanding of time under the Western linear concept of the *arrow of time*.⁴⁷⁶

In contrast to this, within the Eastern perspective, the concepts of present and future are not separated. A point in time B (the future) is already contained within a point in time A (the present). Such a phenomenological representation of time is consistent with the Eastern cyclic concept of time.

Rowell captures the essence of this concept as it applies both to the Eastern experience of time and Eastern music symbolising such cyclicity, as follows:

The cyclic organization of the underlying "tal" [rhythm] is a microcosmic parallel to the macrocosmic cycles within which Indian time unfolds.⁴⁷⁷

⁴⁷⁵ Clayton, *Time in Indian Music*, 19.

⁴⁷⁶ Greene, *The Fabric of the Cosmos*, 143.

⁴⁷⁷ Rowell, "Creation of Audible Time," 192, quoted in Clayton, *Time in Indian Music*, 15.

More generally, Ravi Shankar describes this metaphorical relationship between music and philosophy as follows:

The highest aim of our music is to reveal the essence of the universe it reflects.⁴⁷⁸

Summary

As described in the previous section regarding vectorial movement within North Indian classical music, the experience of movement is cyclic, just as it is for the Indian conductor.

From a teleological perspective (i.e., in terms of a fixed endpoint), there is nowhere to go. Thus, the experience of North Indian classical music, be that as player or listener, is one not of *moving further* but of *going deeper*.

The consideration of such concepts provides possibility for the performance of music that is *cyclic in form, non-teleological, perpetually evolving, and infinite in variation*. Such a concept contrasts with the traditional Western view of music as *linear, teleological, fixed in form and finite*.

Concepts as they apply to RPs 3A and 3B

The current appendix concludes with the translation of these abstract concepts into simple geometric models for the purpose of expanding the probabilities for music performance.

These models — Western composition in accordance with linear time, and Eastern composition in accordance with cyclic time — are the proposals of the tertiary RPs 3A and 3B.

The models are represented as, respectively, “helix” and “vortex” — the concluding contributions of the current research.

These concepts are further discussed in Chapter 3 (Discussion) and summarised in Chapter 4 (Summary and Conclusion),

⁴⁷⁸ Ravi Shankar, *My Music, My Life* (New Delhi: Sangam Books, 1969) 17, quoted in Clayton, *Time in Indian Music*, 10.

Appendix 4: Particle Stream and Wave Representations of the Experience of Metre

The two-beat groove.

Steady but flexible, this rhythm is as old as walking ...

It is an unyielding reference point ... the final word.⁴⁷⁹

This appendix explores the experience of directional movement in music as particle stream and phenomenological wave, presenting the concept via the example of 2/4 metre.

Similar to what has previously been noted, the following conceptual analysis applies to any musical parameter that can be represented as a polar couplet cell. For the sake of simplicity of demonstration, the example of 2/4 metre is used.

Metre as particle stream

A *traditional* view of simple metre considers it as analogous to a *stream* of audible sounds — as beats, separated by the silence between them. In such a view, the structure of metre is analogous to a *stream of pulses or particles*. Represented as pulses or particles, the “events” of metre capture the non-vectorial concept of tempo. In this rudimentary representation, as particles or pulses, the events of metre mark time but are themselves dimensionless. Such a *particle stream* representation of metre may be graphically represented as below:

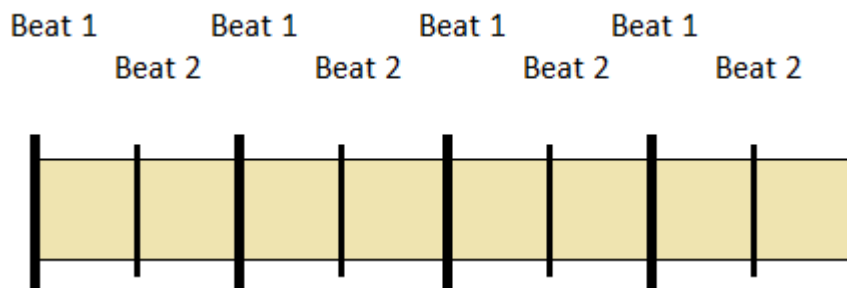


Figure 36: 2/4 metre — representing *particle stream*

Metre as form-void particle stream

A particle stream representation of metre can also be characterised as a particle stream of form and void *events* or *states*. Such a concept is most simply demonstrated by using the *absolute* attributions of form and void — sound and silence.⁴⁸⁰ In the case of metre represented in this way, the sounds of beat 1 and beat 2 function as form.

Conceptually, metre represented as form-void particle stream has two alternative representations. The first of these is where form (the sound of the beats) is represented as a *demarcating event*.⁴⁸¹ The second is where form and void are represented as *oscillating states*.

⁴⁷⁹ Wynton Marsalis, “Music as Metaphor,” Wynton Marsalis Lecture Series, Harvard University, 28 April 2011. <https://www.youtube.com/watch?v=5mAM405w2Sg>

⁴⁸⁰ The description of sound and silence as absolute form and void is used in reference to the four proposed representations of form and void described in Chapter 1 under *Phenomenological form-void polarities*, the other representations being dominance and non-dominance, steady state and change, and expectation fulfilment and surprise.

⁴⁸¹ The concept of the beats of the measure as *demarcations points* of metre is described by Zuckerkandl in *Sound and Symbol*, 169.

Each of these alternative representations are further considered below.

Metre as form-void particle stream — demarcating event representation

Figure 37 is a conceptual representation of metre as form-void particle stream, where form is represented as a *demarcating event*.

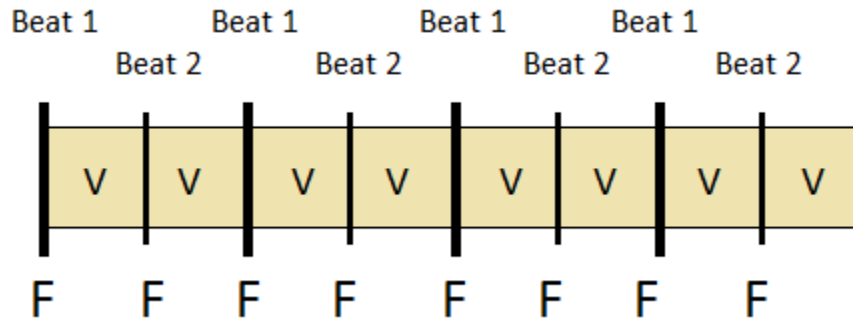


Figure 37: 2/4 metre as form-void particle stream — representing *demarcating events* (V = void; F = form)

In such a representation, beats functioning as form have *positions in time*. As demarcations, they function as separators between adjacent void states. Form *divides and sections* void into equal segments. The demarcating events of form (beats 1 and 2) do not themselves have a time duration. Metre is akin to darkness (void) with a demarcating flash of light (of zero duration) blinking at two intensities — a high intensity (representing beat 1) and a low intensity (representing beat 2). The demarcating events of form (beats 1 and 2) are akin to ideal platonic shapes — they are representable only in an ideal and abstract way.

Just as platonic shapes (e.g., a rectangle), having only two dimensions, cannot exist in three-dimensional space, neither can the form component of metre (the sound of the beat) be represented in terms of durational time. In this representation — form as demarcating events has position but not duration. Form, represented in this way, is simply the interface, separation, change, or “demarcation” between adjacent sections of void.⁴⁸²

Metre as form-void particle stream — oscillating state representation

An alternative representation of metre as form-void particle stream is where form and void are represented as *oscillating states*. Musical form (as sound), rather than being a demarcation that divides and sections void (silence), is then one of two oscillating states, the other state being void. Figure 38 represents an “oscillation of form and void states” model, in its most rudimentary form.

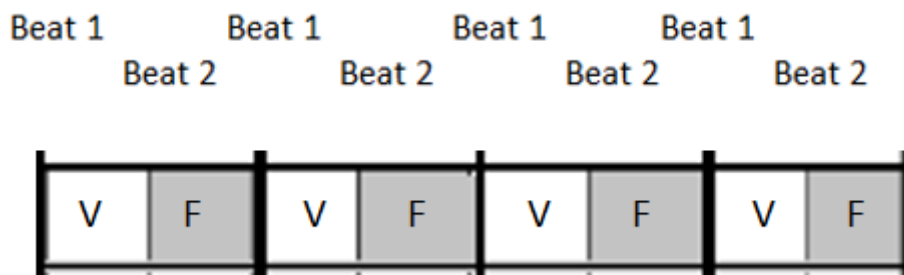


Figure 38: 2/4 metre as form-void particle stream — representing *oscillation of states* (V = void; F = form)

⁴⁸² Zuckerkandl in *Sound and Symbol*, 169.

In this representation, beat 1 is the home or void state, and beat 2 is the away or form state. In this rudimentary representation, form and void instantaneously switch between states. There is no “slope” in the transitioning between form and void states, and there are no gradations of the intensities of form and void. Thus, metre, represented in this way, is like a switch between form and void states.

Quantum phenomenological mechanics perspective — metre as oscillation between undeveloped and developed, stable and unstable phenomenological states.

In this representation of the 2/4 measure, the void state (as silence) may be considered, relative to the form state (as sound), an *undeveloped and stable state*. Conversely, the form state (as sound or beats) may be considered a *developed and unstable state*.

This representation of metre is characterizable as a particle stream of states that oscillate between stable (void) and unstable (form) states. The representation of metre as a form-void particle stream comprising *oscillating states* between undeveloped and developed, and stable and unstable phenomenological states is analogous to Planck’s characterisation of the quantum behaviour of electrons at atomic level.

As described by Planck, quantum behaviour involves the “jumping” of electrons between low (stable) and high (unstable) energy states in adjacent atomic orbitals.⁴⁸³ The inner (stable) orbital may be considered an undeveloped state, and the outer (unstable) orbital a developed state.

In the case of metre, the cyclic oscillation between low (stable, undeveloped) and high (unstable, developed) phenomenological energy states — beat 1 and beat 2, respectively — is analogous to this quantum behaviour. This concept is demonstrated in Figure 39 below. Figure 39

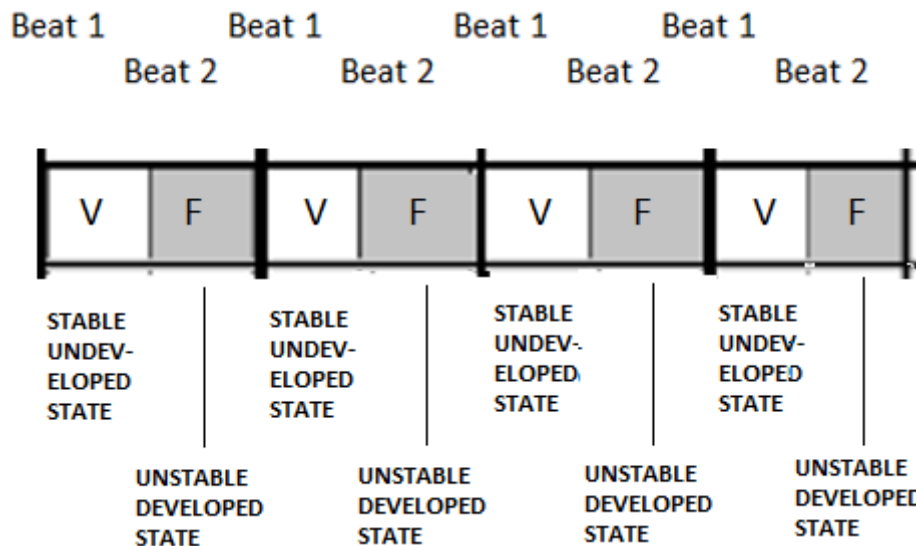


Figure 39: 2/4 metre as analogy of quantum mechanics oscillation between stable and unstable states

Metre — switch and taijitu representations

The representation of metre as an oscillation between form and void states, akin to a particle stream, is arguably a closer approximation to the way metre is phenomenologically experienced than the preceding representation, where form functions only as a demarcating event.

⁴⁸³ Rosenblum and Kotter, *Quantum Enigma*, 56.

Such a *particulate* representation of the transition between the experience of form and the experience of void as being instantaneous, like a switch, is, however, still a very basic representation of metre. A more complex, but arguably more accurate representation of the way in which form (as sound or beats) and void (as the silence between the beats) are phenomenologically experienced is one that represents the transition between these oscillating phenomenological experiences of form and void as having certain tempering characteristics. This includes being experienced not as a switch between sound and silence but as a phenomenological penumbra of expectation and memory of the beats.

To elaborate, experience of form and void is proposed as occurring as a phenomenological *penumbra* of expectation and memory around the audible beat. Thus, the state of form is experienced not only for the duration of the sound of the beat but also for the duration of both its *expectation* and its *memory*.⁴⁸⁴ In other words, there is a period within the 2/4 measure that is experienced as “part of the experience of the beat”, even though the beat itself may not have yet commenced (experienced as expectation) or may no longer be sounding (experienced as memory).

Furthermore, the phenomenological experience of form and void would seem to be non-linear in time. This is because expectation and memory are not linear in time. Otherwise expressed, expectation and memory are influenced by *proximity in time* effects — memory is strongest just after a beat, and expectation is strongest just before a beat. During a single 2/4 measure, memory and expectation thus vary in intensity. Between these points, memory wanes and expectation waxes.

Metre may be considered as a cyclic transition between a *memory-dominant* state (just *after* the beat) and an *expectation-dominant* state (just *before* the beat). Represented in this way, the experience of metre may be characterised not as a stream of particulate events but rather as a phenomenological wave. Such a characterisation of metre — as a dual phenomenological wave defined by peaks of expectation and memory positioned within the extremities of the measure — is further described in the next section.

Metre as a phenomenological wave

Our interest is not in the dividing points [the beats], but in what goes on between them ...We discover that it [metre] is not in the demarcating beats but where at first we did not look at all, where nothing happens, where time simply passes — it is in the apparent vacuum between the demarcating beats that musical meter is born.⁴⁸⁵

This concept of metre as a phenomenological wave originated in Zuckerkandl's (1956) appropriately called *Wave Theory of Metre*. Zuckerkandl gave his reasoning for why the experience of metre may be characterised as wave motion:

With every measure we go through a succession of phases characteristic of wave motion: subsidence from the wave crest, reversal of motion in the wave trough, ascent

⁴⁸⁴ The Merriam Webster Dictionary defines *penumbra* as “a space of partial illumination (as in an eclipse) between the perfect shadow on all sides and the full light” (<https://www.merriam-webster.com/dictionary/penumbra>).

The concept of a *penumbra* is thus typically applied to light rather than sound. Applied to sound, the concept means that the “beat” of metre functions as form not only when it is physically sounding but also in its expectation and its memory. Thus, the experience of metre is *informed* by the sound itself — while, as a phenomenological experience, it is something separate from it. The simplest example of this concept is the recognition that if the sound of beat 1 or beat 2 is intermittently eliminated, the experience of metre nonetheless continues.

Examples of this in Western music include reggae, where the first beat of the bar is commonly omitted in the bass. In Eastern music, this is apparent in *teentaal*, where the ninth beat *khali* (meaning “empty”) indicates a similar concept.

⁴⁸⁵ Zuckerkandl, *Wave Theory of Metre* 169.

toward a new crest, attainment of the summit, which immediately turns into a new subsidence, a new wave has begun.⁴⁸⁶

In the oscillation of form and void states, the particle stream representation of a simple metre means that the transition between form and void states operates like a switch — that is, it permits an instantaneous transition between one discrete state and the next.

In contrast, rather than transitioning between form and void states in a discrete and “switch-like” way, when metre is considered as a wave, form *emerges from* void and *returns to* void in a fluid and continuous way.

The transitioning between form and void states is thus characterizable as a *swelling* (away from void) *to form* and a *decaying* (away from form) *to void*. Just as sound itself is *physically* a waveform, the *phenomenological* experience of metre can also be considered wave-like. Such a recognition allows the phenomenology of metre to be represented not as a stream of particles but as an undulating phenomenological wave.⁴⁸⁷

This is the concept that Zuckerkandl refers to in his wave theory of metre, as described in the above quote. Graphically, the concept of metre as a wave may be represented as shown below:

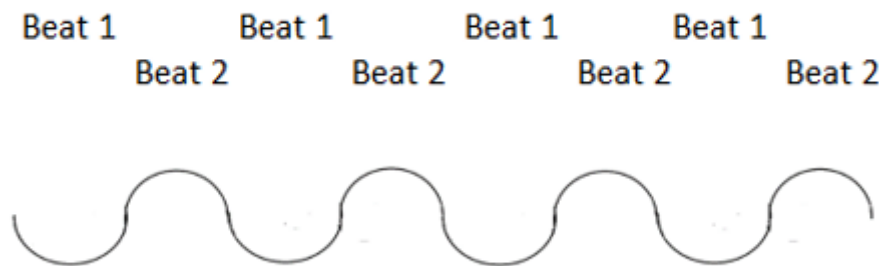


Figure 40: Simple representation of metre as a phenomenological wave

Metre as a dual phenomenological wave of expectation and memory

In seeking to characterise the phenomenological experience of simple metre, it is necessary to introduce a final concept for this section — the concept of the experience of simple metre as a dual phenomenological wave of both *memory and expectation*.⁴⁸⁸

The reason for this is that, in experiencing metre, the experience of musical form — a musically *developed* state — includes more information than the sound itself. Using Zuckerkandl’s terminology, the sound — for example, the sound of the first dominant beat of the 2/4 measure — functions as a trigger for a richer phenomenological experience *beyond that of the sound itself*. According to Zuckerkandl, the meaning within music lies not externally but rather internally — in the richer embellishment of meaning that arises from the “pointer”⁴⁸⁹ (i.e., the experiencer).

⁴⁸⁶ Zuckerkandl, *Wave Theory of Metre* 168.

⁴⁸⁷ Zuckerkandl, *Sound and Symbol*, 168.

⁴⁸⁸ Earlier, I introduced the idea that expectation has two representations — a field of cultural expectation and a field of parameter anticipation. To distinguish between these two meanings of expectation, where the distinction is more clearly expressed in this way, I also use the term *anticipation* to represent the latter of these two meanings of expectation as a phenomenological field. (Kouvaras, *Loading the Silence*, 56.)

⁴⁸⁹ Zuckerkandl, *Sound and Symbol*, quoted in Dahn, *A Summary and Reflection on Victor Zuckerkandl’s Sound and Symbol*.

The temporal penumbra of expectation and memory

In using the term *penumbra*, I am describing the *phenomenological fields* of anticipation and memory that surround the actual physical sound of beats in metre.

As in optics, a penumbra has the meaning of a “partially shaded outer region of the shadow cast by an opaque object [as occurs during an eclipse]”.⁴⁹⁰ As the concept is used in the dissertation, it means the *shadow in time* that accompanies a sound event. In simple terms, this involves two components — the *expectation* of the sound event and the *memory* of the sound event.

Memory and expectation as phenomenological vectors

Since memory and expectation are phenomenological experiences that occur within a shared temporal framework, the experience of memory and expectation (from a phenomenological mechanics perspective) is representable as mirror-image vectors of one another. Thus, expectation is the converse of memory and vice versa.

Being related in this way, it is possible to combine the phenomenological waveforms of the experiences of expectation and memory of a musical event (such as the beats of metre) to produce a graphic representation of the experience of metre, which includes a *penumbra* of its experienced expectation and memory of the sound itself.

Logically, such a position is derivable based on memory and expectation as the phenomenological representations of past and future events, along a common timeline. This is not, however, the evidence on which I propose such interdependence between memory and expectation.

Rather, in making this proposition I am characterising the interdependence between memory and expectation based on the way that metre is *experienced* — specifically, in my own experience. In listening to 2/4 metre, for example, what I experience is a cyclic alternation between memory and expectation — memory of the beat that has just gone and anticipation of the beat that I expect will follow.

My personal experience of metre may be further qualified as follows. At any point in the duration of listening to a 2/4 measure, my experience is either *memory-dominant* or *expectation-dominant* — that is, my experience of where I am in time is referenced against the memory of the beat that has just passed or the beat that I expect to hear next.

In the *first* part of experiencing the 2/4 measure, I am in a *memory-dominant* state — my position in time is referenced against the beat that has just passed. Conversely, in the *second* part of experiencing the 2/4 measure, I am in an *expectation-dominant* state — my position in time is referenced against the beat I am expecting.

The transition from a memory-dominant to an expectation-dominant state is not a discrete one — rather, it is a continuous transitioning.

It is not a linear experience — memory of the beat that has just passed seems to sustain at a high level and then rapidly fades away. Similarly, expectation of the beat to follow seems to be low at first and then, as time moves closer to the anticipated next beat, it seems to rise rapidly. The trajectory of this experience is non-linear in the way that the speed of a pendulum bob is non-linear — it starts slowly and non-linearly accelerates.

⁴⁹⁰ See <https://www.encyclopedia.com/science-and-technology/astronomy-and-space-exploration/astronomy-general/penumbra>

Otherwise expressed, my experience of metre is a repeating cycling of *memory fading* and *expectation swelling* in a non-linear way. The geometric form of this experience is, therefore, characterizable as a wave. Figure 41 represents this concept.

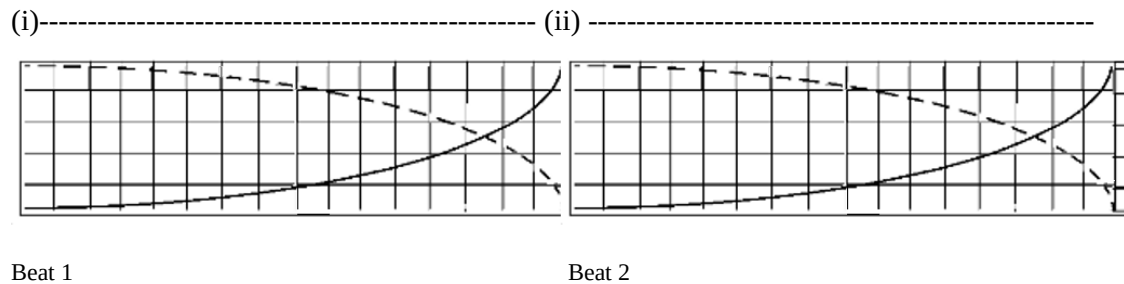


Figure 41: Phenomenological fields of memory (broken line) and expectation (unbroken line) and memory of beat 1 and 2 over duration of 2/4 measure represented as *absolute* displacements

This figure represents memory and expectation in terms of *absolute* displacements — it does not reference the fading of memory and the swelling of expectation relative to a common zero point.⁴⁹¹ The latter is, however, represented in the figures that follow.

Memory and expectation as dual phenomenological waveform

Memory and expectation in metre may also be represented not in terms of absolute levels but in terms of *amplitude* — that is, directional (up and down) *displacements from a central void position*. In such a representation, both memory of the preceding event and expectation of the event to follow are vectorial experiences.

In the convention I have used, memory is represented as a *negative* displacement and anticipation is represented as a *positive* displacement. Therefore, the alternating experiences of memory and of anticipation are characterizable as an oscillation between negative form (memory) and positive form (anticipation).

Further, both memory and expectation are characterizable as displacements from a central void position. That central void position is the experience of metre, not in terms of the memory of the preceding beat, nor in terms of the expectation of the beat to follow, but exactly in the middle of these experiences.

That phenomenologically determined “middle point” between experiencing metre as the memory of sound that has passed and the expectation of sound that is yet to come is a representation of experiencing metre *in the present moment*.

Graphically, Figure 42 represents 2/4 metre in this way — as a *dual phenomenological waveform of memory* (represented as a broken line with negative amplitude) *and expectation* (represented as an unbroken line with positive amplitude).

⁴⁹¹ The representation of memory and expectation as absolute displacements is initially presented in this way because it is easier to represent in contrast to the “amplitude” representation where, in considering the experience of metre as a phenomenological wave, memory and expectation have a “zero point” around which they both oscillate.

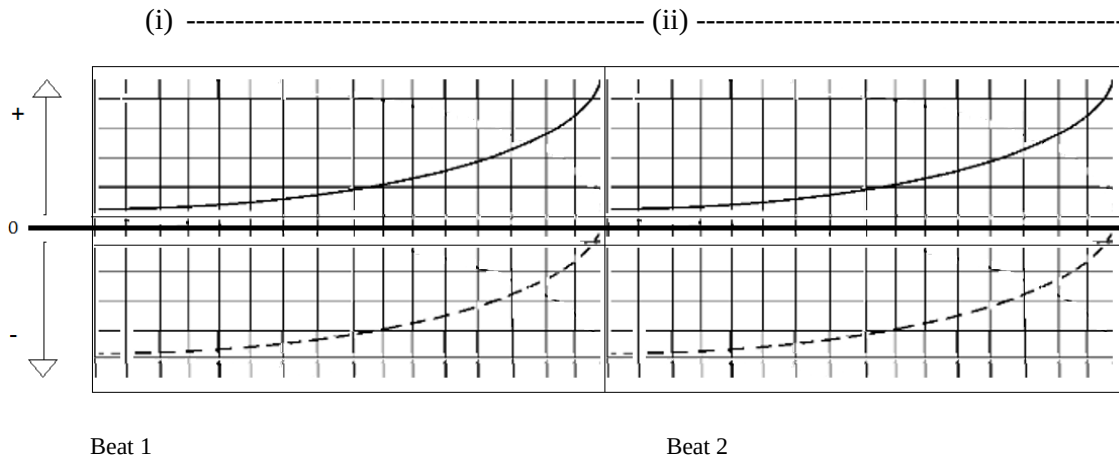


Figure 42: Phenomenological fields of expectation and memory over duration of 2/4 measure (memory is the broken line; anticipation is the unbroken line)

The representation of the vectors of memory and expectation in this way has an advantage. It demonstrates the points in time in 2/4 metre where metre is experienced as maximally phenomenologically *charged*. These points in time are at point (i), just after the sounding of a beat when memory is at its maximum intensity and where the waveform is maximally *negative*, and at point (ii), just before the next anticipated beat where the waveform is maximally positive.

Memory and expectation as combined waveform

This concept is represented in Figure 43 below, where the central line represents an aggregation of the waveforms of memory of the preceding beat and expectation of the beat to follow. The point at which this summated waveform crosses the zero point — the point where there is neither negative displacement of the waveform (memory) nor positive displacement of the waveform (expectation) — is a conceptual representation of the experience of metre as a dual wave of memory and expectation at the point in the measure where the experience of metre is neither memory-dominant nor expectation dominant.

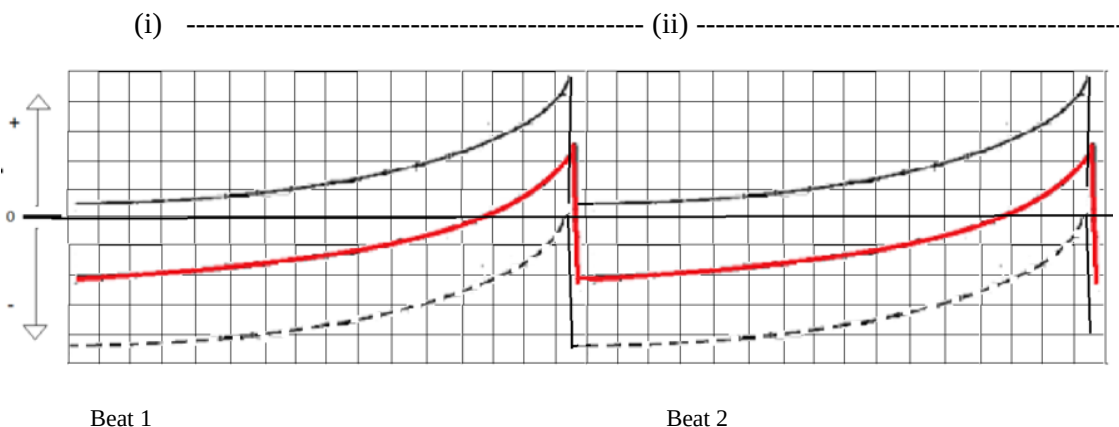


Figure 43: Phenomenological fields of expectation and memory over duration of 2/4 measure (memory is the broken line; expectation is the unbroken line; combined waveform is the line in the middle)

The concept of memory-dominant and expectation-dominant phases of the 2/4 measure

In examining the figure above, it is apparent that, in the phenomenological experience of 2/4 metre, within each 2/4 measure there is a *memory dominant phase* corresponding to the part of the measure where the combined memory-expectation waveform is *below* the zero point of the wave and an

expectation dominant phase where the combined memory-expectation waveform is *above* the zero point of the waveform. Figure 44 represents the same concept, using the wave concepts of troughs and crests to represent memory and expectation.

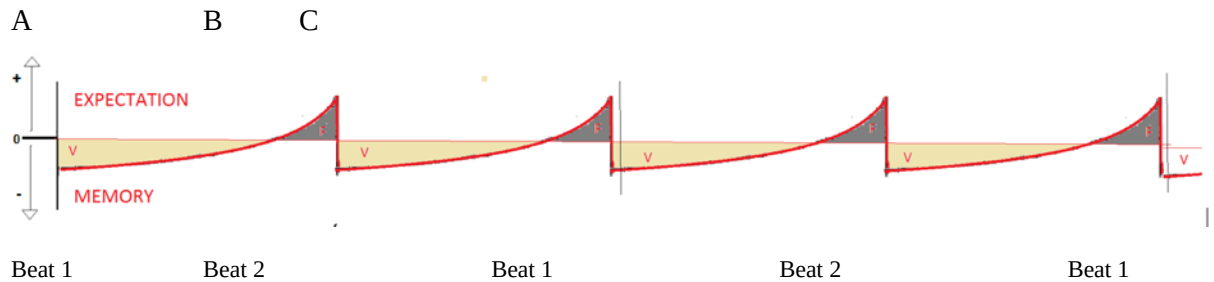


Figure 44: 2/4 metre as a combined wave of memory and expectation, where troughs correspond to the memory-dominant phase and crests correspond to the expectation-dominant phase (AB = troughs; BC = crests)

When the wave form is *below* the central zero amplitude, the metre is in the *memory-dominant* part of its cycle. As is evident in the figure, this occurs at the start of the measure between points A and B. The *memory-dominant* part of the metric cycle thus starts immediately after the sounding of a beat, decaying from that point.⁴⁹² Conversely, when the wave form is above the centre zero amplitude, the metre is in the *expectation-dominant* part of its cycle. It thus starts at the point where the wave crosses the centre line [B], continuing and swelling in amplitude until the expectation of sound is met [C] and the cycle recommences in its memory-dominant form.

The concept of gated form-void cut-offs

Describing the nature of his (1956) wave theory of metre, Zuckerkandl states:

Our interest is not in the dividing points [the beats], but in what goes on between them...We discover that it is not in the demarcating beats but where at first we did not look at all, where nothing happens, where time simply passes – it is in the apparent vacuum between the demarcating beats that musical meter is born.⁴⁹³

The representation of the experience of metre as a dual phenomenological wave of memory and expectation may be further refined, re-introducing the idea of the penumbra — the surrounding transition zone of a transformation. The concept of penumbra, used in the novel sense, is not used to indicate the transition between light and dark but the transition between musical form and void as experienced in 2/4 metre.

The experience of *now* conceptually represented

The experience of “now” would seem not to be a dimensionless transition point between the metre experienced as memory and the metre experienced as expectation. Rather, the experience of now refers to the area of transition between the beats, which is experienced as neither strongly memory-dominant nor strongly expectation-dominant.

Borrowing the concept from the principles of sound engineering, the duration of the period that is neither strongly memory-dominant (just after the beat) or strongly expectation-dependent (just before the beat) is representable in terms of a *gated cut-off*. In other words, even when the waveform is in the

⁴⁹² Though the waveform for memory appears to be *increasing*, it is in fact *decreasing*. This is so because it is moving back to zero. Effectively, it is reducing its negative displacement towards zero.

⁴⁹³ Zuckerkandl, *Sound and Symbol*, 169.

crest form, metre is only experienced in terms of memory if it is sufficiently displaced from the zero line, and similarly for expectation.

The experience of metre in the present, which occurs in the “vacuum between the demarcating beats”,⁴⁹⁴ is not instantaneous but persists for a measurable duration, as demonstrated in Figure 45.

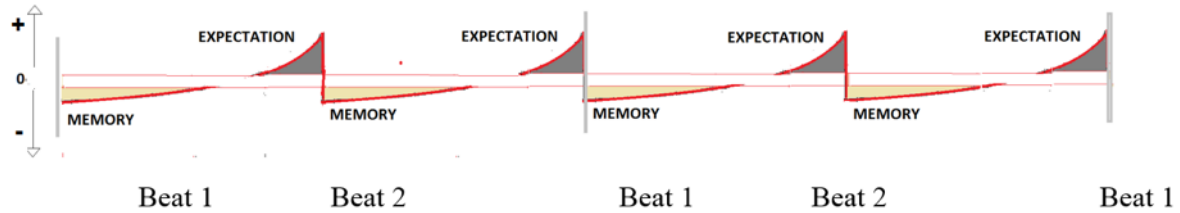


Figure 45: Memory (of preceding beat) and expectation (of forthcoming beat) represented as a phenomenological wave with transition from memory to expectation via *gated cut-offs*

It is visually apparent in the figure that the experience of the beats of 2/4 metre, phenomenologically considered, is more complex than a simple demarcation between sections, as was represented in Figure 37: 2/4 metre as form-void particle stream — *representing demarcating events*. Rather, in the wave form represented in Figure 45, the following is apparent. The experience of 2/4 metre as beat 1 and beat 2 extends beyond the physical sounds themselves — specifically, the beats of metre are experienced inclusive of their expectation and their memory. Thus, they are experienced not as a demarcating line but as a phenomenological penumbra of memory and expectation.

The shapes of the waveforms for expectation and memory are non-linear and non-equal. As represented in the figures, this arises from proposed properties of temporality or phenomenological time, which are different from the properties of physical time itself. This includes non-linearity.⁴⁹⁵

When one considers metre as a cycling oscillation between form and void, the sound of the beats and their phenomenological penumbras of memory and expectation represent form, and the space between them represents void. Figure 46 represents the last of these concepts.

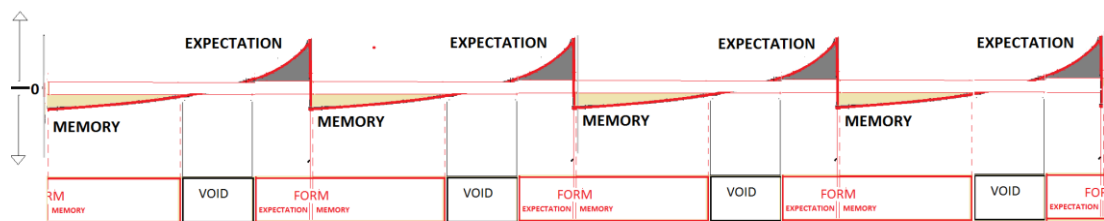


Figure 46: Experience of 2/4 metre as phenomenological wave of oscillating form and void states

How long is now?

The final concept in the representation of metre as a phenomenological wave necessitates considering an interesting psychological question: *how long is now?*

When the experience of directional motion in music is considered from a phenomenological mechanics perspective, the question is an important one. The reason for this is that, arguably, the duration of the

⁴⁹⁴ Zuckerkandl, *Sound and Symbol*, 169.

⁴⁹⁵ An example of non-linearity of phenomenological time is the common anecdote that time slows down when one is involved in a critical incident — such as just before a motor vehicle accident.

experience of “now” corresponds to the limit of the time duration between the beats where metre can be experienced as metre rather than as disconnected and unrelated events.

A detailed consideration of this question is beyond the scope of this dissertation. *New Scientist* magazine has investigated the question, however, and proposes that the experience of now is somewhere between two and three seconds.⁴⁹⁶

A preliminary interpretation of this observation as it applies to phenomenological mechanics is that for metre tempos where the duration between beats 1 and 2 is less than three seconds (tempos of ♩ = 20 and above), the memory of the beats remains experienced as form. Beyond that (tempos below ♩ = 20, which are not characteristic of normal music), the memory of sounds, as required for the experience of metre, probably disintegrates. In such circumstances, the “sounds” of metre are experienced not as components of a singular phenomenon on (metre) but as disconnected and unrelated events.

Particle and wave representations of complex metre — hierarchical organisation

RP 1A proposes a *phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field* model for the experience of directional motion in music.

Under this model, the concept of hierarchical organisation is represented most easily via the parameter of metre. Metre is represented as hierarchically organised, both from particle and wave perspectives. The same structure applies, it is proposed, to the musical parameters, including those of melody, harmony, modulation, and global form. Figure 47 offers a basic representation of these concepts as demonstrated for *simple* metre, *complex metre* (involving two hierarchical levels of metric organisation), and *further complex metre* (involving three hierarchical levels of metric organisation).⁴⁹⁷

This concept is exemplified in the analysis of *Oscillation 1*, where the three main levels of metric organisation are identified in the 24-beat metre.⁴⁹⁸ Hierarchically organised, complex metre is representable both in particle stream and wave representations of complex metre, as shown in Figure 47.

⁴⁹⁶ New Scientist, *How Long is Now? Fascinating Answers to 191 Mind-boggling Questions* (London: Quercus, 2004).

⁴⁹⁷ In the case of the wave representation, analogously to the relationship of a fundamental wavelength to its harmonic wavelengths (whole number divisions of a standing wave), the various hierarchical levels of complex metre may be represented as whole-number divisions of a fundamental wavelength.

⁴⁹⁸ The 24-beat metre of *Oscillation 1* is divided into the following groups of beats: Layer 1: 3 +3+4+3+3+4+4; Layer 2:10 +10 +4; Layer 3: 24-beat cycle.

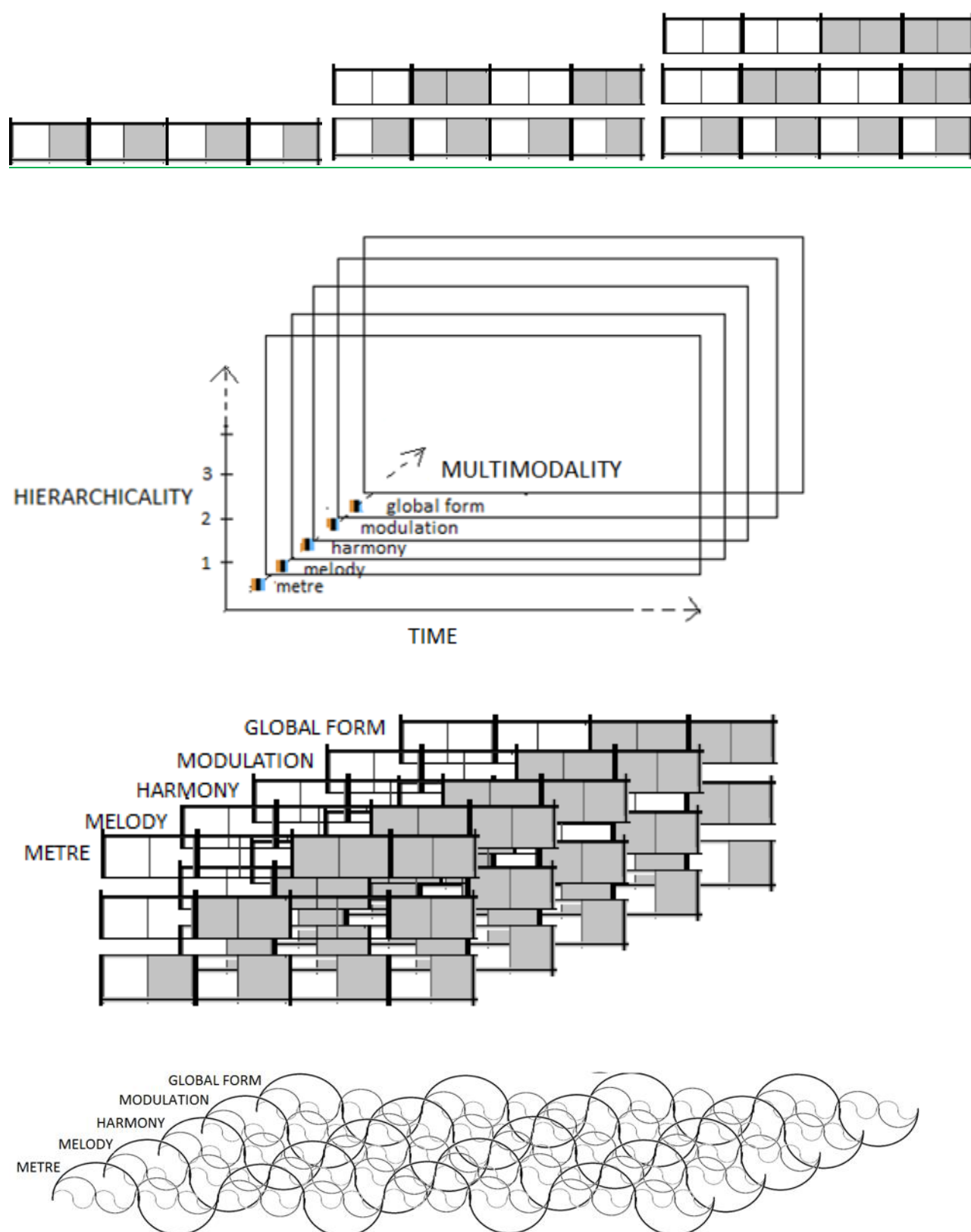


Figure 47: Primary RP 1A — Cartesian, particle stream, and phenomenological wave representations

Appendix 5: Compositional Methods and Processes — Major and Minor Artefacts

Minor Artefact *Beginner's Mind*

Background

The solo improvisation *Beginner's Mind* is included as the dissertation's minor work.

Beginner's Mind is a short (5 minutes and 56 seconds) improvisation presented as a composition one might create in conjunction with the described models that exemplify the process of non-vectorial, globally cyclic development applied to a Western instrument, albeit altered.

In *Beginner's Mind* the solo instrument is the 6-string fretless octave guitar. This guitar is a primarily Western instrument. The tuning is, however, an Eastern tuning, details of which follow.

The fretless octave guitar

The 6-string fretless octave guitar is tuned with a novel “octave” tuning — that is, where all strings are either the fundamental tone or the perfect fifth, as the first harmonic of the fundamental frequency. The fretless octave guitar is thus tuned: C2 – G2 – C3 – G3 – C4 – G4.

At the time of designing the instrument, I was unaware of any similar tunings for guitar, or for that matter, any other instrument. I have since discovered that a similar tuning over four strings is used by Indian violinists.⁴⁹⁹

Such a tuning is advantageous in that it easily permits linear melodic movement. Additionally, because of its regular inter-string tuning, it facilitates a natural octave and dominant and subdominant transposition movements.

Being fretless, the fretless octave guitar permits perfect intervals, untempered pitches, nuances, and vocal-like techniques. The absence of frets thus permits a style of playing similar to the Indian sarod. Like the sarod, the strings, when not being played, may also function as sympathetic strings. Unlike the sarod (or sitar), however, all strings on the 6-string fretless octave guitar are playable.

I conceived the necessary modifications and designed the final instrument in conjunction with my Melbourne-based luthier, Ruben Becker, who modified an existing Cordoba Iberia classical guitar to achieve the required alterations.⁵⁰⁰

Beginner's Mind as improvisation — East and West, traditional and contemporary

The improvisation was recorded in a single unedited recording at Four4ty Studios in Eltham, Australia, just a few days after the physical creation of the newly designed instrument.

The recording represents not only a meeting of East and West but also a meeting of the traditional and the contemporary. It also represents an interface between the musical lineage of the past and the possibilities and openness of the future.

⁴⁹⁹ Lakshminarayana Subramaniam and Viji Subramaniam, *Classical Ragas of India: A Practical Guide* (New Delhi: East West Press, 2018), 10.

⁵⁰⁰ The Cordoba Iberia classical guitar was also used as the basis for the 8-string regular interval guitar. This guitar is described in further detail in Appendix 6.

The non-lineage of a newly conceived instrument

The instruments are so unknown that as you explore ... you are not dealing with your memory and your taste.⁵⁰¹

In the moment of playing the instrument, however, there was no past lineage to refer to.

Nor was there any sense of a future to aspire to.

There was just a newly conceived instrument and the present moment.

It was in that present moment that *Beginner's Mind* was played and recorded as a spontaneous solo improvisation, recorded without editing, on a previously unplayed instrument, in real time, for 5 minutes and 56 seconds.



Figure 48: Fretless octave guitar

Major Artefact Oscillation 1

1. Background and caveat

This section describes the method used for the composition of the submitted creative work, *Oscillation 1*. It includes the processes of conceptualisation, instrument design, composition, graphical representation, notation, recording, and assembly of musical parts. It also demonstrates the relationship between the artefact and the written theoretical work. (Refer to section 8 below: *Operationalisation of philosophical concepts to the compositional process*.)

A caveat is included because, consistent with the emergent process that characterises the methodology, multiple alternatives were considered for the research questions, process, artistic work etc. In the context of the emergent process, they are characterizable as *precursors* from which the final dissertation and submitted creative work emerged.

The caveat thus acknowledges these precursors for what they appear to be — part of a necessary pathway and process, and nascent to the final research question, process, and artistic work of the

⁵⁰¹ John Cage in Thom Holmes “The Cage Interview” Recordings 3, no. 3 (1981): 3, in Feisst “Negotiating Freedom and Control in Composition: Improvisation and Its offshoots, 1950 to 1980,” 10.

dissertation. For the current research, however, the method references the emergent process that began after my meeting and subsequent collaboration with Dr Sam Evans. The method is thus a description of *what was done* during the research to produce the submitted creative work, *Oscillation 1*, and how the artefact's compositional structure and processes exemplify the concepts of the theoretical work.

2. Preliminary challenges

The process of producing the composition faced several preliminary challenges. These had to be addressed well before attempting to compose and record the creative work. Some of these challenges were *conceptual* and related to compositional design. An example of this was the question of how to represent metaphorically and operationalise within a composition such abstract concepts as *form and void*, and the *linearity and cyclicity of time*.

Others were of a *practical but non-material* nature. An example of this was deciding whether it was possible to record multiple tabla drums with different tunings in real time. If so, how many? If not, how could this limitation be alternatively accommodated in the studio?

Still others were both *practical and material*. The most significant of these were challenges over the design and construction of the modified instruments themselves. For instance, if new instruments were to be custom-designed and custom-built for the composition, would they be capable of playing outside their normal ranges while maintaining satisfactory musical and physical properties? For the case of both the 8-string regular interval guitar and the 12-drum harmonic tabla set, this meant determining whether the strings and drum materials would withstand the extended ranges required for the composition and whether they would remain in tune.

Other challenges were of an *ergonomic and playability* nature. For example, even if the instruments could be built with their imagined extended ranges, and even if their material structure were satisfactory enough to play in tune and not break under the strain required to meet the extended ranges, would they be playable? For the tabla, the literature provided an approach to this ergonomic problem.⁵⁰² For the 8-string guitar, this process was essentially one of trial and error, working with Melbourne luthier Ruben Becker. Ultimately, however, the composition, the instrument design and the methods for playing the instruments went hand in hand — thus, the instrument formats and the composition developed mutually and concurrently.

Questions unanswered prior to the research were as fundamental as the following:

- Is it possible to produce a playable low A [A1] below normal range on a standard-length guitar neck?
- Would the neck need lengthening to produce playable string tension?
- Would there be a need for “fanned” (i.e., angled) frets (a solution used by some luthiers to permit different neck lengths for different strings)?
- Would the fingerboard need widening and, if so, would it be possible to play the frets on all strings?
- Is it possible to tune a high E string to high A-flat [A^b4], without the string breaking or going out of tune? This was the pitch required for the highest string to play the composition as it was initially imagined.

⁵⁰² Evans, *Tabla without Borders*.

Table 6 (in this appendix) summarises the tabla and bayan tunings used so that the tabla could play in 12 keys.

Appendix 6: Background Information and Rationale for Guitar and Tabla provides further details of the process and development of the 8-string guitar and the 12-drum tabla set.

Appendix 9: Fingerings for Chords of Lead Sheet for the 8-String Guitar provides further recommendations for the 8-string guitar — specifically, proposed fingering positions for the harmonic movement implied by the equi-harmonic cycle.

3. Scope of the compositional method

As is often the case in practice-led research, the dissertation's research process produced a considerable amount of interdisciplinary knowledge relevant to other disciplines, especially the disciplines of instrument construction, instrument design, and musical ergonomics. A detailed discussion of such interdisciplinary knowledge is, however, beyond the scope of the current study. Suffice to say, it functions as “seeds” for further research across multiple ancillary disciplines.

The method thus focuses primarily on the processes that permitted the composition, notation, graphical representations, recording, and production of the composition *Oscillation 1* as an exemplification of the concepts in the written dissertation. These processes were the following:

- The process of representation of interculturality as it applies to music composition.
- The process of representation of the concepts of form and void using the associated musical devices of sound and silence and phenomenological attribution of “away-ness” versus phenomenological attribution of “home-ness” as these apply to functional harmonic movement.
- The process of representation of contrasting Western and Eastern concepts of time as linear and cyclic using the musical devices of linear and cyclic harmonic modulation and linear and cyclic global organisation.

Artefact RPs. While other research processes were interesting and satisfying explorations in their own right — for example, the process of designing and building the instruments for the composition — they were considered as ancillary to the central RPs of the research and beyond the scope of the current dissertation. In Table 1 (Chapter 1), such ancillary investigations are listed as artefact RPs. The four artefact RPs are only minimally discussed as they do not in themselves play a major role in the development of the RPs. Discussion of the artefact RPs is thus limited and occurs *locally* — that is, in the context of their presentation within this appendix rather than in Chapter 3 (Discussion).

4. Depth of descriptions

In some instances, a reference is made to more detailed documentation outside the current document and within the appendices. This is the domain primarily of Appendix 6.

Regarding the 8-string regular interval guitar design and construction, Appendix 6 puts this instrument and its variations in a historical context. It does this also for the 12-drum harmonic tabla set, focusing primarily on its prior melodic and harmonic use, particularly as exemplified by Sam Evans. The main prerogative, however, is to document the logical and chronological method that made the production of *Oscillation 1* and its associated documents possible.

5. Overview of the composition

Oscillation 1 is an *intercultural duet* for an 8-string regular interval guitar and a 12-drum tabla set, both instruments being novel re-configurations of traditional Western and Eastern instruments.

Summary of composition parameters and organisation

Tempo. The tempo of the composition is crotchet = 192 beats per minute.

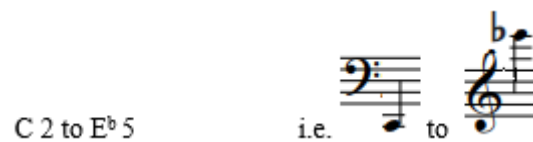
Duration. The duration of the composition is 1 hour and 48 minutes (not including a three-minute introduction and three-minute outro during which the tabla does not play).

To demonstrate application to other creative disciplines, an abridged (one-hour) music video version is also provided, comprising the first 54 minutes of the composition and a two-minute fade out. The music video should be considered a stimulus for further research.

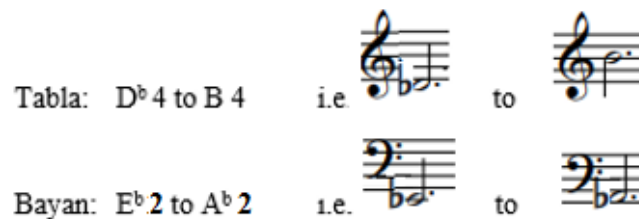
In contrast to the submitted audio recordings and manuscripts — that is, the dissertation's examinable artefacts (refer to Appendix 1 for a list) — the music video (an abridged version of the composition) is presented as a demonstration of concepts for further research, *not as an examinable artefact*.⁵⁰³

Range.

The range of the composition for the guitar part is as follows:



The range for tabla and bayan is as follows:



Time signature. In Western musical terminology, the time signature alters between 3/4 and 4/4 such that the pattern of 3/4, 3/4, 4/4, 3/4, 3/4, 4/4, 4/4 repeats every seven bars, as described below.

Metric cycle. In Eastern musical terminology, the tabla is made up of a 24-beat metric cycle. At the first level of metric organisation, *major accents* occur at beats 1, 11 and 21, effectively dividing the 24-beat metre into three bars of 10, 10 and 4 beats. At the second level of metric organisation, *minor accents* occur at beats 4, 7, 14 and 17, effectively dividing the 24-bar metre into seven bars of 3, 3, 4, 3, 3, 4 and 4 beats.

This structural organisation at the level of metre, as it relates to RP 1A, is summarised in Appendix 7, which also summarises the structural organisation of the composition at the levels of melody, harmony, modulation, global form, and equi-harmonic cycle.

⁵⁰³ The abridged music video version permits listening (and watching) within a one-hour period, as might occur during a lunch break or a break in a schedule organised in hourly slots.

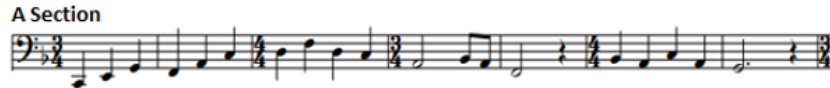
Sections. The composition comprises the following definitions of sections and movements:

- **A-section:** The A-section is a 19-note, 24-beat melodic phrase played over seven bars within the following time signatures: 3/4 3/4 4/4 3/4 3/4 4/4 4/4.

Bars duration: 7 bars

Time duration: 7.5 seconds

The A-section functions as the *call* of an A-B call-and-response couplet. The key centre of the A-section is in the tonic key of one of six primary key centres: F, E^b, D^b, B, A and G. An example of the A-section, played in the tonic key of the opening key of F-major, is as follows:



In the graphic representation of the equi-harmonic cycle (presented later in Figure 57), the key centres of the A-section are represented by the six keys that form the *inner circle*.

- **B-section:** The B-section is an alternate 19-note, 24-beat melodic phrase, also played over seven bars within the same time signatures: 3/4 3/4 4/4 3/4 3/4 4/4 4/4.

Bars duration: 7 bars

Time duration: 7.5 seconds

The B-section functions as the *response* of an AB call-and-response couplet. The key centre of the B-section is in the subdominant key of the A-section.

An example of a B-section, played in the subdominant key (B^b) of the opening primary key of F-major, is as follows:



In the graphic representation of the equi-harmonic cycle, the key centres of the B-section are represented by the six keys that form the *outer circle*.

- **AB-section.** An AB-section is a combined A-section and B-section (i.e., 1 AB-section = A + B).

Bars duration: 14 bars

Time duration: 15 seconds

A-sections are thus in the six primary key centres: F, E^b, D^b, B, A and G, and their respective B-sections are in the subdominant key of these six primary key centres. Thus, B-sections are in the keys of Bb, Ab, Gb/F#, E, D and C.

An example of an AB-section, functioning as call and response — and as “home” and “away” — is as follows:



This first AB-section of the composition is in the primary opening key of F-major and the secondary opening key (B-section) of B^b-major.

- Whereas the tabla changes key to play *within* the harmonic framework of the equi-harmonic cycle, the guitar part *outlines and defines* the harmonic movement.

Also, whereas the harmony of the guitar part for the B-section is different from the guitar part for the A-section because of different pitches in the A and B melodies — effectively *announcing* the modulation — this is not the case for the tabla part. Instead, the tabla tunings within any AB-section are common tunings to both the key of the A-section and the key of its corresponding B-section. Thus, the tabla and bayan pitches remain unchanged across the A and B sections. Because of the modulation, however, the same pitches have different harmonic functions in the B-section compared with the A-section.

For this reason, and unless described otherwise, references to musical parts such as A-part and B-part are references to the guitar parts.

- AB-AB-section (linear modulation).** An AB-AB-section is a repeated AB-section (i.e., AB-AB = AB + AB).

Bars duration: 28 bars

Time duration: 30 seconds

In an AB-AB-section, both AB-sections are in the same key.

In an AB-AB movement because the A-section (following the B-section) returns the music to the same A-key (AB-A movement), an AB-AB section contains within it, linear modulation.

This is evident in the first 15 bars of the composition, when the key centre moves from (in the first A-section) F, to (in the B-section) Bb and then (in the second A-section) back to F.

Details of this concept are discussed in section 8 (*Operationalisation of philosophical concepts to the compositional process*) under “Guitar part”.

AB SECTION

8 F Bb Gm Dm Eb Cm F7

AB SECTION [SAME KEY]

15 C F Dm Am Bb Gm C7

22 F Bb Gm Dm Eb Cm F7

- AB-A'B'-section (cyclic modulation).** An AB-A'B' section is an AB-section followed by an AB-section in a *new modulated key*.

The new modulated key for the A'B' segment is the flat seventh of the harmonic centre of the preceding AB-section. This modulation is achieved via a modulation down a major second interval, except where such a modulation takes the composition beyond the lower range of the guitar (A2), in which case the modulation is an upwards one to the harmonic equivalent (i.e., up a flat seventh). The octave “adjustment” allows the composition to fit within the range of the 8-string guitar and to “cycle” perpetually through all 12 keys.

Bars duration: 28 bars

Time duration: 30 seconds

In an AB-AB'-section, the A'B' is in a modulated key, relative to the preceding AB-section.

AB SECTION

15 C F Dm Am B $\flat$ Gm C ^{7}

22 F B $\flat$ Gm Dm E $\flat$ Cm F ^{7}

A'B' SECTION [NEW KEY]

29 B $\flat$ E $\flat$ Cm Gm A $\flat$ Fm B $\flat^7$

36 E $\flat$ A $\flat$ Fm Cm D $\flat$ B $\flat$ m E $\flat^7$

Linear void-form-void movement. Linear void-form movement is the movement A-to-B-to-A. This movement is linear because it is a *two-directional, uni-dimensional* (i.e., linear) back and forth harmonic movement from A to B and then back to the same A-section, in the same key as the original A-key. Such linear harmonic movement is analogous to the back-and-forth movement of a pendulum bob, appearing as a straight line when viewed from the side. An example is the harmonic movement from the key of F (A-section) to B $\flat$ (B-section) and then back to F again (F-B $\flat$ -F).

Cyclic void-form-void' movement. This is the movement A-to-B-to-A'. It is cyclic because it is a *uni-directional* (continually forward moving), *two-dimensional* (akin to circular movement) from A to B and then onwards to a new A-section (A') — that is, in a new key. Such cyclic harmonic movement is analogous to the circular movement of a pendulum bob, moving in circles (i.e., in two dimensions) viewed from above. An example is the harmonic movement from the key of F (A-section) to B $\flat$ (B-section) and then onwards to a new A-section (A') — that is, in a new key (E $\flat$). Thus F-B $\flat$ -E $\flat$ modulation is an example of cyclic modulation.

Equi-harmonic cycle. The equi-harmonic cycle comprises a sequence of 12 AB-AB sections (using the term AB-AB generically, in reference to form but not key — in this description, both AB and A'B'-sections are included in the reference to the AB-AB sections). Because the key centre of the B-section is in the subdominant key of the A-section, such progressive modulation eventually traverses all 12 major key centres. The equi-harmonic cycle is thus a repeating cycle of alternate linear and cyclic modulations, traversing in this process all 12 major keys. (See Figure 57.)

Bars duration: 168 bars

Time duration: 3 minutes

Oscillation. An oscillation is the term given to the tabla's single extended void-form-void movement, which lasts the entirety of the 108-minute duration of the composition. During this time, in its role as accompaniment, the guitar plays 36 equi-harmonic cycles. For the first 18 cycles (the first 54 minutes) of the oscillation, the tabla part's rhythmic density (RD) progressively increases, peaking at 54 minutes and thereafter progressively decreasing for the final 18 cycles.

Figure 49 graphically captures the cyclic global form of the guitar part and the linear form of the tabla during the tabla's oscillation.

Bars duration: 6048 bars

Time duration: 1 hour 48 minutes

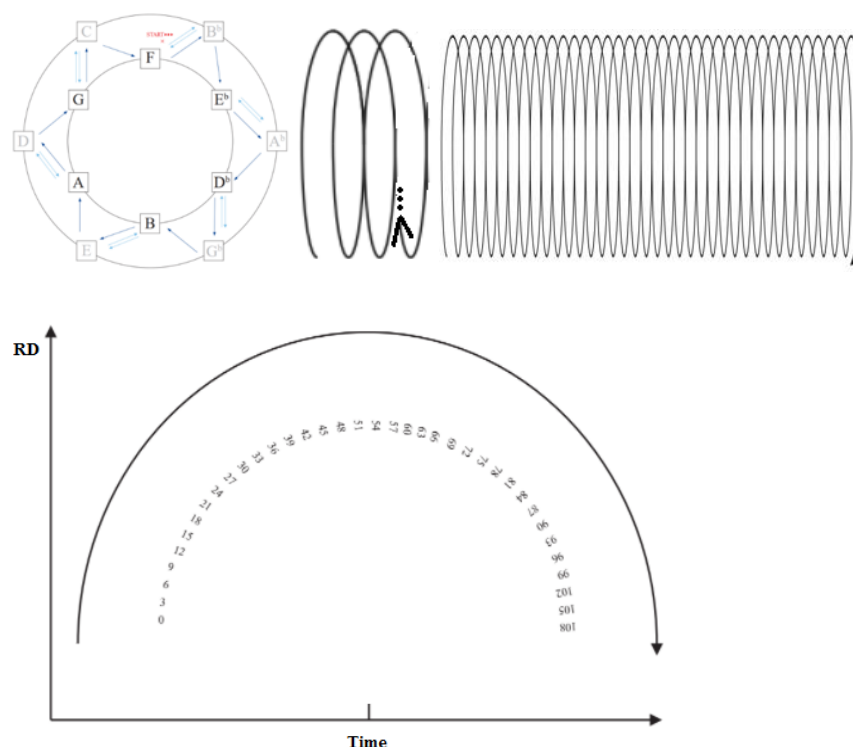


Figure 49: Guitar part (upper, l to r): equi-harmonic cycle, equi-harmonic cycles x 3, total of 36 cycles; tabla part (lower): oscillation x 1

Overall cyclic and linear compositional organisation. The 108-minute duration of the composition is achieved via the following structure:

- *Overall cyclic structure.* The overall cyclic structure of the composition is as follows: 36 cycles of three-minute equi-harmonic cycles. This process defines the guitar part.
- *Overall linear structure.* The overall linear structure of the composition is as follows: 1 oscillation = 54 minutes linear development of linear intensification + 54 minutes linear resolution of intensification. This process defines the *oscillation*, which is the tabla part.
- *Graphic representation of cyclic and linear movement.* The contrasting cyclic and linear movement of the guitar and tabla are graphically represented in Figure 50.

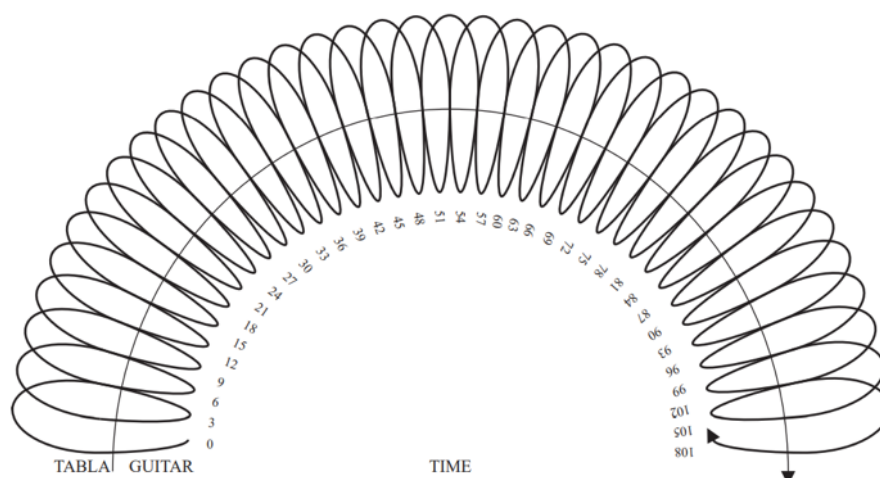


Figure 50: Contrasting cyclic and linear movement of the guitar and tabla

6. Preliminary considerations

Design and construction of modified instruments

The 8-string regular interval guitar used in the current dissertation is an adaptation of the standard 6-string guitar. In simple terms, the guitar has two significant modifications:

- two additional strings, one extending the lower range, the other extending the higher range
- tuned in regular fourths, commencing from low A and ending in high A-flat. The tuning of the guitar, from low to high, is thus A E D G C F B^b A^b.

Justification of modification — guitar

The rationale for modifications of the standard guitar is described in more detail in Appendix 6. A summary of the rationale as it is relevant to the current chapter is as follows.

The earliest known existing 6-string guitar was built in 1779 by Gaetano Vinaccia of the Vinaccia family of luthiers in Naples, Italy. The standard acoustic guitar in its current 6-string format has thus been around for about 250 years.⁵⁰⁴ This format is adequate for a wide variety of uses in popular, folk, classical, and jazz idioms.

In the words of guitarist and teacher Brian Bunnell, “the current model of six strings in a standard tuning has been settled on because it offers an adequate range of pitches and the hundred or so most used chords can be played by the human hand fairly comfortably”.⁵⁰⁵ The modification of such a “satisfactory” arrangement thus warrants justification beyond that of novelty alone.

The justifications are summarised below, organised in terms of *general considerations* (i.e., potential “improvements”) and *specific considerations* (i.e., “improvements” specific to the playing requirements of the submitted creative work, *Oscillation 1*).

General considerations — guitar

The general considerations for the guitar are:

1. Increase in range

The 8-string octave guitar increases the range of the guitar by almost an octave. Specifically, it increases the lower range by a perfect fifth and the upper range by a major third, increasing the overall range by 11 semitones.

2. Horizontal and vertical inter-string interval regularity

In contrast to a “standard” guitar tuning of E A D G B E, where four of the five (ascending) inter-string intervals are a perfect fourth and one interval — the G to B inter-string interval — is a major third, the inter-string intervals of the 8-string regular interval guitar are consistent. All ascending inter-string intervals on the 8-string regular interval guitar are thus a perfect fourth.

The advantage of this tuning is that the inter-string intervallic regularity permits universal transposition and modulation of playing positions of musical content not only up and down the fretboard but also *across the fretboard* — that is, from string to string. On the 8-string regular interval guitar, notes, melodies, scalar movements, arpeggios, chords, chord sequences, and entire songs can thus be transposed without any adjustments to hand position or fingering beyond moving up and down the fretboard horizontally or across the fretboard

⁵⁰⁴ “History of the 6-String Guitar.” <https://lunaguitars.wordpress.com/2011/11/27/history-of-the-6-string-guitar/>

⁵⁰⁵ Quora. “Why Do Most Guitars Have Six Strings?” <https://www.quora.com/Why-do-most-guitars-have-six-strings>

vertically. Such regularity of transposition permits the unaltered transposition of multi-string passages, not unlike the regular transposition of musical segments on the piano.

3. Improvisational orientation

Having such ease of transposition, the 8-string interval guitar, because of its regularity, also lends itself to improvisational capacity, particularly regarding more advanced musical forms rather than simple diatonic music.

4. 12-tone and equi-harmonic orientation

Having both horizontal and vertical interval regularity, the 8-string interval guitar is ideally suited to 12-tone, functional-harmonic, and modulation-based music.

Specific considerations — guitar

The 8-string octave guitar is specifically advantageous for the purpose of playing the submitted creative work, *Oscillation 1*. Except for the guitar part being an improvised part, all the other general considerations apply. Thus, the 8-string regular interval guitar is particularly advantageous for the playing of the guitar part because *Oscillation 1* is a composition that demands an extended range and continuous regular modulation and is equi-harmonic.

Justification of modifications — tabla

Like the 8-string, regular-interval guitar, the 12-drum harmonic tabla set is an adaptation and modification of a traditional instrument. Also like the 8-string, regular-interval guitar, the 12-drum harmonic tabla set has specific applications to *Oscillation 1*, as well as broader application.

Through the process of adaptation described in the next section, the tabla, which is normally a monophonic instrument, can play a composition in all 12 keys. This process of adaptation to a traditional instrument such as the tabla is outlined below.

Effectively, the 12-drum tabla set is the combination of three contributing novel processes:

1. establishment of tuning ranges and tolerances of drums
2. 12-key tuning framework achieved by determining a matrix of paired tunings for both right-hand tabla drum and left-hand bayan drum capable of accommodating 12-key harmony
3. development of a studio process that accommodates the physical playing or recording of 12 drums.

Outlines of these three processes are individually described below. Further detail is also provided in Appendix 6.

1. Tuning ranges — determination of range and tolerances

The first of these requirements was the establishment of a *tuning framework* that would permit the tabla to play within increased tuning ranges and tolerances.

As previously noted, significant work in this regard has already been accomplished by Dr Sam Evans.⁵⁰⁶ By using modern synthetic materials for ties etc., trial and error, and previous experience, Evans was able to establish the following ranges for tabla and bayan. These related to the intent to find tunings for the tabla and bayan that would accommodate a 12-key tuning framework without undue compromise to sound and with a performance tolerance that could permit recording of the composition.

⁵⁰⁶ Evans, “Tabla without Borders.”

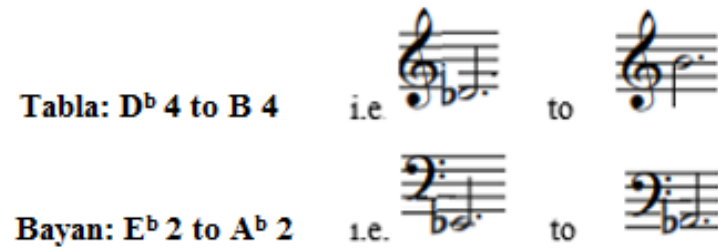


Figure 51: Tuning ranges

2. Tabla — 12-key tuning framework

The second of these requirements was the establishment of a *tuning framework* that would permit the tabla to play within 12 keys, within the limits of its tolerances as a physical drum with limited tuning range.

The outcome of this process is summarised in Table 6. The process through which the tuning framework was achieved precedes this summary, as follows.

Available pitches for tabla drum, based on range. As noted above regarding the specific requirements of the composition, the range of the tabla drum is the *flat seventh* — specifically, the flat seventh interval range from D^b 4 to B 4. This is the tabla range that was found by Evans to have tuning and durability properties acceptable for performance.

The potential tunings of *tabla drum* within this range thus included the following pitches: D^b 4, D 4, E^b 4, E 4, F 4, F[#] 4, G 4, G[#] 4, A^b 4, A 4, B^b 4 and B 4.⁵⁰⁷

By a process of trial and error, the range of the bayan was found to be perfect fourth. The potential tunings of *bayan drum* within its determined range thus included the following pitches: E^b2, E2, F2, F[#]2, G2, A^b2.

Necessity for multiple-interval bayan-tabla tunings. It was apparent from such potential tunings that if a 12-drum tuning framework could be determined, it could not happen within these range limitations on a *single bayan-tabla interval* basis. In other words, it was not possible to simply *transpose* any given bayan-tabla drum pair combination of pitches to accommodate the capacity for playing 12-tone music, be that from a melodic perspective or a harmonic perspective.

Multiple bayan-tabla interval solution. To facilitate the playing of a 12-key composition within these limited ranges, a *multiple bayan-tabla interval* solution was required. Whereas the *standard* bayan-tabla interval is typically an octave or a fifth, to accommodate its need for 12-key harmony, the composition *Oscillation 1* uses two different bayan-tabla intervals:

- Bayan-tabla interval (i) [I-Octave] I–I [A-section] and V–V [B-section]

For AB-sections where an AB-section is in F-B^b, E^b-A^b, A-D and G-C major keys:

- A-section: Bayan I – Tabla I
- B-section: Bayan V – Tabla V

⁵⁰⁷ If it were possible to extend this flat seventh range by one more semitone (i.e., to a major seventh range), then the tabla drum could, in theory, be used to play any melody, contingent upon the octave in which the scale tone is played being variable to fit within this 12-tone range. The current dissertation does not say that this cannot be done. Rather, where the tabla and bayan drums do not play melodically but harmonically, such an interval (and the additional note, be that C4 or C5) was simply not required to achieve tabla and bayan pitches concordant with the 12-key harmonic requirements of the composition.

- Bayan-tabla interval (ii) [Fifth Octave] V–I [A-section] and XI–V [B-section]

For AB-sections where an AB-section is in A^b-D^b and F[#]-B, major keys:

- A-section: Bayan V – Tabla I
- B-section: Bayan IX – Tabla V

A summary of these *multiple bayan-tabla interval solutions* — specifically tabling the keys in which each of these bayan-tabla intervals are used so that all the tunings fall within the empirically determined ranges for the drums — is provided in Table 6.

Table 6: Tunings for the bayan and tabla

Bayan-tabla tuning			Harmonic key			
	Bayan	Tabla	A-section		B-section	
Key	Pitch of Bayan	Pitch of Tabla	Key scale tones (Bayan, Tabla)		Key scale tones (Bayan, Tabla)	
[A] [B] 1: [F][B ^b]	F 2	F 4	F Maj	[I, I]	B ^b Maj	[V, V]
[A] [B] 2: [E ^b][A ^b]	E ^b 2	E ^b 4	E ^b Maj	[I, I]	A ^b Maj	[V, V]
[A] [B] 3: [D ^b][G ^b]	* [High] A ^b 2	D ^b 4	D ^b Maj	[V, I]	G ^b /F [#] Maj	[XI, V]
[A] [B] 4: [B] [E]	* G ^b /F [#] 2	B 4	B Maj	[V, I]	E Maj	[XI, V]
[A] [B] 5: [A] [D]	A 2	A 4	A Maj	[I, I]	D Maj	[V, V]
[A] [B] 6: [G]	G 2	G 4	G Maj	[I, I]	C Maj	[V, V]

* In [A][B]3 & [A][B]4 sections, the bayan is tuned to the V rather than the I, relative to the tabla. Relative to the harmonic key of the [A] section, the bayan functions as the V. Relative to the key of the [B]-section, holding this same tuning, the bayan functions as a *ninth* (or major second).

3. Tabla — studio process solution: ergonomic considerations of multiple drum tunings

The tabla is traditionally played as a two-drum set only — the left hand for the bayan and the right hand for the tabla. The challenge in composing for the tabla within a Western melodic or harmonic context is that to play in this way, it must have multiple tunings so that the instrument approximates more a melodic or harmonic instrument and less a percussive-only instrument.

The first challenge was overcome, at least to some extent (as described above), by determining the ranges and workable inter-drum intervals that would permit the instrument to play in the extended capacity necessitated for an equi-harmonic composition — that is, a 12-key, harmonically equally distributed composition — as is *Oscillation 1*. This solution provided the tolerable tunings that were physically possible for the instrument. It was, however, only the first challenge to be addressed in the realisation of the composition. The second challenge was the actual ergonomic playing of such an instrument.

Integral to its history, the tabla is played in a specific sitting position with the hands (particularly the left hand) resting on the drums, the body positioned in support of playing. As such — regardless of tunings, and apart from experiments to advance this possibility (including the use of up to three tabla drums and one bayan, as used by Evans⁵⁰⁸) — in most instances, the number of drums that can be played at a time is determined by the number of hands that are free to play them.

Several accommodations were considered. Here, it is sufficient to conclude that, of the considered options, the accommodation that permitted *Oscillation 1* to be recorded and mixed, and thus realised from score to tangible audio recording, was the *studio process* solution.

The studio process permits the recording of a 12-drum tabla set by recording sections that use one of the six paired drum combinations before changing drums to another drum combination. For compositions in a single key, no changes are required. For a 12-key composition, however, as is *Oscillation 1*, six pairs of drums are required.

The studio process solution is thus a method where sections of the compositions that require a particular drum combination are recorded in a *batch*; drums are then changed or re-tuned to the next section, recorded again etc. At the end of the process, the relevant sections are cut and pasted into their appropriate corresponding section in the composition. Importantly, this process is simply one of rearrangement of sections — it is not one of digital correction, punching in and out, or studio enhancement.

It is timely at this point to reprise the distinction made between the general RPs and the artefact RPs. The reason for this is that, even though several novel processes have been discovered, as is the purpose of this method section, priority is given to describing the process through which it was possible to translate a concept into a compositional form and then play and record this composition. (See Table 1 in Chapter 1 for a list of the major RPs of the dissertation.)

Ancillary details, however, may be found in the appendices, and this is particularly so regarding the processes of instrumental design, both for the 8-string guitar and the 12-drum tabla set. These are notable as opposed to being directly relevant to the production of *Oscillation 1*.

The purpose of the above is to maintain the *navigation* of the dissertation through the landmarks of the major RPs, which seek to plot a single, rationally connected journey to the dissertation's conclusion. In the spirit of the above, details of processes not immediately relevant to the method are included in Appendix 6.

Further details of the studio process solution, which permitted the equi-harmonic tabla part to be recorded, are described in section 9 below (*Specifics of the compositional process — tabla*).

Manuscripts: Western, Eastern, graphic, formulaic notations

Notations — guitar

The guitar part is notated in traditional Western notation. However, because of its extended range, it uses *concert-pitched* (rather than octave-transposed) *treble clef* and *bass clef*, alternating between the two as required. Thus, rather than being written in the traditional (for guitar) octave-transposed single treble clef with upper and lower ledger lines, the guitar part is written in a single un-transposed concert pitch, which uses bass clef and treble clef as required.

⁵⁰⁸ Evans, "Tabla without Borders."

Additional to this standard traditional Western treble and bass clef notation, the composition references a *Guitar lead sheet and chord chart* for the equi-harmonic cycle (with notes and chord symbols).

A purpose-designed *8-string TAB notation* is also provided as Appendix 9. The latter is, however, not a representation of the composition but rather a chord fingering chart for the 8-string guitar, providing suggested chord shapes and fingerings for the chord tones of the lead sheet. The purpose of this is to provide initial fingering positions that permit a guitarist to “comp” (accompany) the composition or improvise around the suggested chord shapes (or both). Examples of each of these notations are given in Figure 52 and Figure 53 below.

C F Dm Am Bb Gm C7
 F Bb Gm Dm Eb Cm F7

Figure 52: Lead-sheet notation

[illegible]

Figure 53: 8-string TAB notation

Notations — tabla

In *Oscillation 1*, the tabla part has the non-traditional property of being able to play multiple pitched notes. Such a property permits melodic and harmonic possibilities but necessitates a suitable notation system to represent these extended capacities.

The tabla notation used in *Oscillation 1* is thus a hybrid notation that captures both Western and Eastern elements of the music. Specifically, the hybrid notation used captures the Western representations of both pitch and rhythm while retaining the traditional North Indian classical music *bols* (i.e., rhythmic figures, techniques, and patterns).

The tabla notation used is the same as, and directly borrowed from, the notation used by Evans in notating melodies for the tabla drum (right-hand drum).⁵⁰⁹ *Oscillation 1*, however, uses multiple tunings not only for the tabla drum (right-hand drum) but also for the bayan (left-hand drum).

The hybrid notation used by Evans was thus ideal for this purpose, noting that the pitch of the tabla (right-hand drum) is notated on the upper *treble clef* and the pitch of the bayan (left-hand drum) is notated on the *lower bass clef*. An example of the notation is given in Figure 54.

⁵⁰⁹ Evans, "Tabla without Borders."

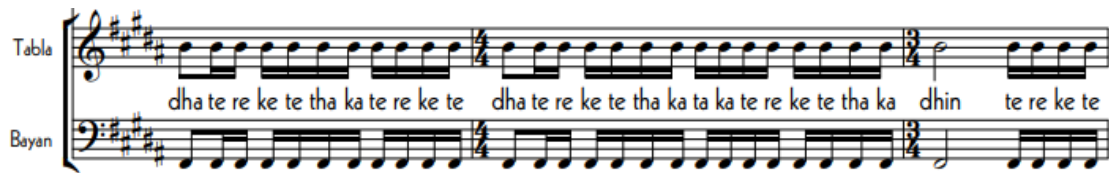


Figure 54: Hybrid notation example

Combined guitar and tabla score notation

The main score of *Oscillation 1* covers both guitar notation and tabla notation, including both Western and Eastern elements of the tabla (i.e., pitch, rhythm, and *bols*), as described. An example of the main combined guitar and tabla score notation of *Oscillation 1* is as follows:

Figure 55: Main combined guitar and tabla score notation of *Oscillation 1*

Graphic and formulaic “scores”/compositional representations

In addition to scoring/notating the guitar and tabla parts of the composition via the described Western, Eastern, and *hybrid* scoring systems, the composition is also represented graphically and formulaically. The purposes of such graphic and formulaic compositional representations are multiple and include the following:

- Graphic and formulaic representations capture the *global compositional form* or shape of the composition, both the entire composition and its constituent parts.
- Graphic and formulaic representations capture the *compositional processes* on which the global compositional form or “shape” of the composition is constructed.
- Graphic and formulaic representations may also reveal a *hidden logic or order* within the form of the composition.

In the current dissertation, graphic compositional representation facilitates the demonstration of linear and cyclic movements within the composition. This supports Secondary RP 2B, which states that *Oscillation 1* metaphorically contrasts Western and Eastern concepts of linear and cyclic time:

The submitted creative work *Oscillation 1*, in its harmonic organisation of alternating linear and cyclic modulation, is a metaphor for linear-oriented and cyclic-oriented representations of time in Western and Eastern philosophical and cultural paradigms.

These representations are addressed below, beginning with an introduction to the use of graphical figures as representations of elements of the composition.

Representation of global compositional form. Both graphic and formulaic representations of the composition can capture and clearly represent the *global compositional form* of the composition — that is, the overall compositional movement or shape. This concept is introduced here with examples from the perspective of graphic representations of the composition.

An example of such a graphic compositional representation is the graphic “symbol” for the composition *Oscillation 1*, displayed on the title page of this dissertation and captured in section *Relationship between theoretical and creative work*.

The relationship of exemplification

The artefacts exemplify the concepts of the theoretical work.

Major artefact

Oscillation 1 exemplifies the concept of RP 1A—the proposition that the experience of directional motion in music is representable as a “phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field”. Table 1 (in Appendix 7) provides a summary of the analysis of *Oscillation 1* in terms of the above proposition.

Additionally, *Oscillation 1* exemplifies the concept of RP 3A — the geometrical model of Western musical compositional form as *helix*. This is visually apparent when one examines the graphical representation of the global form of *Oscillation 1*, as demonstrated in Figure 1.

Minor artefact

The minor artefact, *Beginner’s Mind*, exemplifies the concept of RP 3B — the geometrical model of Eastern musical compositional form as *vortex*.

The relationship of metaphor

Oscillation 1 is also a *metaphor* for the theoretical concepts of the dissertation (Western linear and Eastern cyclic time) — specifically, in its linear and cyclic global form and harmonic structure. This concept is demonstrated graphically in Figure 2. Details of these compositional processes are also presented in Appendix 5.

As the following section demonstrates, this graphic representation is a combined representation of the primary cyclic and linear organisational forms of the guitar and tabla, respectively.

Representation of compositional process. Secondly, both graphic and formulaic representations of the composition can capture and clearly represent the *processes* by which *global compositional form* or overall compositional shape is achieved. Examples of this are apparent in the guitar part, both in graphic and formulaic representations.

Graphic representation of compositional process in the guitar part. Referring to Figure 56, which demonstrates the global form of the guitar part, it is apparent that the repeating cyclic structure labelled “guitar” is a global representation of the guitar part as comprising 36 cycles.

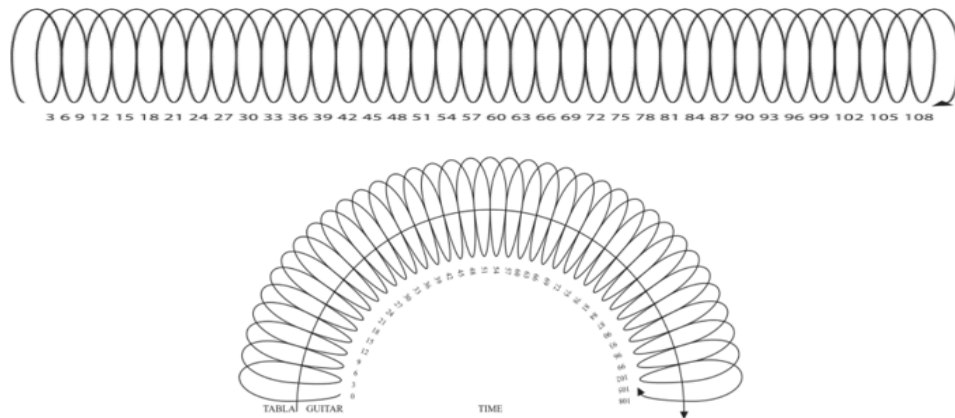


Figure 56: Top: Global form of the guitar part. Bottom: Representation of the global form of the whole composition as contrasting cyclic and linear global forms of guitar and tabla parts, respectively

Within this, and represented more granularly, the graphic representation of the guitar part as an equi-harmonic cycle demonstrates the harmonic movement that constitutes cyclic modulation within each equi-harmonic cycle. This is shown in Figure 57.

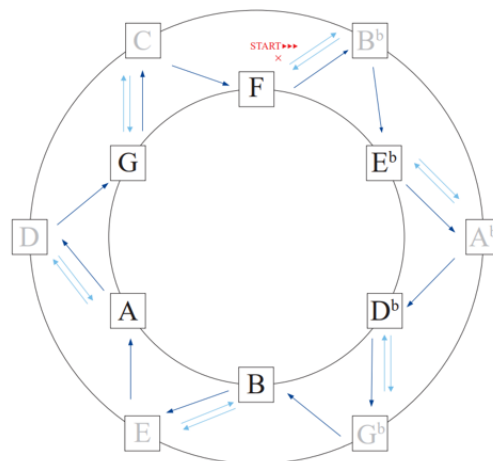


Figure 57: Equi-harmonic cycle

Graphic representation of compositional process in the tabla part. Within the composition, the tabla part is also “scored” in terms of graphic representation. The figures below thus demonstrate the concept of graphic compositional representation and apply it to the tabla part.

Figure 58 is a graphic representation of the tabla part for the parameter of global compositional form. At this level, the compositional shape of the tabla part as globally *linear* is apparent.⁵¹⁰

⁵¹⁰ Linearity, as the concept is used in this context, is opposed to cyclicity. In characterising linear and cyclic movement, one may imagine the movements of a pendulum bob and two of its possible movement pathways, when viewed from above. It may move in a line (representable as movement in one dimension — backwards and forwards). This is linear motion. It is uni-dimensional, bi-directional movement. Alternatively, it may move in a circle (representable as movement within two dimensions) — around and around. This is cyclic motion. It is characterizable as two-dimensional, uni-directional movement.

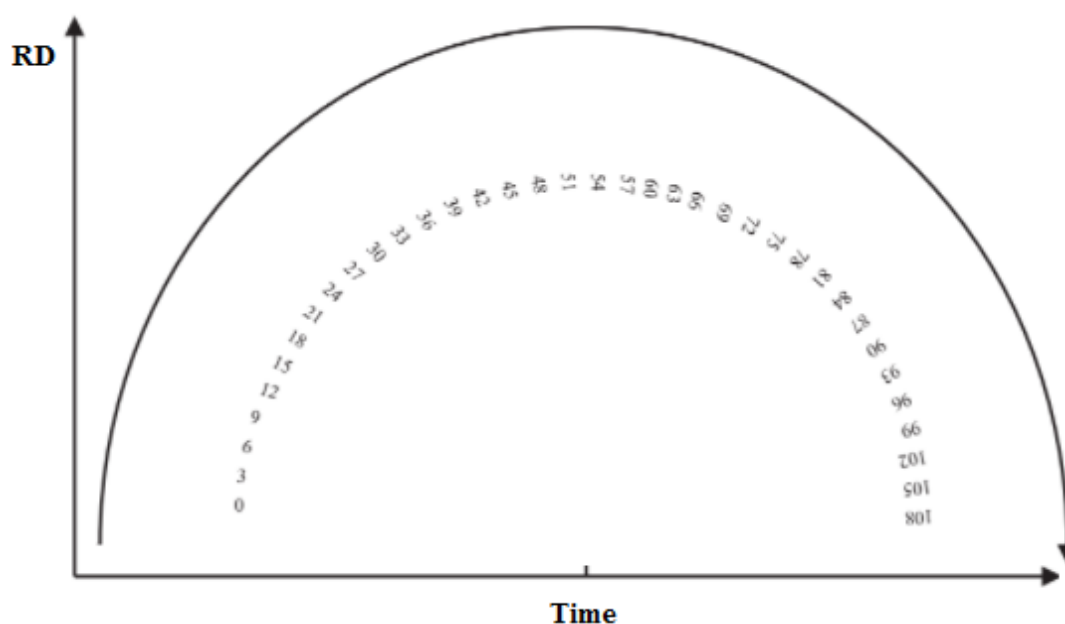


Figure 58: Tabla-rhythmic density RD

Figure 59 is another example of graphic representation of the composition. In contrast, however, to Figure 58's representation of the global form of rhythmic density, Figure 59 is a representation of the global form of the composition in terms of its three improvisation parameters — *key*, *CDP* (compositional development parameter) and *RD* (rhythmic density).

Because each AB-section has a unique specification regarding the level required of the three parameters (6 levels of key x 6 levels of CDP x 6 levels of RD = 216 uniquely specified recordings), Figure 59 is an alternative graphic representation of the tabla part.⁵¹¹

⁵¹¹ Figure 59 elaborates on this concept using the same figure to demonstrate the contrasting sequences in which the 216 x 15-second tabla recordings were *assembled* (i.e., mixed), as opposed to recorded.

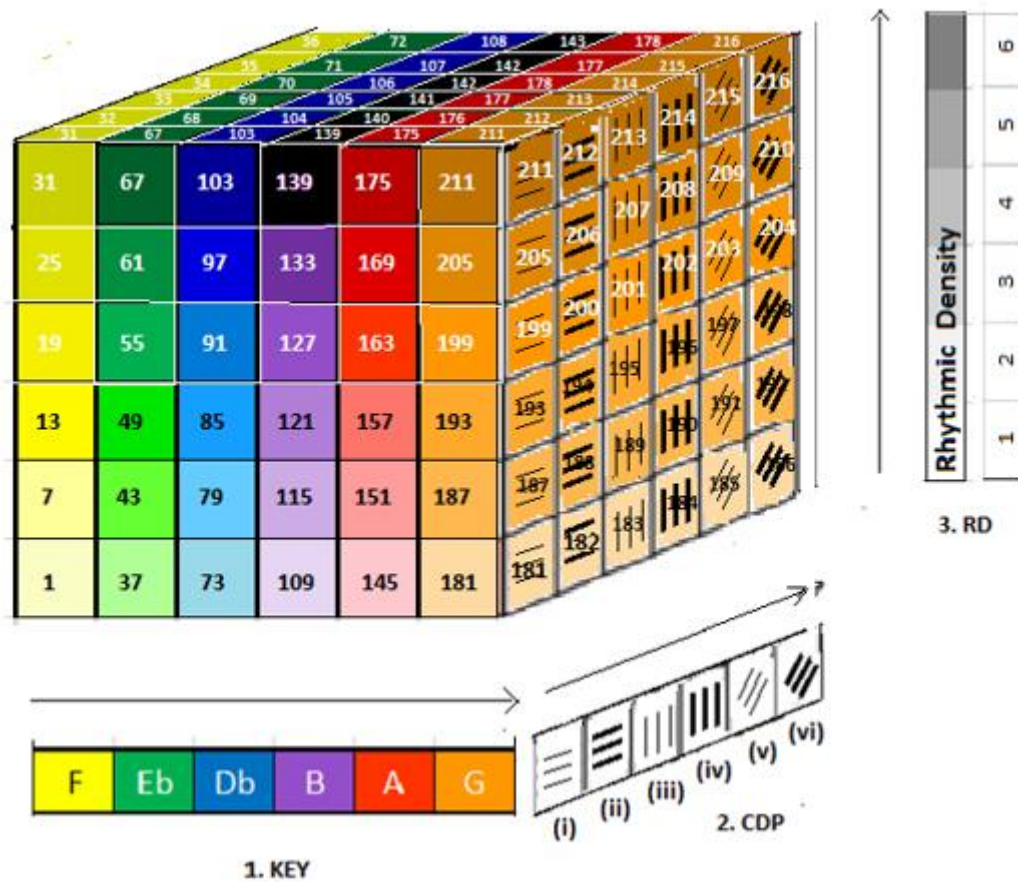


Figure 59: Alternative graphical representation of tabla part

Linear and cyclic movements as metaphors for Western and Eastern concepts of time

By applying the graphic compositional representations provided in Chapter 1 to the use of graphical scoring/notation as it applies to the method of *Oscillation 1*, it becomes apparent that the composition has graphic forms that are linear and cyclic, consistent with Secondary RP 2B.

In addition to graphic compositional representations, the method of the composition also uses formulaic representations of the composition. These are concise representations of the algorithmic processes on which the compositional process is formulated. Like graphic formulaic representations, such formulaic approaches to compositional representation are useful for demonstrating both global organisational form and the processes from which such forms originate.

Formulaic compositional representation, to the extent that it describes the method of *Oscillation 1*, is summarised as follows. It is also further elaborated on in Appendix 6.

- **Formulaic representation as it applies to the guitar part.** In *Oscillation 1*, the algorithm that determines the harmonic movement of the guitar part may be represented formulaically. Such a formula determines the process of modulation within the equi-harmonic cycle. As a result, the formulaic representations specify the rules of modulation on which the harmonic movement within the equi-harmonic cycle is predicated. This formulaic representation of compositional process as it applies to the guitar part of *Oscillation*, as an equi-harmonic composition, is further described in Appendix 6.

In *Oscillation 1*, formulaic representation thus plays an important part. Like graphic representation, it provides a concise representation of the global form or shape of the composition, as well as a mechanism for understanding the process by which such global form or shape is achieved.

In the case of the guitar part, formulaic representation is represented numerically, determining the key, the details of which are discussed in section 8 below and Chapter 3 (Discussion).

Artefact RPs

Finally, at the conceptual level, graphical representation is used for the presentation of the artefact RPs 4A and 4B, incorporating Western and Eastern contrasting concepts of time — as reiterated below:

- **RP 4A.** The dissertation presents the model of the helix as a geometric model incorporating the Western compositional concepts of vectoriality, linearity, and horizontality of time.
- **RP 4B.** The dissertation presents the model of the vortex as a geometric model incorporating the Eastern compositional concepts of intensification, cyclicity, and verticality of time.

Unlike, however, the graphical representations thus far discussed — the contrasting representations of musical form as *helix* and *vortex* — are not representations of the global form of *Oscillation 1*, nor for that matter of any composition. Rather, the musical forms of helix and vortex represent the global forms of Western and Eastern music, *in general*, based upon their contrasting representations of time, in accordance with the theoretical positions presented in the Introduction, in particular Secondary RP 2A, reiterated below:

- **RP 2A.** Western and Eastern musical forms can be considered metaphors for the philosophical and cultural paradigms in which they originate, and specifically, for contrasting Western and Eastern representations of time.

Summary of preliminary considerations

In the overview of the method section presented thus far, I have deliberately tried to keep separate the distinct parts of the process by which the composition was created and recorded. In accordance with this principle, I now introduce the preliminary considerations that had to be considered before starting the actual composition of the submitted creative work, *Oscillation 1*.

The two major preliminary considerations were: (i) the design and construction of the modified instruments, and (ii) the *formats* in which the composition was to be recorded and presented. The first has been described in the preceding sections. The second is described below.

Formats

For *Oscillation 1*, the major formats were decided as *sound recording* (music recording) and *written recording* (a score/notation in a suitable Eastern or Western, or hybrid notation format). In addition to these formats, the composition is presented in the form of a *music video*, which has two formats — the full 108-minute (less introduction and coda) version and an abridged 54-minute (plus credits and 2-minute fade out) version. The latter, as previously noted, is designed to be viewed and listened to within a one-hour time slot. This abridged version is suggested as a suitable *first introduction* to the artefact because, as a combined visual and sonic experience within a shorter time format, it is the most accessible of the various formats.⁵¹⁴

⁵¹⁴ Importantly, although the video accompanies the music (and itself is a metaphor for the concepts of the dissertation *applied to video*), from the perspective of assessment of the dissertation, the video is not presented as assessable in its

In addition to deliberately keeping the composition process *a creative process*, irrespective of its preceding conditions (instrument design and creation, establishment of media for recording, and notation), the process of the composition's *recording and production* has also been separated from section 8 below (*Operationalisation of philosophical concepts to the compositional process*).

It is worthy of comment that formulaic processes were used in the method not only in the composition of the submitted creative work itself but also in the recording and mixing process. It was a precise method for recording sections of the composition in an order that was pragmatic and indeed possible, based upon the ergonomics of playing 12 drums.

As previously mentioned, the recording process involved recording all parts for each bayan and tabla tuning pair as a batch and to continue this process until all recordings had been made for each of the paired tunings. This permitted the 12-key composition to be recorded. Afterwards, by formulaically *re-positioning* the recorded sections (without enhancement or correction) in their appropriate section within the compositional grid, the composition was *assembled* in accordance with the specifications and formula discussed in the previous section.

This process of *re-positioning* of recorded sections applied to the tabla part only. (The guitar part was recorded in real time, without repositioning, albeit with some recording breaks due to the length of the composition.) For this reason, having presented the formulaic representation of the tabla part (Figure 60) *as it applied to the method of composition*, it is appropriate now to present the formulaic representation of the recording of the tabla part as it *applied to the method of recording and production*. The mixing and recording algorithms are thus presented next.

7. Concept of formulaic recording and mixing formula

Each of the 216 squares of the grid represents a 15-second AB-section played by the tabla.⁵¹⁵

Recording formula

As shown in Figure 61, each of the 15-second recordings (represented as a cell on the grid with a number from 1 to 216) represents a 15-second recording of the tabla over one AB-section, improvising in accordance with three parameters: key, CDP, and RD. Each of these three parameters has a value of 1 to 6 and thus each of the 216 x 15-second improvisations represents a unique and non-repeated combination of key, CDP, and RD.

own right — rather it is presented as a *visual accompaniment* to the music, which, in certain contexts, supports, with visual media, the listening experience of the composition.

⁵¹⁵ The 216 x 15-second recordings make up 54 minutes of music. This comprises the first 54-minute development section of the composition. As is further described later in this chapter, the *resolution* section was constructed by assembling these 216 x 15-second recordings in reverse order. The reverse order recordings were, however, not a reverse order recording of the 216 sections *per se*, but rather a reverse order assembly of the recordings grouped in 12s. The reason for this was that 12 of the 15-second recordings constituted one three-minute equi-harmonic cycle. Thus, it was the order of equi-harmonic cycles (rather than the order of the 15-second recordings) that comprised the remaining 54-minute resolution section of the composition. This method kept each of the equi-harmonic cycle recordings generated by the recording and mixing process intact. Thus, the resolution section of *Oscillation 1* is the reverse order assembly, not of the single recordings themselves but of the *first 18 equi-harmonic cycles* that comprise the first 54-minute developmental section. In contrast, the guitar part was played in real time for the duration of the 108-minute recording.

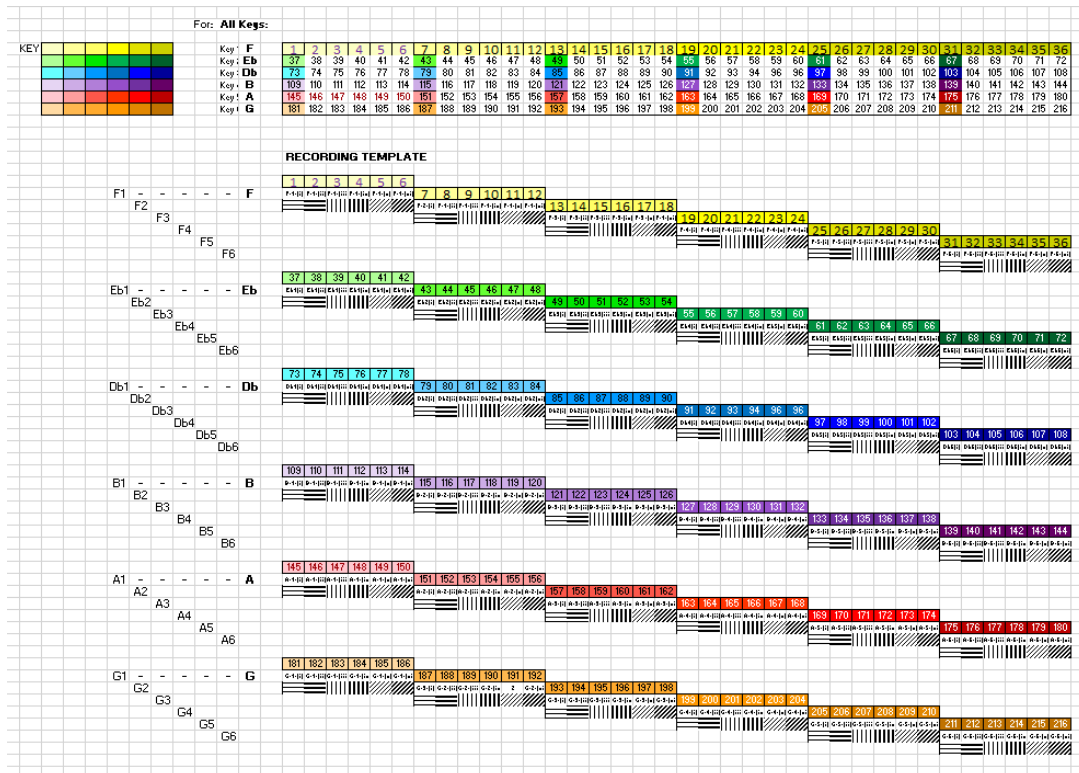


Figure 61: Recording template

- For the parameter of key, the values are F, E^b, D^b, B, A, G.
- For the parameter of compositional development parameter (CDP), the values are as below:
 - Rhythmic outlining of the primary 24-beat metre as a 10-10-4 beat
 - Rhythmic outlining of the secondary 24-beat metre as a 3-3-4-3-3-4-4 beat
 - Rhythmic improvisation based upon the melodic phrasing of the AB-sections — simple
 - Rhythmic improvisation based upon the melodic phrasing of the AB-sections — extended
 - Rhythmic soloing over 24-beat sections (A-section and B-section separately)
 - Rhythmic soloing over 48-beat sections (combined AB-sections)
- For the parameter of rhythmic density (RD), the values are 1, 2, 3, 4, 5, 6, where 1 is rhythmically the least dense and 6 is rhythmically the most dense.

Thus, 216 unique and musically distinct 15-second AB-AB⁵¹⁶ sections were recorded in sequence from 1 to 216, each 15-second improvisation having a unique key-CDP-RD improvisation instruction combination, in accordance with the *recording template*, as follows.

The 216 recordings were rearranged in the order shown in Figure 62. This process produced 18 unique and incrementally progressive (regarding RD) three-minute equi-harmonic cycles, each cycle

⁵¹⁶ The 15-second AB-sections for the tabla reference key but not specific notes. Thus, the term AB-AB section has different specific meanings for the tabla and guitar parts. For the guitar part, the AB-AB section is a melodic sequence. For the tabla part, the AB-AB section is an improvisation on the tabla and bayan drums, tuned to the tunings of a specific key, in accordance with compositional stipulations for the parameters of CDP and RD. The term AB-AB section used in this context also includes the AB-A'B' sections referenced in the previous section — i.e., sections where there is cyclic modulation as opposed to linear modulation.

comprising 12 of the 15-second recordings (18 equi-harmonic cycles x 12 AB-sections/equi-harmonic cycle = 216 AB-sections). Such a process was used to produce an algorithmically determined slow, *incrementally progressive* increase in the tabla's rhythmic density from near silence to maximum rhythmic density at time = 54 minutes (excluding the introduction).

As previously noted, the second *resolution* phase involved arranging the 18 incrementally progressive three-minute equi-harmonic cycle combinations in the *reverse order* to that demonstrated in the mixing template.

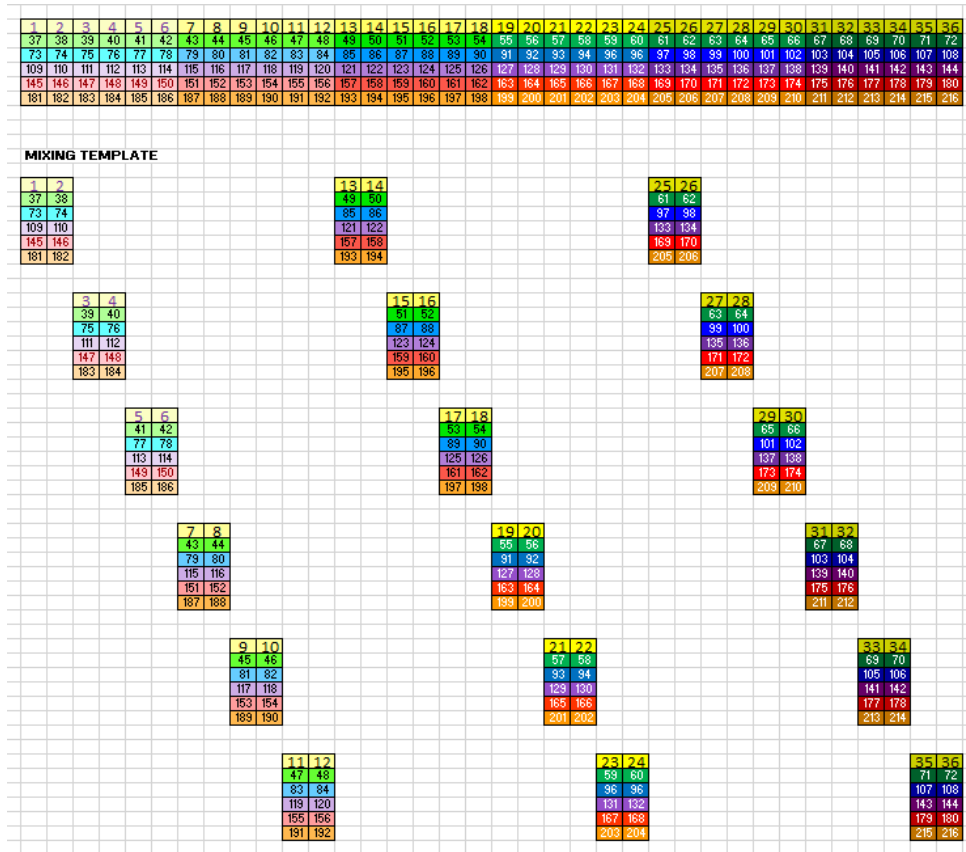


Figure 62: Mixing/assembly template — development phase

Figure 63 provides a three-dimensional representation of the recording and mixing assembly sequences.

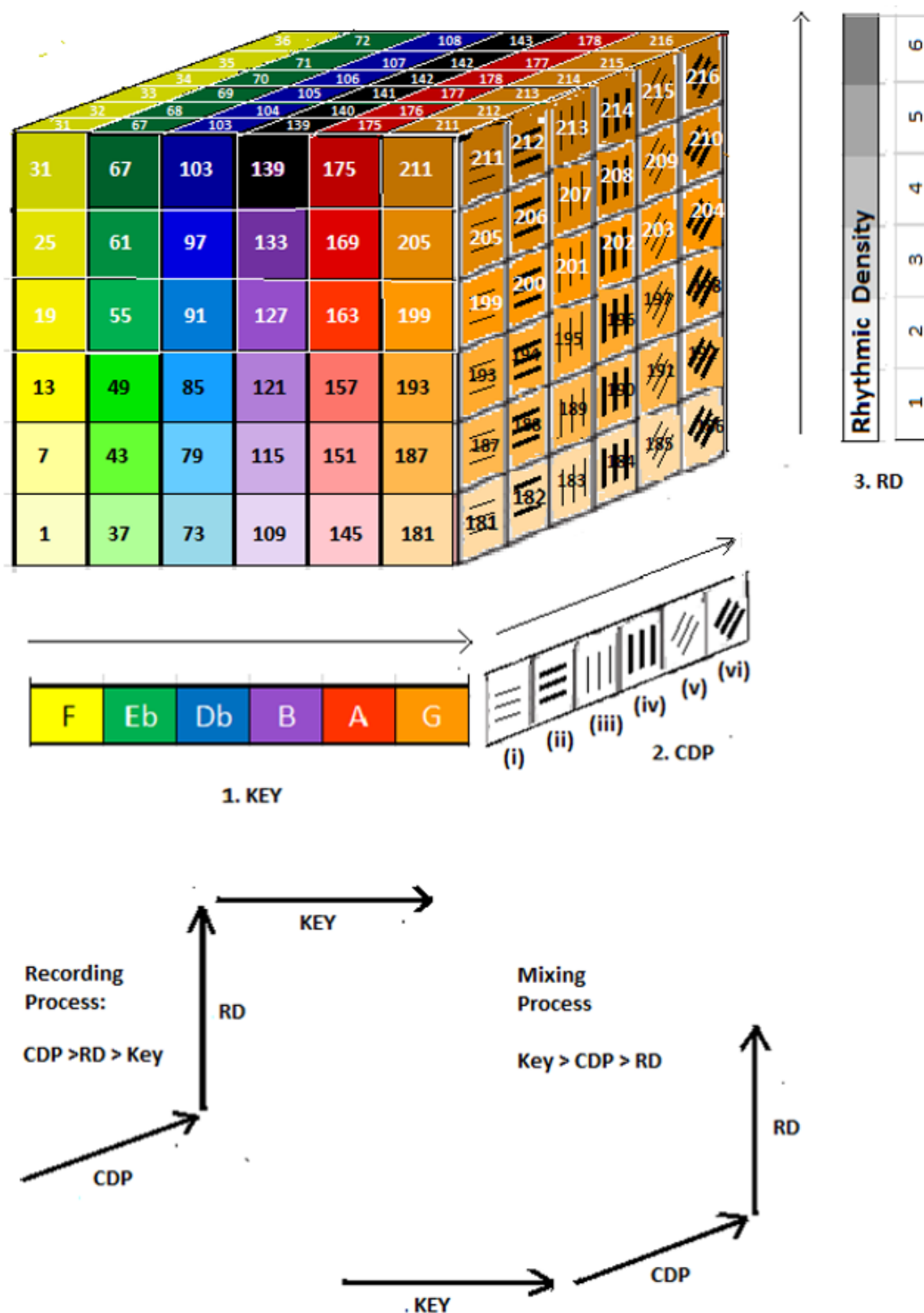


Figure 63: Combined mixing/assembly and recording template — development phase — 3D representation

Orders of parameter changes in recording and mixing/assembling of AB-sections

The recording and mixing/assembly phase of the tabla part are described in detail in section 9 below, including with explanatory diagrams. A summary of the process follows.

In the recording phase, the order of moving through the parameters is thus *CDP, then RD, then key*. This order facilitates the continuity of the same key (F) for 36 x 15-second recordings — *all in the same key* (F). At this point, a new drum tuning was established (E^b). The process then continued through all keys: F, E^b, D^b, B, A G.

The first recording sequence — all in the key of F — thus comprises blocks 1 2 3 4 5 6 7 8 9 10 11 and 12 in this order, each of these a unique 15-second recording. Continuing this systematic process, 216 x 15-second recordings of tabla improvisation, each recording being defined by a unique combination of key, CDP, and RD, were produced.

In contrast to this, in the *mixing/assembling* phase, the order of moving through the parameters is *key, then CDP, then RD*. This order of assembly facilitates the generation of equi-harmonic cycles every 12 x 15-second recording. The first mixing/assembling sequence thus comprises blocks 1 2 37 38 73 74 109 110 145 146 181 and 182, in order. This produces the first equi-harmonic cycle. During this time, the key changes every 7.5 seconds, RD remains at level 1, and CDP exhausts its first two values (levels 1 and 2 of its six levels).⁵¹⁷

This process then repeats twice for another two equi-harmonic cycles. During these cycles, the key continues to change every 7.5 seconds, CDP cycles through levels 3 and 4, and then levels 5 and 6, producing the next two equi-harmonic cycles. At this point, nine minutes of the composition have been assembled and all RD = level 1 options have been exhausted. The assembly process repeats using RD = level 2 improvisations. Another nine minutes of composition have been assembled.

This process is further repeated for the remaining levels of RD 3, 4, 5, and 6, producing 54 minutes of music, which comprises the full *development* arc of the composition.

The order of three-minute equi-harmonic cycles is then reversed, comprising the 54 minutes of the resolution arc.

Importantly, by establishing RD as the last of the three parameters to change, the process prioritises the slow, incremental progression of RD such that RD peaks at 54 minutes and then, in mirror-image fashion, progressively and incrementally resolves.

This process is consistent with Clayton's concept of *intensification*.⁵¹⁸

⁵¹⁷ Because the AB-section itself involves a key change — the B-section is in the subdominant key of the A-section, the assembling of six ABAB-sections in the keys of F, E^b, D^b, B, A and G is actually the assembly of six ABAB-sections in the keys of: F [A-section], B^b [B-section], E^b [A-section], A^b [B-section], D^b [A-section], F[#] [B-section], B [A-section] E [B-section], A [A-section], D [B-section], G [A-section], and C [B-section] — thus producing an equi-harmonic cycle.

Because the AB-section repeats to form a 30-second ABAB segment, the first ABA movement is a *linear* oscillation, returning to the original key.

In contrast to this the second ABA-section is an ABA' movement — a *cyclic* modulation from A to B to A' section where A' represents a new key.

The overall effect of this alternating linear and cyclic modulation is that the key changes from F to B^b to E^b in the first 30 seconds and continues this cycling process, thus traversing all 12 keys per three-minute equi-harmonic cycle.

The method of this process is presented under "Linear and cyclic movement within inter-AB sectional harmonic movement" and in Figures 33 and 34.

⁵¹⁸ Clayton, *Time in Indian Music*, 25.

8. Operationalisation of philosophical concepts to the compositional process

Oscillation 1 — overview of metaphorical representations. Though more typically applied to the domain of the social sciences, the concept of operationalisation as “turning abstract concepts into measurable observations” applies also to musical composition.⁵¹⁹ Such a process is particularly appropriate in a dissertation such as this, which seeks to represent abstract concepts in a tangible form manifestable as audible music.

This section of the method thus describes the process of operationalisation by which the abstract concepts of the dissertation are made representable within the submitted creative work. In that regard, this section describes the following specific operationalisations, each of which is an abstract concept metaphorically represented within the composition by a musical device.

These tangible representations of abstract concepts as they apply to the composition are as follows:

Sound and silence as metaphorical for the concept of form and void	1. The <i>absolute</i> representation of void and form states as <i>silence</i> and <i>sound</i> 2. The <i>relative</i> representation of void and form states as <i>harmonic home state</i> (home key) and <i>harmonic away state</i> (modulation to subdominant key)
Linear and cyclic harmonic modulation movements metaphorical for the concept of Western linear and Eastern cyclic time	3. <i>Linear ABA modulation</i>, metaphorical for the Western concept of linear time (e.g., through key centres of F-B^b-F) 4. <i>Cyclic ABA' modulation</i> metaphorical for the Eastern concept of cyclic time (e.g., through key centres of F-B^b-E^b) 5. <i>Equi-harmonic cyclic resolution</i> metaphorical for the Eastern concept of cyclic time (through key centres of F-B^b-E^b-A^b-D^b-F[#]-B-E-A-D-G-C-F)
Linear and cyclic global forms metaphorical for the concept of Western linear and Eastern cyclic time	6. Tabla global form (regarding RD) as linear metaphorical for the Western concept of linear time. 7. Guitar global form as cyclic (regarding repetitions of equi-harmonic cycle) metaphorical for the Eastern concept of cyclic time.

Sound and silence as metaphorical for the concept of form and void

The first two of these operationalisations — the *absolute* representation of void and form states as *silence* and *sound* and the *relative* representation of void and form states as *harmonic home state* (home key) and *harmonic away state* (modulation to subdominant key) are static representations.

The absolute representation of void and form states as silence and sound

Unlike the guitar part, which, in its role as a harmonic tanpura has effectively *no variation*, the tabla part incrementally and progressively increases from the void-variant state to the form-variant state and then incrementally and progressively returns from the form-variant state to the void-variant state.⁵²⁰

⁵¹⁹ An explanation of operationalization can be found here:
https://www.google.com/search?q=operationalization&rlz=1C1CHBD_en-GBAU852AU852&oq=operationalization&aqs=chrome..69i57j0l9.3321j1j15&sourceid=chrome&ie=UTF-8

⁵²⁰ The concept of form variant and void variant states is further addressed under “Minimalism” in Chapter 3 (Discussion).

The former occurs for the first 54 minutes of the composition, which is the *development arc* of the oscillation, and the latter occurs for the second 54 minutes of the composition, which is the *resolution arc* of the oscillation. Thus, the tabla part transitions from a void-variant state (silence) to a form-variant state (maximum RD of sound) and back to a void-variant state.

This oscillation movement is graphically represented below:

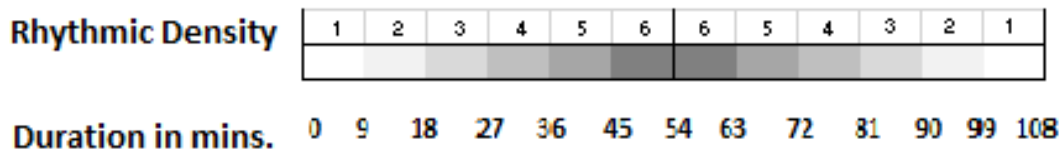


Figure 64: Increasing and decreasing RD

Referring to the concepts of absolute and relative form and void, as introduced in Chapter 1, the representation of void and form states as silence and sound is absolute because it directly refers to sound and silence as activity (form) and non-activity (void).

Thus, such a representation of form and void is not specifically related to context.

The relative representation of void and form states as home key and away key (subdominant key)

Void and form are also represented within the compositions, not as sound and silence, but metaphorically as *home* and *away* states within a changing (modulating) harmonic framework.

In this representation, void is represented not as silence but as the home key of a harmonic movement. Such a representation is a relative representation of form and void — key centres thus function as form and void relative to the harmonic context, the key centre of which changes every 7.5 seconds.

Correspondingly, form is represented not as sound but as the form of a modulation to a new key. In the case of *Oscillation 1*, this new key is the subdominant key.

The home key represents void because it is the default state. Referring again to Chapter 1, form and void in this representation are characterised not as sound and silence but as *context-specific significant change* or *context-specific salience*. In this characterisation of form, form occurs when *something unexpected happens*. If one is not expecting modulation and it occurs (a subjective and individual phenomenologically determined expectation, depending on one's familiarity with the music), then one experiences form. Such form is relative form because it depends on the context.

Not only is it context-dependent upon the listener and his/her expectations of what will occur in the music, it is also context-dependent within the harmonic framework itself. Thus, it is not the key of B^b itself that contains the musical form — rather it is the key of B^b *in the context of having previously been in the key of F*.

Linear ABA modulation, metaphorical for the Western concept of linear time, and cyclic ABA' modulation metaphorical for the Eastern concept of cyclic time.

The harmonic structure of *Oscillation 1*'s equi-harmonic cycle thus comprises a repeating pattern of alternating linear and cyclic modulations between AB-sections. These *inter-AB* linear and cyclic harmonic modulation movements were graphically represented earlier in Figure 57 (the equi-harmonic cycle) where the thinner lines represent linear modulation, and the thicker lines represent cyclic modulation.

Such linear and cyclic modulation movements are not only movements between the *key centres* that precede and follow a harmonic modulation but also movements between phenomenological representation of polar states — representable as the mutually exclusive states of (in the home-away couplet) *home* and *away* or (in the form-void couplet) *void* and *form*.

Thus, in *Oscillation 1*, within each AB-section, the harmonic dispositions of the original key centre (A-section) and the modulated key centre (B-section) are musical devices functioning as metaphorical operationalisations of the phenomenological attributions of home and away (and void and form) states.

Such movement trajectories are either linear or cyclic.

As an example of this, the *linear* ABA modulation evident in the first 15 bars of the composition — represented as a movement from the key F [at Bar 1] to the key of B^b [at Bar 8] and (consistent with *linear* modulation) *back to the same home key* of F [Bar 15], phenomenologically represented, is a movement from home to away and *back to home* again.

In comparison to this, the *cyclic* ABA' modulation evident in bars 15 to 29 of the composition — represented as a movement from the key of F [Bar 1] to the key of B^b [Bar 8] and then (consistent with *cyclic* modulation) *onward to a new home key of E^b* [Bar 15 — the new A'], phenomenologically represented, is a movement from home to away and then (rather than *back to*) *onward to a new home*.

Thus, to permit continuous progressive cyclic movement within an equi-harmonic framework, harmonic centres must change function from away status to new home status. In the example above, B^b functions as such a key centre, *pivoting* from the status of away key in the linear modulation, which occurs between bars 1 and 15, to the status of new home key, as part of the cyclic ABA' modulation, which occurs between bars 15 and 29. In addition to this, the home-away-home movement is apparent at a higher hierarchical level, via the resolution of the equi-harmonic cycle back to the key from where it commenced.

In addition to the described ABA' inter-AB cyclic movement, which takes place over 14 bars (7-bar A-section plus 7-bar B-section) within *Oscillation 1*, another cyclic movement is occurring at a higher hierarchical level every 168 bars within the composition.

This cyclic movement is the equi-harmonic cycle returning to the same place from where it began 168 bars ago, having traversed the 12 major key centres with equal harmonic distribution — a process that takes three minutes to complete.

Otherwise expressed, every 168 bars, the equi-harmonic cycle returns to the point where it started. This movement is also a movement from home to away and back again to the home state. Like all cyclic movements, it is conceptually representable as a *uni-directional, two-dimensional movement*.

In summary, the equi-harmonic cycle comprises the following home-away-home (or void-form-void) movements:

- Linear ABA movement
- Cyclic ABA' movement (where A' functions both as the old “away” key and the new “home” key)
- Cyclic movement at a second hierarchical order, resolving after 12 cyclic modulations, by returning to the “home” key from where it commenced, once every 3-minute equi-harmonic cycle.

The movements between home and away states (functioning as void and form states) within the equi-harmonic cycle are detailed in Figure 65 below. Appendix 7 also provides details about this concept.

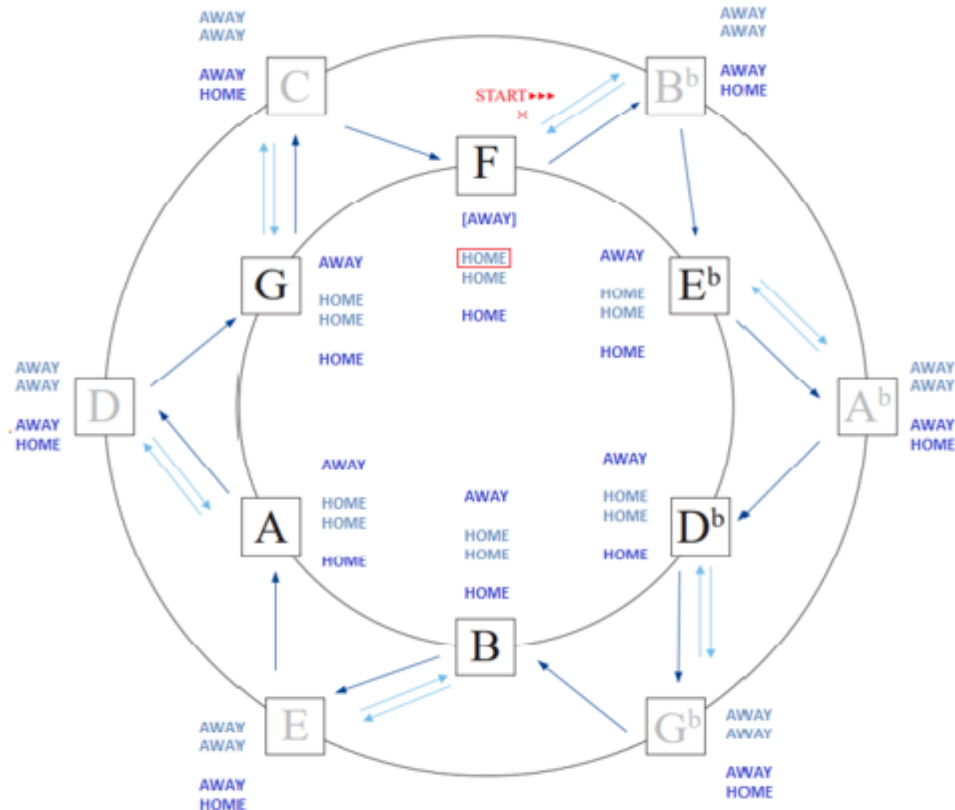


Figure 65: Home-away movement in the equi-harmonic cycle

Linear and cyclic global forms metaphorical for the concept of Western linear and Eastern cyclic time

In addition to being a metaphor for the concept of Western linear time and Eastern cyclic time, via its harmonic organisation, the composition is a metaphor for this concept in its global form — particularly in the contrasting global forms of the instrument parts.

In summary, the global form of the tabla is linear. Such a representation focuses on the progressive incremental increase and decrease in rhythmic density, which defines the overall global form of the tabla part. Thus, the tabla part comprises a single linear development and resolution.

In contrast to this, the global form of the guitar part is cyclic. Specifically, it comprises 36 cycles of the equi-harmonic cycle — the equi-harmonic cycle itself also being a cyclic structure.

The global forms of the tabla and guitar parts as primarily linear and cyclic (respectively) are graphically represented in Figure 2.

Relationship of operationalisation of concepts to exegesis research propositions

Secondary RP 2B (Exegesis) makes the following proposition:

The submitted creative work *Oscillation 1*, because of its harmonic organisation and global form, is a metaphor for the linear and cyclic representations of time in Western and Eastern paradigms.

Regarding the compositional process of *Oscillation 1* as it relates to the theoretical concepts of the dissertation, the following is a summary of the artefact's specific compositional processes as they relate to Secondary RP 2B:

- The representations of linear movement within *Oscillation 1* — in the form of linear inter-AB modulation movements within the harmonic cycle and the linear global form of the tabla part — is metaphorical for the Western concept of linear time.
- The representations of cyclic movement within *Oscillation 1* — in the form of cyclic inter-AB modulation movements within the harmonic cycle, the cyclic form of the equi-harmonic cycle's resolution, and the cyclic global form of the guitar part — are metaphorical for the Eastern concept of cyclic time.

Instrument parts

Guitar part

Background. The guitar part was introduced in section 5 above (*Overview of the composition*). The four functions of the guitar part are:

- The guitar establishes the melodic content of the composition via the repetitive playing of A (call) and B (response) melodic fragments.
- The guitar establishes the composition's implicit harmonic movement via the playing of a systematically modulating sequence of notes to outline a dynamic cycle of moving harmonic centres.
- In its repetition of the equi-harmonic cycle, the guitar functions as a *harmonic tanpura* (i.e., as a drone), repeatedly playing the 168 bars of the equi-harmonic cycle, against which the (non-repetitive) tabla solos over, during its progressive development and resolution of intensification.
- The guitar in its global form functions as the metaphorical representation of cyclicity as it relates to the Eastern concept of cyclic time.

The current section expands the description of the guitar part as it relates to the composition, especially as it relates to Secondary RP 2A, which proposes that *Oscillation 1* is a metaphor for contrasting Western and Eastern concepts of linear and cyclic time. The previous section has listed the proposed ways in which *Oscillation 1* symbolises such concepts.

At the centre of this metaphorical representation is the equi-harmonic cycle. (Table 8 is a tabulated summary of the equi-harmonic cycle as an organisation of hierarchically organised, multi-parameter form-void vectors.)

An analysis of the guitar part, referenced to the compositional device of the equi-harmonic cycle, now follows.

Equi-harmonic cycle. The equi-harmonic cycle is a fundamental unit of the guitar part. The compositional method of the equi-harmonic cycle in achieving the roles of guitar is described below.

- The first step was the establishment of the *melodic content* of the composition and the role of this melodic content to create repetitive playing of A (call) and B (response) melodic fragments. This is evident in the A and B melodies described in section 5.

- The second step was the establishment of the composition's implicit *harmonic movement*, which is evident in the sections that follow — specifically, in the analysis of the harmonic movement as being either linear or cyclic.
- The third step was the role of guitar as harmonic tanpura. In *Oscillation 1*, the guitar functions as *harmonic tanpura* via the playing of a repeating-note sequence, which constitutes the equi-harmonic cycle. In this way, the guitar's repeated (36 times) playing of the equi-harmonic cycle functions as *musical void*, akin to a blank canvas or an empty frame. The guitar role is thus limited to defining the harmonic movement, providing what is effectively an empty space against which the tabla can improvise.

Typically, the musical content of the traditional tanpura is the repetition of a four-note sequence, generally a combination of Sa (first degree of the scale) and Pa (fifth degree of the scale). This four-note repeating-note sequence defines a *static tonal centre*.

In contrast to this, rather than comprising a four-note sequence, the repeating musical sequence in *Oscillation 1* is a 456-note sequence. This sequence, lasting 168 bars and three minutes, is the equi-harmonic cycle. In this way, the equi-harmonic cycle, as the guitar's primary musical content, defines a *dynamic harmonic centre* rather than a *static tonal centre*. Furthermore, the note content of the equi-harmonic cycle is such that the harmonic content of the cycle is distributed equally across all 12 keys.

Guitar part — metric, rhythmic, melodic, harmonic, modulatory and equi-harmonic structure.

In examining the metric, rhythmic, melodic, harmonic, modulatory, and equi-harmonic structure of the guitar part, several points may be made. These explicitly reference the A-section and B-section, which comprise the notes of the guitar section. An example of such an A-section and B-section is given in the figure below, being the first 14 bars of the composition.



Figure 66: First 14 bars of the composition

From the example, the following is notable:

- **Metric analysis.** A-section and B-section have the same 24-beat structure comprising 3 + 3 + 4 + 3 + 3 + 4 + 4 groupings.
- **Rhythmic analysis or rhythmic mirroring.** Sections A and B are rhythmically identical. In other words, the rhythms of the phrases of the A-section are identical to the rhythms of the phrases of the B-section. Sections A and B are thus related by a process of rhythmic mirroring.
- **Phrasing within sections A and B.** Being rhythmic mirrors of one another, sections A and B share phrasing characteristics. Based on the positioning of rests or extended (longer than a crotchet) notes, the phrasing of each section comprises three phrases.

Referencing the A-section from bars 1 to 7, the three phrases are as follows:

A-section



PHRASE 1



PHRASE 2



PHRASE 3

B-section



PHRASE 1



PHRASE 2



PHRASE 3

Figure 67: Phrases

What becomes apparent when analysing these phrases in context is that the rest lengths from phrase 1 to phrase 2 to phrase 3 increase. Specifically, the rest lengths (or final note value) increase from one to two to three beats. The effect of this lengthening of rest time is that the major rhythmic punctuation points occur at the end of the section, conceptually defining sections A and B and thus allowing the effect of call and response.

- **Melodic analysis.** *Melodically*, sections A and B, as previously noted, relate to one another in a relationship of call and response. The establishment of this call-and-response relationship is achieved through two compositional mechanisms. The first is *rhythmic mirroring*, described above. The second is *melodic and harmonic variation*. It is apparent from this example that the melodic shape of the B-section is different from that of the A-section, and such variation functions as call and response. From the first 14 bars of the composition, melodic variation occurs on the ninth note of the first phrase of the B-section. This is demonstrated in the following example, where the arrow at beat 9 indicates the change to the melodic shape of the phrase.



Figure 68: Melodic shape of the phrase

At this point, in contrast to the A-section where the shape “falls” from the F to the D, in the B-section, the shape “rises” from the B to the C. The harmonic movement that occurs in the guitar part of *Oscillation 1* is a metaphorical representation of Western linear and Eastern cyclic time. It is discussed in depth in the sections that follow.

In the context of the compositional techniques used to establish the relationship between the A-section and the B-section as one of “call and response”, it is sufficient to note that the melody in the B-section occurs within a harmonic context where the B-section is in the subdominant key to the A-section. Thus, in the first 14 bars, as referenced, the B-section is in the key of B^b while the A-section is in the key of F.

- **Harmonic movement and modulations (harmonic analysis).** In *Oscillation 1*, the harmonic movement of the guitar part is defined by two processes. The first is the *intra*-(AB) sectional harmonic movement — that is, the harmonic movement from bar to bar *within* each 14-bar AB-section.

The second is *inter*-AB movement, the harmonic movement that occurs *between* AB-sections. Effectively, this is modulation movement, comprising alternating linear and cyclic modulation. The net effect is a continuous, repeating 168-bar cycle of harmonic movement — the equi-harmonic cycle. Intra-AB and inter-AB sectional harmonic movement are described in further detail in the immediately following sections.

Intra-AB sectional harmonic movement

Intra-sectional harmonic movement takes place within the AB-section. It is the harmonic movement that occurs over a 14-bar segment, commencing at the start of an A-section and terminating at the end of each B-section.

An example of the intra-(AB) sectional harmonic movement, taken from the first 14 bars of the composition, as notated in the guitar lead sheet,⁵²¹ is shown in Figure 69.

⁵²¹ The main manuscript for *Oscillation 1*, because it also includes the tabla part, does not include harmonic movement notations (i.e., chords). Chords are, however, included in the guitar lead sheet.



Figure 69: Intra-(AB)-sectional harmonic movement

Harmonic modulation within the AB-section

Within the AB-section, it is notable that modulation has occurred during the 14 bars from the A-section to the B-section. Specifically, the key centre has moved from the tonic to the subdominant.

In the AB-section example above, the key centre has moved from F to B^b.

For visual clarity, the key signature in the written notation has not been altered. Instead, the modulation is evident in the altered scale tones in the fourth and sixth bar of the B-section.

Because all AB-sections are effectively transpositions of one another — in the primary keys of F, E^b, D^b, B, A and G — it appears from the key signatures that the equi-harmonic cycle is within six keys only. Within every AB-section, however, there is a modulation, as evidenced by the accidentals. Thus, the B-sections provide the harmonic content for the keys of B^b, A^b, G^b/F[#], E, D and C, and the equi-harmonic cycle systematically traverses all 12 major keys.

Harmonic nomenclatures against A-section and B-section individually versus combined

The harmonic movement from the A-section to the B-section is a modulation from a tonic key to a subdominant key. The overall harmonic movement within the 14-bar intra-(AB) section may be represented in one of two ways. The first is to reference the harmonic movement against the key centres of the A and B sections individually; the second is to reference it against the combined AB-section.

Harmonic analysis of AB-section referenced against A-section and B-section individually

In this characterisation, the harmonic movement within the A-section is referenced against the harmonic centre key of the A-section, and the harmonic movement within the B-section is referenced *against the harmonic centre key of the (modulated) B-section*.

This nomenclature considers the harmonic movement from the perspective that, in moving from the A-section to the B-section, the harmonic movement *has already modulated* — that modulation being from the tonic to the subdominant. In such a harmonic analysis, it is evident that the harmonic sequential movement within the A-section and B-section are, despite their melodic differences, the same.

Figure 70 shows the absolute harmonic movement, followed by the relative harmonic movement. In this representation, the harmonic movement within the B-section is described *relative to the modulated key of B^b-major*.

[KEY OF F MAJOR]

A Section

[IN REFERENCE TO KEY OF B^b MAJOR]

B Section



Figure 70: Harmonic movement within the B-section

In summary, a harmonic analysis of the AB-section referenced against A-section and B-section individually produces the following harmonic sequence:

$$V-I-(vi)^m-(iii)^m-IV-(ii)^m-V^7-V-I-(vi)^m-(iii)^m-IV-(ii)^m-V^7$$

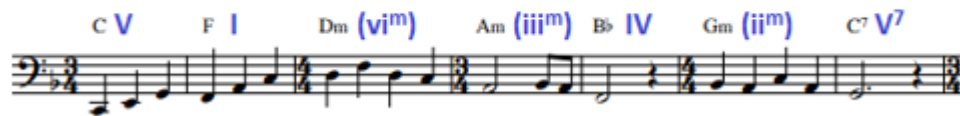
Harmonic analysis of AB-section referenced against the combined AB-section

In contrast to the previous analysis, the harmonic movement within the AB-section is alternatively referenceable against *the key centre of the combined AB-section*, rather than the A-section and B-section harmonic centres separately. In this analysis, the B-section, even though the harmony has modulated to the subdominant key of the A-section by the fourth bar of the B-section, the AB unit is harmonised as a *single combined unit*.⁵²²

Figure 71 shows the absolute harmonic movement, followed by the relative harmonic movement, when the entire AB-section is harmonised relative to the key centre of the A-section.

[IN REFERENCE TO KEY OF F MAJOR]

A Section



[IN REFERENCE TO KEY OF F MAJOR]

B Section



Figure 71: Entire AB-section harmonised

In summary, a harmonic analysis of AB-section referenced against the combined AB-section produces the following harmonic sequence:

$$V-I-(vi)^m-(iii)^m-IV-(ii)^m-V^7-I-IV-(ii)^m-(vi)^m-(vii^b)-V^m-I^7$$

⁵²² The harmonic analysis of AB-section referenced against the combined AB-section is thus a harmonic analysis of the combined AB-section in reference to the key signature of the AB-section, rather than in reference to the changed key, as indicated by the accidentals within the staff.

Inter-AB sectional harmonic movement — continuous alternating linear and cyclic harmonic modulation

The second of the harmonic movements analysed is inter-AB sectional harmonic movement — the harmonic movement that occurs between the AB-section. This harmonic movement is a continuous repeating cycle of alternating linear and cyclic modulations, modulating through all 12 major harmonic key centres, to produce the equi-harmonic cycle (shown in Figure 72).

The *continuous cyclic harmonic modulation* summarised in the following graphical representations of the modulation movement that occurs within each of the 36 three-minute, 12-key equi-harmonic cycles by which the composition is harmonically defined.

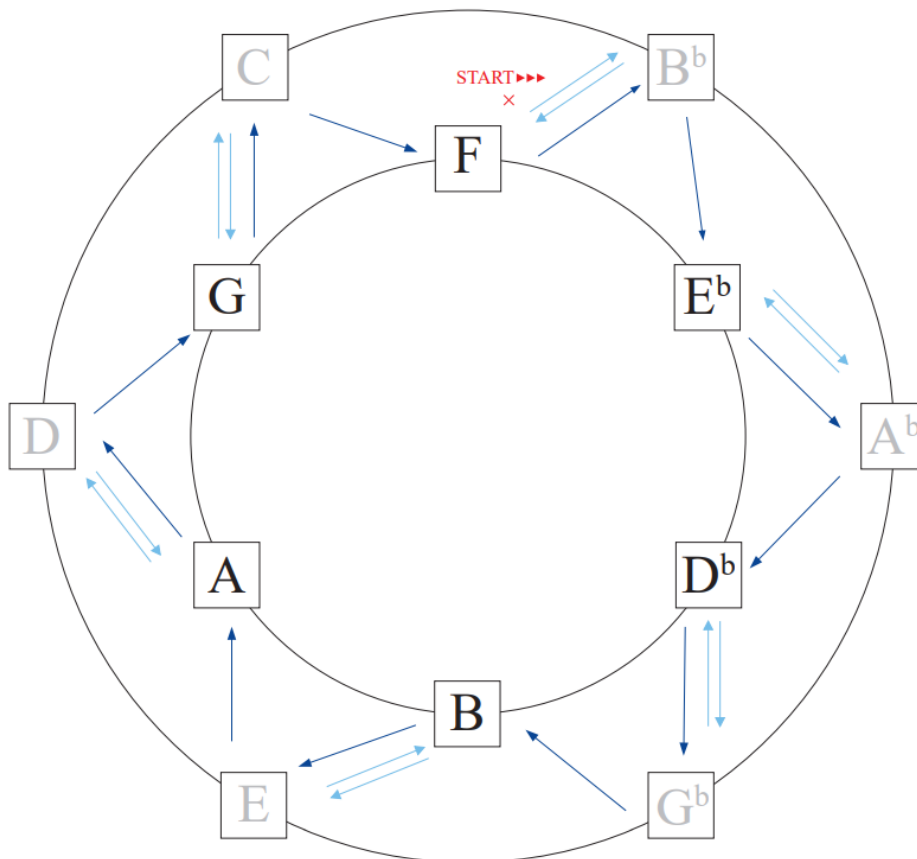


Figure 72: Continuous cyclic harmonic modulation

Linear and cyclic movement within inter-AB sectional harmonic movement

Regarding the compositional processes that operationalise the theoretical concepts of the dissertation, the equi-harmonic cycle functions in its own right as intercultural metaphor for contrasting Western linear and Eastern cyclic concepts of time.

This section describes the compositional process by which this concept is operationalised within the guitar part. The specific mechanism for this is the alternating linear and cyclic harmonic movements occurring within the equi-harmonic cycle. Notably, such harmonic movements occur within the equi-harmonic cycle at the end of every AB-section.

Inter-AB sectional harmonic movement, as modulation, thus occurs every 14 bars or every 15 seconds. Furthermore, such harmonic movements are alternatively linear or cyclic. As previously noted, the inner circle lists the keys in which the A-section is played, and the outer circle lists the keys

in which the B-section is played. Furthermore, in the representation of the equi-harmonic cycle, the thinner (light) lines represent linear modulation and the thicker (dark) arrows represent cyclic modulation.

The compositional method of this alternating linear and cyclic harmonic movement of the guitar part's equi-harmonic cycle is examined in further detail, including graphic representations, below.

Inter-AB harmonic movement within the equi-harmonic cycle

The points within the equi-harmonic cycle at which modulations are determinable as either linear or cyclic are the points between a completing B-section and a commencing A-section. These points of harmonic movement are evident in the figures below.

Inter-AB movement — linear. Figure 73 represents linear modulation in more detail. Linear modulation, first occurring in the composition at bar 8, is represented in the equi-harmonic cycle as thinner (light) arrows moving *back and forth* in opposite directions.

The example demonstrates the linearity of harmonic movement in the movement from the A-section to the B-section and then *back to the A-section in the same key*.

In the example demonstrated in Figure 73, the linear harmonic movement is thus the harmonic movement from F to B^b and *back to F again*.

As previously described, such cyclic harmonic movement is akin to the *one-dimensional, bi-directional movement* of a simple pendulum appearing as a straight line, when viewed from above.

In Figure 73, this cyclic modulation movement is highlighted by the large arrows.

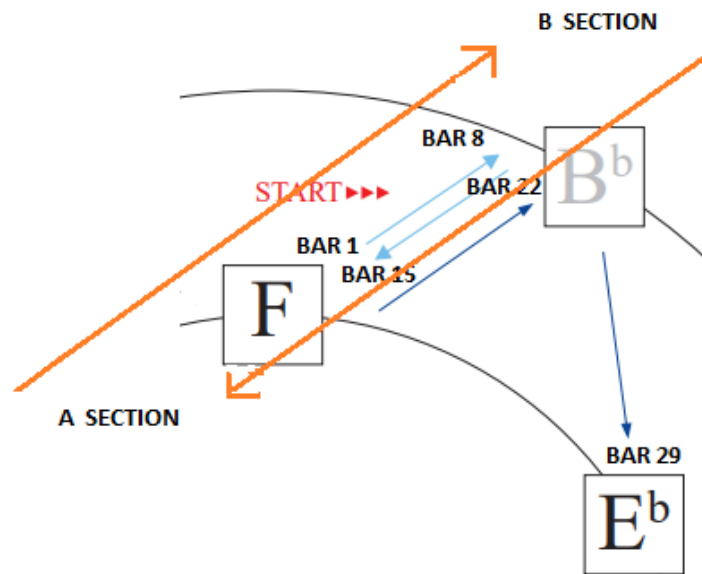


Figure 73: Linear modulation

Inter-AB movement — cyclic. Figure 74 represents cyclic modulation in more detail. Cyclic modulation, first occurring in the composition at bar 29, is represented in the equi-harmonic cycle as thicker (dark) arrows moving *around the cycle* in a continuous forward direction. In the example demonstrated, cyclic harmonic movement is thus the harmonic movement from F to B^b and then *onwards to E^b*.

As also previously described, such cyclic harmonic movement is analogous to the *two-dimensional, uni-directional movement* of a pendulum bob, moving in a circle, viewed from above. This cyclic modulation movement is highlighted in Figure 74 by the large arrows.

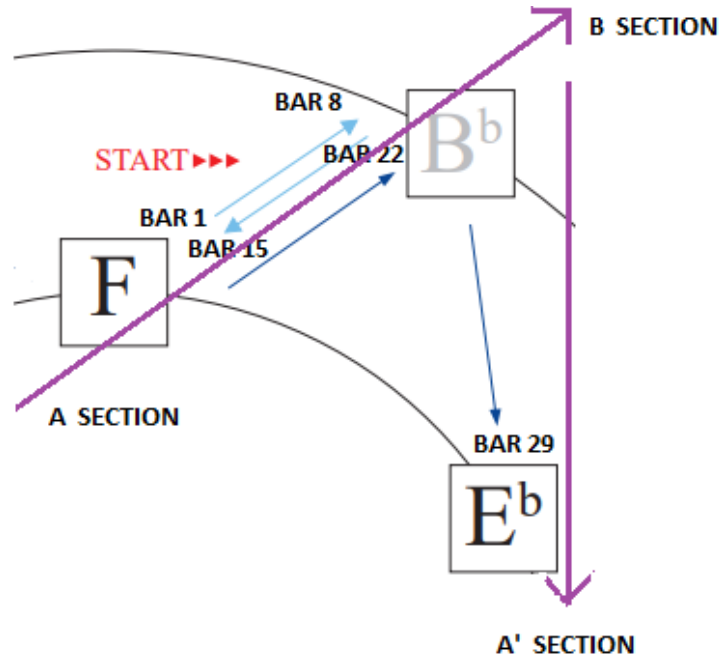


Figure 74: Cyclic modulation

Summary of linear and cyclic movement — guitar part

Thus, linear and cyclic modulation, functioning as a metaphor for Western and Eastern linear and cyclic concepts of time, occur in the *inter-AB harmonic movement* of the equi-harmonic cycle, as evident in the figures above. These figures represent linear modulation as thinner, lighter arrows and cyclic modulation as thicker, darker arrows. This concept forms the foundation of the inter-AB sectional harmonic movement of the guitar part. As described in RP 2B, the guitar part, in its alternating linear and cyclic modulation, is a metaphor for Western and Eastern linear and cyclic concepts of time.

Combined intra-sectional (AB) harmonic movement and continuous) cyclic harmonic modulation movement — harmonic movement of the equi-harmonic cycle

The overall harmonic movement of the three-minute equi-harmonic cycle is established by combining the intra-sectional (AB) harmonic movement — as demonstrated by the continuous cyclic harmonic modulation movement demonstrated earlier in Figure 57 (the equi-harmonic cycle), and in further detail in the figures above (Figure 73 and Figure 74).

Otherwise expressed, the harmonic movement of the *equi-harmonic cycle* is the *intra-(AB) sectional harmonic movement*, modulated through all 12 keys.

Figure 75 summarizes the overall harmonic movement, both *intra-AB sectional* and *inter-AB sectional*, for a single equi-harmonic cycle.

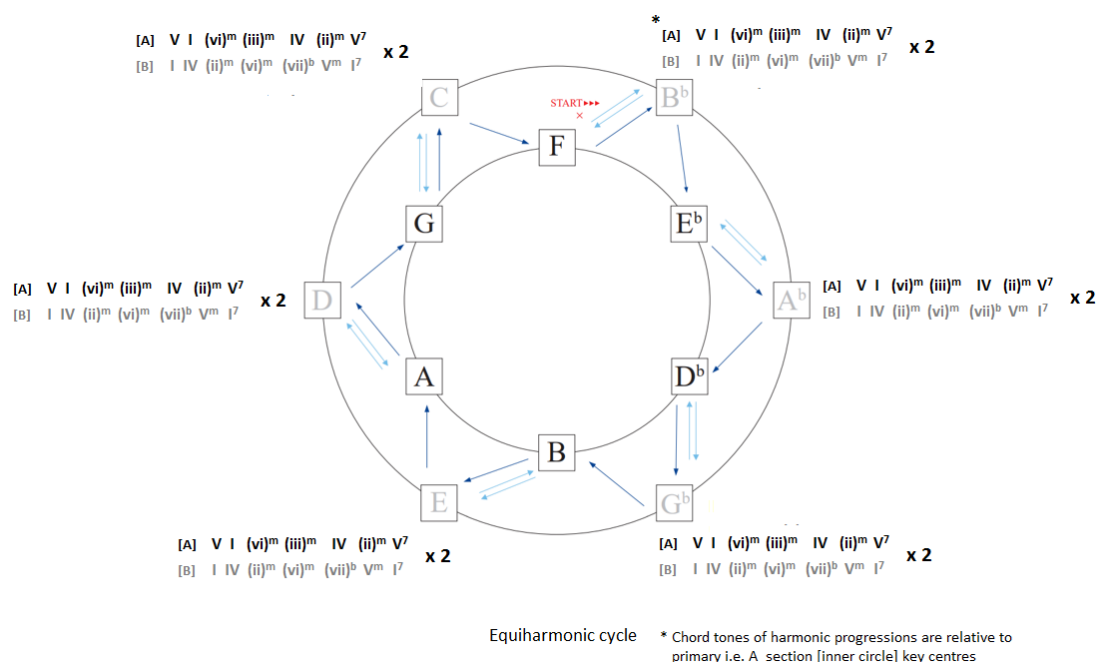


Figure 75: Combined *intra-AB-sectional* and *inter-AB-sectional* harmonic movement for a single equi-harmonic cycle

Equi-harmonic cycle — alternative representations

To illustrate harmonic movement and modulation within *Oscillation 1*, the harmonic and modulatory movements of the *equi-harmonic cycle* may be represented differently, each of these being an alternative representation of what is essentially the same 168-bar three-minute section of music.

Alternative representations of the equi-harmonic cycle are:

- traditional lead-sheet and chord chart representation (Figure 76)
- graphic harmonic representation (Figure 75)
- graphic home-away movement representation (Figure 65)
- graphic form-void vector representation (Figure 77)

The following chord chart (Figure 76) is a traditional lead-sheet representation of the harmonic movement for the guitar part of *Oscillation 1*.

Figure 76 displays a chord chart for an equi-harmonic lead sheet, organized into 10 staves. Each staff contains a sequence of chords, with the chord symbols written above the staff. The chords are as follows:

- Staff 1: C, F, D^m, A^m, B^b, G^m, C⁷
- Staff 2: F, B^b, G^m, D^m, E^b, C^m, F⁷
- Staff 3: B^b, E^b, C^m, G^m, A^b, F^m, B^b⁷
- Staff 4: E^b, A^b, F^m, C^m, D^b, B^b^m, E^b⁷
- Staff 5: A^b, D^b, B^b^m, F^m, G^b, E^b^m, A^b⁷
- Staff 6: D^b, G^b, E^b^m, B^b^m, C^b, A^b^m, D^b⁷
- Staff 7: F[#], B, G[#]^m, D[#]^m, E, C[#]^m, F[#]⁷
- Staff 8: B, E, C[#]^m, G[#]^m, A, F[#]^m, B⁷
- Staff 9: E, A, F[#]^m, C[#]^m, D, B^m, E⁷
- Staff 10: A, D, B^m, F[#]^m, G, E^m, A⁷

The chart is presented in a lead sheet format, with the chord symbols written above the staff lines. The staves are organized into a single system, with each staff containing a sequence of chords. The chords are written in a specific notation, with superscripts used for some chords (e.g., D^m, A^m, B^b, G^m, C⁷).

Figure 76: Chord chart of equi-harmonic lead sheet

Relation to the research propositions

Equi-harmonic cycle — harmonic graphic representation expressed in terms of Zuckerkandl's 2/4 metre home-away concept

Linear home-away-home movement alternative representations. In Chapter 1 of the dissertation, extensive reference is made to the theoretical work of Victor Zuckerkandl's implicit concept of home-away polarity within 2/4 metre as the foundation of the experience of musical vectoriality within metre, one of the initial concepts on which the research is based.

The equi-harmonic cycle, specifically its concept of *continuous cyclic modulation*, is also representable, referring to Zuckerkandl's same concept. In this representation, linear modulation is the movement where the second "home" (from a harmonic perspective) is the same "home" as the original. Thus, linear modulation is representable as ABA. Such linear harmonic movement is representable as *home-away-home* (or *void-form-void*) movement. The *linear modulation* in the first 15 bars of the composition (i.e., from bar 1 to bar 15, from the key of F to B^b then back to F) is an example of such linear home-away-home movement.

Cyclic home-away-home movement. In contrast to this, the *cyclic modulation* in the next 14 bars (from bars 15 to 29, from F to B^b, then *onwards* to the *new key* and *new home* of E^b) is representable as *home-away-home'* (or *void-form-void'*) movement, where *home'* represents the new home key. The equi-harmonic cycle is thus referenced against Zuckerkandl's concept of home and away as an alternating pattern of linear home-away-away movement and cyclic home-away-home' (new home) movement.

As it applies to inter-AB sectional harmonic movement, this concept is illustrated in Figure 65. Expressed in terms of movements between form and void states, it is illustrated in Figure 77.

Equi-harmonic cycle as it relates to the primary research proposition

RP 1A states:

The phenomenological experience of directional movement within a music composition is conceptually representable as a "phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field".

RP 1A thus comprises five sub-propositions as below:

- (i) The experience of vectoriality in music is phenomenologically determined.
- (ii) The experience of vectoriality in music is hierarchically organised.
- (iii) The experience of vectoriality in music occurs at the level of multiple parameters (including those of metre, melody, harmony, and in more complex music, modulation and global form).
- (iv) The experience of vectoriality in music arises from the phenomenological representation of polarised couplet cells, within which the experience of form-void vectors (the directional movement between form and void states) is made possible as a phenomenological representation.
- (v) The arrangement of such form-void vectors constitutes a phenomenologically determined vector field.

The case for these five sub-positions, and thus the case for RP 1A, is discussed at the beginning of Chapter 3.

Concerning sub-proposition (iv), the equi-harmonic cycle is representable in an analogous way in Figure 77 below, though using the concept of musical composition as comprising movements between phenomenologically determined form and void states. The figure is thus a “map” of the form-void vectors that comprise the equi-harmonic cycle. In it, the “START” mark indicates the point at which the composition commences.

At this commencement point, the key of F major functions as home and thus “void”.

The first form-void vector for the equi-harmonic cycle is thus the thinner, light line directly under the x mark of the START symbol.

This vector is a void-to-form vector. (In reading Figure 77, the “void” status is represented by the word “void”, directly under the word “form”).

Continuing this demonstration of form-void vectors, the first four phenomenological void-to-form vector representations are thus:

- Linear void to form phenomenological vector [F to B^b] as represented by the thin, light arrow from F to B^b.
- Linear form to void phenomenological vector [B^b back to F] as represented by the parallel but opposite direction thin, light arrow from B^b back to F.
- Cyclic void to form phenomenological vector [F to B^b] as represented by the thicker, dark arrow moving from F to B^b].
- Cyclic void to form phenomenological vector where the previous form key [B^b] has changed its status from form to void to become part of the void to form movement [B^b to E^b] cyclically modulating the composition into the new key of E^b major. This is represented by the thicker arrow from B^b to E^b.

This process continues throughout the remaining keys of the equi-harmonic cycle. The figure is thus the representation of this progressive alternating linear and cyclic harmonic modulation movement and its associated form-void phenomenological vector movement.

Form-void vectors at the level of the composition’s other parameters — those of metre, melody, modulation, and global form — are described in Appendix 7. The demonstration of such form-void vectors corresponds with the model of musical vectoriality proposed in RP 1A. In this way, the composition exemplifies the theoretical concepts introduced in Chapter 1.

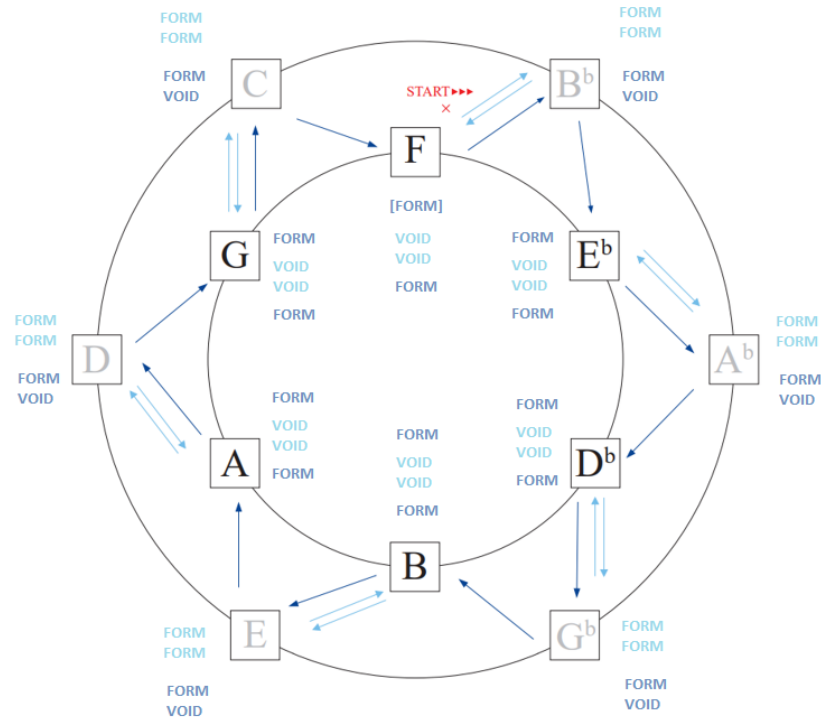


Figure 77: Void-form vectors in the equi-harmonic cycle

Equi-harmonic cycle as it relates to Secondary RP 2B (Exegesis)

Exegesis RP 2B is as follows:

The submitted creative work, *Oscillation 1*, because of its harmonic organisation and global form, is a metaphor for the linear and cyclic representations of time in Western and Eastern paradigms.

The concept of the composition's contrasting linear and cyclic harmonic modulation movements was represented in the previous figures.

In reprising Exegesis RP 2B, the harmonic structure of the equi-harmonic cycle, as alternating linear and cyclic modulation, may reasonably be considered a metaphor for the concepts of linearity and cyclicity, especially as they relate to Western and Eastern concepts of time. Similarly, the global forms of the tabla and guitar as linear and cyclic, respectively, as demonstrated in section *Relationship between theoretical and creative work*.

The relationship of exemplification

The artefacts exemplify the concepts of the theoretical work.

Major artefact

Oscillation 1 exemplifies the concept of RP 1A — the proposition that the experience of directional motion in music is representable as a “phenomenologically determined, hierarchically organised, multi-parameter, form-void vector field”. Table 8 (Appendix 7) provides a summary of the analysis of *Oscillation 1* in terms of the above proposition.

Additionally, *Oscillation 1* exemplifies the concept of RP 3A — the geometrical model of Western musical compositional form as *helix*. This is visually apparent when one examines the graphical representation of the global form of *Oscillation 1*, as demonstrated in Figure 2.

Minor artefact

The minor artefact, *Beginner's Mind*, exemplifies the concept of RP 3B — the geometrical model of Eastern musical compositional form as *vortex*.

The relationship of metaphor

Oscillation 1 is also a *metaphor* for the theoretical concepts of the dissertation (Western linear and Eastern cyclic time) — specifically, in its linear and cyclic global form and harmonic structure. This concept is demonstrated graphically in Figure 2. Details of these compositional processes are also presented in Appendix 5.

Equi-harmonic cycle as it relates to RPs 4A and 4B

The tertiary RPs are geometrical representations of contrasting Western and Eastern musical forms, respectively, as helix and vortex, metaphorical for contrasting Western and Eastern concepts of time. They are discussed in Chapter 3 as they relate to the artefact, and then tendered as concepts for further research in Chapter 4 (Summary and Conclusion).

The next section gives a detailed presentation of the specific processes that permitted the production and recording of the tabla part.

9. Specifics of the compositional process — *tabla****Background***

The tabla part of *Oscillation 1* is a 54-minute development section followed by a 54-minute resolution section. The compositional process of linear development and resolution is achieved via the systematic and algorithmically determined ordering of 216 individual 15-second tabla recordings, each being uniquely defined for three parameters: key, CDP, and RD.

For each of these recordings, the tabla is thus required to play an improvised rhythmic invention that accords with one of the six levels for each of these three parameters. The duration of each unit of recorded tabla is one AB-section — that is, 14 bars, lasting (at a tempo of ♩ = 192) exactly 15 seconds per recording.

The six levels for each of these three parameters are summarised below:

Key: F, E^b, D^b/C[#], B, A and G

CDP: (i) (ii) (iii) (iv) (v) (vi) defined as follows:

- (i) Rhythmic outlining of the primary 24-beat metre as a 10-10-4 beat
- (ii) Rhythmic outlining of the secondary 24-beat metre as a 3-3-4-3-3-4-4 beat
- (iii) Rhythmic improvisation based upon the melodic phrasing of the AB-sections — simple.
- (iv) Rhythmic improvisation based upon the melodic phrasing of the AB-sections — extended.
- (v) Rhythmic soloing over 24-beat sections (A-section and B-section separately)
- (vi) Rhythmic soloing over 48-beat (combined AB-sections).

RD: 1, 2, 3, 4, 5 or 6 levels of rhythmic density.

Summary of 216 units of recorded tabla units as 6 keys x 6 CDP levels x 6 levels of RD

Using the above compositional process, it was possible to create 216 units (6 keys x 6 levels of CDP x 6 levels of RD) of 15-second tabla improvisation recordings, each recorded unit being uniquely defined in terms of the parameters of the key, CDP and RD.

Figure 78 summarises this concept.

	PARAMETERS: 1. Key x 2. CDP x 3. RD					
1. KEY	F	E ^b	D ^b	B	A	G
2. CDP	(i)	(ii)	(iii)	(iv)	(v)	(vi)
3. RD	1	2	3	4	5	6
	Rhythmic Density					

Figure 78: Summary of controlled graded improvisation

Controlled graded improvisation

The concept of “controlled graded improvisation” is thus fundamental to the tabla part of *Oscillation 1*. It is the deliberate and precise compositional process that makes it possible to incorporate improvisation into global control of the process of development and resolution within the composition. It is also the foundation for the concept of “intensification”, further described under “Development and resolution via non-vectorial process of intensification” below.

In the case of the tabla part for *Oscillation 1*, controlled graded improvisation applies primarily to the RD parameter. The reason is evident in the differences between the data sets associated with the CDP and RD parameters. This is briefly explained below.

The data sets of key, CDP, and RD

For practical purposes, the data set of the parameter *key* contains nominal data — that is, the six keys are related to each other in terms of differences of identity like the data set of fixed colours.⁵²³

Similarly, the CDP data set, describing differences of approach to improvisation, is primarily nominal data.

In contrast to this, the RD data set contains ordinal data. The six levels of RD invited for the improvisation can thus be measured. This capacity to be ordinal permits quantitative, algorithmically determined development and resolution of the RD parameter. RD is the parameter on which the overall linear development and resolution of the tabla part are structured. The compositional method by which this is achieved is contingent on the logical “ordering” of the 216 recorded units of improvisation so that the process is one of gradual movement from low RD to high RD.

⁵²³ In theory, both musical keys and colours are also considered as continuous ordinal data. The is so because, at the physical level, both musical keys and colours are frequencies. Frequencies, being numbers, are both continuous (i.e., not discrete) and ordinal (arrangeable in an order or hierarchy). The statement: *Orange is closer to yellow than blue* is thus comparable to *E^b is closer to F than B*. Certainly this is case when key centres are considered as vibrational frequencies within a spectrum. The “closeness” of key centres to one another may also be considered in other terms of closeness or relatedness. This concept of “relatedness” is evident, for example, in George Russell’s *Lydian Chromatic Concept of Tonality*. For practical purposes, however, in the context of the current dissertation, keys are considered a nominal data set. George Russell, *George Russell’s Lydian Chromatic Concept of Tonal Organization* (2001), cited at https://en.wikipedia.org/wiki/Lydian_Chromatic_Concept_of_Tonal_Organization

The compositional process for the tabla part is thus one of orderly, algorithmically determined assembly of each of the recorded units to produce an overall effect of development by intensification (gradual increase in RD), followed by intensification resolution (gradual decrease in RD).

The compositional mechanisms enabling this process, and in particular the specific order of re-assembly of the 216 x 15-second duration tabla recordings to achieve this effect, are described in the sections that follow.

Representation of recorded units

Single key x CDP x RD units

As mentioned earlier, the tabla part comprises the systematic ordering of 216 14-bar AB-sections, each having a duration of 15 seconds. Each of these 216 sections is thus representable in terms of the value (1 to 6) on each of its three parameters of key, CDP, and RD. The figure below captures this representation.

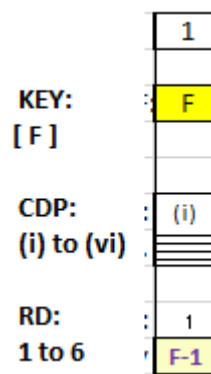


Figure 79: Fifteen-second duration AB unit — improvisation values on Key, CPD, and RD

Geometrically, this unit may be represented as a three-dimensional unit or “block” as shown here:

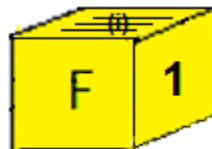


Figure 80: Three-dimensional representation of 15-second duration AB unit

Units 1 to 6: Key of F x CDP (i) to (vi) x RD = 1

Continuing with this description, the first six x 15-second duration AB improvisational units are defined in terms of:

Key: [F]

RD: 1

CDP:

- (i) Rhythmic outlining of the primary 24-beat metre as a 10-10-4 beat
- (ii) Rhythmic outlining of the secondary 24-beat metre as a 3-3-4-3-3-4-4 beat
- (iii) Rhythmic improvisation based upon the melodic phrasing of the AB-sections — simple
- (iv) Rhythmic improvisation based upon the melodic phrasing of the AB-sections — extended
- (v) Rhythmic soloing over 24-beat sections (A-section and B-section separately)
- (vi) Rhythmic soloing over 48-beat sections (combined AB-sections)

These six AB units and their improvisational direction values regarding Key, CDP and RD are representable as demonstrated below:

	1	2	3	4	5	6
KEY: [F]	F					
CDP: (i) to (vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)
RD: 1 to 6	1	1	1	1	1	1
	F-1	F-1	F-1	F-1	F-1	F-1

Figure 81: First six AB units — improvisation values on Key, CDP, and RD

Geometrically, in three dimensions, the improvisation directions for the first six AB units may be represented as shown below:

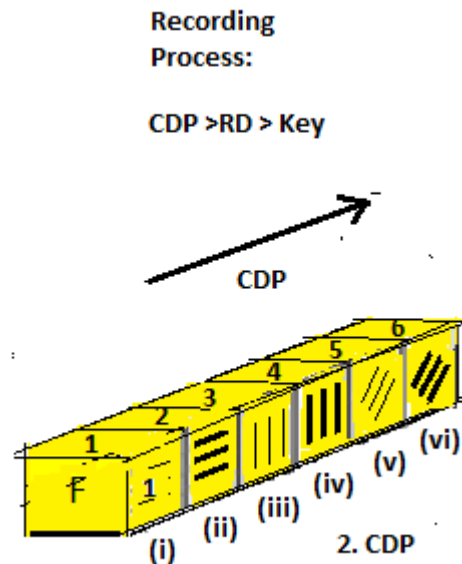


Figure 82: First six AB improvisation units in three dimensions

Units 1 to 36: Key of F x CDP (i) to (vi) x RD 1 to 6

Continuing this process, for each of these six units there are six levels of RD. Thus, the first 36 improvisational units are similarly defined in terms of:

Key: [F]

RD: 1 to 6

CDP:

- (i) Rhythmic outlining of the primary 24-beat metre as a 10-10-4 beat
- (ii) Rhythmic outlining of the secondary 24-beat metre as a 3-3-4-3-3-4-4 beat
- (iii) Rhythmic improvisation based upon the melodic phrasing of the AB-sections — simple
- (iv) Rhythmic improvisation based upon the melodic phrasing of the AB-sections — extended

(v) Rhythmic soloing over 24-beat sections (A-section and B-section separately)

(vi) Rhythmic soloing over 48-beat sections (combined AB-sections).

The first 36 units of improvised AB units are thus represented as demonstrated below:

	1	2	3	4	5	6	7	8	9	10	11	12
KEY:	F											
[F]												
CDP:	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)
(i) to (vi)												
RD:	1	1	1	1	1	1	2	2	2	2	2	2
1 to 6	F-1	F-1	F-1	F-1	F-1	F-1	F-2	F-2	F-2	F-2	F-2	F-2

	13	14	15	16	17	18	19	20	21	22	23	24
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	3	3	3	3	3	3	4	4	4	4	4	4
	F-3	F-3	F-3	F-3	F-3	F-3	F-4	F-4	F-4	F-4	F-4	F-4

	25	26	27	28	29	30	31	32	33	34	35	36
	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)
	5	5	5	5	5	5	6	6	6	6	6	6
	F-5	F-5	F-5	F-5	F-5	F-5	F-6	F-6	F-6	F-6	F-6	F-6

Figure 83: First 36 AB units — improvisation values on Key, CDP, and RD

Geometrically, in three dimensions, these 36 units may be represented as demonstrated below:

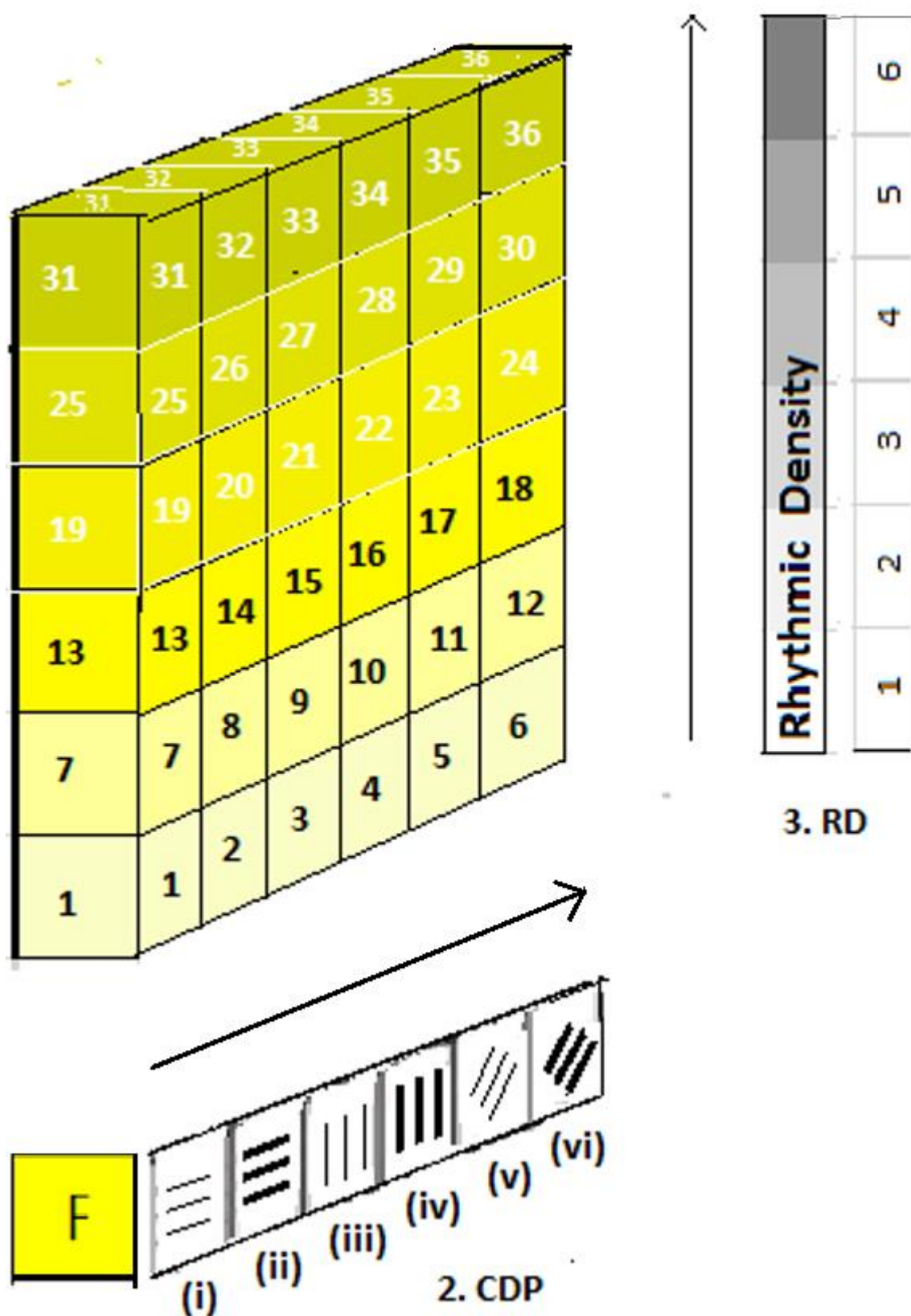


Figure 84: First 36 AB-improvisation units in three dimensions

Units 1 to 216: Keys of F, E^b, D^b/C[#], B, A, G x CDP (i) to (vi) x RD 1 to 6

Continuing this process for each of these 36 units, there are six keys. Thus, the first 216 improvisational units are defined in terms of:

Key: F, E^b, D^b/C[#], B, A, G

RD: 1 to 6

CDP:

- (i) Rhythmic outlining of the primary 24-beat metre as a 10-10-4 beat
- (ii) Rhythmic outlining of the secondary 24-beat metre as a 3-3-4-3-3-4-4 beat
- (iii) Rhythmic improvisation based upon the melodic phrasing of the AB-sections — simple
- (iv) Rhythmic improvisation based upon the melodic phrasing of the AB-sections — extended
- (v) Rhythmic soloing over 24-beat sections (A-section and B-section separately)
- (vi) Rhythmic soloing over 48-beat sections (combined AB-sections)

These 216 units are demonstrated below:

CDP (i) to (vi):		(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Comp. Dev't. Param.																			
RD 1 to 6:		1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3
Rhythmic Density		F-1	F-1	F-1	F-1	F-1	F-1	F-2	F-2	F-2	F-2	F-2	F-2	F-3	F-3	F-3	F-3	F-3	F-3
Key 1	F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Key 2	E ^b	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Key 3	D ^b	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
Key 4	B	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
Key 5	A	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162
Key 6	G	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198

CDP (i) to (vi):		(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Comp. Dev't. Param.																			
RD 1 to 6:		4	4	4	4	4	4	5	5	5	5	5	5	6	6	6	6	6	6
Rhythmic Density		F-4	F-4	F-4	F-4	F-4	F-4	F-5	F-5	F-5	F-5	F-5	F-5	F-6	F-6	F-6	F-6	F-6	F-6
Key 1	F	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Key 2	E ^b	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
Key 3	D ^b	91	92	93	94	96	96	97	98	99	100	101	102	103	104	105	106	107	108
Key 4	B	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
Key 5	A	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
Key 6	G	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216

Figure 85: 216 AB units — improvisation values on Key, CPD, and RD

Geometrically, in three dimensions, these 216 units may be represented as demonstrated below:

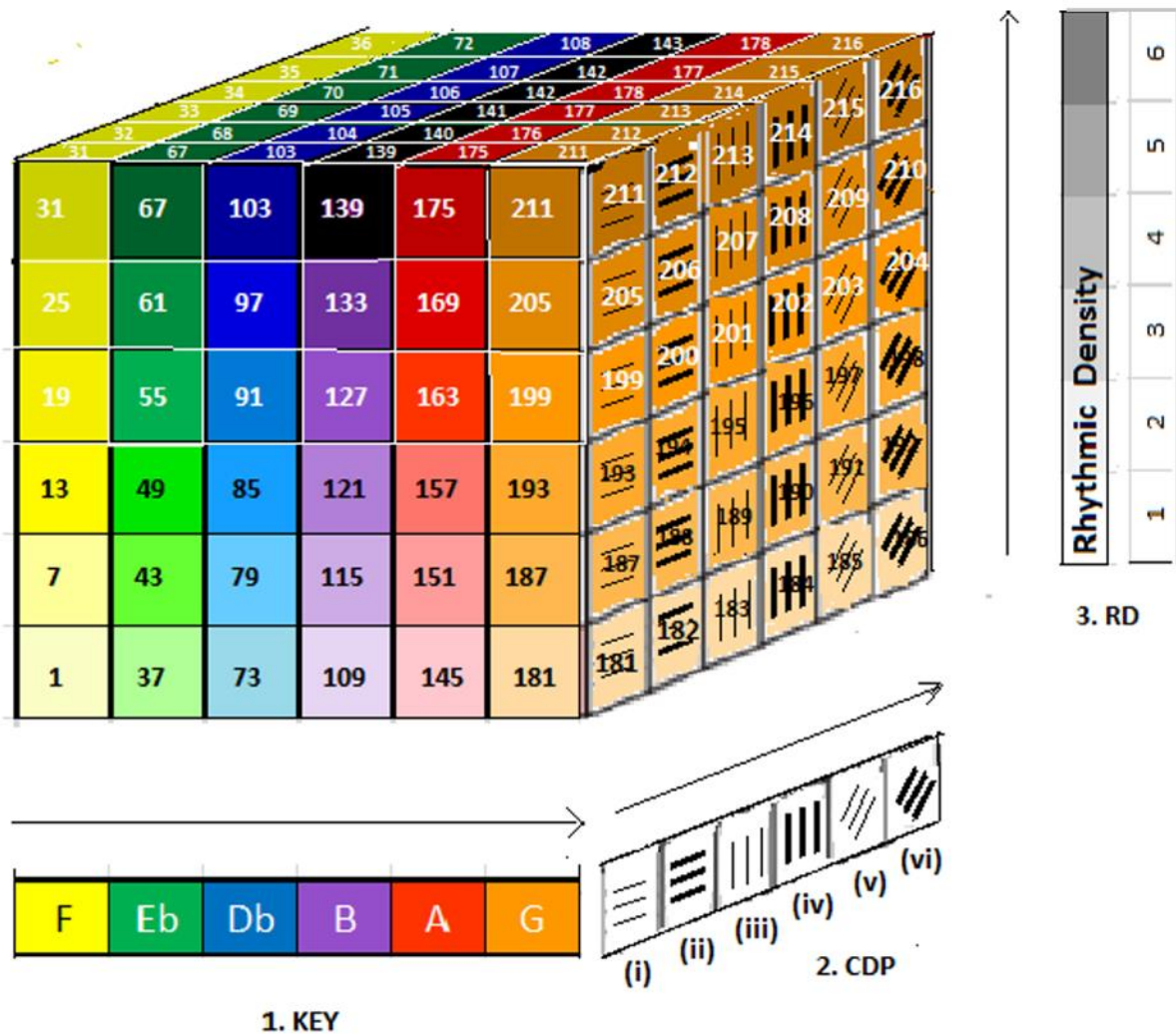


Figure 86: First 36 AB improvisation units in three dimensions

Recording and mixing templates

For the reasons previously discussed, the order of AB improvised segments needed to be different from the recording order. Essentially, this was because the composition required changing key every 15 seconds — a task that is effectively impossible in real time on the tabla.

For this reason, all AB-improvised segments were recorded in one key before moving to the next. The recording and mixing templates, which demonstrate the process by which this was achieved, are summarised in the figures below.

- Figure 87 demonstrates the order in which improvisations for the tabla AB units were recorded, in accordance with the specified values of CDP, RD, and Key.
- Figure 88 demonstrates the order in which the AB units were *reassembled* to achieve the compositional purpose of creating incremental progressive increase in RD.
- Figure 89 demonstrates the two contrasting orders for recording of AB segments, and their re-assembly, in the form of a single figure.

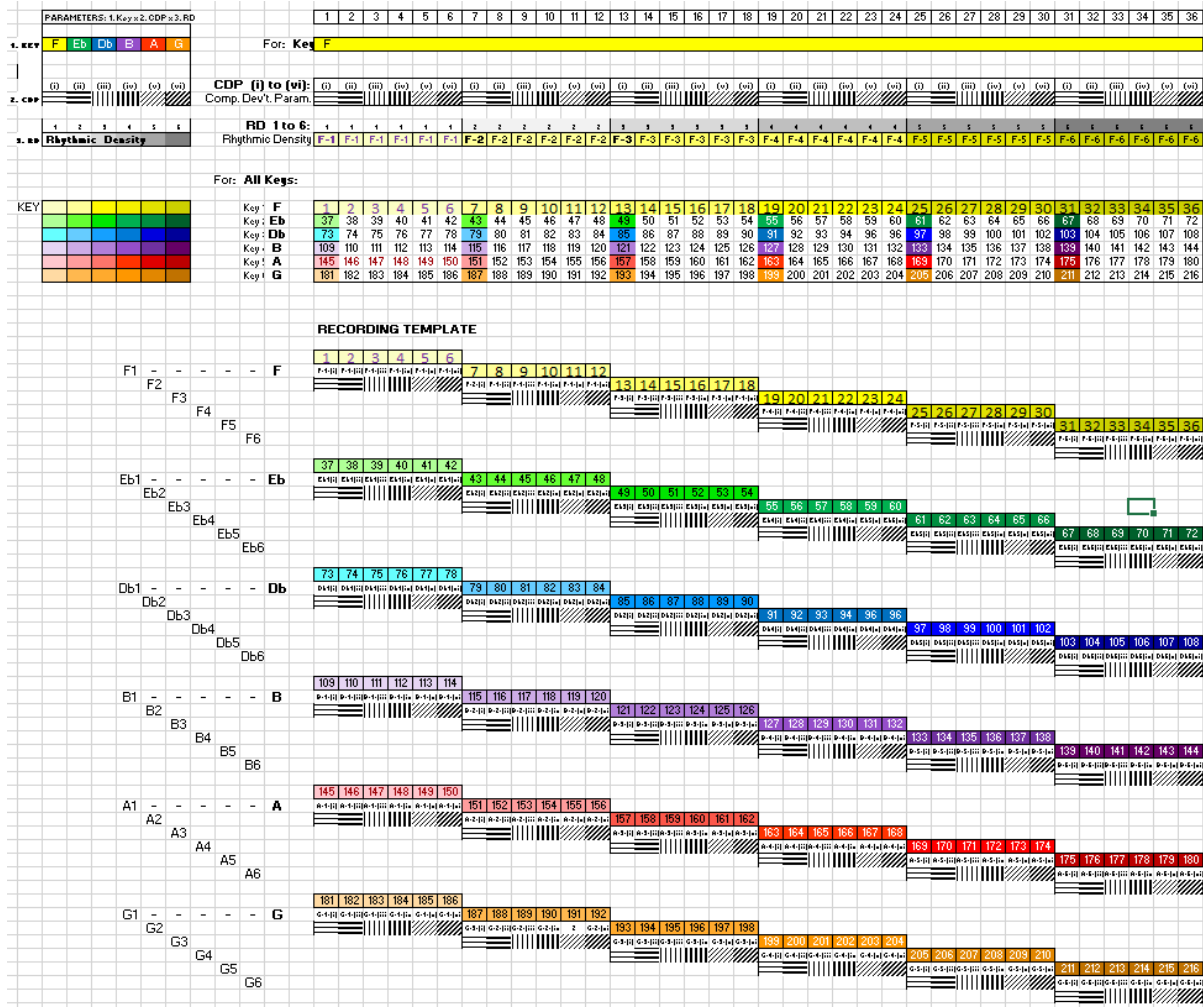


Figure 87: Summary of recording process

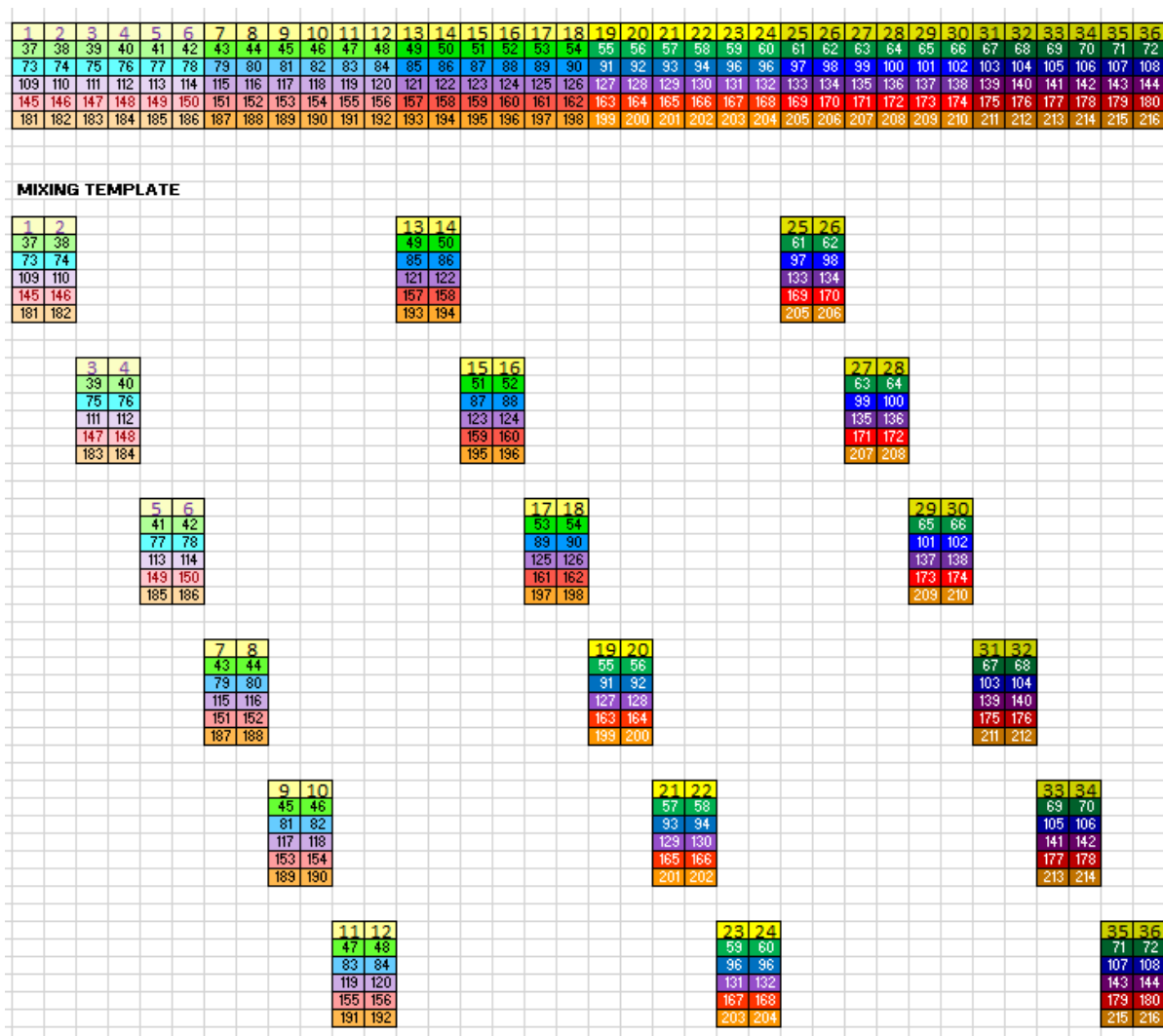


Figure 88: Summary of mixing/assembly process — development phase

Graphical 3D summary of recording and mixing process

Geometrically, in three dimensions, the recording and mixing templates units may be represented as follows:

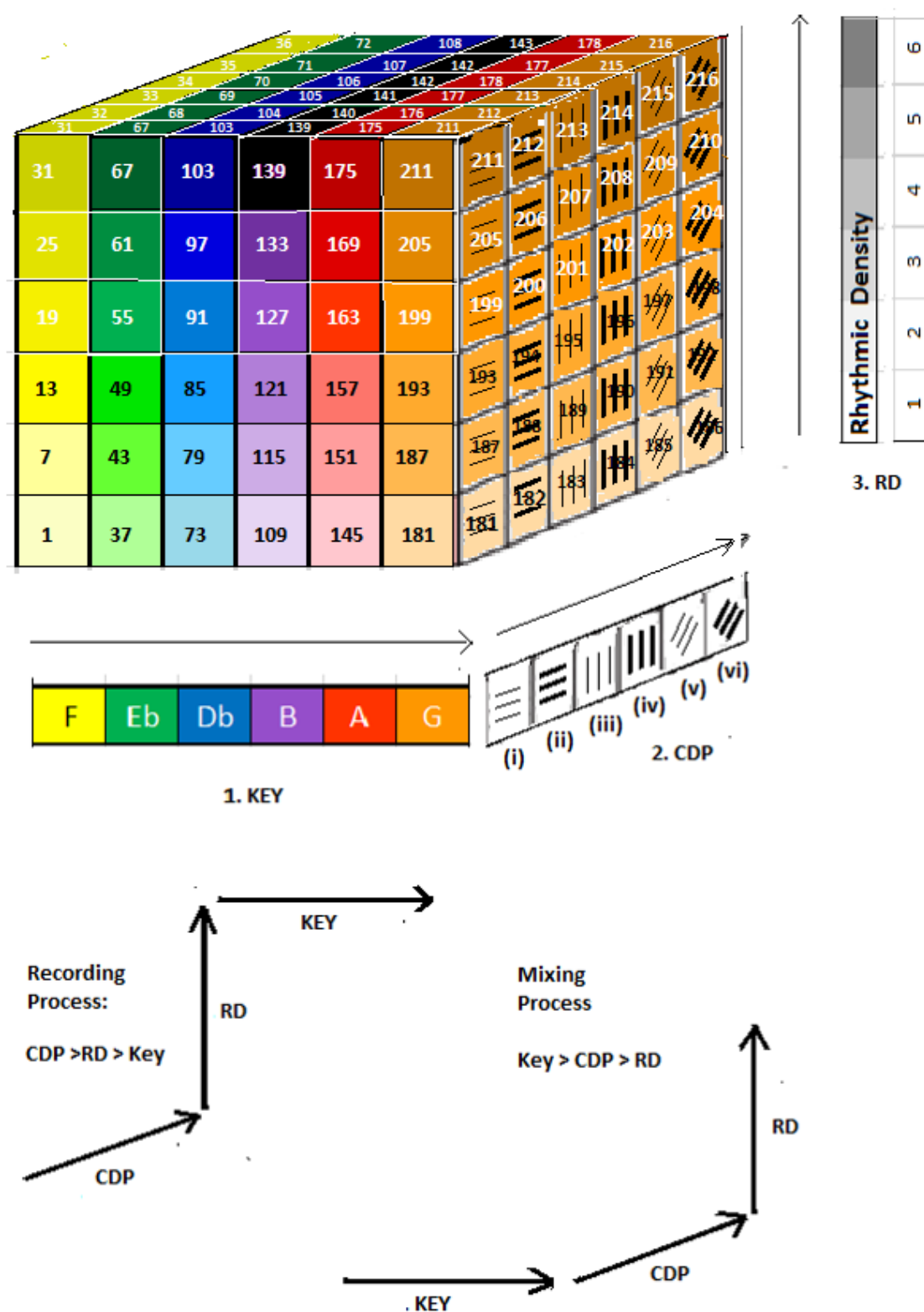


Figure 89: 3D summary of recording and mixing/assembly process — development phase

Development and resolution via non-vectorial process of intensification

Regarding the tabla part, the processes described and demonstrated in the figures elucidate the method used to create the experience of 54 minutes of tabla improvisation.

As previously mentioned, the second 54 minutes of the composition comprises the tabla parts, grouped into three-minute equ-harmonic cycles, played in reverse order.

The cyclic aspect of this process occurs via key changes. Specifically, as the tabla is playing in the same key as the guitar throughout the composition, it must, like the guitar, effectively change key every 15 seconds to progress through all 12 keys, as described in the equi-harmonic cycle.

The linear aspect is that for the duration of the composition, the tabla incrementally and progressively increases its rhythmic density.

At 54 minutes, after 216 (re-assembled) 15-second AB-sections have been played, each having a different combination of Key, CPD and RD requirements, the composition is at the peak of its rhythmic density, as provided by the tabla part.

Such a process is an emulation of the concept of *intensification*, a process that characterises Eastern (i.e., North Indian) classical music. Reiterating Clayton's characterising of this concept, intensification may be considered "large-scale process ... proceeding by a process of expansion".⁵²⁴

Thus, the first 54 minutes of the composition (excluding the three-minute single equi-harmonic cycle introduction where the tabla does not play) constitutes the tabla's process of *development*.

As previously described, the second part of the composition is the reversal of this process, constituting the composition's process of resolution. The resolution process is achieved via playing the sequence of equi-harmonic cycles in the reverse order of the development arc.

In that regard, the tabla part of *Oscillation 1* is effectively a single *void-to-form* phenomenological vector, followed by a single, *equal but opposite* form-to-void phenomenological vector.

The composition's overall form is thus an oscillation from void to form and back to void again.

Combined concept: Intercultural consideration in the experience of music as a phenomenological machine. Briefly stated, the current dissertation proposes that the representation of Western and Eastern concepts of time as linear and cyclic, respectively, is metaphorically represented in *Oscillation 1*. This includes linear and cyclic representations at the harmonic level, in the form of alternating linear and cyclic modulation within the equi-harmonic cycle, and at the level of global form, as characterised by the linearity of the tabla part and the cyclicity of the guitar part.

Final consideration — concept of equi-harmonic composition as analogous to unrefracted light

The final concept of the method section broadens the concept of equi-harmonic composition and situates the concept within an interdisciplinary context. This concept is also relevant, in a broader sense, to the concept of the experience of music as comparable to that of a phenomenological machine. Consideration of this concept in detail is beyond the scope of the current dissertation — it is a concept, however, worthy of consideration in future research.

The final concept of the method section thus considers the concept of key centres — a sonic phenomenon as analogous with a visible phenomenon — that of light. Simply expressed, the concept equates the 12 (major) key centres of the Western musical system with the seven constituent colours

⁵²⁴ Clayton, *Time in Indian Music*, 25.

and frequencies in the refraction of light as it travels through a prism. In such a comparison, the 12 distinct key centres are analogous to the colours of refracted light.

Equi-harmonic composition is then analogous to unrefracted white light. The figure below demonstrates this concept.

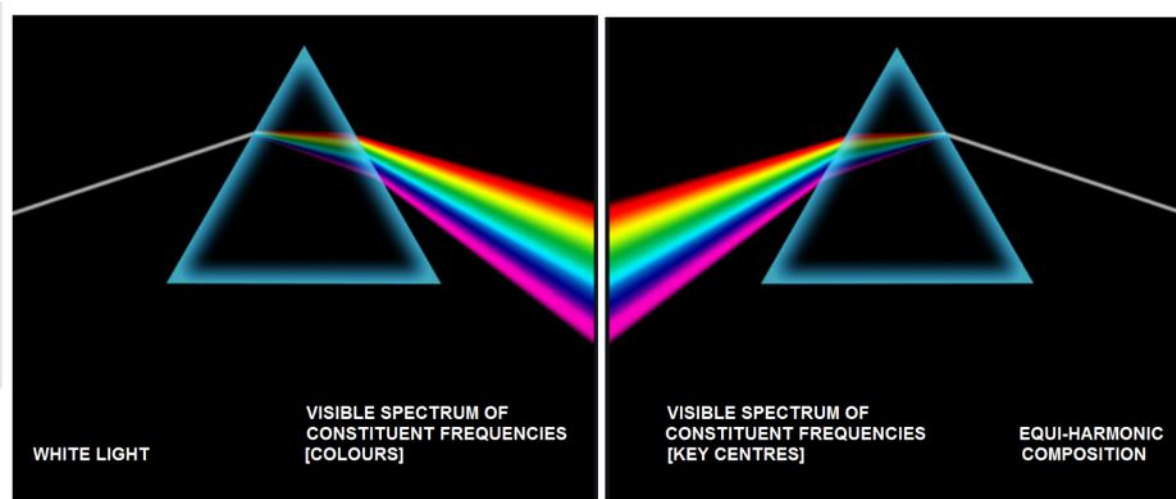


Figure 90: Equi-harmonicity of musical composition as synonymous with white, unrefracted light

Source: https://www.google.com/search?q=prism+refraction&rlz=1C1CHBD_en-GBAU852AU852&tbm=isch&source=iu&ictx=1&fir=u9aTFd2LQee1rM%252C6GkZ_mYTComcDM%252C_&vet=1&usg=AI4_-#imgsrc=A1hY754__CA4qM

Appendix 6: Background Information and Rationale for Guitar and Tabla

8-string regular interval guitar

The 8-string regular interval guitar used is an adaptation of the standard 6-string guitar. A detailed history of the guitar and its various modifications and alternative tunings is not within the scope of the current dissertation, nor is it the intent of the research. A brief justification for the context-specific advantages of the 8-string regular interval guitar as it applies to the current dissertation is, however, warranted.

Concept

In simple terms, the guitar has two significant modifications:

- Two additional strings, one extending the lower range, the other extending the higher range.
- Tuned in regular fourths, starting from low A and ending in high A flat, its tuning is: A D G C F B^b E^b A^b.

The first 6-string guitar

The standard acoustic guitar in its current 6-string format has been around for about 250 years.⁵²⁵ The earliest known 6-string guitar was built in 1779 by Gaetano Vinaccia of the Vinaccia family of luthiers in Naples, Italy. Italian luthiers Giulio Regondi and Luigi Legnani experimented with 8-string guitars in the 1900s, none of which became standard-use guitars.⁵²⁶

8- and 10-string guitars — earlier designs

Both 8-string and 10-string guitars have been used in classical guitar music. The most well-known of these would be the Yepes 10-string guitar and the Brahms 8-string guitar. The Yepes 10-string guitar was invented by Narciso Yepes in collaboration with José Ramírez III. Yepes publicly debuted the Yepes 10-string guitar in his 1964 performance of *Concierto de Aranjuez* with the Berlin Philharmonic Orchestra.⁵²⁷ The tuning is demonstrated below:

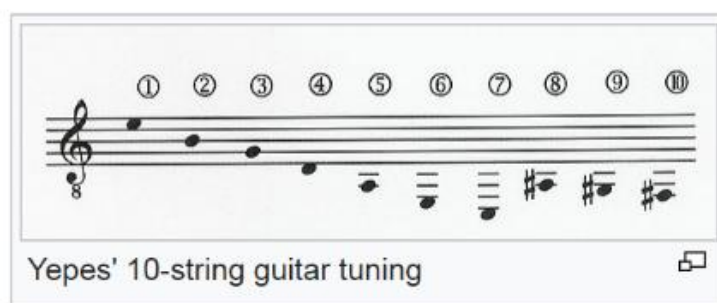


Figure 91: Yepes 10-string guitar tuning

The Yepes 10-string guitar is a standard guitar with 4-string resonators, tuned to C, A#, G#, and F#, functioning as sympathetic strings.

⁵²⁵ "When Was the 6 String Guitar Invented?" Fundamental Guitar. <https://www.fundamental-guitar.com/when-was-the-6-string-guitar-invented/>

⁵²⁶ Jeffrey Noonan, *The Guitar in America: Victorian Era to Jazz Age* (American Made Music Series, University Press of Mississippi, 2008), 205.

⁵²⁷ "Narciso Yepes," Wikipedia. https://en.wikipedia.org/wiki/Narciso_Yepes.

The Brahms Guitar is an 8-string guitar played and co-designed by Paul Galbraith and luthier David Rubio and played by Paul Galbraith. It is so named because it was originally designed to play Brahms's Theme and Variations Op 21. The Brahms guitar is tuned like a standard guitar, but it includes a low A and a high A string. It also has fanned frets to allow string length differences for the extra strings, thus improving string tension and sound.

The 8-string guitar in jazz

Australian guitarist Laszlo Sirsom plays an 8-string guitar made by Phil Carson Crickmore. The guitar has normal guitar tuning with added low B and high A strings.

American guitarist Charlie Hunter plays an 8-string guitar that is a bass–standard hybrid. Its tuning is thus E A D (corresponding to the bass guitar's lowest three strings) and A D G B E (corresponding to the upper five strings of the standard guitar).⁵²⁸

Orientation of earlier 8-string guitars and rationale for modifications

Musicians who have used 8-string guitars have generally made modifications for one of two reasons.

Within classical guitar performance:

- To extend range, thus allowing the guitar repertoire to be extended to compositions otherwise outside its normal range.
- To provide alternative fingering options at the extremes of the instrument. This includes more open bass note options whilst playing in the open position.

In jazz guitar performance:

- To extend range.
- To increase string numbers to allow the instrument to play multiple parts, such as bass, chords and melody, simultaneously.

Maintenance of irregular inter-string intervals in earlier 8-string guitars

A significant common factor in all described 8-string modifications of guitar tuning is that, within these modified tunings, *irregularity of tuning is maintained*. In other words, the described configurations are essentially a standard-tuned guitar with more strings in their upper and lower ranges.

Because such modifications maintain the standard E A D G B E tuning, the previously described 8-string guitars also maintain the guitar's sharp keys bias. (The sharps keys bias of the guitar in its standard tuning is further discussed in the following sections.)

The 8-string guitars described are thus designed to play a standard guitar repertoire in a standard way, more or less, with some extensions of capacity and additional ease of facility.

Orientation of 8-string regular interval guitar

The 8-string regular interval guitar's orientation is not designed like earlier 8-string guitars. Rather it is designed with an intent for openness of approach to playing, especially improvised music.

Its regular horizontal and vertical hand positional movements for transposition and modulation are designed around its capacity to transpose musical ideas seamlessly, vertically (up or down), or horizontally across the fingerboard within its extended range, without requiring consideration of the

⁵²⁸ "Eight-String Guitar," Wikipedia. https://en.wikipedia.org/wiki/Eight-string_guitar

vertical position from which it starts. Interestingly, it would be difficult to play a normal guitar repertoire on the instrument because such a repertoire would have been written for the irregularly tuned guitar in its standard tuning configuration.

The 8-string regular interval guitar has thus been designed with the capacity to play new and improvised music, including music not oriented towards sharp keys nor the performance of existing repertoires. Specifically, this includes *Oscillation 1*, which, being equi-harmonic, is not oriented towards sharp keys. More generally, the instrument has been designed for improvisation.

Rationale for modifications

The standard E A D G B E tuning format has been adequate for a wide variety of uses in popular, folk, classical, and jazz idioms. The modification of such a “satisfactory” arrangement thus warrants justification beyond that of novelty alone.

In proposing a justification for the modifications of the 8-string regular interval guitar over the standard 6-string irregularly tuned guitar, it is informative to consider in what musical context the standard guitar is typically played. It is then possible to consider what advantages are conferred by the standard irregular tuning and in what *contexts* such design properties of the instrument are advantageous or in what context the standard tuning is a hindrance.

Rationale for standard tuning

The guitar is played in multiple genres and idioms. A particularly common role, however, is as an accompaniment instrument for the voice. The standard irregular tuning of the guitar would thus seem to be designed around ease of playing the guitar within a specific role, including as a support instrument for the voice. In such a role, simple, easily fingered open chords are often used. This, and other advantages of irregular tuning are discussed below.

Advantages of irregular tuning

The following explanation comes from the article *Why Is the Guitar Tuned the Way It Is?*⁵²⁹

By using a major 3rd between G and B, the chord tones on the higher strings come down a fret, making them easier to play as part of the chord.

Also, if the guitar used a true all-fourths system, it would be EADGCF. But that means you would have a minor 2nd interval between your low string and your high string. Things like barre chords wouldn't be possible because you would constantly need to compensate in order to avoid voicing that minor 2nd interval ...

This tuning is also the reason that guitarists tend to favour “sharp” keys, such as the key E, G, A, or D. Since the strings are tuned to important notes from these keys, it's very easy to play chords with open strings which sound more resonant.

Guitar teacher Brian Bunnell captures this concept succinctly as follows:⁵³⁰

The current model of six strings in a standard tuning has been settled on because it offers an adequate range of pitches and the hundred or so most commonly used chords can be played by the human hand fairly comfortably.

⁵²⁹ The Guitar Journal, “Why Is the Guitar Tuned the Way It Is?” (June 2017). <https://www.theguitarjournal.com/why-is-the-guitar-tuned-the-way-it-is/>

⁵³⁰ Quora, “Why Do Most Guitars Have Six Strings?” <https://www.quora.com/Why-do-most-guitars-have-six-strings>

Tuning biases of the traditional guitar

In such a context, the guitar is typically played with a bias towards:

- simple music over more complex music
- ease of strumming over single notes
- open position over advanced positions
- sharp keys over flat keys.

This includes the use of open chord hand positions where the standard irregular tuning allows certain chord voicings to be played easily. Because of this, however, the overall orientation of the instrument strongly favours some keys over others in a manner perhaps not seen to the same extent in any other 12-key instrument.

General considerations

The 8-string regular interval guitar, as used for the current dissertation, is tuned in perfect fourths starting from A. Thus, from low to high, the tuning for its open strings is as follows: A D G C F B^b E^b A^b. Such a modification allows these design advantages:

- **Increase in range**

The 8-string octave guitar increases the range of the guitar by almost an octave. Specifically, it increases the lower range by a perfect fifth and the upper range by a major third, increasing the overall range by 11 semitones.

- **Horizontal and vertical (inter-string) interval regularity**

In contrast to the “standard” guitar tuning of EADGBE, where four of the five inter-string intervals are a perfect fourth, and one interval (the G to B inter-string interval) is a major third, the inter-string intervals of the 8-string regular interval guitar are consistent — all seven inter-string intervals are a perfect fourth.

The advantage of this regularity is that it permits universal transposition of positions — be they notes, chord shapes or melodic phrases — not only up and down the fretboard but also *across the fretboard* (i.e., from string to string).

Notes, melodies, scalar movements, arpeggios, chords, chord sequences, and entire songs can thus be transposed without any adjustments to hand position or fingering beyond moving up and down the fretboard horizontally or across the fretboard vertically. This regularity of transposition allows the unaltered transposition of multi-string passages in a way not unlike the regular transposition of musical segments on the piano.

In addition to the ease of transposition, the 8-string interval guitar, by its regularity, also lends itself to improvisational capacity.

- **12-tone and equi-harmonic orientation**

Having both horizontal and vertical interval regularity, the 8-string interval guitar is ideally suited to 12-tone and equi-harmonic styles of music.

The basis for this lies in the regular capacity afforded by the design for forward and reverse functional harmonic movement, as described below, a capacity that in the composition *Oscillation 1* permits ease of both *linear* and *cyclic* harmonic movement.

- **Forward and reverse functional harmonic movement orientation — movements and modulations to the sub-dominant and dominant**

Being separated in horizontal (string-crossing) movements by a perfect fourth, the 8-string regular interval guitar easily permits forward and reverse functional harmonic movement.

- **Forward functional harmonic movement**

On the 8-string regular interval guitar, movement of a note, melody, or scalar “up a string” constitutes *transposition* up a fourth or modulation up a fourth to the subdominant key — that is, forward harmonic motion.

- **Reverse functional harmonic movement**

Conversely, movement of a note, melody, or scalar “down a string” constitutes *transposition* down a fourth or modulation down a fourth to the dominant key — that is, reverse harmonic motion.

Because of the regularity of its tuning, the 8-string regular interval guitar, in contrast to the traditionally tuned guitar, has regular and unchanging forward and reverse harmonic movement orientation.

For this reason, the guitar is ideally suited to a composition like *Oscillation 1*.

- **Linear and cyclic modulation capacity because of forward and reverse functional harmonic movement orientation**

By its *forward and reverse harmonic movement orientation*, the 8-string regular interval guitar also permits two distinct harmonic movement modulation options — one being *linear* (i.e., one-dimensional and bi-directional, akin to the movement of a pendulum through its arc and its return), the other being *cyclic* (i.e., two-dimensional and uni-directional, akin to the movement of a pendulum through a circular displacement as seen from above).⁵³¹

Form and void representations of linear and cyclic modulations

The modulation movement designated to demonstrate the concepts of linear and cyclic modulation (and the suitability of the 8-string regular interval guitar to playing music structured around such modulations) is the fundamental modulation from a root I key to the subdominant IV key and back again: I – IV – I.

The “void” or “home” position of the described modulation is “I” or the *root position*.

The “form” or “away” position of the described modulation is “IV” or the *subdominant position*.

The *linear* modulation pathway from void (home) to form (away) to void (home) is characterizable as a *uni-dimensional, bi-directional* movement

The *geometrical representation* of the *linear modulation pathway* is thus akin to the *uni-dimensional and bi-directional* movement of a pendulum traversing its forward-and-backward arc.

⁵³¹ Linear modulation is achieved by moving the hand position up one string (“up” means higher in pitch — physically, it is a downwards movement to the next string) and then returning it back down to the original string. Cyclic modulation is achieved by moving the hand position up one string and then up an additional string. Variations on these linear and cyclic hand movement algorithms occur when the modulation also includes a modulation of up or down an octave, to keep the modulation within the instrument’s playing range.

In harmonic formulaic representation, this linear modulation void-form-void pathway would be represented as: I – IV – I.

For the example of the key of C Major, in *alphabetic* representation, this *linear modulation void-form-void pathway* would be represented as: C – F – C.

In contrast, the *cyclic* modulation pathway from void (home) to form (away) to void (home) is representable as a *two-dimensional, uni-directional* movement.

Similarly, as described earlier, the *geometrical representation* of the *cyclic modulation pathway* is thus akin to the *two-dimensional, uni-directional* movement of a pendulum traversing a circular path as viewed from above.

In harmonic formulaic representation, this linear modulation void-form-void pathway would be represented as: I – IV – vii^b – iii^b – vi^b – ii^b – v^b – vii – iii – vi – ii – V – I.

For the example of the key of C major, in *alphabetic* representation, this *linear modulation void-form-void pathway* would be represented as: C – F – B^b – E^b – A^b – D^b – F[#] – B – E – A – D – G – C.

What is apparent in the functional harmonic representation of the *cyclic* modulation void-form-void pathway is that to complete the void-form-void cycle, there must be *iterative progressive modulation*, which is the process of *repeated modulation from the away position rather than the home position*, such that for sequential modulations *what was previously the “away” (or form) position becomes the new “home” (or void) position*.

In the alphabetic representation above, the “F” key centre initially functions as the “away” (or form) position *relative to the key for its home position — the key of C*.

Continuing the *iterative progressive modulation*, however, for the next step of the cyclic sequence, the “F” key centre changes its function as the “away” (i.e., form position) to become a *new home* (i.e., void position) *relative to the new key — the key of F*.

With F as the new home key, B^b becomes the new “away” key.

Thus the cyclic modulation becomes C – F – B^b

Cyclic modulation and iterative progressive modulation — non-transitive and transitive formulaic nomenclatures

Referring to the above example, the *cyclic* modulation pathway from void (home) to form (away) to void (home) may have *either*:

- alphabetic representation: C – F – B^b or
- harmonic formulaic representation I – IV – vii^b

The “vii^b” (i.e., flat-seventh degree of the scale) is flat-seventh relative to the original home key (i.e., C) rather than relative to the “new” home key (i.e., F).

Such a harmonic formulaic representation may be said to be *non-transitive* harmonic nomenclature — that is, the home (void) position *does not transition or move with the sequential modulation*.

By contrast, referring again to the above example, the *cyclic* modulation pathway from void (home) to form (away) to void (home) may also be represented as harmonic formulaic representation, I – IV – IV^T, where IV^T indicates the IV or subdominant is relative to the *transitioned* new home (or void) key — relative to the new modulated key of F rather than relative to the original key of C.

In the above example of the cyclic sequence of C – F – B^b, the “B^b” may be represented as “vii^b” — the flat seventh relative to the original (non-transitive) home key of C.

Alternatively, the “B^b” may be represented as “IV^T” — that is, as the subdominant of relative to the new (transitive) home key of F.

Function of transitive and non-transitive nomenclatures

The main reasons for introducing the concept of transitive and non-transitive nomenclatures in this section is twofold:

- Firstly, such nomenclatures allow a concise description of the suitability of the 8-string regular interval guitar for the playing of an equi-harmonic composition such as *Oscillation 1*. The nomenclature can be used to describe the **positional change algorithm** of the classical hand positions (based on fret position) for the linear and cyclic modulation movements needed for the guitar part of *Oscillation 1*.
- Secondly, the transitive nomenclature provides a concise language for describing the linear and cyclic vectorial movements that make up the composition, as described in Chapter 2 (Methodology).

Demonstrating these concepts, the following section describes the **positional change algorithm** of the classical hand positions (based on the fret position for the left index finger) for the linear and cyclic modulation movements, as required for the guitar part of *Oscillation 1*.

The essential structure of the repeating equi-harmonic cycle of the composition, *formulaically* expressed, is:

Where B is in the subdominant key of its corresponding A-section, and Aⁿ⁺¹ is in the subdominant key of its preceding B-section Bⁿ, The equi-harmonic cycle is representable as:

$$A^1B^1 A^1B^1 > A^2B^2 A^2B^2 > A^3B^3 > A^4B^4 > A^5B^5 A^5B^5 > A^6B^6$$

Referencing the above concept of transitive nomenclature, the same essential structure of the equi-harmonic cycle may be more concisely described as:

Where B is in the subdominant key of its corresponding A-section, and Aⁿ⁺¹ is in the subdominant key of its preceding B-section Bⁿ, and

For n = 1 – 6, where T indicates transitive nomenclature

The equi-harmonic cycle is representable as:

$$A^1B^1 A^1B^1 > A^{T1}B^{T1}A^{T1}B^{T1} > A^{T1}B^{T1}A^{T1}B^{T1} > A^{T1}B^{T1}A^{T1}B^{T1} > A^{T1}B^{T1}A^{T1}B^{T1} > A^{T1}B^{T1}A^{T1}B^{T1}$$

or

$$A^{T1}B^{T1}A^{T1}B^{T1} \times 6$$

Forward and reverse linear, and cyclic harmonic movement

The compositional units section describes the structure of the composition as being made up of seven-bar A and B sections, effectively working as call and response respectively, so that the seven-bar B-section harmonically functions as the modulation of the seven-bar A-section to its subdominant key.

The “vectorial” movement of the A-section to the B-section is thus akin to the *linear* forward arc of a uni-dimensional, bi-directional pendulum movement. The vectorial movement of the B-section back

- Go up a string and play the B-section from this position.
- Go back down a string, move down two frets. *If this is beyond the instrument range, play the A-section an octave higher by moving up a string and remaining in the same classical guitar position.*⁵³²
- Play the A-section in the new cyclically modulated key from this position.

This ABA'B' movement corresponds to the repeated *perpetually forward* movements of the bidimensional, uni-directional, *cyclic* pendulum movements.

This is thus the method by which the 8-string guitar accommodates cyclic modulation.

It is notable that in the $A^1B^1 A^1B^1 > A^2B^2 A^2B^2 > A^3B^3 A^3B^3 > A^4B^4 A^4B^4 > A^5B^5 A^5B^5 > A^6B^6 A^6B^6$ formulaic representation of the full equi-harmonic cycle, the algorithm for forward cyclic harmonic movement could shift the hand position at A^2 from the 2nd position to the open position, the harmonic movement being F B^b F B^b E^b A^b E^b A^b etc.

This would, however, require a change of fingering pattern as the open strings would be played open rather than by the index finger (represented in Figure 92 as “1”). Such an irregularity defeats the described purpose of the 8-string guitar as an instrument that does not require adjustments in vertical (inter-string) or horizontal (intra-string) movements.

For this reason, in the 1st cyclic modulation of the composition, occurring at bar 29, when the composition moves into the key of E^b, the hand position remains in the 2nd classical guitar position, commencing on the 6th G string.

The capability of the 8-string guitar to do this demonstrates the benefits of its additional strings and extended range.

Before moving on, the topic of chords and chord shapes for the 8-string interval guitar will be briefly addressed.

Chord fingering chart for the 8-string regular interval guitar — the concept of vertical regions

In *Oscillation 1*, the guitar functions as a “harmonic tanpura”. To that extent, its melodic sequence defines the harmonic movement of the composition, similar and analogous to the role of the traditional tanpura in Indian classical music, albeit at the level of a repeating pattern of modulations between moving harmonic centres rather than at the level of a single tonal centre.

As notated and recorded, *Oscillation 1* does not include an accompaniment (known as “comping”) part for the guitar. Nonetheless, like the regular guitar, the 8-string guitar has the capacity to play chords in a comping style.

The suggested initial chord shapes for all chords within one three-minute equi-harmonic cycle are graphically represented in Appendix 9.

It is notable that, as it is an instrument with eight strings rather than six, playing chords on the 8-string guitar can be approached from a perspective where *not all strings of the guitar need to be played*.

⁵³² The converse applies when the upper limit of the range of the instrument is reached. In this scenario, the modulation that occurs lowers the modulation by an octave, permitting the modulation to be accommodated within the range of the guitar. Such accommodations permit the equi-harmonic cycle to be played perpetually within the range of the instrument.

Thus, rather than including all eight strings in chord positions, which (for reasons described in the cited article “Why Is the Guitar Tuned the Way It Is?”) is not feasible, the 8-string guitar can be approached from the perspective of *vertical regions*.⁵³³

The chord shapes provided in Appendix 9 are three-note chords played within the vertical region of three strings. The chord fingerings presented in Appendix 9, even when played in all 12 keys with reasonable voice leadings, when played as three-note chords within defined vertical regions, do not extend outside the range of five strings — using strings 7, 6, 5, 4, and 3 only. Such an approach emulates the way a piano keyboard is played. The difference, however, is that the piano keyboard, when played in a comping style, limits its horizontal regions, while the 8-string guitar limits both its horizontal and vertical regions. This is a fundamentally different approach to playing the guitar as an instrument where all strings need to be sounded at once in a consonant way.

Approaching the playing of the 8-string regular interval guitar from the perspective of limitation of vertical (as well as horizontal) regions thus addresses the “minor second” problem of consecutive fourths tuning in a novel way. Rather than sounding all strings open or fretted, the guitar is played within selected vertical regions — for example, three strings only.⁵³⁴ Such an approach is like the way the piano keyboard is played, as is described next.

Keyboard-like qualities of the 8-string regular interval guitar

With its regular intervals, increased range, and 12-key orientation, it is proposed that the 8-string regular interval guitar has a place in certain musical contexts — in particular, 12-tone music, equiharmonic or 12-key music, and improvised music that maintains a traditional Western harmonic organisation.

It is proposed that the 8-string regular interval guitar is less “idiosyncratic” than the traditionally tuned 6-string guitar, particularly in relation to its regular organisation of intervals, chord shapes, and modulation algorithms.

Whereas the traditional 6-string tuned guitar orients towards the ease of playing I, IV and V chords in open position strongly biased towards sharp keys, the 8-string interval guitar is more “harmonically open” in its orientation.

For this reason, the 8-string regular interval guitar is more *keyboard-like* than the traditionally tuned 6-string guitar. This is for two reasons:

- Firstly, like the layout of the keyboard, the 8-string regular interval guitar, having open string tunings equally distributed in sharps and flats, is *relatively flat-keys-sharp-keys neutral*.
- Secondly, repeated movements of hand positions correspond to repeated regular-interval movements.

For these reasons, it is proposed that the 8-string regular interval guitar is more keyboard-like in orientation than the traditional guitar. Further to this, the 8-string regular interval guitar is arguably more “open” to play music that is not inherently guitar-oriented, including improvised music within a traditional Western harmonic organisational framework.

⁵³³ *The Guitar Journal*.

⁵³⁴ *The Guitar Journal*.

12-drum tabla set

The tabla in its traditional usage in North Indian classical music has a rich lineage. Important historical milestones, styles, and examples of some characteristic pieces and their historical period are listed in the discography (see Appendix 8).

Dr Sam Evans contextualises the musical language of the tabla and related Indian musical concepts using the following orthographic convention:

Specific terms related to Indian music are included in this text, most derived from the Hindi language. Transliteration of these terms is according to *The Oxford Hindi-English Dictionary* (McGregor: 1993) and are italicised throughout. ... The word bayan has not been italicised as it is one of the main drums in the tabla set that is central to the work and often appears in conjunction with the word tabla. The spellings for the mnemonic syllables that define the notes performed on the tabla (tabla bols) are defined in the notation indications at the beginning of the scores document of this portfolio.⁵³⁵

In referencing and representing such concepts, the current dissertation assumes the same conventions as those defined by Evans. These conventions appear in two main contexts in Chapter 2.

- Firstly, the convention is applied to the tunings and notation of tabla drums — particularly the naming and spelling of the “bayan” (in Hindi बेयान) — the left-hand drum of the tabla pair.
- Secondly, in the composition score/transcription for *Oscillation 1*, the convention is applied in the spelling of tabla “bols” — the *mnemonic syllables that define the notes performed on the tabla*.⁵³⁶ The notation convention used in the current research for the tabla’s score/transcription is described in further detail in the next section.

Score/transcription notation for tabla

As described above, traditional tabla notation is defined *mnemonically* as “bols”, being of fixed and unchanged tuning. Thus, traditional bols make no reference to pitch — they refer to timbre and rhythm only.

The particular significance of this for the current research is the requirement of the tabla set in the composition *Oscillation 1* to have melodic, harmonic, chord sequential, and key modulation capacity.

Not only is the tabla required to have pitch, but *Oscillation 1* also requires the tabla drums to have *changing pitch*. (The pitch of both drums changes every 30 seconds.)

In the context of the current dissertation being otherwise written within a Western musical system, the tabla notation used for the composition is the same contemporary notation system as that used by Evans in “Tabla without Borders” as a notation to indicate pitch. The essence of this contemporary tabla notation is a hybrid notation that notates tabla and bayan pitch on the standard Western staff, alongside the tabla’s mnemonic bols.

Given that the tabla part of the composition originated from and extends the work of Evans, it is logical and appropriate to use the same convention as that used by Evans.

⁵³⁵ Evans, “Tabla without Borders,” v.

⁵³⁶ Evans, “Tabla without Borders,” v.

Relative and absolute pitch references in Eastern (North Indian classical) and Western musical systems

Being an intercultural composition, the current research refers to both Western and Eastern (North Indian classical) musical systems.

Coming from a Western musical paradigm, however, and being primarily written for a Western academic audience, most of the description and analysis refers to the terms and concepts of the Western musical system. The exception is in the description of the tabla drum and bayan drum tunings, which are described both in terms of *absolute pitch* (Western nomenclature) and *relative pitch* or *scale degree nomenclature* (North Indian classical musical system, also known as *sargam*).

A brief outline of the North Indian classical musical system and where it is referenced in the research follows.

The North Indian Classical “sargam” system

Though by no means synonymous with Western musical notes,⁵³⁷ the musical notes system of North Indian classical musical nomenclature or *sargam* is sufficiently like the Western musical system to justify a statement about the basic correspondence between notes in Western and North Indian classical systems.

Like the Western musical system, the *sargam* system divides the octave into seven notes or “swara”. The notes are called shadja (षड्ज), rishabha (ऋषभ), gandhara (गान्धार), madhyama (मध्यम), panchama (पञ्चम), dhaivata (धैवत) and shadja (षड्ज). They are collectively abbreviated to *Sa, Re, Ga, Ma, Pa, Da, Ni*,⁵³⁸ roughly corresponding (regarding relative pitch at least) to the Western diatonic scales of *Do, Re Mi, Fa, So, La, Ti*. Importantly, *Sa, Re, Ga, Ma, Pa, Da, Ni* and *Sa* notes have no absolute pitch — that is, they have musical definition and relative pitch only in the context of comparison with one another.

In summary, for the current research, the intervals and tunings for the bayan and tabla drum are described both in Western musical notation terms and in reference to the Indian *sargam* system.

Tabla terminology

The term “tabla” requires clarification as it is used differently in different contexts. The *general* use of the word in music refers to *both drums of a pair of drums* played by a tabla player. The *specific* use of the word is a reference to the right-hand drum only. In this terminology, the left-hand drum is called the *bayan*. The term *tabla* used in the general sense thus refers to *the pair of drums* — the left-hand *bayan* drum and the right-hand *tabla* drum.

Going forward from this position in the research, the term *tabla* will be used interchangeably with the term *tabla drum* (as opposed to *tabla drums*) to refer to the right-hand drum only of the tabla pair. When emphasising the capacity of the 12-drum tunings used in the composition to play in all 12 keys, the terms *harmonic tabla set* and *12-drum harmonic tabla set* are used interchangeably with the term *tabla*.

⁵³⁷ Significant differences include that the *sargam* system uses untempered tuning, has 22 shruti or micro intervals, and the concept of the note extends beyond the musical concept of a scale tone to include a vast array of non-musical associations (each note for instance has a ruling deity), the scope of which is beyond the purpose of the current dissertation.

⁵³⁸ “Svara,” Wikipedia at <https://en.wikipedia.org/wiki/Svara#:~:text=Svara%20or%20swara%20is%20a,complete%20dimension%20of%20musical%20pitch.&text=These%20seven%20swaras%20are%20shortened,Pa%2C%20Dha%2C%20and%20Ni>

This convention, as it relates to the terminology of individual drums of the tabla pair, is consistent with that used by Dr Sam Evans in “Tabla without Borders”.

The 12-drum harmonic tabla set

The 12-drum harmonic tabla set used in the current dissertation is a novel adaptation and extension of the traditional tabla pair. As such, it is a tuning modification involving both the left-hand *bayan* drum and right-hand *tabla* drum.

Purpose of modification

Like the situation stated for the guitar, the essential design of the tabla pair has been satisfactory for the music styles in which it has traditionally been played. Also like the guitar, over time the tabla has progressively modernised — up to its present form as it appears in contemporary North Indian classical music.

In the last half of the twentieth century, solo instruments such as the santoor (a small, hammered dulcimer played on the lap) and the bansuri (Indian classical flute) have transitioned from “folk instruments” to concert instruments traditionally accompanied by the tabla. References to such transitions from folk to concert music are listed in the discography (Appendix 8) and include the post-2000 recordings of bansuri virtuoso Hariprasad Chaurasia.

The tabla has supported such instruments and modernised alongside them. To modify an instrument that is perfectly adequate in its traditional context thus requires a good reason.

In the context of the current dissertation, the purpose of conceiving, creating, notating for, and recording the 12-drum harmonic tabla set has been conceived as a modification and contemporising of the instrument to permit it to play in all 12 Western keys. Such a modification significantly increases the instrument’s potential repertoire and allows it to make a novel contribution to contemporary Western music.

Evans provides examples in various recordings, reference to which will be made later regarding the tabla’s capacity for melody, harmony, and chord changes, and poses these questions:

What role can, and does the tabla play, in contemporary music that does not adhere to the musical conventions for which the current repertoire is devised? Which musical elements and conventions that are not accounted for in the current repertoire may be brought to and performed on the tabla in such music?⁵³⁹

In regard to extending the melodic, harmonic, chord sequential, and ultimately key modulation possibilities for the tabla, the current research extends the tabla set as conceived, constructed, and composed for by Evans, to the *12-drum harmonic tabla set*, further contemporising the instrument and specifically providing a mechanism for the tabla to play *equi-harmonically* (i.e., with equal distribution of harmonic content in all 12 keys), a requirement of the submitted creative work, *Oscillation 1*.

Summary of modifications

If the conceived 12-drum harmonic tabla set were an instrument akin to a piano or guitar, the conception and construction of an instrument capable of playing 12-key music within the Western musical system would be straightforward — one would simply build 24 drums (12 tabla and 12 bayan) and play them. Though conceptually this is a rational and simple enough idea, in a practical

⁵³⁹ Evans, “Tabla without Borders,” 16.

sense, as determined by the practice-based research of Evans, it appears not to be a viable option for several reasons, the most important of these being:

- Both bayan and tabla drums, being hand drums, have *limited range*, which is less than an octave. The lower limit is limited by timbre, a minimum tension being necessary to produce a musically acceptable tone. The upper limit is limited by tolerance — that is, the reliability of the instrument to both remain in tune and not to break under tension. Bayan and tabla, though apparent to the onlooker as two drums, are in fact played like the combined left and right hand playing of the piano, a *combined system*. Of importance is not only the absolute pitches of each of the drums but also their relative pitches — that is, the interval between them.
- Specifically, the tuning of the bayan relative to the tabla is, for the most part, limited to tonic, fifth and occasionally fourth. Typical bayan-to-tabla tunings are thus *Sa: Sa* (tonic: tonic) and *Pa: Sa* (fifth: tonic).
- Unlike a stringed instrument, such as a piano or guitar, for the tabla, the fundamental of every individually tuned note needs to be played on a different drum, a reality that creates (due to the limited reach of the human arm) ergonomic limitations to the number of drums that can be simultaneously used as part of a multi-drum tabla set.

Fortunately, however, innovations in the current dissertation both in tuning and in recording and mixing technique, enabled the establishment of a usable 12-drum harmonic tabla set that allowed, with the assistance of studio-recording techniques, the recording of the submitted creative work, *Oscillation 1*. Appendix 5 details how this was achieved.

Evans's "Tabla without Borders" as the foundation for developing the harmonic capacity of the tabla

Given that the 12-drum harmonic tabla set configuration proposed, recorded, and noted in *Oscillation 1* has its origins in, and is a conceptual extension of, the melodic, harmonic, and chord sequential playing capacity of the tabla set (as achieved by Evans), it is appropriate to summarise the capacity of the tabla to play contemporary melodic and harmonic music (as demonstrated by Evans), particularly the challenges, limits, and pathways that allow the tabla to be played as a multi-pitched instrument.

Building from this foundation, this dissertation extends the work of Evans to find ergonomic, configurative, performance-based, arrangement/compositional, and studio-recording process adaptations and accommodations that collectively provide a music production mechanism that allows the tabla to play in, or modulate between, any of the 12 Western major keys.

Considerations for multiple pitch tunings in tabla and bayan

In designing a mechanism and process for the tabla pair, it is possible to conceive tuning configurations that provide multiple tunings for either tabla or bayan or both.

For reasons stated below, Evans's work on melodic, harmonic and chord sequential tabla configurations involves multiple tunings (up to four) of tabla only — that is, with a fixed single-pitch bayan tuning.

The reasons for this are multiple and are summarised by Evans as follows:

In this investigation, I found that melodic content on multiple tabla drums was more effective than that on multiple bayan drums for a variety of reasons. When required,

the pitch and sound of the bayan may be adjusted during performance and in most cases, this alone negates the use of multiple bayans. Also, in practical application, the bayan is most often played with sustain. The register of the bayan is between one and a half, and two octaves below middle C, the same register as the lowest notes on an electric bass. Multiple sustaining pitches in this register create an incoherent lower register in the music. Finally, during the research process I discovered the traditional tabla technique easily adapted to playing multiple tabla drums but multiple bayans always felt very awkward. I suggest this is mainly due to the nature of the playing technique on the bayan that requires constant contact between the palm of the performer and the skin of the drum to continually adjust the sound. Breaking that contact also broke the flow of the playing in my experience. For these reasons, I have not included the bayan drum as part of the melodic investigations in this research.⁵⁴⁰

In contrast to Evans's compositions, this dissertation provides a mechanism and configuration that involves multiple tunings of *both* tabla drums — that is, both right-hand tabla and left-hand bayan. This is achieved via accommodations of ergonomics, configuration, arrangement/composition, performance process, and studio-recording process, discussed below.

Timbral considerations for pitched tabla

Evans notes that, *compared with non-hand drum instruments*, there are inherent timbral challenges for the tabla to play pitched music. He notes that the timbral difference between hand drums and traditional melody-playing instruments are such that “unlike other instruments that may typically play a chord progression, such as guitar or piano, the sound of the tabla has a very fast attack”.⁵⁴¹

Conversely, *within the field of hand drums*, the tabla has advantageous timbral qualities, leading to the possibility of melodic playing. In this regard, Evans notes that:

Due to the sustaining pitch and long decay produced on the tabla the instrument may be considered favourable in harmonic settings relative to other drums.⁵⁴²

Evans provides evidence of these propositions graphically, by way of their contrasting wave forms, as shown in Figure 93 (next page). These timbral qualities are attributed specifically to the tabla; the bayan has very different timbral qualities. Perhaps the most important of these is that it has less attack than the tabla (being pitched in the bass register). Regarding sustain, however, the bayan (being lower) has a much longer sustain than the tabla, and even more so when allowed to ring un-muted by the palm of the left hand.

Further explanation of the acoustics of the bayan are beyond the scope of the current research. It is important, however, to note that the timbral qualities of the tuned bayan drum, particularly in its role of outlining the harmonic movement of the piece at its modulation points, contribute significantly to the novel timbral quality of *Oscillation 1*.

⁵⁴⁰ Evans, “Tabla without Borders,” 57.

⁵⁴¹ Evans, “Tabla without Borders,” 87.

⁵⁴² Evans, “Tabla without Borders,” 87.

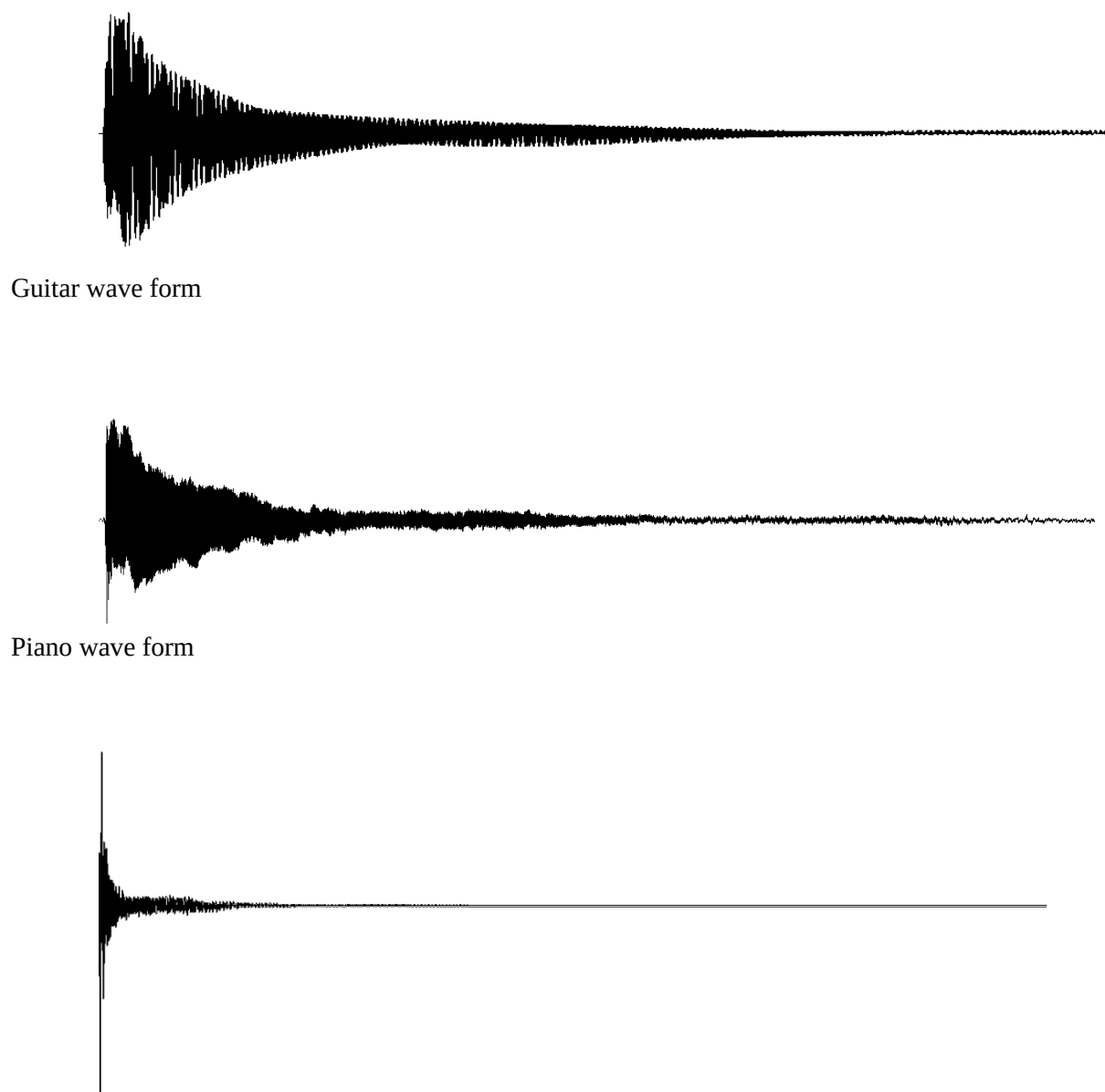


Figure 93: Tabla wave forms

Source: Evans, “Tabla without Borders.”

Melodic capacity of tabla as formulated by Evans

In “Tabla without Borders”, Evans has devised a method for playing tabla within a melodic context, using 2, 3, and 4 tabla sets.⁵⁴³ He also describes a historically novel instrumental method for tabla for the playing of melodies with 2, 3, and 4 notes.⁵⁴⁴

Configurational accommodations

The configurational accommodations devised by Evans for playing two-, three- and four-note melodic tabla are demonstrated in the following photos (see Figure 94).⁵⁴⁵

⁵⁴³ Evans, “Tabla without Borders,” 56.

⁵⁴⁴ Evans, “Tabla without Borders,” 60–64.

⁵⁴⁵ Evans, “Tabla without Borders,” 60–64.



Figure 94: Examples of configurations for two, three, and four tabla (with one bayan)

Compositional accommodation

The arrangement of melodic content to allow playing on the tabla is an example of what may be referred to as *compositional accommodation* or adjustment. In principle, such compositional accommodation is no different from writing for any instrument with awareness of the biases and limitations of the instrument. The difference, however, for the tabla is that in many cases (such as the limit of pitch choices) the limitations are absolute rather than relative.

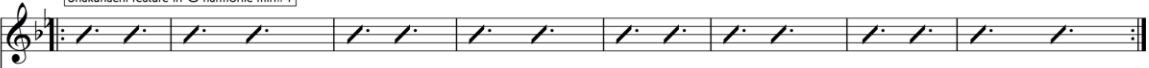
As an example of compositional accommodation, a composition written for the cello would conceivably be preferentially written in the key of C rather than D flat because of the biases of the instrument. For the case of a melodic tabla in “Tabla without Borders”, the keys and notes are not just biases but, in the absence of significant innovation and novelty, absolute constraints.

In the following examples taken from “Tabla without Borders”, Evans uses such compositional accommodations to write melodically for tabla within the scope of the multi-drum instrument configurations.

Examples of two-, three- and four-note melodies

The following figures demonstrate examples of two-, three- and four-note melodies.

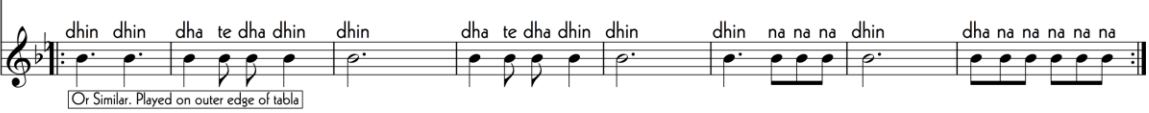
159  Shakuhachi feature in G harmonic min#4

Shak. 

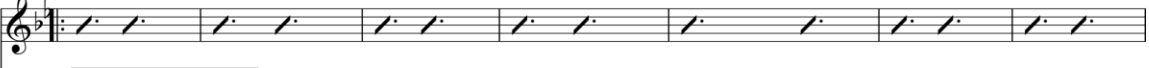
 Or Similar in G harmonic min#4

Pno. 

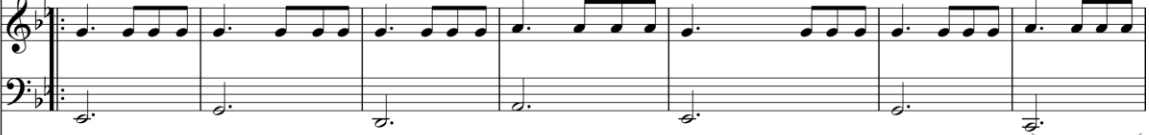
Bass 

Tabla. 
dhin dhin dha te dha dhin dhin dha te dha dhin dhin dhin na na na dhin dha na na na na na
 Or Similar. Played on outer edge of tabla

167  Shakuhachi feature in G harmonic min#4

Shak. 

 Or Similar in G harmonic min#4

Pno. 

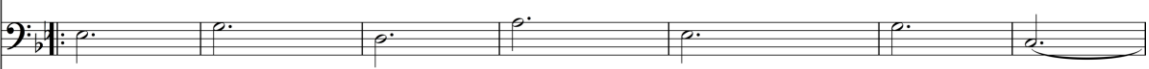
Bass 

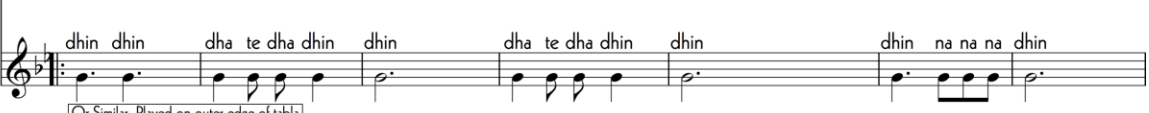
Tabla. 
dhin dhin dha te dha dhin dhin dha te dha dhin dhin dhin na na na dhin
 Or Similar. Played on outer edge of tabla

Figure 95: Two-note melody in Evans's *The Valley of Vung* (3:50)

9 [A]

Cello

Tabla

ka tin tin ke tin tin ka ka ka ka ka tin tin tin tin ka tin tin tin

16

Cello

Tabla

tin tin tin ke tin ke tin tin tin tin tin ka tin ka

22 wordless...

Voice

Cello

Tabla

ke ke tin tin ke tun tun tun tun tun tun tun tun tun tun tun tun tun tun tun tun

strike outer rim of tabla

Figure 96: Three-note tabla melody in Evans's *Shifter* (0:5)

The musical score is divided into three systems, each with three staves: Piano (treble clef), Bass (bass clef), and Tabla (treble clef). The time signature is 7/8. The score includes lyrics for the Tabla part.

System 1 (Measures 14-18):

- Piano:** Treble clef, 7/8 time. Notes: G4 (half), A4 (quarter), B4 (quarter), C5 (quarter). Rest: D5 (half).
- Bass:** Bass clef, 7/8 time. Notes: G3 (half), A3 (quarter), B3 (quarter), C4 (quarter). Rest: D4 (half).
- Tabla:** Treble clef, 7/8 time. Notes: G4 (half), A4 (quarter), B4 (quarter), C5 (quarter). Rest: D5 (half). Lyrics: tin

System 2 (Measures 19-23):

- Piano:** Treble clef, 7/8 time. Notes: G4 (half), A4 (quarter), B4 (quarter), C5 (quarter). Rest: D5 (half).
- Bass:** Bass clef, 7/8 time. Notes: G3 (half), A3 (quarter), B3 (quarter), C4 (quarter). Rest: D4 (half).
- Tabla:** Treble clef, 7/8 time. Notes: G4 (half), A4 (quarter), B4 (quarter), C5 (quarter). Rest: D5 (half). Lyrics: tin na na

System 3 (Measures 24-28):

- Piano:** Treble clef, 7/8 time. Notes: G4 (half), A4 (quarter), B4 (quarter), C5 (quarter). Rest: D5 (half).
- Bass:** Bass clef, 7/8 time. Notes: G3 (half), A3 (quarter), B3 (quarter), C4 (quarter). Rest: D4 (half).
- Tabla:** Treble clef, 7/8 time. Notes: G4 (half), A4 (quarter), B4 (quarter), C5 (quarter). Rest: D5 (half). Lyrics: tin na tin

System 4 (Measures 29-33):

- Piano:** Treble clef, 7/8 time. Notes: G4 (half), A4 (quarter), B4 (quarter), C5 (quarter). Rest: D5 (half).
- Bass:** Bass clef, 7/8 time. Notes: G3 (half), A3 (quarter), B3 (quarter), C4 (quarter). Rest: D4 (half).
- Tabla:** Treble clef, 7/8 time. Notes: G4 (half), A4 (quarter), B4 (quarter), C5 (quarter). Rest: D5 (half). Lyrics: dhin dha ta ke ne te ta dhin te ke ne te tin ke ke tin ke ke tin ke ke tin ke ke

Figure 97: Four-note melody in Evans's *In a Milky Way* (3:22) 62

Harmonic capacity of tabla as formulated by Evans

Extending the re-imagination of the tabla and its role in “Tabla without Borders”, Evans further proposes a system for harmonic playing of the tabla, devoting a chapter to the formulation of how this may be achieved.⁵⁴⁶ Evan’s formulation includes subsections devoted to *pedal point*, *root-based harmony*, *triad-based harmony*, *moving harmony*, and *the creation of harmony through multiple parts*.

Examples of tabla playing harmonic roles in various capacities are as follows:

The musical score consists of two systems, each spanning three measures. The first system (measures 73-75) includes a Voice part with lyrics "The te - lling and the re -", a Vc. part, a Tabla part with lyrics "dhin na dhin dhin na tin na dhin dhin na dhin na dhin dhin na", and a Tabla E part with lyrics "dhin na dhi ge dhi na ke te tha ka ta ka te re ke te tha ka ta ka te re ke te dhin na dhi ge dhi na ke te". The second system (measures 76-78) includes a Voice part with lyrics "te - lling. Of your -", a Vc. part, a Tabla part with lyrics "tin na dhin dhin na dhin na dhin na tin na dhin dhin na dhin na dhin dhin na", and a Tabla E part with lyrics "tha ka ta ka te re ke te tha ka ta ka te re ke tedhin na dhi ge dhi na ke tin tin na dhi ge dhi na ke dhin na dhi ge dhi na ke".

Figure 98: Two harmonised tabla parts in Evans’s *Blueprint* (2:16) 84

⁵⁴⁶ Evans, “Tabla without Borders,” 71–90.

Condensed

9

Tabla

Em D Bm C Em D Bm C

Cello

17

Tabla

Em D G Bm C Am Em Em

Cello

128

Voice

Shak.

Vc.

Tabla

Tabla E

Tabla B

dha ti ge tin ge tin ge na dha ti ge tin ge tin ge na dha ti ge tin ge tin ge na dha ti ge tin ge tin ge na

dha ti ge tin ge tin ge na dha ti ge tin ge tin ge na dha ti ge tin ge tin ge na dha ti ge tin ge tin ge na

dha ti ge tin ge tin ge na dha ti ge tin ge tin ge na dha ti ge tin ge tin ge na dha ti ge tin ge tin ge na

Condensed

18

Tabla

Cello

Figure 99: Three harmonised tabla parts in Evans's *Blueprint* (3:43)

Chord sequential capacity of tabla as conceived by Evans

Regarding the capacity of the tabla to play chord sequences, Evans notes:

Further extending this approach of multiple tabla pitches in harmony led to the creation of compositions with tabla parts that fulfil a complete changing chord progression. This approach requires many drums and either sufficient players or overdubs to achieve.⁵⁴⁷

⁵⁴⁷ Evans, "Tabla without Borders," 87.

In relation to the piece exemplifying this concept, he notes:

The harmony in *While You Were Sleeping* is produced entirely with tabla parts alone as an example of the extent to which the tabla may function as a harmonic instrument (track 12, *The Tabla Project*).⁵⁴⁸



Figure 100: Chordal tabla harmony in Evans's *While You Were Sleeping*

Regarding the achievement of the tabla to play chord sequences, Evans further notes:

As far as I have uncovered during this research, it [*While You Were Sleeping*] is the first piece to be written with a complete chord progression performed on the tabla.⁵⁴⁹

Regarding the capacity for the tabla to play in a jazz and extended harmonic context, and summarising the significant advancement and re-contextualisation of the tabla into a Western framework, Evans notes:

While there is a long history of tabla performance in jazz dating back to the 1960s (Farrell 1997: 169⁵⁵⁰), with famous musicians such as Miles Davis, John Coltrane and Pharoah Sanders incorporating the tabla, this approach, in which chord changes may also be outlined by the tabla, is yet to be adopted.⁵⁵¹

To that extent, not only are the *configurations* of multiple tabla proposed in “Tabla without Borders” unique and novel, but so too is the depth to which the tabla is incorporated to *harmonically contribute* to the structure of compositions.

Adaptations and accommodations

Regarding the extended compositional possibilities for tabla, the current dissertation builds directly on the work of Evans in “Tabla without Borders” to propose a 12-key harmonic tabla set with capability to play in all 12 keys of the Western harmonic system, the details of which are presented in the next section.

⁵⁴⁸ Evans, “Tabla without Borders,” 87.

⁵⁴⁹ Evans, “Tabla without Borders,” 90.

⁵⁵⁰ Gerry Farrell, *Indian Music and the West* (Oxford: Oxford University Press, 1997) 169, cited in Evans, “Tabla without Borders.”

⁵⁵¹ Evans, “Tabla without Borders,” 90.

The method used to achieve this is discussed as follows, noting the contribution of various accommodations and methods that were collectively applied in the current research to permit the tabla to play in 12 keys, and to permit the recording of the equi-harmonic composition *Oscillation 1*.

Configurative adaptations

Configurative adaptations are adaptations of the tabla set configuration that allow multi-pitch tabla playing and hence the capacity for melodic and harmonic capacity.

In “Tabla without Borders”, Evans found two important ergonomic limitations to the extent to which the normally two-drum tabla set could be configured to play more than one pitch:

- The tabla was the only drum of the pair for which multiple drum configurations were feasible, this being for reasons previously listed, including the bayan’s bass pitch and a playing style that required constant contact between the palm of the left hand and the drum.
- The ergonomic limit of multiple tabla was four tabla drums and one bayan. Granted the size of the tabla and the time taken to move the hand from one drum to another (as opposed to the time to move the finger only as is required on, for instance, piano, guitar, wind instruments), the limit of such a tabla set to four tabla drums does not require further explanation.

In the establishment of a 12-key tabla to record *Oscillation 1*, no configurative adaptations were used — that is, the standard configuration of two drums, bayan and single tabla played together, was the only configuration used.

Performance-based adaptations

In “Tabla without Borders”, Evans refers to what may be broadly classified as “performance adaptation”. This is not a new concept. In the public playing of a piano concerto, for example, the performer may use a “page-turner”. In a pop music performance, an electric guitarist may use an assistant to replace one guitar with another. Such examples of performance adaptations have in common the need for an assistant to manage a task that the musician cannot manage because they are occupied playing the instrument.

Before recording *Oscillation 1*, performance adaptations were discussed, but both Sam and I felt that the amount of human assistance required to replace one tuned tabla with another and to play the pitches required for the music was impractical to the point of being not feasible. Thus, no performance-based adaptations nor any configurative adaptations were undertaken for the recording.

Arrangement/compositional adaptation

For the current dissertation, the arrangement or compositional accommodations that allow the ease of playing a composition are referred to as *arrangement/compositional adaptation*.

Referring to the previously cited example, an arrangement/compositional adaptation for a piece of cello music originally written or intended for the key of D^b would be to write the music in the key of C.

As another example, for the case of the guitar being required to play a piano piece that has an eight-note chord, an *arrangement/compositional adaptation* would be to leave out the two least-important notes and *re-arrange* the chord as a six-note chord instead.

Except for the tabla voicings between A and B sections (as described in the next section), composition of the tabla part for *Oscillation 1* did involve arrangement/compositional adaptation.

The most interesting part of this process, and the part that made the most contribution to *new knowledge*, at least within the field of contemporary tabla technique and repertoire, was the *symbiosis* (i.e., mutual benefit) that occurred between composition and instrument design. As a dynamic characteristic of the relationship between research and practice in practice-based research, this symbiosis was so significant that it would not be an exaggeration to say that the *composition begot the instrument, and the instrument begot the composition*.

In other words, the *12-drum harmonic tabla set* came to fruition out of the necessity to play the equi-harmonic composition. Vice-versa, the (tabla part of the) composition came to fruition out of the capacity of the instrument to play in 12 keys — more specifically, out of the *compositional mechanism* that permitted the instrument to play in all 12 keys.

This *compositional mechanism* is addressed in detail in Chapter 2. Here, it is enough to summarise that the compositional mechanism that permitted the 12-drum harmonic tabla set to come to fruition in the format that was used for the recording of *Oscillation 1* was the realisation that it was possible to play in 12 keys without having 12 tuned tabla drums, pitched in sequential semitones.⁵⁵²

Alternative configurations to 12-drum configuration to permit playing of tabla in 12 keys

The alternative possibility was to use fewer drums but to permit 12-key composition via adaptations. Put simply, in *Oscillation 1*, the *compositional adaptation* made to determine tabla pitches *used alternative voicings* in different sections of the composition. This was achieved by two accommodations — one at the level of the composition and the other at the level of instrument configuration.

The accommodation at the level of the composition — the *compositional adaptation* — was to compose the piece such that a single tabla pair tuning (tabla and bayan) could *play the changes*, or, at a minimum, *play within the key centre*, for two different keys. Otherwise expressed, the tunings of the tabla were such that a single paired tuning was used across both an A-section and its corresponding B-section in the subdominant key. There were thus six pairs of tabla-bayan tunings, 12 drum tunings in all.

Configurational adaptations symbiotic with compositional adaptations

The accommodation at the level of the instrument — the *configurational adaptation* (used in this sense to define the tuning configurations of drums needed to play the piece⁵⁵³) — was to reduce the total number of paired tunings from 12 to 6, based on the capacity of the instrument to play in 12 keys, by using alternative voicings within the A-sections and B-sections of the composition.

The result of this was the structure of the composition having a repeating and modulating AB-section such that the A-section and B-section were sufficiently harmonically related for a common bayan and tabla tuning to be able to define, or at the least be *harmonically consistent with*, the 12 key centres of the composition.

Referring to the cycle of fifths as an indicator of “harmonic relatedness”, the simplest harmonic AB relationship that allows a single tabla part tuning to define *the key centre* is the tonic-subdominant

⁵⁵² Apart from the ergonomic capacity to play 12 tabla drums, tuned in semitones, this is not possible in a practical sense also because of the limited range of the tunings possible for the tabla and the bayan as a hand drum.

⁵⁵³ The term is used here differently from where the term implies multiple tuned drums played at once, in real time.

relationship. The AB-section of *Oscillation 1* is thus written so that in each of the 432 (36 equi-harmonic cycles x 12 A-B movements per equi-harmonic cycle) instances where the composition moves from the A (call) section to the B (response) section of the melody (as described in Appendix 5), the harmonic movement is a modulation up a perfect fourth or down a perfect fifth.⁵⁵⁴

Adaptations to studio-recording process

In addition to the compositional adaptation that made it possible to compose and record the tabla in 12 keys, the final important adaptation discussed was the recording process itself. In short, the recording adaptations provided a way of recording the tabla whilst in particular tunings and mixing this content into the correct position. The details of the process that permitted this are given in Appendix 5.

Summary

This section has given an account of the research process that culminated in recording *Oscillation 1*. In relation to the tabla part, the research process found a configuration (i.e., a tuning arrangement of both drums) and a mechanism (in this case, a recording and mixing process) by which the recording of a 12-key composition could be made.

The specific tabla tuning that met this challenge has been designated the 12-drum harmonic tabla set.

At the outset, it was noted that the *conceptual* possibility of having 12 tabla tuned in semitones was not feasible from both an ergonomic and a physical instrument-construction point of view. For this reason, a solution was conceived that involved six paired tabla tunings, with *compositional adaptations* in the form of alternative voicings of A and B sections, where the B-section was in a subdominant key. The drum tunings that permitted the physical construction of a *harmonic tabla set* capable of being played in 12 keys was discovered during this process.

The differences between the harmonic tabla set proposed in the current dissertation and the two-, three- and four-tabla multi-tabla configurations proposed by Evans, and successfully used to play Western harmonic compositions, including simple chord sequential movements, involve the following:

1. Whereas Evans's multi-tabla configurations are designed to play harmonic music within one harmonic key centre (as Western musical compositions are typically written in), the harmonic tabla set is designed to play *equi-harmonic* compositions — that is, compositions whose harmonic content is equally distributed across all 12 keys. *Oscillation 1* is an example of such a composition.
2. Whereas Evans's multi-tabla configurations use multiple (up to four) tabla tunings with a *single fixed bayan tuning*, the harmonic tabla set is a set of paired tunings that use *six different tabla tunings*, and *six different bayan tunings* — that is, both the tabla and the bayan are configured in paired tunings. Further, these paired tunings retain the integrity of the tabla-bayan inter-drum interval (this typically being either an octave interval or a perfect fifth interval, consistent with the inter-drum tunings used in traditional tabla configurations).
3. Whereas Evans's multi-tabla configurations are capable of being played in real time, the harmonic tabla set is not. Rather, it is a set of tunings that fit within the range of the tabla drums (both tabla and bayan) and is physically constructible with satisfactory tuning and tolerances (i.e., the drums stay in tune at these tunings, and the skins do not break). The

⁵⁵⁴ The A-section moves to the B-section 12 times within each equi-harmonic cycle and the composition constitutes 36 repetitions of the equi-harmonic cycle.

recording of equi-harmonic music requires the recording of tabla within one of the six tuning configurations and the subsequent re-assembly of this content. For *Oscillation 1*, the *recording and mixing adaptations* that made the recording of the composition possible are described in Chapter 2.

The tabla tunings used in *Oscillation 1*, summarised in Appendix 5, are reiterated in Table 7.

Table 7: Tabla tunings used in *Oscillation 1*

Key	Pitch of Bayan	Pitch of Tabla	Key	Scale tones [Bayan, Tabla]	Key	Scale tones [Bayan, Tabla]
[A] [B] 1: [F][B ^b]	F 4	F 2	F Maj	[I, I]	B ^b Maj	[V, V]
[A] [B] 2: [E ^b][A ^b]	E ^b 4	E ^b 2	E ^b Maj	[I, I]	A ^b Maj	[V, V]
[A] [B] 3: [D ^b][G ^b]	* _[High] A ^b 4	D ^b 2	D ^b Maj	[V, I]	G ^b /F [#] Maj	[XI, V]
[A][B] 4: [B] [E]	* G ^b /F [#] 4	B 2	B Maj	[V, I] _[High]	E Maj	[XI, V]
[A] [B] 5: [A] [D]	A 4	A 2	A Maj	[I, I]	D Maj	[V, V]
[A] [B] 6: [G] [C]	G 4	G 2	G Maj	[I, I]	C Maj	[V, V]

Appendix 7: *Oscillation 1* — Analysis of Phenomenological Vector Field from the Perspective of Primary RP 1A

Table 8: *Oscillation 1* — Summary of hierarchical vector structure

Thirteen Form-void vectors within five parameters within the equi-harmonic cycle			
Parameter 1: Metre	Vector 1	Level 1: At level of simple metre	3 3 4 3 3 4 4 beats
	Vector 2	Level 2: At level of medium compound metre	10 10 4 beats
	Vector 3	Level 3: At level of full compound metre	24 beats
Parameter 2: Melody	Vector 4	Level 1: At level of melodic phrase 1	4 bars duration
	Vector 5	Level 2: At level of melodic phrase 2	5 bars duration
	Vector 6	Level 3: At level of melodic phrase 3	7 bars duration
[Song Form]	Vector 7	At level of AB Call and Response	14 bars duration
Parameter 3: Harmonic Movement within Single Key Centre	Vector 8	V-1 cadence between 1 st and 2 nd bars of A-section V-1 cadence between 1 st and 2 nd bars of B-section	2 bars duration
	Vector 9	2-5-1 progression at 6 th , 7 th and 8 th bars of AB-section	3 bars duration
Parameter 4: Modulation	Vector 10	Linear modulation	15 bars duration [A-section (7 bars) + B-section (7 bars) + 1 st bar of A-section in the <i>same</i> key (1 bar)]
	Vector 11	Cyclic modulation	15 bars duration [A-section (7 bars) + B-section (7 bars) + 1 st bar of A' -section in <i>new</i> key (1 bar)]
Parameter 5: Global form — Equi-harmonicity	Vector 12	Equi-harmonic Cycle	168 bars duration
Global form — Rhythmic Density	Vector 13	Oscillation	6048 bars duration

LEVEL 2 MELODY

Vector 4	At level of melodic phrase 1	4 bars duration
Vector 5	At level of melodic phrase 2	5 bars duration
Vector 6	At level of melodic phrase 3	7 bars duration



Figure 104: Melodic organisation of phrases P1, P2 and P3, respectively, 4, 5 and 7 bars duration

SONG FORM⁵⁵⁵

Vector 7 At level of AB Call and Response 14 bars duration



Figure 105: Melodic organisation of 14-bar melodic phrases, functioning as call and response

LEVEL 3 HARMONIC MOVEMENT WITHIN SINGLE KEY CENTRE

Vector 8 Perfect cadence 2 bars duration

Vector 9 2-5-1 progression 3 bars duration

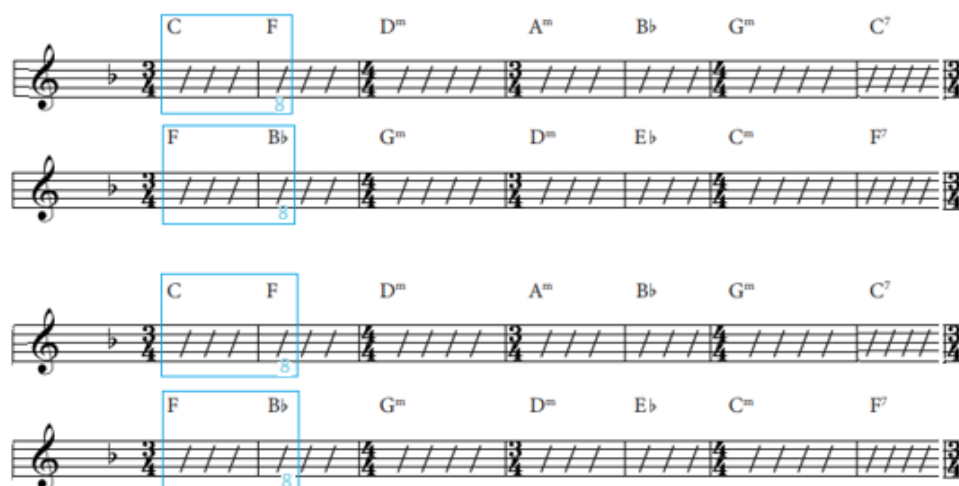


Figure 106: Harmonic movement within a single key centre — perfect cadence

⁵⁵⁵ I have called the fourth hierarchical level of melodic organisation “song form” because, I propose, melodic organisation at this high hierarchical level is experienced as *call and response*.

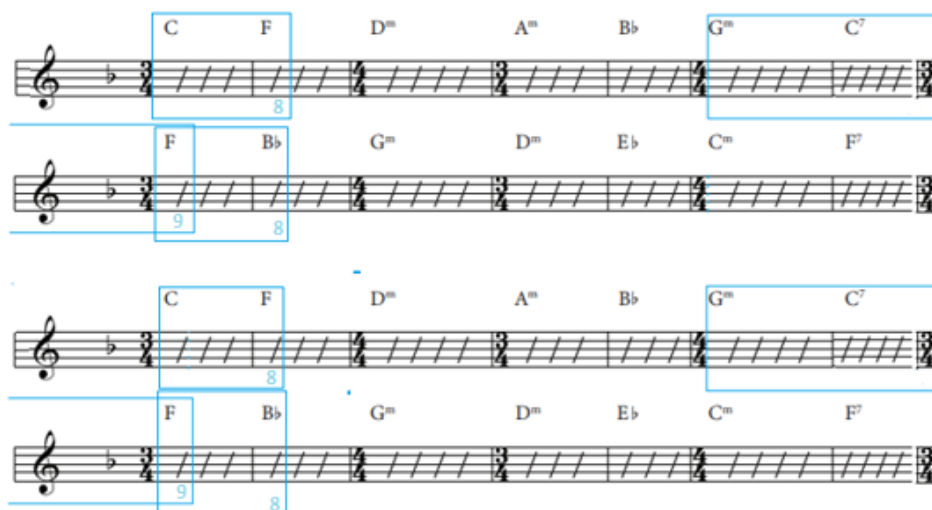


Figure 107: Harmonic movement within a single key centre — ii-V-1 harmonic progression

LEVEL 4 MODULATION

Vector 10 Linear modulation 2-bars duration

Vector 11 Cyclic modulation 3-bars duration



Figure 108: Linear modulation — bars 1 to 15

Figure 109: Cyclic modulation — bars 15 to 29

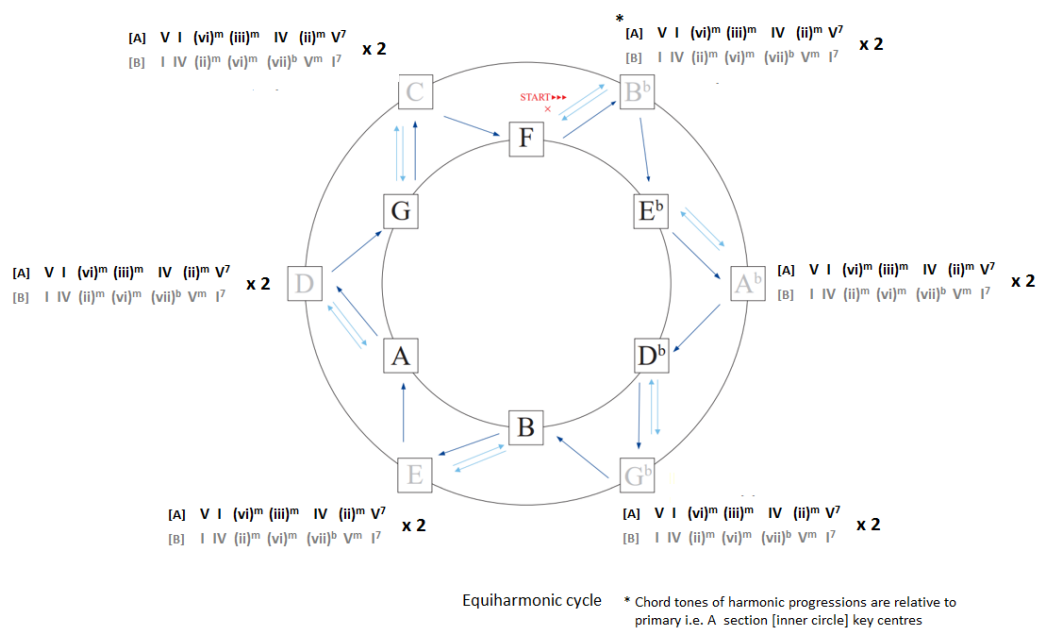


Figure 110: Combined harmonic movement within a single key centre and modulation, linear and cyclic

Note: The small parallel arrows demonstrate linear modulation and the larger arrows — between the inner and outer circles — demonstrate cyclic modulation.

LEVEL 5 GLOBAL FORM

Vector 12

Equi-harmonic Resolution

168 bars duration

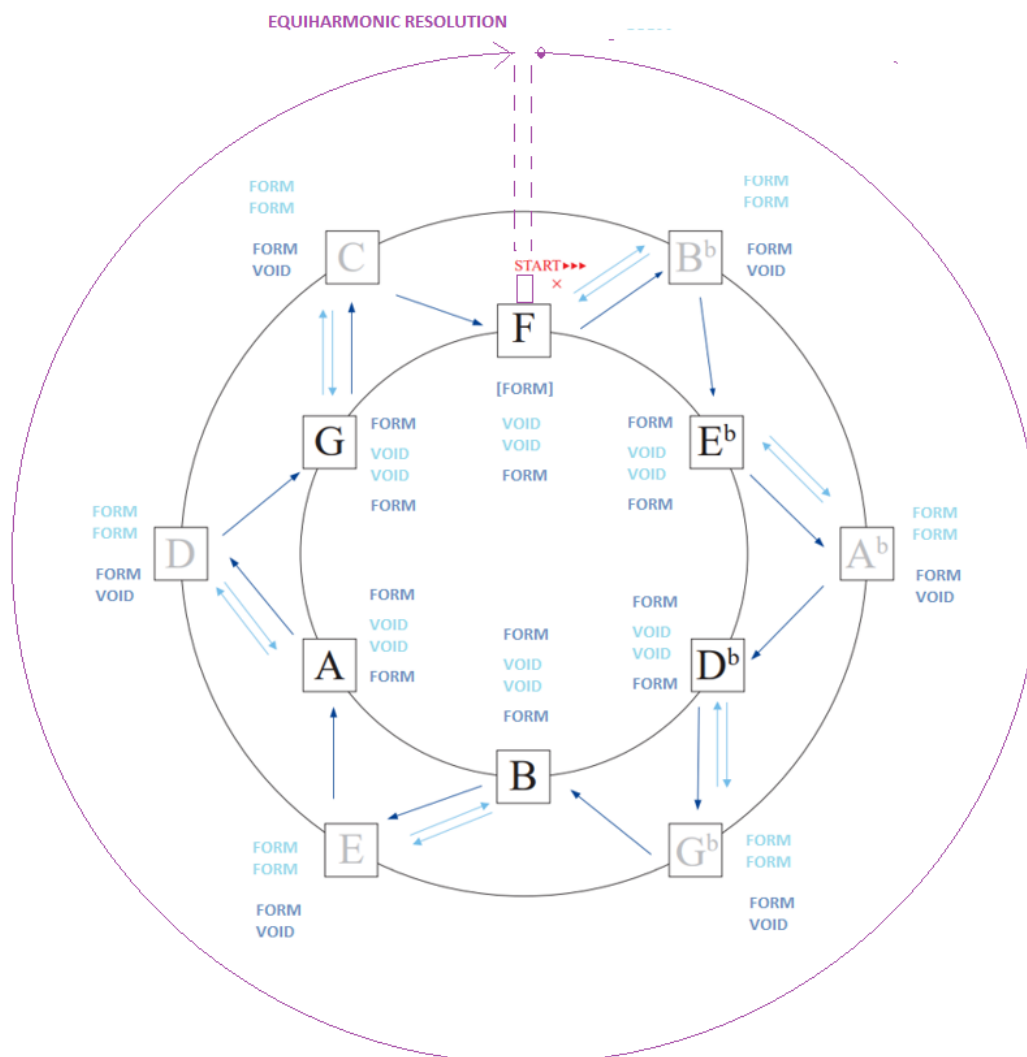


Figure 111: Form-void vectors in the equi-harmonic cycle

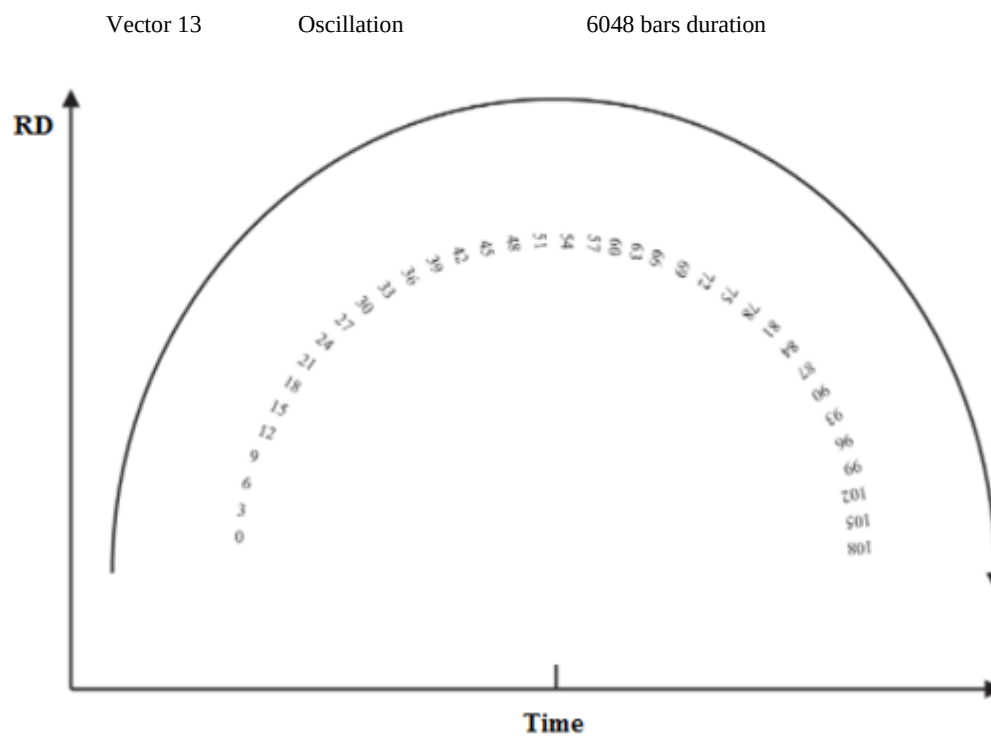


Figure 112: Linear global form of the tabla part

Note: RD is rhythmic density. Refer to section 9 of Appendix 5 for details of the compositional process.

Appendix 8: Historical Discography — Western and Eastern

1. WESTERN MUSIC HISTORICAL DISCOGRAPHY			
1.1 EARLY	<i>Gregorian Introit for the Mass in Honour of Henry, Patron Saint of Finland</i>		[c 900]
1.2 MEDIEVAL	<i>Non al suo Amante</i>	Jacopo da Bologna	[c 1350]
1.3 RENAISSANCE	<i>Ave Maria</i>	Josquin Desprez	[c 1500]
1.4 COMMON PRACTICE			
1.4.1 Baroque	<i>Goldberg Variations/Aria</i>	J.S. Bach	[1741]
1.4.2 Classical	<i>Serenade No. 13 for strings in G major/Allegro</i>	Mozart	[1757]
1.4.3 Romantic	<i>Piano Concerto No. 5 in E-flat Major/Allegro</i>	Beethoven	[1809]
1.5 TWENTIETH CENTURY			
1.5.1 Modernism			
<i>1.5.1.1 Impressionism:</i>			
1.5.1.1.1 Ambient Impressionism	<i>Gymnopédies 1</i>	Erik Satie	[1888]
1.5.1.1.2 Symbolist Impressionism	<i>Prélude à l'après-midi d'un faune</i>	Debussy	[1894]
<i>1.5.1.2 Expressionism:</i>			
1.5.1.2.1 Serialism	<i>Pelleas und Melisande</i>	Arnold Schoenberg	[1903]
1.5.1.2.2 Primitivism	<i>The rite of spring</i>	Igor Stravinsky	[1913]
1.5.1.2.3 Absolutism	<i>Wind quintet</i>	Paul Hindemith	[1922]
1.5.1.2.4 Dadaism	<i>Ballet Mécanique</i>	George Antheil	[1925]
1.5.1.2.5 Point Music	<i>Klavierstück V</i>	Karlheinz Stockhausen	[1955]
1.5.2 Post-Modernism			
1.5.2.1.1 Form-Void Inversion	<i>4'33"</i>	John Cage	[1952]
1.5.2.1.2 Subject-Object Inversion	<i>Abfaelle</i>	Dieter Schnebel	[1962]
1.5.2.1.3 Aleatoric Music	<i>String quartet</i>	Witold Lutosławski	[1964]
1.5.3 Minimalism			
1.5.3.1 Player Minimalism	<i>Music for 18 Musicians</i>	Steve Reich	[1976]

1.5.3.2 Machine-Programmed Minimalism	<i>Koyaanisqatsi</i>	Philip Glass	[1982]
1.5.4 Late Twentieth Century and Twenty-first Century			
1.5.4.1 New Complexity	<i>Lemma-Icon-Epigram</i> for piano	Brian Ferneyhough	[1982]
1.5.4.2 Cross-Genre	<i>Homage to Metallica</i>	Matthew Hindson	[1997]
1.5.4.3 Twenty-First Century	<i>Ecstatic Architecture</i>	Liza Lim	[2004]

2. EASTERN MUSIC HISTORICAL DISCOGRAPHY

2.1 EARLY

2.1.1 Sanskritic Tradition/Vedic Hymns	<i>Purusha Sukta</i> — hymn 10.90 of the Rigveda		[c 1350 BC]
2.1.2 Araiya Seval/Tamil Hymns	<i>Divya Prabandham</i> — from the hymns of the Alvars Nathamuni		[c 820]
2.1.3 Ashtapadi Hymns/Early Raga & Tala Form	<i>Gita Govinda</i>	Kavi Jayadeva	[c 1150]

2.2 MEDIEVAL

2.2.1 Qawwali	<i>Aj Rang Hai</i>	Amir Khusro	[c 1300]
2.2.2 Haveli Sangheet — Pre-Karnatic [South Indian] Music	<i>Pushtimarg Kirtan: Raag Brindavani Sarang</i> in <i>Dhamer Taal</i>		[c 1400]
2.2.3 Haveli Sangheet — Pre-Shastriya Sanghit [North Indian Classical] Music	<i>Raag Mishra Kafi</i> in <i>Bhajani Taal</i>		[c 1400]
2.2.4 Dhrupad	<i>Dhrupad</i> in <i>Raga Bhairava</i> in <i>Tala Sadara</i>		[c 1500]

2.3. KARNATIC [SOUTH INDIAN] MUSIC

	<i>Gaja Vadana Beduve Gowri Thanaya</i> in <i>Karnatic Raag Hamsdhwani</i>	Purandara Dasa	[c 1500]

2.4 SHASTRIYA SANGHIT [NORTH INDIAN CLASSICAL] MUSIC

	<i>Raga Miyan Ki Todi</i>	Mian Tansen	[c 1600]

2.5 TWENTIETH-CENTURY NORTH INDIAN CLASSICAL MUSIC

2.5.1 Early Twentieth-Century North Indian Classical Music

2.5.1.1 Early Twentieth-Century North Indian Classical Music — Vocal	<i>Raga Bhimpalasi</i>	Vishnu Digambar Paluskar	[c 1920]

2.5.1.2 Early Twentieth-Century North Indian Classical Music — Instrumental	<i>Raga Darbari Karnada</i>	Hafiz Ali Khan — Sarod	[c 1950]
	<i>Raga Yaman</i>	Pannalal Ghosh — Bansuri	[c 1950]

2.5.2 Late Twentieth-Century North Indian Classical Music: Folk-To-Classical Instrumental Transition

2.5.2.1 Folk to Classical Transition — Santoor	<i>Raga Bagashri</i>	Shiv Kumar Sharma	[1988]
2.5.2.1 Folk to Classical Transition — Bansuri	<i>Raga Kirwani</i>	Hariprasad Chaurasia	[1989]

2.6 CONTEMPORARY NORTH INDIAN CLASSICAL MUSIC — BANSURI

	Dawn Raga: <i>Raga Lalit</i>	Hariprasad Chaurasia	[2003]
	Noon Raga: <i>Raga Brindabani Sarang</i>	Hariprasad Chaurasia	[2009]
	Night Raga: <i>Raga Malkauns</i>	Hariprasad Chaurasia	[2013]

Appendix 9: Fingerings for Chords of Lead Sheet for the 8-String Guitar

OSCILLATION 1— CHORD VOICINGS FOR 8 STRING INTERVAL GUITAR - PARTS [A] & [B] — [Key of F Major \[Page 1/12 \[A\]](#)

[Section](#)] [Relative to Key of Part A] [A] **V** I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** [B] I IV (ii)^m (vi)^m (vii^b) V^m I⁷ /

[New A] [VII]^o

[Key to Key of F Major] **C** F Dm Am Bb Gm C⁷ F Bb Gm Dm Eb Cm F⁷ / [B^o]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3																
F 3	4																
C 3	5																
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] **V** I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** [B] I IV (ii)^m (vi)^m (vii^b) V^m I⁷ / [New A] [VII]^o

[Key to Key of F Major] **C** F Dm Am Bb Gm C⁷ F Bb Gm Dm Eb Cm F⁷ / [B^o]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3																
F 3	4																
C 3	5																
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] **V** I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** [B] I IV (ii)^m (vi)^m (vii^b) V^m I⁷ / [New A] [VII]^o

[Key to Key of F Major] **C** F Dm Am Bb Gm C⁷ F Bb Gm Dm Eb Cm F⁷ / [B^o]

A ^b 3	1																
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F 3	4																
C 3	5																
G 2	6																
D 2	7																
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[Key to Key of F Major] **C** F Dm Am Bb Gm C⁷ F Bb Gm Dm Eb Cm F⁷ / [B^o]

A ^b 3	1																
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A 1	8																

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[Key to Key of F Major] **C** F Dm Am Bb Gm C⁷ F Bb Gm Dm Eb Cm F⁷ / [B^o]

A ^b 3	1																
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B ^b 3	3																
F 3	4																
C 3	5																
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] **V** I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** [B] I IV (ii)^m (vi)^m (vii^b) V^m I⁷ / [New A] [VII]^o

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A ^b 3	1																
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B ^b 3	3																
F 3	4																
C 3	5																
G 2	6																
D 2	7																
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C 3	5																
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

OSCILLATION 1— CHORD VOICINGS FOR 8 STRING INTERVAL GUITAR - PARTS [A] & [B] — [Key of F Major \[Page 2/12 \[B\] Section\]](#)

[Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** ^[B] I IV **(ii)^m** (vi)^m (vii^b) V^m I⁷ ... / ^[New A] [VII^o]
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 [Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** ^[B] I IV **(ii)^m** (vi)^m (vii^b) V^m I⁷ ... / ^[New A] [VII^o]
 [Key to Key of F Major] C F Dm Am Bb Gm C⁷ F Bb Gm Dm Eb Cm F⁷ ... / ^[B^o]

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C 3	5																
G 2	6																
D 2	7																
A 1	8																

V VII IX XII
 [Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** ^[B] I IV **(ii)^m** (vi)^m (vii^b) V^m I⁷ ... / ^[New A] [VII^o]
 [Key to Key of F Major] C F Dm Am Bb Gm C⁷ F Bb Gm Dm Eb Cm F⁷ ... / ^[B^o]

A ^b 3	1																
E ^b 3	2																
B ^b 2	3																
F 2	4																
C 3	5																
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

OSCILLATION 1 – CHORD VOICINGS FOR 8-STRING INTERVAL GUITAR - PARTS [A] & [B] – Key of E^b Major [P. 3/12 [A]
Section]

[Relative to Key of Part A] ^[A] **V** **I** **(vi)^m** **(iii)^m** **IV** **(ii)^m** **V⁷** ^[B] **I** **IV** **(ii)^m** **(vi)^m** **(vii^b)** **V^m** **I'** ... / **[New A]** **[VII^b]**
 [Rel. to Key of Eb Major] **Bb** Eb Cm Gm Ab Fm **Bb7** Eb Ab Fm Cm Db Bbm Eb7 ... / **[A^b]**

[illegible]

[Relative to Key of Part A] ^[A] V I (vi)^m (iii)^m IV (ii)^m V⁷ ^[B] I IV (ii)^m (vi)^m (vi)^b V^m I⁷ ... / [New A] [VII]^b
[Rel. to Key of Eb Major] Bb Eb Cm Gm Ab Fm Bb7 Eb Ab Fm Cm Db Bbm Eb7 ... / [A^b]

[illegible]

	V		VII		IX		XII			
[Relative to Key of Part A]	^[A] V	I (vi) ^m	(iii) ^m	IV (ii) ^m	V ⁷	^[B] I	IV (ii) ^m	(vi) ^m (vi) ^b	V ^m I ⁷	... / [New A] [VII] ^b
[Rel. to Key of Eb Major]	Bb	Eb Cm	Gm	Ab Fm	Bb7	Eb	Ab Fm	Cm Db	Bbm Eb7	... / [A ^b]

[illegible]

	V							VII			IX			XII					
[Relative to Key of Part A]	[A]	V	I	(vi) ^m	(iii) ^m	IV	(ii) ^m	V ⁷	[B]	I	IV	(ii) ^m	(vi) ^m	(vi) ^b	V ^m	I ⁷	...	[New A]	[VII] ^b
[Rel. to Key of Eb Major]		Bb	Eb	Cm	Gm	Ab	Fm	Bb7		Eb	Ab	Fm	Cm	Db	Bbm	Eb7	...	[A ^b]	

[illegible]

	V							VII			IX			XII					
[Relative to Key of Part A]	[A]	V	I	(vi) ^m	(iii) ^m	IV	(ii) ^m	V ⁷	[B]	I	IV	(ii) ^m	(vi) ^m	(vii) ^b	V ^m	I ⁷	...	/ [New A]	[VII] ^b
[Rel. to Key of Eb Major]		Bb	Eb	Cm	Gm	Ab	Fm	Bb7		Eb	Ab	Fm	Cm	Db	Bbm	Eb7	...	/ [A ^b]	

[illegible]

	V		VII		IX		XII				
[Relative to Key of Part A]	^[A] V	I (vi) ^m	(iii) ^m	IV (ii) ^m	V ⁷	^[B] I	IV (ii) ^m	(vi) ^m (vi) ^b	V ^m I ⁷	... / [New A]	[VII] ^b
[Rel. to Key of Eb Major]	Bb	Eb Cm	Gm	Ab Fm	Bb7	Eb	Ab Fm	Cm Db	Bbm Eb7	... /	[A ^b]

[illegible]

	V						VII			IX			XII					
[Relative to Key of Part A]	[A]	V	I	(vi) ^m	(iii) ^m	IV	(ii) ^m	V⁷	[B]	I	IV	(ii) ^m	(vi) ^m	(vi) ^b	V ^m	I ⁷	... / [New A]	[VII] ^b
[Rel. to Key of Eb Major]		Bb	Eb	Cm	Gm	Ab	Fm	bb7		Eb	Ab	Fm	Cm	Db	Bbm	Eb7	... / [A ^b]	

[illegible]

V VII IX XII

OSCILLATION 1— CHORD VOICINGS FOR 8-STRING INTERVAL GUITAR - PARTS [A] & [B] – Key of E^b Major [P. 4/12 [B] Section]

[Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m IV **(ii)^m** $\underline{V^7}$ ^[B] I IV **(ii)^m** (vi)^m (vii^b) $\underline{V^m}$ I⁷ ... / [New A] [VII¹⁰]
 [Rel. to Key of E^b Major] B $\flat$ E $\flat$ C $\flat$ G $\flat$ A $\flat$ F $\flat$ B $\flat$ 7 E $\flat$ A $\flat$ F $\flat$ C $\flat$ D $\flat$ B $\flat$ m E $\flat$ 7 ... / [A $\flat$]

A $\flat$ 3	1																			
E $\flat$ 3	2																			
B $\flat$ 2	3																			
F 2	4																			
C 3	5																			
G 2	6																			
D 2	7																			
A 1	8																			

V VII IX XII

[Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m IV **(ii)^m** $\underline{V^7}$ ^[B] I IV **(ii)^m** (vi)^m (vii^b) $\underline{V^m}$ I⁷ ... / [New A] [VII¹⁰]
 [Rel. to Key of E^b Major] B $\flat$ E $\flat$ C $\flat$ G $\flat$ A $\flat$ F $\flat$ B $\flat$ 7 E $\flat$ A $\flat$ F $\flat$ C $\flat$ D $\flat$ B $\flat$ m E $\flat$ 7 ... / [A $\flat$]

A $\flat$ 3	1																			
E $\flat$ 3	2																			
B $\flat$ 2	3																			
F 2	4																			
C 3	5																			
G 2	6																			
D 2	7																			
A 1	8																			

V VII IX XII

[Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m IV **(ii)^m** $\underline{V^7}$ ^[B] I IV **(ii)^m** (vi)^m (vii^b) $\underline{V^m}$ I⁷ ... / [New A] [VII¹⁰]
 [Rel. to Key of E^b Major] B $\flat$ E $\flat$ C $\flat$ G $\flat$ A $\flat$ F $\flat$ B $\flat$ 7 E $\flat$ A $\flat$ F $\flat$ C $\flat$ D $\flat$ B $\flat$ m E $\flat$ 7 ... / [A $\flat$]

A $\flat$ 3	1																			
E $\flat$ 3	2																			
B $\flat$ 2	3																			
F 2	4																			
C 3	5																			
G 2	6																			
D 2	7																			
A 1	8																			

V VII IX XII

[Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m IV **(ii)^m** $\underline{V^7}$ ^[B] I IV **(ii)^m** (vi)^m (vii^b) $\underline{V^m}$ I⁷ ... / [New A] [VII¹⁰]
 [Rel. to Key of E^b Major] B $\flat$ E $\flat$ C $\flat$ G $\flat$ A $\flat$ F $\flat$ B $\flat$ 7 E $\flat$ A $\flat$ F $\flat$ C $\flat$ D $\flat$ B $\flat$ m E $\flat$ 7 ... / [A $\flat$]

A $\flat$ 3	1																			
E $\flat$ 3	2																			
B $\flat$ 2	3																			
F 2	4																			
C 3	5																			
G 2	6																			
D 2	7																			
A 1	8																			

V VII IX XII

[Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m IV **(ii)^m** $\underline{V^7}$ ^[B] I IV **(ii)^m** (vi)^m (vii^b) $\underline{V^m}$ I⁷ ... / [New A] [VII¹⁰]
 [Rel. to Key of E^b Major] B $\flat$ E $\flat$ C $\flat$ G $\flat$ A $\flat$ F $\flat$ B $\flat$ 7 E $\flat$ A $\flat$ F $\flat$ C $\flat$ D $\flat$ B $\flat$ m E $\flat$ 7 ... / [A $\flat$]

A $\flat$ 3	1																			
E $\flat$ 3	2																			
B $\flat$ 2	3																			
F 2	4																			
C 3	5																			
G 2	6																			
D 2	7																			
A 1	8																			

V VII IX XII

[Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m IV **(ii)^m** $\underline{V^7}$ ^[B] I IV **(ii)^m** (vi)^m (vii^b) $\underline{V^m}$ I⁷ ... / [New A] [VII¹⁰]
 [Rel. to Key of E^b Major] B $\flat$ E $\flat$ C $\flat$ G $\flat$ A $\flat$ F $\flat$ B $\flat$ 7 E $\flat$ A $\flat$ F $\flat$ C $\flat$ D $\flat$ B $\flat$ m E $\flat$ 7 ... / [A $\flat$]

A $\flat$ 3	1																			
E $\flat$ 3	2																			
B $\flat$ 2	3																			
F 2	4																			
C 3	5																			
G 2	6																			
D 2	7																			
A 1	8																			

V VII IX XII

[Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m IV **(ii)^m** $\underline{V^7}$ ^[B] I IV **(ii)^m** (vi)^m (vii^b) $\underline{V^m}$ I⁷ ... / [New A] [VII¹⁰]
 [Rel. to Key of E^b Major] B $\flat$ E $\flat$ C $\flat$ G $\flat$ A $\flat$ F $\flat$ B $\flat$ 7 E $\flat$ A $\flat$ F $\flat$ C $\flat$ D $\flat$ B $\flat$ m E $\flat$ 7 ... / [A $\flat$]

A $\flat$ 3	1																			
E $\flat$ 3	2																			
B $\flat$ 2	3																			
F 2	4																			
C 3	5																			
G 2	6																			
D 2	7																			
A 1	8																			

V VII IX XII

OSCILLATION 1 – CHORD VOICINGS FOR 8-STRING INTERVAL GUITAR - PARTS [A] & [B] – Key of **D^b Major** [P. 5/12 [A] Section]

[Relative to Key of Part A] ^[A] **V I (vi)^m (iii)^m IV (ii)^m V⁷** ^[B] **I IV (ii)^m (vi)^m (vii^b) V^m I⁷ ... / [New A] [VII]^b**
 [Rel. to Key of D^b Major] **Ab Db Bbm Fm Gb Ebm Ab7 Db Gb Ebm Bbm Gb Bbm Db7 ... / [G^b]**

A ^b 3	1																			
E ^b 3	2																			
B ^b 3	3																			
F 3	4																			
C 3	5						(3)		(4)											
G 2	6					1														
D 2	7						2													
A 1	8																			

V VII IX XII
 [Relative to Key of Part A] ^[A] **V I (vi)^m (iii)^m IV (ii)^m V⁷** ^[B] **I IV (ii)^m (vi)^m (vii^b) V^m I⁷ ... / [New A] [VII]^b**
 [Rel. to Key of D^b Major] **Ab Db Bbm Fm Gb Ebm Ab7 Db Gb Ebm Bbm Gb Bbm Db7 ... / [G^b]**

A ^b 3	1																			
E ^b 3	2																			
B ^b 3	3																			
F 3	4																			
C 3	5					1														
G 2	6						3													
D 2	7						2													
A 1	8																			

V VII IX XII
 [Relative to Key of Part A] ^[A] **V I (vi)^m (iii)^m IV (ii)^m V⁷** ^[B] **I IV (ii)^m (vi)^m (vii^b) V^m I⁷ ... / [New A] [VII]^b**
 [Rel. to Key of D^b Major] **Ab Db Bbm Fm Gb Ebm Ab7 Db Gb Ebm Bbm Gb Bbm Db7 ... / [G^b]**

A ^b 3	1																			
E ^b 3	2																			
B ^b 3	3																			
F 3	4																			
C 3	5					1														
G 2	6					1														
D 2	7					1	2													
A 1	8																			

V VII IX XII
 [Relative to Key of Part A] ^[A] **V I (vi)^m (iii)^m IV (ii)^m V⁷** ^[B] **I IV (ii)^m (vi)^m (vii^b) V^m I⁷ ... / [New A] [VII]^b**
 [Rel. to Key of D^b Major] **Ab Db Bbm Fm Gb Ebm Ab7 Db Gb Ebm Bbm Gb Bbm Db7 ... / [G^b]**

A ^b 3	1																			
E ^b 3	2																			
B ^b 3	3																			
F 3	4																			
C 3	5					1	4													
G 2	6					1														
D 2	7					1														
A 1	8																			

V VII IX XII
 [Relative to Key of Part A] ^[A] **V I (vi)^m (iii)^m IV (ii)^m V⁷** ^[B] **I IV (ii)^m (vi)^m (vii^b) V^m I⁷ ... / [New A] [VII]^b**
 [Rel. to Key of D^b Major] **Ab Db Bbm Fm Gb Ebm Ab7 Db Gb Ebm Bbm Gb Bbm Db7 ... / [G^b]**

A ^b 3	1																			
E ^b 3	2																			
B ^b 3	3																			
F 3	4																			
C 3	5					1	4													
G 2	6					1	2													
D 2	7					1														
A 1	8																			

V VII IX XII
 [Relative to Key of Part A] ^[A] **V I (vi)^m (iii)^m IV (ii)^m V⁷** ^[B] **I IV (ii)^m (vi)^m (vii^b) V^m I⁷ ... / [New A] [VII]^b**
 [Rel. to Key of D^b Major] **Ab Db Bbm Fm Gb Ebm Ab7 Db Gb Ebm Bbm Gb Bbm Db7 ... / [G^b]**

A ^b 3	1																			
E ^b 3	2																			
B ^b 3	3																			
F 3	4																			
C 3	5						1													
G 2	6					1			4											
D 2	7					1			2											
A 1	8																			

V VII IX XII
 [Relative to Key of Part A] ^[A] **V I (vi)^m (iii)^m IV (ii)^m V⁷** ^[B] **I IV (ii)^m (vi)^m (vii^b) V^m I⁷ ... / [New A] [VII]^b**
 [Rel. to Key of D^b Major] **Ab Db Bbm Fm Gb Ebm Ab7 Db Gb Ebm Bbm Gb Bbm Db7 ... / [G^b]**

A ^b 3	1																			
E ^b 3	2																			
B ^b 3	3																			
F 3	4																			
C 3	5						(3)		(4)											
G 2	6					1														
D 2	7						2													
A 1	8																			

V VII IX XII

[Relative to Key of Part A] [A] **V** I (**vi**)^m (iii)^m IV (**ii**)^m **V**⁷ [B] **I** IV (ii)^m (vi)^m (vii)^b V^m I⁷ ... / [New A] [VI]^o
[Rel. to Key of Db Major] Ab Db Bbm Fm Gb Ebm Ab7 Db Gb Ebm Bbm Gb Bbm Db7 ... / [Gb]

[illegible]

V VII IX XII

[Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** ^[B] I **IV** (ii)^m (vi)^m (vii)^b V^m I⁷ ... / [New A] [VI]^o
[Rel. to Key of Db Major] Ab Db Bbm Fm Gb Ebm Ab7 Db Gb Ebm Bbm Gb Bbm Db7 ... / [Gb]

[illegible]

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ ... / [New A] [VII]^b
[Rel. to Key of Db Major] Ab Db Bbm Fm Gb Ebm Ab7 Db Gb Ebm Bbm Gb Bbm Db7 / [Gb]

[illegible]

V VII IX XII

[Relative to Key of Part A] [A] **V** I (**vi**)^m (iii)^m IV (**ii**)^m **V**⁷ [B] I IV (ii)^m (**vi**)^m (vii)^b V^m i⁷ ... / [New A] [VII]^o
[Rel. to Key of Db Major] Ab Db Bbm Fm Gb Ebm Ab7 Db Gb Ebm Bbm Gb Bbm Db7 ... / [Gb]

[illegible]

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ ... / [New A] [VI]^o
[Rel. to Key of Db Major] Ab Db Bbm Fm Gb Ebm Ab7 Db Gb Ebm Bbm Gb Bbm Db7 ... / [G^o]

[illegible]

V VII IX XII

[Relative to Key of Part A] [A] **V** I (**vi**)^m (iii)^m IV (**ii**)^m **V**⁷ [B] I IV (ii)^m (vi)^m (vii)^b **V**^m I⁷ ... / [New A] [VII]^o
[Rel. to Key of Db Major] Ab Db **Bbm** Fm Gb **Ebm** Ab7 Db Gb Ebm Bbm Gb **Bbm** Db7 ... / [G^o]

[illegible]

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ ... / [New A] [VI]^b
[Rel. to Key of Db Major] Ab Db Bbm Fm Gb Ebm Ab7 Db Gb Ebm Bbm Gb Bbm Db7 ... / [G^b]

[illegible]

V VII IX XII

OSCILLATION 1- CHORD VOICINGS FOR 8-STRING INTERVAL GUITAR - PARTS [A] & [B] - **Key of B Major [P. 7/12 [A] Section]**

[Relative to Key of Part A] ^[A] **V** **I** **(vi)^m** **(iii)^m** **IV** **(ii)^m** **V⁷** ^[B] **I** **IV** **(ii)^m** **(vi)^m** **(vii)^b** **V^m** **I'** ... / *[New A]* *[VII^b]*
 [Rel. to Key of B Major] **F#** **B** **G#m** **D#m** **E** **C#m** **F#7** **B** **E** **C@bm** **G#m** **A7** **F#m** **B7** ... / *[A Major]*

[illegible]

V VII IX XII

[Relative to Key of Part A] ^[A] V I (vi)^m (iii)^m IV (ii)^m V⁷ ^[B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ ... / [New A] [VII]^b
[Rel. to Key of B Major] F# B G#m D#m E C#m F#7 B E C@bm G#m A7 F#m B7 ... / [A Major]

[illegible]

V VII IX XII

[Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m IV **(ii)^m** V⁷ ^[B] I IV **(ii)^m** **(vi)^m** **(vii)^b** V^m I⁷ ... / [New A] [VII^b]
[Rel. to Key of B Major] F# B G#m D#m E C#m F#7 B E C@bm G#m A7 F#m B7 ... / [A Major]

[illegible]

V VII IX XII

[Relative to Key of Part A] ^[A] V I (vi)^m (iii)^m IV (ii)^m V⁷ ^[B] I IV (ii)^m (vi)^m (vii)^b V^m I' ... / [New A] [VII]^b
[Rel. to Key of B Major] F# B G#m D#m E C#m F#7 B E C#m G#m A7 F#m B7 ... / [A Major]

[illegible]

V VII IX XII

[Relative to Key of Part A] ^[A] V I (vi)^m (iii)^m IV (ii)^m V⁷ ^[B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ ... / [New A] [VII]^b
[Rel. to Key of B Major] F# B G#m D#m E C#m F#7 B E C@bm G#m A7 F#m B7 ... / [A Major]

[illegible]

V VII IX XII

[Relative to Key of Part A] ^[A] V I (vi)^m (iii)^m IV (ii)^m V⁷ ^[B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ ... / [New A] [VII]^b
[Rel. to Key of B Major] F# B G#m D#m E C#m F#7 B E C@bm G#m A7 F#m B7 ... / [A Major]

[illegible]

V VII IX XII

[Relative to Key of Part A] ^[A] V I (vi)^m (iii)^m IV (ii)^m V⁷ ^[B] I IV (ii)^m (vi)^m (vii)^b V^m I' ... / [New A] [VII]^b
[Rel. to Key of B Major] F# B G#m D#m E C#m F#7 B E C@bm G#m A7 F#m B7 ... / [A Major]

[illegible]

V VII IX XII

OSCILLATION 1— CHORD VOICINGS FOR 8-STRING INTERVAL GUITAR - PARTS [A] & [B] — Key of B Major [P. 8/12 [B] Section]

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ / [New A] [VII]^b
 [Rel. to Key of B Major] F# B G#m D#m E C#m F#7 B E C@bm G#m A7 F#m B7 / [A Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3												(3)		(4)		
F 3	4											1					
C 3	5												2				
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ / [New A] [VII]^b
 [Rel. to Key of B Major] F# B G#m D#m E C#m F#7 B E C@bm G#m A7 F#m B7 / [A Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3																
F 3	4											1					
C 3	5												3				
G 2	6												2				
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ / [New A] [VII]^b
 [Rel. to Key of B Major] F# B G#m D#m E C#m F#7 B E C@bm G#m A7 F#m B7 / [A Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3												1				
F 3	4												1				
C 3	5												1		2		
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ / [New A] [VII]^b
 [Rel. to Key of B Major] F# B G#m D#m E C#m F#7 B E C@bm G#m A7 F#m B7 / [A Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3											1		4			
F 3	4											1					
C 3	5											1					
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ / [New A] [VII]^b
 [Rel. to Key of B Major] F# B G#m D#m E C#m F#7 B E C@bm G#m A7 F#m B7 / [A Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3											1		4			
F 3	4											1		3			
C 3	5											1					
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ / [New A] [VII]^b
 [Rel. to Key of B Major] F# B G#m D#m E C#m F#7 B E C@bm G#m A7 F#m B7 / [A Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3												1		4		
F 3	4												1		3		
C 3	5												1				
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ / [New A] [VII]^b
 [Rel. to Key of B Major] F# B G#m D#m E C#m F#7 B E C@bm G#m A7 F#m B7 / [A Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3												(3)		(4)		
F 3	4											1					
C 3	5												2				
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] ^[A] **V** **I** **(vi)^m** **(iii)^m** **IV** **(ii)^m** **V⁷** ^[B] **I** **IV** **(ii)^m** **(vi)^m** **(vii^b)^b** **V^m** **I⁷** ... / *[New A]* *[VII^b]*
[Rel. to Key of A Major] **E** **A** **F#m** **C#m** **D** **C#m** **E7** **A** **D** **Bm** **F#m** **G7** **Bm** **E7** ... / *[G Major]*

[illegible]

V VII IX XII

[Relative to Key of Part A] ^[A] V I (vi)^m (iii)^m IV (ii)^m V⁷ ^[B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ ... / [New A] [VII]^b
[Rel. to Key of A Major] E A F#m C#m D C#m E7 A D Bm F#m G7 Bm E7 ... / [G Major]

[illegible]

V VII IX XII

[Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m IV **(ii)^m** V⁷ ^[B] I IV (ii)^m (vi)^m (vii)^b V^m I' ... / [New A] [VII]^b
[Rel. to Key of A Major] E A **F#m** C#m D C#m E7 A D Bm F#m G7 Bm E7 ... / [G Major]

[illegible]

V VII IX XII

[Relative to Key of Part A] ^[A] V I (vi)^m (iii)^m IV (ii)^m V⁷ ^[B] I IV (ii)^m (vi)^m (vii)^b V^m I' ... / [New A] [VII]^b
 [[Rel. to Key of A Major] E A F#m C#m D C#m E7 A D Bm F#m G7 Bm E7 / [G Major]

[illegible]

V VII IX XII

[Relative to Key of Part A] ^[A] V I **(vi)^m** (iii)^m **IV** **(ii)^m** **V⁷** ^[B] I IV (ii)^m (vi)^m (vii)^b V^m I' ... / [New A] [VII]^b
[Rel. to Key of A Major] E A F#m C#m D C#m E7 A D Bm F#m G7 Bm E7 ... / [G Major]

[illegible]

V VII IX XII

[Relative to Key of Part A] ^[A] V I (vi)^m (iii)^m IV (ii)^m V⁷ ^[B] I IV (ii)^m (vi)^m (vii)^b V^m I' ... / [New A] [VII]^b
[Rel. to Key of A Major] E A F#m C#m D C#m E7 A D Bm F#m G7 Bm E7 ... / [G Major]

[illegible]

V VII IX XII

[Relative to Key of Part A] ^[A] V I (vi)^m (iii)^m IV (ii)^m V⁷ ^[B] I IV (ii)^m (vi)^m (vii)^b V^m I' ... / [New A] [VII]^b
[Rel. to Key of A Major] E A F#m C#m D C#m E7 A D Bm F#m G7 Bm E7 ... / [G Major]

[illegible]

V VII IX XII

OSCILLATION 1— CHORD VOICINGS FOR 8-STRING INTERVAL GUITAR - PARTS [A] & [B] – Key of A Major [P. 10/12 {B} Section]

[Relative to Key of Part A] [A] V I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** [B] I IV **(ii)^m** **(vi)^m** **(vii^b)^m** V^m I⁷ / [New A] [VII]^o
 [Rel. to Key of A Major] E A F#m C#m D C#m E7 A D Bm F#m G7 Bm E7 / [G Major]

A ^b 3	1																
E ^b 3	2																
B ^b 2	3																
F 3	4																
C 3	5																
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** [B] I IV **(ii)^m** **(vi)^m** **(vii^b)^m** V^m I⁷ / [New A] [VII]^o
 [Rel. to Key of A Major] E A F#m C#m D C#m E7 A D Bm F#m G7 Bm E7 / [G Major]

A ^b 3	1																
E ^b 3	2																
B ^b 2	3																
F 3	4																
C 3	5																
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** [B] I IV **(ii)^m** **(vi)^m** **(vii^b)^m** V^m I⁷ / [New A] [VII]^o
 [Rel. to Key of A Major] E A F#m C#m D C#m E7 A D Bm F#m G7 Bm E7 / [G Major]

A ^b 3	1																
E ^b 3	2																
B ^b 2	3																
F 3	4																
C 3	5																
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** [B] I IV **(ii)^m** **(vi)^m** **(vii^b)^m** V^m I⁷ / [New A] [VII]^o
 [Rel. to Key of A Major] E A F#m C#m D C#m E7 A D Bm F#m G7 Bm E7 / [G Major]

A ^b 3	1																
E ^b 3	2																
B ^b 2	3																
F 3	4																
C 3	5																
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** [B] I IV **(ii)^m** **(vi)^m** **(vii^b)^m** V^m I⁷ / [New A] [VII]^o
 [Rel. to Key of A Major] E A F#m C#m D C#m E7 A D Bm F#m G7 Bm E7 / [G Major]

A ^b 3	1																
E ^b 3	2																
B ^b 2	3																
F 3	4																
C 3	5																
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** [B] I IV **(ii)^m** **(vi)^m** **(vii^b)^m** V^m I⁷ / [New A] [VII]^o
 [Rel. to Key of A Major] E A F#m C#m D C#m E7 A D Bm F#m G7 Bm E7 / [G Major]

A ^b 3	1																
E ^b 3	2																
B ^b 2	3																
F 3	4																
C 3	5																
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I **(vi)^m** (iii)^m IV **(ii)^m** **V⁷** [B] I IV **(ii)^m** **(vi)^m** **(vii^b)^m** V^m I⁷ / [New A] [VII]^o
 [Rel. to Key of A Major] E A F#m C#m D C#m E7 A D Bm F#m G7 Bm E7 / [G Major]

A ^b 3	1																
E ^b 3	2																
B ^b 2	3																
F 3	4																
C 3	5																
G 2	6																
D 2	7																
A 1	8																

V VII IX XII

OSCILLATION 1— CHORD VOICINGS FOR 8-STRING INTERVAL GUITAR - PARTS [A] & [B] – Key of G Major [P. 11/12 [A] Section]

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii^b) V^m I⁷ / [New A] [VII^b]
 [Rel. to Key of G Major] D G Em Bm C Am D7 G C Am Em F7 Am D7 / [F Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3																
F3	4																
C3	5																
G2	6																
D2	7																
A1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii^b) V^m I⁷ / [New A] [VII^b]
 [Rel. to Key of G Major] D G Em Bm C Am D7 G C Am Em F7 Am D7 / [F Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3																
F3	4																
C3	5																
G2	6																
D2	7																
A1	4																

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii^b) V^m I⁷ / [New A] [VII^b]
 [Rel. to Key of G Major] D G Em Bm C Am D7 G C Am Em F7 Am D7 / [F Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3																
F3	4																
C3	5																
G2	6																
D2	7																
A1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii^b) V^m I⁷ / [New A] [VII^b]
 [Rel. to Key of G Major] D G Em Bm C Am D7 G C Am Em F7 Am D7 / [F Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3																
F3	4																
C3	5																
G2	6																
D2	7																
A1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii^b) V^m I⁷ / [New A] [VII^b]
 [Rel. to Key of G Major] D G Em Bm C Am D7 G C Am Em F7 Am D7 / [F Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3																
F3	4																
C3	5																
G2	6																
D2	7																
A1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii^b) V^m I⁷ / [New A] [VII^b]
 [Rel. to Key of G Major] D G Em Bm C Am D7 G C Am Em F7 Am D7 / [F Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3																
F3	4																
C3	5																
G2	6																
D2	7																
A1	8																

V VII IX XII

[Relative to Key of Part A] [A] V I (vi)^m (iii)^m IV (ii)^m V⁷ [B] I IV (ii)^m (vi)^m (vii^b) V^m I⁷ / [New A] [VII^b]
 [Rel. to Key of G Major] D G Em Bm C Am D7 G C Am Em F7 Am D7 / [F Major]

A ^b 3	1																
E ^b 3	2																
B ^b 3	3																
F3	4																
C3	5																
G2	6																
D2	7																
A1	8																

V VII IX XII

[Relative to Key of Part A] ^[A] **V** **I** (**vi**)^m (iii)^m **IV** (**ii**)^m **V**⁷ ^[B] **I** **IV** (ii)^m (vi)^m (vii)^b V^m i⁷ ... / [New A] [VII]^b
[Rel. to Key of G Major] D G Em Bm C Am D7 G C Am Em F7 Am D7 ... / [F Major]

[illegible]

	V		VII		IX		XII		
[Relative to Key of Part A] ^[A]	V	I (vi)^m	(iii) ^m	IV (ii)^m	V⁷	^[B] I	IV (ii) ^m	(vi) ^m (vii) ^b	V ^m I ⁷ ... / [New A] [VII] ^b
[Rel. to Key of G Major]	D	G Em	Bm	C Am	D7	G	C Am	Em F7	Am D7 ... / [F Major]

[illegible]

	V		VII		IX		XII		
[Relative to Key of Part A]	[A]	V I (vi) ^m	(iii) ^m	IV (ii) ^m	V ⁷	[B]	I IV (ii) ^m	(vi) ^m (vii) ^b	V ^m I ⁷ / [New A] [VII ^b]
[Rel. to Key of G Major]		D G E ^m	B ^m	C A ^m	D ⁷		G C A ^m	E ^m F ⁷	A ^m D ⁷ / [F Major]

[illegible]

	V		VII		IX		XII		
[Relative to Key of Part A] ^[A]	V	I (vi) ^m	(iii) ^m	IV (ii) ^m	V ⁷	^[B] I	IV (ii) ^m	(vi) ^m (vii) ^b	V ^m I ⁷ ... / [New A] [VII] ^b
[Rel. to Key of G Major]	D	G Em	Bm	C Am	D7	G	C Am	Em F7	Am D7 ... / [F Major]

[illegible]

[Relative to Key of Part A] ^[A] V I (vi)^m (iii)^m IV (ii)^m V⁷ ^[B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ ... / [New A] [VII]^b
[Rel. to Key of G Major] D G Em Bm C Am D7 G C Am Em F7 Am D7 ... / [F Major]

[illegible]

[Relative to Key of Part A] ^[A] V I (vi)^m (iii)^m IV (ii)^m V⁷ ^[B] I IV (ii)^m (vi)^m (vii)^b V^m I⁷ ... / [New A] [VII]^b
[Rel. to Key of G Major] D G Em Bm C Am D7 G C Am Em F7 Am D7 ... / [F Major]

[illegible]

	V		VII		IX		XII			
[Relative to Key of Part A] ^[A]	V	I (vi) ^m	(iii) ^m	IV (ii) ^m	V ⁷	^[B] I	IV (ii) ^m	(vi) ^m (vii) ^b	V ^m I ⁷	... / [New A] [VII] ^b
[Rel. to Key of G Major]	D	G Em	Bm	C Am	D7	G	C Am	Em F7	Am D7	... / [F Major]

[illegible]

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