Contemplative Synthesis: Meditative Aspects in Modular-based Listening, Composition and Performance

PhD by Practice submitted by:

Rotem Haguel

Principal Supervisor – Professor Justin Paterson,
Professor of Music Production, London College of Music
Secondary Supervisor – Professor Robert Sholl,
Professor of Music, London College of Music

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Glossary

Ānāpānasati	In short, ānāpāna—awareness or mindfulness of breath.
Anattā	Non-Self—the belief that there is no permanent Self in phenomena. Belief in Self is considered a cause for suffering and realising the true nature of Self results is enlightenment.
Annica	Impermanence or change; the belief that nothing stays the same.
Contemplative	A descriptor for a diverse range of religious, philosophical and humanist practices that emphasise self-awareness to enact psychological transformation.
CV	Control Voltage.
DAW	Digital Audio Workstation.
Dukka	Suffering—part of the first of the Four Noble Truths and one of the three marks of existence, it refers to the dissatisfaction of craving or grasping toward transient experience.
EG	Envelope Generator.
Koan	A paradoxical question, statement, or story used in Zen Buddhism to help students break away from logical thought and acknowledge one's buddha-nature.
LFO	Low Frequency Oscillator.
LPF	Low-Pass Filter.
Mahāsatipatthāna Sutta	The great discourse on the establishment of mindfulness. A foundational discourse for Vipassana meditation.
Mahãyãna	Literally translates to 'great vehicle'. This Buddhist tradition stands in contrast to Theravada, forming the dominant Buddhist tradition in Bhutan, the Himalayas, China, Japan, Korea, Mongolia, Taiwan and some parts of India and Russia.
Metta bhavavna	Also known as loving-kindness meditation, is a Buddhist meditation practice that involves cultivating feelings of kindness, love, and compassion towards oneself and others.

MIDI	Musical Instrument Digital Interface
Nonduality	The absence of duality between the perceiving subject and the object.
Rūpa	Form, body—refers to the physical aspect of existence, including the body and the external material world. It encompasses the sense organs (eye, ear, nose, tongue, body, and mind) and their corresponding objects (visible forms, sounds, smells, tastes, tactile objects, and mental objects).
Saṅkhāra	Volitional activities and inclinations, both conscious and unconscious, including emotions, thoughts, intentions, and attitudes.
Saṅñā	Perception—a mental aggregate involved in the recognition and identification of sensory information. It is the process of labelling and interpreting experiences.
SH	Sample & Hold.
Soto Zen	A school of Zen Buddhism that focuses on seated meditation.
Śūnyatā	Emptiness—a philosophical concept that refers to the idea that nothing is fixed or stable, and that everything is dependent on something else.
VCA	Voltage-Controlled Amplifier.
VCF	Voltage-Controlled Filter.
Vedanā	Sensation—a mental aggregate that pertains to the feeling experienced through contact with form. These sensations are categorized as pleasant, unpleasant, or neutral.
Viññāṇa	Consciousness—this mental aggregate is the awareness of sensory experiences. It arises when the sense organs come into contact with their objects and can be seen as the foundation that supports the other aggregates.

Vipassana to see things as they really are. An ancient technique of meditation that involves observing physical sensations without judgment or reaction. It is distinguished from the Vipassana tradition, which is used as a proper noun throughout the text.

Overview of Submission

This **PhD by Practice** submission includes the following elements:

1. **Written Component**—the thesis enclose herein.
2. **Practical Component ('The Artefact')** — Comprising:
    i. A performance showcase held at UWL on 12th July, available for streaming via YouTube here.
    ii. Recorded versions of the performed pieces, along with an additional composition titled *A6*, which are available for download as 44.1KHz, 16-bit WAV files via Dropbox here. They can also be streamed as mp3 files via SoundCloud here.
3. **Supporting Materials**—appendices containing supplementary materials relevant to the research, including tabled lists of multimedia journals captured during the research, analysed segments from those journals, and additional contextual documentation.

As is customary in this PhD format, the practical component serves as both a demonstration and an extension of the research explored in the written thesis. The thesis, in turn, provides a detailed account of the background, development, and creative process behind the performance and its recorded versions.

Guide to the Text

This document makes use of several stylistic conventions designed to support clarity and navigation:

1) Cross-references and hyperlinks—provided in the electronic version of the thesis and formatted as underlined blue text. **Cross-references** are used to help the reader locate items *within* the document—such as figures, tables, section headings, or bookmarks[2]. Cross-references are also embedded in headings and table captions in the appendix, allowing the reader to navigate from the appendix back to relevant positions in the body of the text. When clicking through a cross-reference, readers who wish to return to the previous position in the document are encouraged to use the 'back' key command (Cmd/Ctr + ←) in Acrobat Reader. Finally, **hyperlinks** are similar in format, except they are used to direct the reader *outside* of the document, to external audio and video materials.

2) Quotations—citations of external sources follow the Harvard Cite Them Right referencing system. References to research data (e.g., journal entries, video annotations) follow a similar format, whereby short quotations are integrated into the main body of text using double quotation marks—for example: "I noticed my attention shifted from moments where […] I was focused on a single sound and the way all sounds appear together" (UT). And longer quotations are presented as block quotes, e.g.:

[2] For example, a cross-reference to the first chapter might appear as: the chapter's title (The Spiritual Significance of Modular Synthesisers); its page number (e.g., p. 22); or section label (i.e., 1).

> It does this in a myriad of ways: ‘real’ sounds (bells) are played as they are; they are reversed; their envelope is altered; they are constructed using additive methods (synthesis); voices are blended with pure tones, fragmented to create pops, and clicks (MPVV).

In such cases abbreviated journal names are used (e.g., *UT*, *MPVV*) instead of author, date, and page number.

0 Contemplative Synthesis: An Introduction

Electronic music represents an evolving dialogue between human creativity and technological mediation. It is a medium through which abstract concepts may take audible form, and where the manipulation of electronic systems can give rise to affective, even spiritual, experience. My engagement with this field began serendipitously. As a session musician, I was invited to perform using a bass synthesiser, prompting the acquisition of my first electronic instrument—a Moog Little Phatty. The act of exploring its parameters for the first time revealed a world in which minor adjustments could yield significant sonic transformation. This tactile engagement initiated a long-standing preoccupation with the intersection of sound, its perception, and consciousness.

While my initial interest in synthesisers was largely pragmatic, early experiments with these instruments began to provoke deeper questions—specifically concerning the epistemic dimensions of music-making. These questions converged with an emerging interest in contemplative practice, particularly as prescribed in the discipline of Vipassana meditation. The subsequent discovery of modular synthesisers marked a pivotal moment in this process. In contrast to fixed-architecture synthesisers, modular systems are characterised by open-ended configurability and a high degree of user agency. Their non-linear, reconfigurable design invites improvisation, indeterminacy, and responsiveness (Auricchio and Borg, 2020; Randell and Rietveld, 2024)—qualities that resonate with the impermanence and interdependence central to

Buddhist contemplative frameworks (Hart, 2018). A single change—a rerouted patch cable, a subtle modulation—can produce wide-reaching, often unpredictable effects. Over time, the modular synthesiser assumed a dual role in my practice: as a musical instrument and as a site for contemplative inquiry.

From the outset, I held a preliminary hypothesis: that there must be something inherently contemplative about modular synthesisers. However, I could not yet articulate what that "something" was. Rather than approaching the topic deductively through an existing theoretical framework, I sought to develop a grounded theory through practice-led research. My aim was to allow theoretical insights to emerge from within compositional and listening acts—through sustained engagement with the modular system as both a creative and self-reflective tool.

0.1 Research Questions

This study seeks to explore the relationship between modular synthesis and meditation through two core questions:

- What contemplative themes emerge from listening to modular-based compositions, and how might these themes inform the aesthetics and practice of modular composition and performance?
- How can modular aesthetics and praxis ground these contemplative themes while also generating new ones?

These questions form the foundation of a research project that integrates theoretical inquiry with creative practice. As a composer and long-term Vipassana practitioner, my approach is shaped by lived experience as well as critical reflection. To address these questions, I employ an interdisciplinary

methodology that weaves together compositional and performative practice, autoethnographic data collection, and self-reflexive analysis. Through this approach, the study aims to articulate the ways in which modular synthesis can not only represent but also *promote* contemplative insights, functioning as a medium for exploring and expressing altered modes of awareness.

0.2 Chapter Overview

Chapter 1 provides theoretical and contextual review. It begins with an exploration of modular synthesisers and their evolving role in contemporary music. Originally developed as tools for experimental music, modular synthesisers have undergone a resurgence in recent years, gaining popularity among musicians who value their tactile, open-ended nature (Holmes, 2020; Engström and Kitzmann, 2024). Unlike digital audio workstations (DAWs), which often present a visually dominated interface, modular systems demand a physical engagement that emphasises listening and intuition (Randell and Rietveld, 2024). This shift from screen-based production to hands-on interaction aligns with the principles of mindfulness, which emphasise present-moment awareness and embodied experience (Varela, Thompson and Rosch, 2016).

Against this techno-cultural background, the first chapter will also delve into the tradition of Vipassana, its Buddhist roots and surrounding practices, serving as a foundation for understanding how modular synthesisers can be used to embody key concepts from within this tradition. Equally important, the chapter introduces a large corpus of electronic and experimental music that

explores spirituality, offering examples of how such themes materialise in the works of Cage, Stockhausen, and more.

The second chapter, Toward Contemplative Synthesis: Research Methodology explores the role of meditation within the research and its manifestation in *deep listening* practice (Oliveros, 2005). The paradigm of *autoethnography* is also examined, with its emphasis on personal experience as a means of generating cultural knowledge (Chang, 2008; Ellis, Adams and Bochner, 2011), as well as *practice research*, which stresses the generation of knowledge through working with tools. These two paradigms come into coherence, since both enable researchers to pose and answer questions in a personally situated manner (Bartleet, 2021). The chapter will then consider aspects of data collection, analysis and writing, before presenting the multi-method approach utilised in this project.

In Chapter 3, the focus will shift to the act of listening. *Listening*, as distinct from mere *hearing*, is an active process that demands sustained attention and openness. Oliveros' (2005) concept of deep listening, which combines elements of meditation with auditory awareness, offers a framework for exploring how modular-based compositions can engage listeners in a contemplative state. By attending to the subtle nuances of sound—its textures, patterns, and transformations—listeners can come to terms with realities concerning the nature of the mind, which mirror the introspective experiences of Vipassana meditation.

The practical component of this research, explored in Chapters 4, 5 and 6 involves creating and performing modular-based compositions that embody

these principles. Through the cascading process of system building, performance development, and reflection, the body of work developed not only explores the aesthetic potential of modular synthesis but also investigates its capacity to evoke contemplative apprehensions. This practice-led approach allows for physical engagement with the medium, enabling insights to emerge through critical instances within practice.

In the spirit of the Vipassana tradition and the research paradigms mentioned, this study is both personal and broadly relevant. Ultimately, it seeks to demonstrate how meditation and modular praxis can be mutually enriching of one another. My hope is that this research will contribute to the fields of music and spirituality by offering a perspective on how electronic music made with modular synthesisers can serve as a medium for contemplation, and by proposing taxonomies of modular musicking[3] rooted in contemplative thinking.

[3] Small (1998, p. 9) describes “musicking” as: “to take part, in any capacity, in a musical performance, whether by performing, by listening, by rehearsing or practising, by providing material for performance (what is called composing), or by dancing.”

1 The Spiritual Significance of Modular Synthesisers

The introductory chapter raises two central questions: what contemplative themes emerge from listening to modular-based works, and how might such themes be qualified, or modified, within modular synthesis practice? This chapter begins to address these questions by situating modular synthesis within a broader historical, technological, and cultural context, with particular attention to its potential for facilitating contemplative and meditative experience. While existing research on modular synthesis has seldom foregrounded its contemplative dimensions, various conceptual 'loose ends'—drawn from both scholarly literature and artistic practice—may help us begin to articulate the spiritual and philosophical resonances of working with modular systems. Throughout, I draw on Buddhist frameworks, particularly the Vipassana tradition, to consider how modular composition might mirror, support, or deepen introspective states.

The chapter unfolds in six sections. It opens with a historical overview of modular instruments to establish a foundation for thinking about their contemporary significance. The following sections examine the relationship between awareness, listening, and flow states, considering how modular practice may resonate with core Buddhist ideas such as impermanence (*anicca*), non-Self (*anatta*), and emptiness (*śūnyatā*). From there, the discussion explores how music has historically functioned as a vehicle for meditative insight and spiritual exploration. Figures such as Pierre Schaeffer,

John Cage, Philip Glass, and Jonathan Harvey are introduced to trace a lineage of sonic practice that opens up space for such inquiry.

These threads lead toward a more focused exploration of modular synthesis as a medium that may engage impermanence and non-Self—not only as compositional strategies, but also as phenomena experienced through listening and performance. To pursue this further, I turn to the practices of Elaine Radigue and Caterina Barbieri. Their work offers a way to think about how modular synthesis might operate not merely as a tool for sonic creation, but also as a site for contemplative engagement. Through these examples, the chapter asks: how might modular-based approaches to sound and composition reconfigure listening, and whether such reconfiguration can foster modes of awareness aligned with, or conducive of, spiritual insight.

1.1 Modular Synthesisers and their Significance

Modular synthesisers are electronic music instruments that comprise of different components—like oscillators, filters, noise generators and effects—all housed together in a case or a rack. Components or modules are connected to one another with patch cables, and this makes them flexible and reconfigurable instruments, as users can choose modules based on their affordability, function, and design. While a comprehensive history of modular synthesisers is beyond the scope of this chapter, it is worth examining their origins and the events that led to their contemporary reincarnation.

Engström and Kitzmann (2024) refer to a mythical divide between two foundational figures: Robert Moog (East Coast) and Don Buchla (West Coast).

The former emphasised subtractive synthesis and is associated with normative instrumental design, whereas the latter hailed additive complexity, non-normative interfaces and elaborate patching. While this dichotomy is historically reductive and inaccurate, its productive value lies in the way it shapes modular design and manufacturing today[4]. During the 1980s, analogue synthesisers were usurped by digital counterparts, until they re-emerged close to the turn of the century.

A common sentiment amongst scholars suggests that modular synthesisers re-surfaced in 1996 with the introduction of the Eurorack format by Dieter Doepfer (Auricchio and Borg, 2020; Holmes, 2020; Engström and Kitzmann, 2024). Certainly, Eurorack helped solve an issue of compatibility between modules of different manufacturers (Holmes, 2020), yet its adoption by enthusiasts serves to counteracts “the lack of tactility” in digital interfaces and “the paradoxical limitations of always having infinite possibilities at your disposal” (Engström and Kitzmann, 2024, p. 3). Engström and Kitzmann further assert that modular synthesisers in the 21st century should not be described in terms of a nostalgia, postmodern pastiche or revivalism. Rather, their re-emergence is indicative of the *post-digital* state of media, art and design, wherein the teleology of technology breaks, and distinctions between old and new cease to matter.

The designation ‘post-digital’ is similarly utilised by Randell and Rietveld (2024, p. 172) to describe contemporary modular design and patching, which “draw[s]

[4]An example is can be seen in the Make Noise 0-Coast semi-modular synthesiser, incorporating both East and West Coast synthesis “but is loyal to neither” (Make Noise Co., no date a).

on a heritage of vintage analogue electronics as well as modern digital signal processing techniques". It is no surprise that Auricchio and Borg's conception of *new modular instruments* is in part characterised by the introduction of digital processing into a "traditionally *analogue* format" (2020, p. 102).

Many practitioners and authors portray the process of working with 21st century modular synthesisers as emphasising tactility via buttons, knobs and faders. In her forward to *Patch & Tweak* (Bjørn and Meyer, 2018), Buchla pioneer Suzanne Ciani states:

> What we love is the hands-on experience of patching and tweaking … the way it engages both our brains and our bodies, the freedom of choice it offers, the individualism, the uniqueness. And what we love is noticing the correlation of the human hand turning a knob and hearing the resulting change in the sound. We're starving not only for music but for the process itself (Ciani, 2018, p. i).

Modular synthesis, as Ciani attests, is experimental and open-ended, and this aspect is evident in practitioners' selection of modules, which form unique and bespoke systems, but also in the way these modules are patched together. As artist Robin Rimbaud (stage name, Scanner) writes:

> [W]ith the modular, I can set up a BPM, apply clock dividers, LFOs and random CV to the point where a pulse becomes alive and almost beyond my control. It's such a thrilling moment when sounds and shapes that you never planned are born from the system (Rimbaud, cited in Bjørn and Meyer, 2018, p. 175).

This view of modular composition and performance is shared by Randell and Rietveld (2024, p. 175), who suggest that modular practitioners aren't "in complete command, as the sonic outcomes are surrendered within the serendipity of a dynamic process between the human musician and the electronic instrument." This aspect of modular synthesis resonates Cage's (2020, p. 13) idea of experimental music as "an act the outcome of which is unknown".

The capacity of modular synthesisers to reflect or promote meditative experiences is frequently acknowledged by practitioners and writers. In an essay for *Caesura*, composer Bret Schneider (2016) describes modular synthesis as emblematic of a self-reflective turn in electronic music, where "the artist [is] an abstract blight in a sonic landscape of their own making." For Schneider, introspective electronic music production is "endlessly fascinating, the possibilities and permutations endless," aligning with meditation as a form of self-examination. For Bruno (2016), however, the connection between modular synthesis and meditation is more direct, as she writes:

> With my composition [...] I aim to transmit the meditative listening state that I was in during Berlin Atonal. I find myself in this state regularly with the modular synthesiser, while playing it in a live performance setting (Bruno, 2016).

That listening is a prerequisite for music-making is unsurprising, but the designation *meditative* raises questions. To conceive of modular instruments

in this way, one must first consider how musical instruments and practices serve as metaphors for something other than themselves.

According to De Souza (2024, p. 82), musical instruments do more than produce sound—they shape "new ways of perceiving, imagining, and knowing music"[5]. De Souza examines the epistemic role of modular synthesisers within organology, philosophy, and media theory. In the case of philosophy, he argues that synthesisers inform conceptual models in the writings of Gilles Deleuze and Félix Guattari, particularly *Anti-Oedipus* (1972) and *A Thousand Plateaus* (1980). In both the musical and philosophical sense, synthesis involves blending heterogeneous elements to create something new. Just as a *thought synthesiser* is a cognitive process that combines ideas to generate novel concepts, a *modular synthesiser* "can generate material [sound] by applying abstract formulas to different sonic parameters" (De Souza, 2024, pp. 91–92).

Similarly, Rodgers (2011) views synthesisers not just as musical instruments but as cultural artefacts that participate in *technological worlding*. A concept rooted in Heidegger's (2001) philosophy, technological worlding suggests that technologies and artefacts 'set up worlds' by revealing and shaping meanings in historical and cultural contexts. On synthesisers, Rodgers writes:

> The process of sound synthesis, which implies a holistic yet contingent configuration of parts, itself offers a metaphor for the making of worlds through nonnormative procreative contacts, generative syntheses, and

[5] Consider the concept of a musical scale, e.g., C major. For a pianist, this scale may be mentally represented as a pattern of white keys or a fingering technique, whereas for guitarists this concept might be imagined as shapes on the fretboard.

> emergent transformations of heterogeneous actors and elements (Rodgers, 2011, p. 513).

This conceptualisation of synthesis challenges conventional notions of creation and individuality. Instead of producing fixed, isolated entities, synthesisers generate dynamic, evolving sounds that reflect complex interrelations. By creating ‘sound worlds’, Rodgers suggests, synthesisers engender cultural narratives about life, liveliness and embodiment (think of terms like ‘sustain’ and ‘release’), promoting a perception of sound as a living, dynamic force.

Whether we agree or disagree with these authors, their writings demonstrates that synthesisers can inspire and inform concepts other than themselves. In Rogers, they are seen as metaphors for living organisms, while in the De Souza, they help ground concepts in the philosophy of Deleuze and Guattari[6]. To address the ways in which modular synthesisers can ground Buddhist concepts and engender meditative experiences, I will begin by introducing the tradition of Vipassana. In sketching Vipassana’s origins, purposes, and surrounding practices, I will attempt to highlight key Buddhist concepts that underpin it, exploring its relation to the psychology of music perception and modular practice.

1.2 The Development of Concentration

Vipassana (meaning ‘insight’, in Pali) meditation is taught by Burmese/Indian teacher S. N. Goenka. The practice involves developing awareness of the

[6] De Souza (2024) additionally notes the way synthesisers support Kittler’s media theory and Heyde’s Organology.

changing nature of physical and mental experience with the purpose of alleviating psychological suffering (in Pali, *dukka*). Originating in the Mahāsatipatthāna Sutta[7], this tradition is centred around three techniques—*ānāpānasati, vipassana*, and *metta bhavavna*—and each serves a different function on the path to enlightenment. Students who practice these techniques gain first-person insight into three realities concerning the mind-body complex:

1) The reality of *impermanence* (or change) is appreciated through the experience of transitory sensations
2) The truth of *non-Self* is understood when one considers the changing nature of mental and physical phenomena
3) Clinging to that which is in constant flux results in dukka or suffering (Hart, 2018, pp. 94–95).

These realities are considered pillars in Buddhist ontology. For students of the Vipassana tradition, understanding those realities and the way they manifest in everyday physical and mental experience is paramount. However, in order to realise them *experientially*, they must first cultivate their awareness by practicing *ānāpānasati* (in short, *ānāpāna*) or mindfulness of breath. The purpose of the exercise is simple—to observe one's breath without trying to control it. Paying attention to their inhalations and exhalations, students quickly recognise the ease with which their mind wanders away uncontrollably, from one thought to the next. When they notice their mind has wandered away, the potentially frustrated student is instructed to draw their attention back to the breath repeatedly and non-judgmentally. Thus, ānāpāna provides students

[7] *The Great Discourse on the Establishing of Mindfulness*. It is one of the most celebrated and widely studied discourse in the Pali Canon of Theravada Buddhism.

insight into the nature of the mind, which is to get *distracted*. However, with repeated practice, students can 'sharpen' (make finer and more discerning) their awareness and concentrate for longer stretches of time.

In essence, ānāpāna is an exercise of sustaining *attention*. According to Styles (2006) attention is a cognitive process essential for the selection of information from the surrounding environment, with a controlled and limited capacity for processing. She argues that while the nature of control remains debatable, attention is a *finite* resource and can, to some extent, *be directed*. It is not surprising that composer and performer, Oliveros (2005) in her guide to deep listening distinguishes *hearing* as an involuntary, physical process from *listening* as a focus of attention. While the significance of deep listening to this study will be discussed in 0 and 0, this distinction between listening and hearing bears implications, as Biswas suggests:

> Listening is voluntary because it entails active restraint from habitual, involuntary reactions; and is selective because it seeks out that which is subtle and obscure, at the fringes of awareness. Listening perseveres with what was at first too loud to bear and reveals what was at first too quiet to hear. (Biswas, 2011, p. 103).

Biswas and Oliveros interpret listening as an attentive process. The objective criterion for maintaining listening, therefore, lies in our ability to concentrate on auditory information and develop discernment (to 'sharpen' our ears). However, attention is also central to the theory of *flow*. Csikszentmihalyi (2008) conceptualises attention as 'psychic energy' and argues that the way in which we focus attention stands to alter our phenomenological experience. His theory

of optimal experience, or *flow*, relates to one's ability to immerse themselves in a task, and this extends to listening, performing, and composing music[8].

Thinking of listening and performance through the lens of flow emphasises the role of attention but also influences instrument design. Since flow is identified in experiences of playing musical instruments, designers have faced the challenge of creating equally engaging experiences with digital, electronic music interfaces. Bullock (2018) advocates fostering flow in algorithmic, computer music instruments, yet his line of thinking may be extended to post-digital modular instruments, where algorithms are often embedded within their seemingly analogue circuitry.

In response, Randell and Rietveld (2024, p. 172) argue that interacting with modular systems, unlike other interfaces of electronic music-making, cultivates "the flow of compositional improvisation". They also point toward the fact that modular practice emphasises listening due to lack of visual cues:

> Hands-on interactivity puts an emphasis on listening, which is of particular importance in an era where the arguably reductive, yet visually seductive, interface of the screen-based DAW (digital audio workstation) dominates in electronic music-making (Randell and Rietveld, 2024, p. 174).

Indeed, visual interfaces have taken over various aspects of electronic music production processes, where users compose, record, arrange, mix and master

[8] As a mental state, flow is characterised by deep concentration, merging of action and awareness, even goals and feedback, loss of the sense of Self, altered sense of time, and increased enjoyment (Csikszentmihalyi, 2008).

works using only their laptop computer (or smartphone in some cases[9]). As an 'antidote', modular synthesisers help electronic musicians reclaim the sensory richness that is typical of traditional instruments, which are unfettered by keyboard-and-mouse interfaces.

Regardless of whether modular synthesisers are uniquely suited to facilitate flow, they undeniably promote flow in electronic music creation. While this distinguishes them from screen-based interfaces, it merely places them on par with traditional musical instruments in terms of engagement. In other words, modular synthesisers are no more unique than violins or trumpets in this regard. To explore what sets synthesisers apart in evoking meditative concepts and states, we must delve deeper into the essence and purpose of meditation—an exploration that will be clarified through an examination of Vipassana's foundational technique.

1.3 The Progress of Insight

Once concentration is cultivated through ānāpāna practice, students of the Vipassana tradition are introduced to its namesake technique. The technique of vipassana involves systematically scanning one's body and consciously observing sensations non-verbally and without judgment. In this form of examination, practitioners come to realise that every sensation, whether pleasant, unpleasant, or neutral, eventually fades away. Directly experiencing the fluctuations of mind-body phenomena, practitioners come to terms with the

[9] This is exemplified in a *Wired* magazine article about musician and producer Steve Lacy, who uses his iPhone as his primary music studio (Pierce, 2017). Lacy's unconventional approach helped him produce music for renowned artists like Kendrick Lamar and earned him a Grammy nomination with his band, The Internet.

reality of impermanence (in Pali, *annica*), and this, of course, bears significant cultural implication. According to Geismar, Otto, and Warner (2022), impermanence is a universal condition that stands in opposition to a human desire for fixity; it is central to various aspects of our lives, including our aging bodies, the transient nature of material possessions, shifts in social status and cultural practices, and environmental changes. Yet, for Varela, Thompson, and Rosch (2016, pp. 60–61), insight into impermanence goes beyond this common understanding:

> Experiences [...] are impermanent. This is not just the leaves-fall, maidens-wither, and kings-are-forgotten type of impermanence with which all people are hauntingly familiar but a personal penetrating impermanence of the activity of the mind itself [... as a] shifting stream of momentary mental occurrences.

Impermanence is of profound significance to the Buddha, whose teachings categorise phenomena into five aggregates, or accumulations (Goenka, 2017). According to this classification, when a sense object encounters the *body* (*rūpa*) (1), it becomes known to *consciousness* (*viññāṇa*) (2), and this encounter flows with a *sensation* (*vedanā*) (3). Then, *perception* (*saṅñā*) (4) kicks into action, identifying and labelling sensations as ‘good’, ‘bad’, ‘pleasant’, ‘unpleasant’, or ‘neutral’. This labelling, in turn, causes the formation of *mental volition* (*saṅkhāra*) (5). The five aggregates are seen to constitute an individual’s experience of themselves and the world around them; devoid of a permanent essence, they arise and cease. They also provide a

logical ground for the notion of non-Self, for how can there be an enduring Self when one considers these transitory aggregates?

The doctrine of non-Self is contained within the idea of *emptiness*. A key principle in Mahãyãna Buddhism, emptiness has various meanings in different traditions. For the purpose of this chapter, I will refer to two uses of the term: "(1) all sentient beings are empty of a Self or anything pertaining to a Self; (2) all things, no matter what, are empty of their own inherent or intrinsic existence because they are all relative to causes and conditions." (Williams, 1998). The idea that entities have a *relational* rather than *absolute* existence is not uncommon in Western philosophy. Priest (2009, p. 468) explores this relational approach in the philosophy of Leibniz, who, unlike Newton, asserted that "a spatial/temporal position is simply a locus in a field of spatial/temporal relations. That is, it has only a relational existence." This also extends to structural linguistics according to which:

> Words and sentences enter into various kinds of relationships with other words and sentences [...] To have a certain meaning is simply to be related to other words/sentences in certain ways. That is, meanings have no intrinsic existence, merely a relational one." (Priest, 2009, p. 468).

Certainly, experiencing *impermanence* is central to the Vipassana tradition, however it is not enough on its own. As students examine the shifting cloud of bodily sensations, they are instructed to remain e*quanimous*. Loosely defined, *equanimity* is the quality of non-reaction. Since suffering, in the Buddhist sense of the term, equated to unsatisfactoriness—craving pleasurable experiences

and rejecting unpleasant one—when a student ceases to react to ‘good’ or ‘bad’ sensations, they may break their own patterns of clinging and aversion and begin a process of liberation from suffering. The soteriological promise of Buddhism, therefore, lies in the development of *non-attachment*. Non-attachment should not be mistake with detachment or apathy. Rather, it can be conceived as a *presence-with* experience, maintaining compassionate awareness and impartiality.

So, how might music serve to embody these reflections? Firstly, as Maconie (2018, p. 9) writes, “music is spiritual in the sense that sound is an invisible, relatively intangible, and invincibly impermanent medium. To a musician, all is transition.” Additionally, music enables one to observe “fine physical and emotional details,” allowing “experimental manipulation of states of mind” (Biswas, 2011, p. 107). Lastly, sound offers a suitable medium for contemplating emptiness. As Lowe (2011, p. 119) points out, what constitutes the sound of an instrument or its pitch are but “gross simplifications”, empty of “self-existence”, since a spectrographic image will reveals them as “fluxing, inter-dependent, baseless phenomena”. But does this extend to organised sound? To address this question, let us focus on how these Buddhist insights relate to extant musical traditions.

1.4 Sonorous Constituents of Meditation

Concentrating our efforts on Western music in the last century (the author’s field of expertise), we can trace an affinity between Buddhist philosophy and music in four cases: Pierre Schaeffer’s mode of reduced listening, minimalist practices conceived in the 1960s, John Cage’s indeterminate music, and the

music of Jonathan Harvey. In the latter two, the affinity to Buddhism is more pronounced, whereas in the case of Schaeffer and in 1960s minimalism, this link is more latent. Indeed, a review of Schaeffer's writing is beyond the scope of this chapter, however the idea of reduced listening described in his *Traité des objets musicaux* (1966) resembles the mindfulness attitude of observing experience without verbalising or adding value judgment.

Reduced listening is a state wherein "intention is directed toward the sound itself [...] having ignored the source and the meaning, we perceive the sound object" (Schaeffer, 2017, p. 160). The word 'reduced' is derived from Husserl's phenomenology, particularly from his procedure of *épochè*, which involved examining the structure of experience whilst 'bracketing' ordinary judgment about the relation between experience and the world (Moore, 2015; Santaella, 2017). For Varela et al. (2016, p. 88), phenomenology is "*the* philosophy of human experience" and is thus comparable with the Buddhist tradition of mindfulness[10]. And while Schaeffer was not motivated by spiritual inquiry per se, the phenomenological origin of reduced listening signifies a turn to experience *as-it-is*, similar to the teachings of the Buddha[11].

A more explicit relation to the Buddhist tradition of Zen is seen in the works of John Cage. In his book Silence (2020, p. xi), Cage famously wrote: "without my

[10] Day (2024) studies the relationship between phenomenology and Buddhism by examining two texts of Husserl from 1925 and 1926. According to Day (2024, p. 211), Husserl compared the Buddha's enlightenment to the transcendental *epochè*, all the while critiquing his failure to develop a "universal science of consciousness".

[11] Certainly, this attitude of 'sound as sound' was embraced by many experimental electronic composers, such as Oliveros (2005), with her practice of deep listening, and Stockhausen, who insisted on the truth of auditory perception, irrespective of visual confirmation or external validation (Maconie, 2018).

engagement with Zen […] I doubt whether I would have done what I have done." The composer's involvement with Zen is attributed to his mentor D. T. Suzuki, whose teachings contextualise Cage's brand of indeterminacy (Haskins, 2014). Lowe (2011) discusses his famous piece *4' 33''*, suggesting that its function lays in how it focuses listeners' attention on ambient sounds and thus posits music as empty of its own existence. Cage promoted a "radical passive intending of sound" (Clarke, 2011, p. 23) and was quoted to advise listeners to listen to sound before processes of recognition start taking place (Lowe, 2011, p. 122). This approach to listening certainty mirrors Buddhist approaches of attendance to experience without habitual labelling and assigning value judgment.

We can trace Buddhist insights to the minimalist movement through one of its foundational figures, Phillip Glass. His music, often described as exhibiting a meditative quality (Binford-Walsh, 2002), invites listeners to enter a mode wherein "neither memory nor anticipation […] have a place in sustaining the texture, quality and reality of the musical experience" (Glass, quoted in Lowe, 2011, p. 123), suggesting an emphasis on present moment experience[12]. Whilst the temporality of the present is further elucidated in Chapters 0 and 6—in the latter it is set against Deleuze's (1994) synthesis of time—it is worth observing general characteristics of minimalism that yield the capacity to promote meditative insights.

[12] Glass himself is known to have been a Tibetan Buddhist practitioner since the late 60's, yet he prefers to avoid having any connections drawn between his practice and his music (Wu, 2020).

The techniques and devices expressed in early pulse-based minimalism include repetition and gradual process (Gann, 2017). Acknowledging existing interpretations of minimalism—which associate its repetitiveness with a Freudian 'death-drive' and "psychic states that precede ego differentiation"—Fink (2005, pp. 4–5) argues that such interpretations are limiting and not necessarily true. He also critiques the proposition according to which minimalism was resultant of an encounter between post-Cageian experimental composers and Eastern philosophies. As an alternative, he argues that minimalism's repetitive nature "can be interpreted as both the sonic analogue and, at times, a sonorous constituent of a characteristic repetitive experience of mass media consumer society" (Fink, 2005, pp. 3–4)[13].

Regardless of whether minimalism reflects a turn to Eastern culture, its psychoacoustic effects—rooted in its repetitiveness—are undeniable. Margulis (2014) discusses repetition at length, arguing that it promotes flow by expanding the sense of present and enhancing memory through the re-experience of meaningful elements. Additionally, repetition fosters a shift in attention from one rewarding musical level to another. Examining repetition through ritualistic practices, Margulis writes:

> The shift in attention itself can elicit a sense of profundity, sacredness or transcendence, as everyday goals are set aside, and new insights and

[13] Despite this materialist interpretation, Fink (2005) also examines the case of Shinichi Suzuki's classical music education—which emphasises constant repetition—through the lens of his Soto Zen background. He argues that the nonteleological approach of Soto Zen, characterized by gradual progress toward enlightenment, parallels the gradual processes and repetition found in minimalist music.

> perceptions are allowed to emerge [...] The very act of repeating a passage in the first place emphasises a certain nonteleological attitude, intimating that something within the sound itself, rather than an aim towards which things are driving, should be the focus of attention (Margulis, 2014, p. 57).

This psychoacoustic perspective shapes our understanding of minimalism by highlighting its capacity to induce meditative states and expand listeners' perception of time. Consequently, minimalism's repetition can be interpreted not only as a cultural or material phenomenon but also as a vehicle for introspection.

A key aspect of minimalism that contributes to this effect is its emphasis on *gradual process*, as encapsulated in the writings of composer Steve Reich. Slow musical process, according to Reich (2017, p. 431), resemble "pulling back a swing, releasing it, and observing it gradually come to rest". The contemplative potential of process music lays in listener's attention, as Reich writes:

> Listening to an extremely gradual process opens my ears to *it*, but *it* always extends further than I can hear [...] I begin to perceive these minute details when I can sustain close attention, and a gradual process invites my sustained attention. (Reich, 2017, p. 432)

Listener awareness or attention of incremental changes is central to Reich's compositional approach, where the perception of change forms the essence of the composition. His concept has significantly influenced electronic composer

Brian Eno (1996), who describes how composers can initiate systems that yield complex and often unpredictable outcomes. This approach resonates with the principles of algorithmic music, which can be traced back to experimental process music of the 1960s (Collins, 2018; Magnusson and MacLean, 2018). While early minimalists manually or mechanically executed these processes, computer-generated music relies on digital systems to carry out similar procedures[14].

Minimalism also includes *drone-based* compositions, like the works of La Monte Young and The Theatre of Eternal Music (Gann, 2017). Boon (2002) traces European drone practices to the cathedrals of medieval times and contends that their significance faded from the 18th century onwards. He points out that while drones pull us from variety and change toward stasis, they afford us listening in the present tense, as he writes:

> Freed, at least temporarily, from the distractions of change and time, the listener enters the stream of sound itself and discovers that what seemed to be a single tone shifts and changes as the listener scans and focuses on different parts of it, opening up into a universe of overtones, microtones and combination tones (Boon, 2002, p. 62).

Indeed, this description is relevant to works of composer and modular synthesist Eliane Radigue, whose works will be explored later down the line.

[14] Notable examples are seen in works by Iannis Xenakis, James Tenney, and Laurie Spiegel as discussed by Ames (1987).

A final example that demonstrates explicit engagement with contemplative themes is British composer Jonathan Harvey. Harvey, a self-proclaimed Christian whose primary spiritual practice grew to incorporate Buddhism, explored, among other things, such notions as emptiness, dependent origination, and concentration using devices of pitch and timbre (Lowe, 2011). For example, his pieces, *Ritual Melodies* (1990) and *Mortus Plango, Vivos Voco* (1980) morph between timbres of well-defined instrumental characteristics, demonstrating the empty nature of sound objects. And while those compositional technique owes much to the works of Stockhausen—especially in *Kontakte* (1964)—Harvey's contribution lies in the deepening of their contemplative significance.

According to Harvey, "unless art changes our lives, expands us towards our greater, unbounded selves, towards 'egoless-ness' […] it is not art." (1985, p. 316). He posits 'evolutionary' music as music that deals with something 'central', that is to say something philosophical or spiritual (Harvey, 1992). An example for this centrality, according to Harvey, is the human aspiration for dissolving into the universe:

> The dissolution of the self has, of course, played an important part in the art of our time [...] To put it in Buddhist language, only when the illusory person that I think I am has been demolished on at least one level is it possible for a vision of reality to dawn (Harvey, 1992, p. 615).

The cases provided so far demonstrate approaches to composition that embody or indeed promote Buddhist insights. These insights are conjured in

the works of Cage and Harvey and implied in Schaeffer's reduced listening and in minimalism's repetitiveness, gradual process and drone practices. Harvey's example, in particular, explores transcendent states of ego dissolvement, and as such it links to debates on music and *transcendence*. To explore this idea further, I would like to pivot toward a discussion on transcendence: its definition, characteristics, and how music might be associated with or engender transcendent states of different varieties.

1.5 Leaps of Knowledge

Musical experiences and meditative states often exhibit transcendent qualities, that is, they surpass or exceed ordinary experience. Wahbeh et al. (2018) explore transcendent states linked to meditation, examining their psychological, physiological, and phenomenological aspects. They define transcendence as an ineffable, subjective experience of an altered state of consciousness. Aldridge (2003) refines this notion, suggesting transcendence as a leap beyond current awareness to a deeper level of understanding. Indeed, several authors have explored the role of music in facilitating transcendent experiences. Gabrielsson's book, *Strong Experiences with Music* (2011), offers a comprehensive and systematic examination of music's transformative power. Drawing on two decades of research, Gabrielsson dedicates a chapter to 'Music and Transcendence', which highlights experiences described as magical, mysterious, supernatural, or even extra-terrestrial. In transcendent experiences, individuals may feel as if they are in a trance or ecstasy, experiencing a complete merging with something greater and catching glimpses of other realms of existence.

In her book *Deep Listeners* (2004), Becker examines transcendent experiences facilitated by music within ritualistic and religious contexts. She differentiates between meditation, characterised by solitude, stillness, and silence, and trancing, which occurs in a communal setting accompanied by music and sensory stimulation. Trancing, she adds, relies on intense emotions, whereas meditation aims to transcend or set aside strong emotions. Furthermore, Becker (2004, p. 2) suggests Oliveros' concept of deep listening as "a kind of secular trancing, divorced from religious practice but often carrying religious sentiments such as a feeling of transcendence or a sense of communion with a power beyond oneself". While Becker acknowledges the contextual distinction between meditation and trancing, a paradox arises, since deep listening, which forms the basis of trancing, is itself a form of meditation (Oliveros, 2005).

Interestingly, both experiences of trancing and meditation involve a diminished sense of Self or a temporary replacement of the autobiographical narrative we construct about ourselves. Clarke (2014) traces a theme in Western thought, according to which music allows individuals to both 'lose' and 'find' themselves within it. He argues that these states are possible when our linguistic, higher-order consciousness becomes quiet, revealing a pre- or non-linguistic primary consciousness. Clarke suggests that bodily awareness serves as the foundation for this primary consciousness. Acknowledging the difficulty of quieting higher-order consciousness, he asserts that significant glimpses of primary consciousness can be regained through meditative practices and sensorimotor experiences, including music.

In the Mahāsatipatthāna Sutta, the Buddha identifies the goal for practising mindfulness: “thus, he develops his awareness to such an extent that there is mere understanding along with mere awareness” (Goenka, 1993, p. 29). The purpose of practice: a state that transcends conventional subject-object conceptualisation, wherein there is no ‘I’ looking over at experience. Wahbeh et al. (2018) explore this *nondual* aspect of transcendent experiences. They define nonduality as a state of ‘background awareness’ that goes beyond conceptual cognition, knowing itself to be conscious reflexively. Nonduality is described as a unifying space that presupposes the contents of consciousness, devoid dualistic fragmentation as ‘this or that’ or ‘then and now’.

Within the auditory realm, a similar subject-object ‘collapse’ is echoed by Daniel (2017, p. 63), who suggest that sound is “an involuntary solvent of the self”, blurring the boundaries between Self and world. This dissolution of self that is promoted through listening is also seen in different Buddhist practices, including chanting in Indian Buddhism and the somatic practice of reciting a sacred utterance, or a mantra in Tibetan Buddhism, both of which serve as a way of reaching different states of awareness and an understanding of non-Self (Wu, 2020).

1.6 Contemplative Modular Synthesis

So, music has the power to engage listeners in contemplation. Accordingly, it evokes transcendent states, which, when interpreted using Buddhist frames of thinking, are characterised by a sense of subject-object collapse that reveals the truth of non-Self. But to what extent can modular synthesisers be used to

model impermanence, non-Self and emptiness? French composer, Elaine Radigue ponders a similar question:

> How can sounds or words transcribe this imperceptibly slow transformation occurring during every instant and that only an extremely attentive and alert eye can sometimes perceive, the movement of a leaf, a stalk, a flower propelled by the life that makes it grow? (Radigue, 2009, p. 49)

In the 1960's, Radigue had begun to move away from her *musique concrète* work as Pierre Henry's assistant. Expanding on the acousmatic idea of 'sound objects', she sought to explore the subtle evolution and transformation of sound. In the 1970's she used her ARP 2500 modular synthesiser and magnetic tape to make long-form pieces to be played back to an audience (Radigue, 2009). While her contemporaries explored composing and performing with modular synthesisers as a form per se, Radigue explored them to embody her reflection and insights as a Tibetan Buddhist practitioner (Wu, 2020). As such, the synthesised drones in *Trilogie De La Mort* (1994) create ephemeral resonances, when perceived in an active mode of listening that involves concentration on subtle, sonic changes.

While Radigue is an early example of a contemplative composer working with modular synthesisers, their re-emergence, since the introduction of the Eurorack format, prompts a re-examination of their contemplative capacity. Accordingly, Auricchio and Borg (2020, p. 106) argue that 'new modular performers' join the audience in experiencing sound in a state of reduced

listening, focusing on sonic properties, “such as amplitude, spectrum and morphology over time”. Certainly, this observation enhances the contemplative significance of contemporary modular instruments’, given the underlying Buddhist attitude that presupposes reduced listening.

In contrast to Radigue’s imperceptible sonic changes, a different brand of impermanence is gleaned in contemporary modular synthesis through practitioner testimonies. Bruno (2016) suggests that the sound of complex patches has an the “ephemeral quality”, laying in the fact that they cannot be exactly replicated. Similarly, modular synthesist, Emily Sprague (cited in Bjørn and Meyer, 2018, p. 332) reflects on “creating pieces of music that exist in one time and space”, ones that “cannot be perfectly preserved”. “The art of the medium”, she adds, “is meditation on impermanence”.

Modular instruments do not only engender impermanent soundscapes, but they also reflect non-Self and emptiness. As Navs (2016) suggests, modular patches are “eco-systems, where the twist of a single knob can change the entire landscape”. As in Buddhist thinking, the five aggregates give rise to an individual’s experience, the sound of a patch is the result of a complex and shifting network of components, parameters, and human interaction. This web of relations[15], wherein a small gesture can cause significant change, demonstrates that like all things, the output of modular synthesisers lacks an inherent self-existence.

[15] The idea that modular instruments exist within a networks of relations and that their sound is the product of an assemblage of technological components and human creativity relates to Latour's Actor-Network Theory (Randell and Rietveld, 2024).

In their practice-led research, Randell and Rietveld (2024, p. 173) use a hybrid of hardware and software modular instruments to create a larger generative network. They argue that generative patches have a form of agency, “enabling an exploratory creative dynamic”, adding that:

> A modular generative patch [...] may therefore be understood as a performer within the ensemble; as a patch, the instrument becomes a performing partner with the musician in a creative relationship where boundaries between human and machine are symbiotic.

They suggest that the creative relationship afforded when interacting with a generative modular patch contributes to a sense of *serendipity*. And this is tied to the experimental concept of *music as process*. Composition with modular synthesisers is therefore “a continuously developing performance”, and as such “the instrument is, ultimately, a process.” (Randell and Rietveld, 2024, pp. 172–175).

So, not only can modular synthesisers help model impermanence and emptiness through their material design; they also enable compositional process through serendipitous, generative patching techniques. But what about their transcendent capacity? For Turkel (2024, p. 241), this capacity might involve the perception of agency. According to him, we may be able to have a “meaningful dialogue” with random streams of data via modular patches who have their own agency ("a life of their own"). Such encounters, he posits, may be conducive to altered states of consciousness. More tangibly, he argues that modular synthesisers are well-positioned to arouse ecstatic and meditative

states, “in the sense that it is much easier to create fast hypnotic drums for raving, or dreamy Rings-into-Clouds for navel gazing” (Turkel, 2024, p. 242).

A prominent example of a contemporary, modular-based approach that exhibits contemplative qualities lies in the work of Italian composer, Caterina Barbieri. Barbieri’s album, *Patterns of Consciousness* (2017a) demonstrates ‘traditional’ minimalist practices within the modular domain. In an interview for Fact magazine (2018), she acknowledges the influence of minimalism on her work:

> In this music, the process of change of the material is important as it produces a process of change in the mind that is listening [...] So, this music is more about the change we, as listeners undergo, rather than the change of the material itself. I change in the sound that changes.

Barbieri’s works correspond with minimalist works by Reich and Glass, in that they investigate the perception of time and memory through pattern repetition. Moreover, she claims to explore patterns as “a state of consciousness” that exist in a non-dual relationship with the subject that observes it (2017a). This somewhat reflects Harvey’s approach, according to which “music is both physical object and mental object”, and a pattern of meaning arises through “joining together the moments of time in our memories” (1985, p. 315). Indeed, the repetition of patterns using modular instruments in Barbieri’s work invokes in listeners different conscious states, ranging from the ecstatic to the meditative.

1.7 Chapter Summary

This chapter has traced a series of conceptual and historical threads that may help orient an investigation into contemplative modular synthesis practice. Beginning with the origins of modular instruments, it examined how their design and cultural framing have shaped their contemporary artistic use. Drawing from Buddhist traditions—particularly Vipassana—as well as psychological theories of flow and attention, the discussion considered how modular musicking might afford particular modes of listening and presence. These ideas were then extended into a broader reflection on musical transcendence, exploring how contemplative insights have historically been articulated within electronic and experimental music discourse. The chapter concluded by turning to two case studies—Elaine Radigue and Caterina Barbieri—whose practices offer grounded examples of how modular synthesis might function as a medium for spiritual or introspective engagement.

Amidst a resurgence in modular synthesisers' popularity lies a renewed scholarly interest. Still, few studies have taken a practice-led approach to examining modular instruments' creative affordances, and even fewer have considered how modular-based works might embody or evoke contemplative insights. The case studies presented here suggest aesthetic and conceptual starting points, while the perspectives of practitioner-researchers highlight a theoretical space that remains underdeveloped. What remains to be explored is how these ideas might be more systematically theorised through embodied, practice-led inquiry. The next chapter proposes a methodological framework for doing so, outlining an approach to modular-based listening, practice, and

self-reflection designed to address the research questions at the heart of this study.

2 Toward Contemplative Synthesis: Research Methodology

The previous chapter illustrates how music can be framed in contemplative terms, highlighting musical traditions and practices that foster contemplative discourses. It also explores how modular synthesisers could reflect and promote meditative (particularly Buddhist) insights. However, the chapter also identifies limited practice research on modular synthesisers and research informed by Buddhist thinking. At this point, it is worth reinstating the research questions:

- What contemplative themes emerge from listening to modular-based compositions, and how might these themes inform modular synthesiser performance aesthetics and practice?
- How can modular aesthetics and praxis ground these contemplative themes while also generating new ones?

As mentioned in the introduction, these questions reflect the open-ended, inductive nature of this study, where aesthetics and praxical principles emerge through listening and music-making. In addition, these questions guide the creation of a performed body of work with modular synthesisers, where both the process and the resulting works serve to demonstrate and refine the theory developed. The research objectives are therefore:

1. Identify contemplative aesthetics by listening to modular-based works.
2. Design a modular system to explore these aesthetic principles, generating themes from modular praxis.

3. Develop a body of work using said system and examine how previously generated themes manifest in practice.
4. Perform the works and reflect on the creative process and outcomes.

The nature of this study and its focus on listening experience and creative practice require a tailored methodological approach. This chapter will critically review relevant research methodologies before proposing a unifying framework. Given the study's engagement with meditation, a key question arises regarding how meditation itself can inform its methodology.

2.1 On Meditation

Initially, I grappled with meditation's role in my research methodology. Colleagues and fellow researchers often posed questions such as: How do you study meditation? Will you meditate and then make music? Will you meditate to music? And will the music induce a meditative state? While some of these questions are valid, others reflect cultural biases and misconceptions about meditation and its practice.

In *The Embodied Mind*, Varela, Thompson, and Rosch (2016) challenge the Western notion of meditation as an altered state of consciousness, emphasising instead its purpose as mindfulness— "to experience what one's mind is doing as it does it" and "to be present with one's mind" (2016, p. 23). Buddhist mindfulness techniques are methods of self-examination, in which the mind becomes a tool for knowing itself. This aligns with Zen teacher Suzuki Roshi's assertion that "the purpose of studying Buddhism is not to study Buddhism, but to study ourselves" (2020, p. 63). Meditation is thus a means of

self-reflection rather than a theoretical, academic pursuit, and Suzuki (2020, p. 57) cautions against “idealistic practice,” which sees meditation as a tool for gaining ‘ideas’. This raises an important question: how can one draw from mindfulness when conducting research without instrumentalising meditation?

2.2 Self-Study

This conviction provides an impetus for this study. Instead of practicing meditation *for* musicking, perhaps we can detect it *in* musicking. In other words, draw from the experience of meditation as we approach listening and music-making. A similar attitude was adopted by composer Pauline Oliveros. Her approach, described in her book *Deep Listening* (2005) involves attending to the spectrum of sound and silence with the aim of expanding auditory awareness. A form of *sonic meditation*, deep listening engages the body in auditory perception, emphasising attaining knowledge through embodied reflection.

Practitioners of Oliveros’ approach are provided with practical exercises, including a seated form of listening that resembles many meditation techniques, prescribing listeners to “sit either on the floor or in a chair”, with a “relaxed upper body [...] Palms rest on thighs, or palms folded close to the belly.” (Oliveros, 2005, p. 12). She also emphasises the importance of reviewing listening experience and comparing feelings, sensations, and thoughts before and after. Experiences should be written in a journal, and as writing accumulates, ‘patterns of listening’ might be generated. Oliveros’ approach brings us closer to the standards of rigour required in academic

research. Representing a phenomenological interpretation of experience, deep listening opens itself up to documentation and generalisation.

On the other hand, many practitioner-researchers turn to the social constructivist epistemology provided by autoethnography. Autoethnography (AE) departs from an observation of the self (auto), revealing cultural understandings (ethno) through evocative descriptions (graphy) (Adams, Holman Jones and Ellis, 2021). In autoethnographic works, the researcher becomes the researched and, through a systematic process of recalling and self-observation, seeks rich narratives with a cultural interpretive orientation (Chang, 2008).

There are plenty of example for autoethnographic research that covers various musical topics[16]. Notably, Findley-Walsh's *Sonic Autoethnographies* (2018) applies autoethnographic methods specifically to sound and listening. His approach involves reflexively documenting one's own auditory experiences, making recordings that capture the recordist's auditory subject-position ("aural selfies"), and layering these perspectives to explore sonic identity. In the present study, this approach is extended by incorporating self-reflection on listening experiences—drawing on the researcher's lived experience as a

[16] The collection titled *Music Autoethnographies* (Bartleet and Ellis, 2009) offers a range of relevant examples. McRae's chapter (2009), for instance, reflects on the embodied, physical, and tacit knowledge gained through learning a new instrument (the bass guitar). The volume also includes Carless and Douglas's (2009) collaborative autoethnography, which explores songwriting as a process of meaning-making and a mode of knowledge production. Elsewhere, Bartleet (2009) uses autoethnography to address personal and musical challenges as a female conductor, leading her to a deeper understanding of herself and her profession.

Vipassana meditator—as a means of generating compositional strategies and informing creative ideologies.

Of course, approaches to self-study have been subject to criticism and were condemned for their small sample size, bias, tendency for navel-gazing, and failure to fulfil obligations of hypothesis, analysis, and theorising (Ellis, Adams and Bochner, 2011). Such positivist arguments, centred around ideas of validity, reliability, and generalisability, are resolved within an interpretivist epistemology. Additionally, self-study is validated by its inherent deductive and narrative reasoning[17] and by providing researchers with continuous access to themselves, a fact that is conducive to richer, more accurate data collection (Gorichanaz, 2017).

2.3 Practice as Research

The engagement with modular practice and the creation of an artefact (i.e., performance and accompanying recordings) requires we consider the paradigm of practice as research. The epistemological framing of practice as research can be traced to Bolt (2010, 2011), who links it to Heidegger's (1927, p. 69) philosophy, particularly his concept of 'handling,' where interacting with tools "has its own way of seeing". Bolt (2011) further develops this idea through 'praxical knowledge,' which refers to insights gained through direct engagement with materials and processes. Praxical knowledge is also relevant to practitioner-researchers who integrate autoethnographic methods within art-

[17] Inductive reasoning is realised from the ground up: one starts with a specific case-study and works towards a general theory. Narrative reasoning suggests the demonstration of theory through real-life examples (Gorichanaz, 2017).

based research. After all, “creative research questions are often inseparable from artist identity, experiences, and culture” (Skains, 2018, p. 88).

Zagorski-Thomas (2022, p. 7) argues that a difference between AE and practice research lays in the assertion that “ethnography (of any type) is concerned with ‘what happened’ whereas practice research is concerned with ‘how can I do it better?’”. The idea that practice should be labelled as ‘good’, ‘bad’, ‘better’ or ‘worse’ may seem controversial, however, according to Zagorski-Thomas, practitioner-researchers are motivated to understand and improve their practice based on their agendas. In other words, if one has a certain goal for the artwork, then the artwork can be evaluated based on its efficacy in achieving that goal (certainly, this is how art-based research is evaluated in academia).

Still, within the arts, the boundaries between AE and practice research seem blurry. In her essay, Bartleet (2021, p. 133) considers creative research and autoethnography as ‘synergetic’, since they overlap “in acknowledging the insights that come from researchers’ own subjectivities, voices, and experiences”. As part of the interface between the two, “artists ask deeply autoethnographic questions through artistic means, and deeply artistic questions through autoethnographic means” (Bartleet, 2021, p. 134). I argue that both art-based practice research and AE are based on researchers’ personal experiences but differ in their orientation. One is aimed at the knowledge gained through handling, the other emphasises cultural themes. Certainly, they are unified within this research framework, which focuses on

the researcher's experience as a meditator (AE) and the creation of modular-based works based on that experience (practice research).

Practice-based research can serve as a conduit for both inductive reasoning (deriving knowledge from experience) and deductive reasoning (applying theoretical frameworks through hypothesis and experimentation)[18]. While this distinction aligns with traditional scientific methodologies, it may appear reductive when applied to autoethnographic, arts-based research, which is inherently subjective and context-dependent[19]. This research exemplifies such an approach, as it engages with practice through a guiding principle—namely, the notion that modular synthesisers are inherently contemplative—while allowing theory to develop organically from experiential engagement.

An essential consideration within practice research is the relationship between the artefact, its creation, and the generation of knowledge. Candy (2006) differentiates between practice-based research, in which the artwork itself constitutes a central contribution to knowledge, and practice-led research, which focuses on the insights gained through the creative process. While these distinctions are valuable, Smith and Dean (2009) critique their broad application, arguing that both approaches can be encompassed within the wider paradigm of practice as research. They advocate for a more integrated definition of practice-led research, describing it as encompassing both the

[18] In this context, deductive reasoning is evident when theory is tested through practice, whereas inductive reasoning emerges from insights gained within the practice itself (Zagorski-Thomas, 2022)

[19] Zagorski-Thomas (2022, p. 16) discusses the dichotomy between inductive and deductive reasoning but argues that, in practice research, "neither of these approaches can exist in these idealised forms." Instead, he suggests that reasoning operates along a continuum, ranging from predominantly inductive to predominantly deductive processes.

production of an artwork as a form of research and the creative process as a means of generating knowledge (2009, p. 7). In contrast, they define *research-led* practice as research activities undertaken to inform and inspire artistic creation.

These theoretical models illustrate the diverse ways in which practice as research can be conceptualised and implemented. In larger research projects, they are often applied collaboratively (Smith and Dean, 2009). This is evident in my own work, where an analysis of listening experiences informs the subsequent creative process (research-led practice). The modular performance creation process is then examined to generate new insights (practice-led), while the final performance and accompanying recordings serve as both an articulation and demonstration of theory (practice-led/based research).

2.4 Data Collection

This self-investigation of listening and creative practice presents two key considerations. The first involves selecting an effective method for documenting experience, both in terms of media and format. Effective documentation ensures that information is captured systematically and conveniently while preserving the necessary details relevant to the researcher. While certain aspects of practice can be recorded through audio, photos, and videos, these media cannot reveal practitioners' internal experiences or the reasoning behind their decision-making processes. The same applies to listening experiences, which are almost entirely internal. In such cases—where cognitive processes, thoughts, emotions, and sensations are central to the

inquiry— ‘linguistic’ formats, such as text-based journals or voice memos, are essential.

However, recalling experiences from memory and representing them in text or speech presents challenges related to accuracy and depth, which differ from those associated with photo or video documentation. While audiovisual recordings provide a direct representation of external practice, they cannot capture subjective states, necessitating complementary linguistic formats. In her exploration of systematic self-observation in AE, Chang (2008) discusses ways to mitigate these challenges. This begins with defining *what* to observe and *how*, followed by determining the frequency, format, and timing of data collection. Self-observation can occur at regular intervals (interval-based) or in response to specific events (event-based), depending on the phenomena under study. Similarly, documentation can follow a free-form, narrative structure for flexibility or adhere to a pre-formatted structure to facilitate the capture of specific details. Finally, data collection can take place either immediately, to enhance accuracy through real-time memory recall, or retrospectively, to avoid disrupting the natural flow of activity.

Naturally, these methodological choices depend on the aims of the research. In my work, data during listening sessions was collected using text-based journals in a narrative format immediately after each session, ensuring the capture of internal cognitive processes with minimal loss of detail. In contrast, practice was documented using a combination of text-based journals and audiovisual (AV) recordings, the latter primarily used to capture trial performances in both studio and live settings. Additionally, supporting

documentation—including scores and patch schematics—was collected and later analysed. While the specific data collection methods for each research phase will be explored in detail in the following sections, it is first necessary to outline the approach to data analysis.

2.5 Embracing Subjectivity

A crucial consideration in interpretive self-study is the choice of an appropriate analytical method. The paradigms discussed thus far share a fundamental requirement: the identification of meaningful patterns within data (Oliveros, 2005; Chang, 2008). The challenge lies in choosing a method that accommodates diverse data types while systematically facilitating both inductive and deductive reasoning. Additionally, the chosen method must align with interpretivist and constructivist paradigms, which recognise the researcher's active role in meaning-making. Given these requirements, Reflexive Thematic Analysis**,** as developed by Braun and Clarke (2022), is particularly well-suited, offering flexibility, researcher reflexivity, and deeper engagement with the interpretive process.

Thematic Analysis (TA), more broadly, encompasses a range of qualitative approaches designed to identify patterns of meaning across different types of data, including interviews, surveys (Braun and Clarke, 2021), and autoethnographic self-observations (Leung, 2021). Within this framework, Reflexive TA highlights the inherent subjectivity of interpretation and underscores the role of researcher reflexivity. Positioned within a social-constructivist theoretical stance, Reflexive TA facilitates a systematic yet

adaptable approach to pattern identification, enabling researchers to engage inductively with the data[20].

In my own work, Reflexive TA enabled an open-ended research approach, allowing questions to be adapted and refined through ongoing analysis and contextualisation. For instance, the question 'What constitutes contemplative modular-based music?' served as an entry point for analysing listening experiences. As analysis progressed, emerging themes were refined through contextualisation and iterative engagement with the data[21]. In analysing practice sessions, Reflexive TA facilitated the examination of multiple data forms (e.g., journal entries, AV recordings, scores, and patch schematics). This process not only situated praxis within existing theories but also generated novel, practice-led taxonomies for modular performance.

2.6 Multi-Voiced Strategies

A final consideration is the exegesis, the written component that accompanies the practical element. Ings (2015, p. 1277) traces the term's origins to the Greek word *exegeisthai*, meaning "to interpret, guide, or lead." Originally, exegesis was a form of theological writing concerned with textual interpretation. Today, many scholars advocate for its role in creative practice research, where it serves as an authorial commentary that complements the

[20] This is facilitated through an iterative framework that consists of six stages: 1) familiarisation; 2) coding; 3) initial theme generation; 4) theme development and review; 5) refining, defining, naming; and 6) write-up. (Braun and Clarke, 2022)

[21] *Themes* are multi-faceted patterns of meaning organised around a unifying concept. They are generated through the process of coding, during which the researcher generates *codes* and *code labels.* A code is an "analytically interesting idea, concept or meaning associated with particular segments of data", while labels are "a succinct phrase" provided as a "shorthand tag for a code" (Braun and Clarke, 2022, p. 53).

artefact (Haseman and Mafe, 2009; Smith and Dean, 2009; Barrett, 2010; Bolt, 2010; Haseman, 2010; Ings, 2015; Skains, 2018).

However, key questions arise regarding the purpose of the exegesis in practice research—specifically, how it should be written and how it relates to the artefact. Hamilton and Jaaniste (2010) identify two traditional exegesis models: context and commentary. The context model adopts an objective, external, and interpretive style, whereas the commentary model focuses solely on the practice—the process, outcome, and reception. As an alternative, they propose a hybrid *connective* model, which integrates both approaches by "looking both outwards and inwards" (2010, p. 39).

The connective model requires researchers to blend different writing styles and voices seamlessly. Ings (2015) describes it as a combination between prosaic and poetic voices, bridging technical analysis with personal expression. This approach transforms the exegesis into an authentic extension of the creative work itself, effectively conveying the researcher's critical and situated position. This framework is exemplified in Goddard's doctoral research, *A Correspondence Between Voices* (2010), where a conversational interplay emerges between documentary film and directorial annotation[22]. Here, the exegesis becomes integral to creative research, resonating with the researcher's voice and embedding practical insights within the creative process.

[22] Goddard's (2010) correspondence approach takes inspiration from the concept of letters—a tradition rooted in the Republic of Letters of the Enlightenment and echoed in early forms of dialectic writing, like the Socratic dialogue.

Accordingly, Chapter 6 provides an exegesis for the performed element of this research, and as such, its purpose is to describe, interpret, and contextualise the performance. The chapter is structured to reflect a conversation between three voices: a contemplative listener, a reflective practitioner, and the researcher. Like forms of religious writing, the artefact and exegesis become the site of an interpretive dialectic[23]. This relationship will be further explored in the next section of this chapter, which delves deeper into the research design and stages.

2.7 Research Approach

So far, we have situated this research methodology within auto-methodologies and practice-research paradigms. In doing so, certain considerations concerning processes of data collection and data analysis were delineated, alongside those that pertain to research findings, or outputs (e.g., artefact, themes, and exegesis). The following section will attempt to delineate the four-phased, multi-method approach proposed for this research. First, by considering the overlap between the paradigms of autoethnography and practice research. Second, by reviewing the research design and the way the different phases interact with one another. Finally, by exploring each phase in detail.

As established, the research methodology is grounded on paradigms of autoethnography (AE) and practice research (PR). Within this research framework, certain processes are seen to revolve around one paradigm or the

[23] This relationship is evident in the Jewish Talmud, which encompasses a dialectic between the Mishna—a companion to the Torah—and the Gemara, which interprets it.

other, while some are in the orbit of both. Figure 2-1 demonstrates this relationship, showing the association between certain methods with either AE or PR, all the while illustrating the overlap over journalling and reflexive TA.

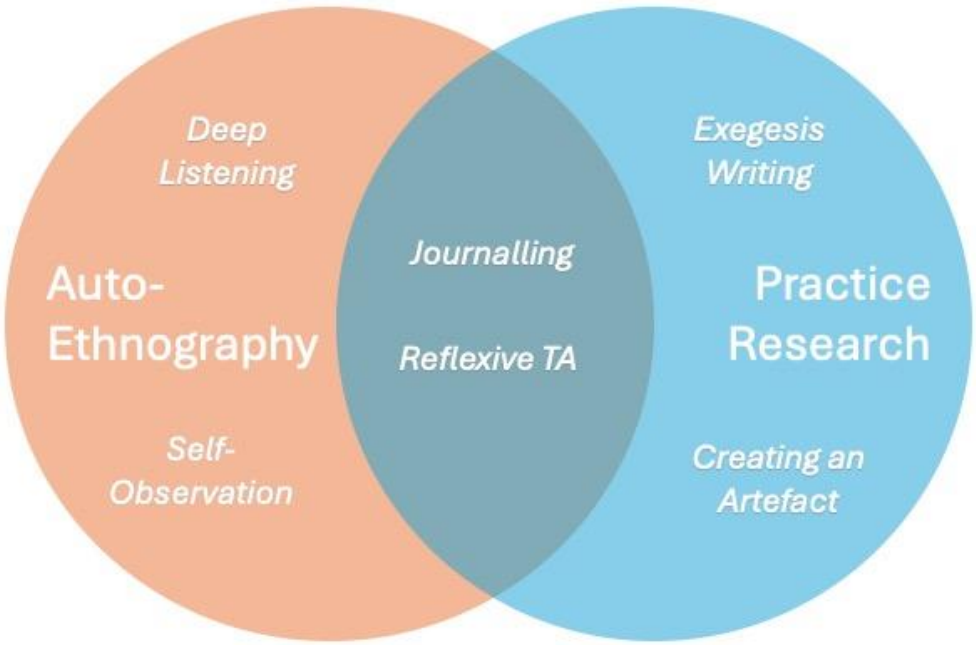

Figure 2-1 – The Overlap between Autoethnography and Practice Research within the research approach

The proposes multi-method approach unfolds in four phases: 1) listening to modular-based compositions; 2) modular system building; 3) performance development; and 4) exegesis writing. As seen in Figure 2-2, these phases follow a cascading structure, with each designed around specific pre-requisites (inputs), objectives, and outcomes (outputs). This research design supports the development of a contemplative body of work from the inception of an

aesthetic framework, through modular system design, to the creation of a performance.

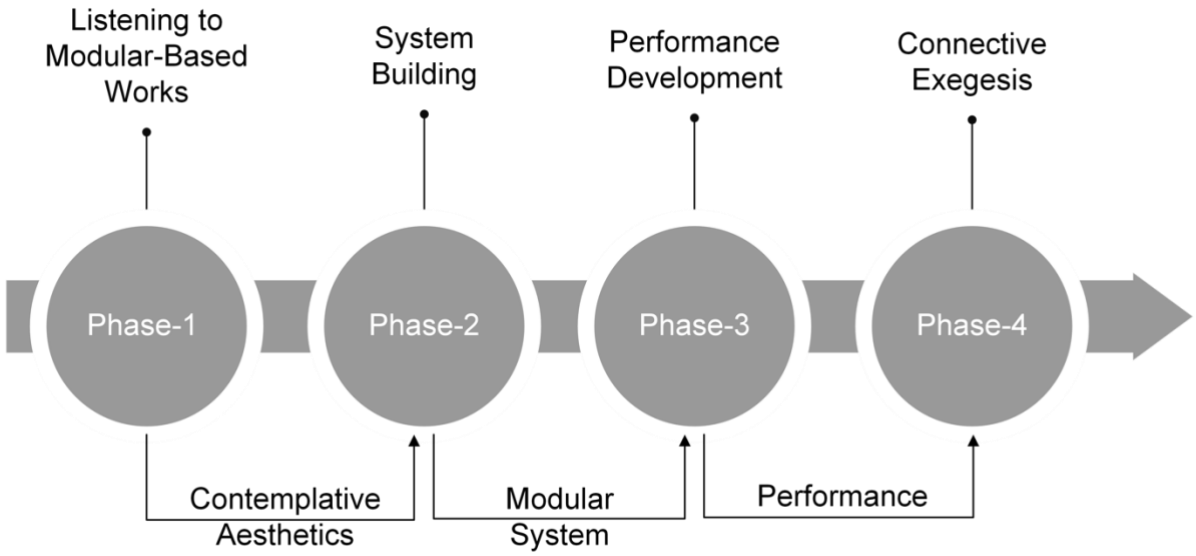

Figure 2-2 – Four-Phased, Cascading Research Structure

In practice, however, this structure was not strictly linear, as some phases overlapped. This means that not only the analysis of one phase informed the next, but also that activities in certain phases contributed to ongoing analysis in previous ones. To capture this complexity, Figure 2-3 provides a comprehensive account of the research design, demonstrating the relationship between different processes and outputs of this research. The remainder of this chapter will describe each of the four phases in detail, starting with the first phase, which is concerned with listening to modular-based compositions.

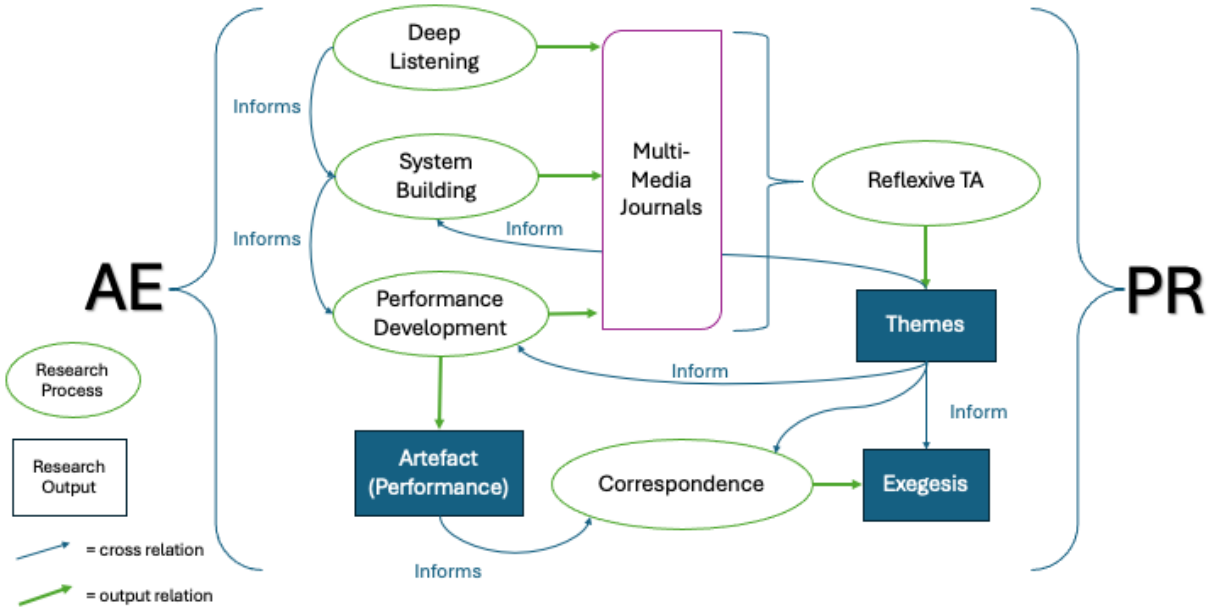

Figure 2-3 – A Comprehensive Account of the Research Design

2.7.1 Phase 1: Listening to Modular-Based Works

Concerned with the creation of a contemplative aesthetic, the purpose of this stage is to generate grounded contemplative themes, by listening to modular-based works made by other composers. Utilising systematic self-observation described previously (Chang, 2008), this phase examines the activity of listening. Enabling embodied contemplation, this Phase 1 was performed in adherence to the deep-listening seated exercise described earlier (Oliveros, 2005).

Before listening, it was necessary to compile a list of contemplative pieces, and this proved to be a challenge, since the definition of 'contemplative' was still being developed. Eventually, a compilation of 16 electronic and electroacoustic pieces (listed in Table 2-1) was created, highlighting modular-based practices as well as contemplative insights. It includes *Kyema* by Éliane Radigue (1994),

which draws inspiration from Tibetan Buddhism and was created using an ARP modular system (Radigue, 2009; Wu, 2020), as well as Caterina Barbieri's works that utilise a bespoke Eurorack system, exploring themes of consciousness, listening, and memory (2017; 2018).

While the pieces by Barbieri and Radigue provided positive examples of contemplative music, other pieces chosen because they were made using modular instruments—like *Diene Augen* (Koçer, 2020) and *Double-Image* (Bella Donna, 2023)—turned out to be negative examples.

Artist	Piece
Abul Mogard	Bound Universe
Barker	Maximum Utility
Barker	Utility
Caterina Barbieri	Pnuema
Caterina Barbieri	This Causes Consciousness to Fracture
Caterina Barbieri	INTCAEB
Caterina Barbieri	SOTRS
Caterina Barbieri	The Landscape Listens
Donatto Dozzi	Vaporware 01
Eliane Radigue	Kyema
JakoJako	Deine Augen
Jonathan Harvey	Mortuos Plango, Vivos Voce
Kara-Lis Coverdale	X 4Ewi
Lisa Bella Donna	Double Image
Venetian Snares	Dreamt Person v3
Abul Mogard	Live @ Waking Life

Table 2-1 – Contemplative Playlist, available on Spotify here.

Once this playlist was created, listening sessions were conducted, and the experience was documented using journals. Journals were written after the fact, as to not hinder listening, and in narrative format, to allow detailed descriptions with no restrictions of length and format (Chang, 2008). Through journaling, my hope was to address questions like:

1. What does this composition *do*?
2. How does it me *feel* or *think*?
3. What is it *like* to listen to it?[24]

These questions reflect an interest in the qualia of experience and the practicalities of modular-based composition. The purpose is to reflect *on* listening experience (reflection on reflection = reflexivity) in order to *generate* patterns[25]; and those patterns would form the basis of the creative inquiry that would follow. One might say that this is what all composers do—listen to music to gather inspiration or influence. My effort was to merely make this process more structured and systematic. My hope was that my position a meditator will provide an interpretive lens that will illuminate modular praxis from this unique point of view. But how might this be generalised?

Once journals were written, they were analysed using Reflexive TA. I began by familiarising myself with the data, transcribing hand-written journal into text files and importing them into NVivo software. This helped identify repeated

[24] This question is inspired by American philosopher, Thomas Nagel's renowned paper "What Is It Like to Be a Bat?" (1974). The paper is concerned the limits of phenomenal consciousness, suggesting that while humans can imagine what it is like to be a bat, they can never truly know what it is like for a bat to be a bat.

[25] According to Braun and Clarke (2022) constructivist paradigm, patterns in Reflexive TA aren't 'recognised' or 'discerned. Rather, they are 'created', 'constructed' or generated. This challenges the positivist claim that patterns in qualitative research can be observed and fortifies the subjective, personally situated nature the analysis.

words, phrases, and concepts, which formed the basis of two coding cycles. After the second coding cycle, initial themes were generated, and those were further developed, refined, defined and finally named. As the analysis progressed and themes began to emerge, they were further contextualised within existing scholarly writing.

To assess the usefulness of themes, Braun and Clarke (2022) recommend creating a thematic map to capture a visual or figurative representation of potential themes and their interrelationships. The example in Figure 2-4 illustrates the four resulting themes (represented in rectangles) and their associations with one another, as well as the codes they encompass (represented in circles). Explored in Chapter 3, the themes—*'Attention in Listening', 'Music as Change', 'Music is Empty',* and *'Transcendent Experiences with Music'*—form a framework for interpreting the act of listening to modular-based compositions. Additionally, they inform the subsequent phase of system building.

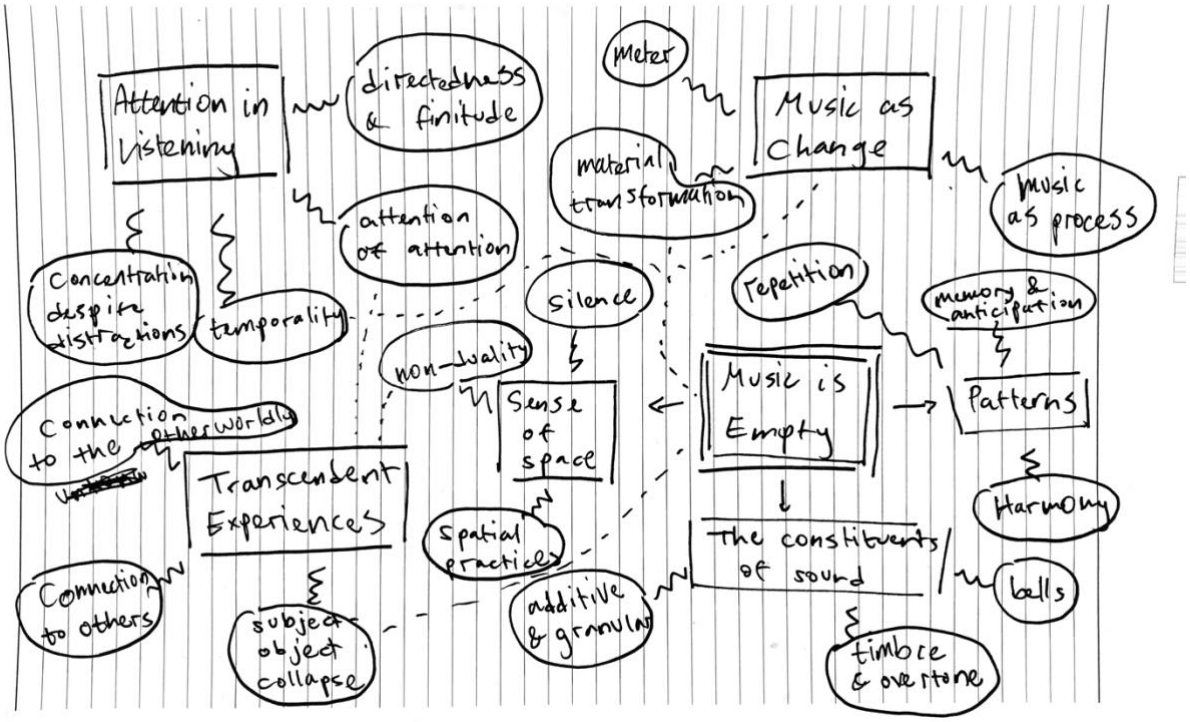

Figure 2-4 – Thematic Map for Phase 1

2.7.2 Phase 2: System Building

The second phase was aimed at assembling a bespoke modular system for composing and performing *contemplative* works. Zagorski-Thomas (2022) discusses agendas that motivate practitioner-researchers, positing a typology of *artistic*, *pragmatic*, and *activist* practice research[26]. In *artistic* practice research, one may be driven by "questions of aesthetics […] communication or representation" as well as "the elegance and coherence of the musical metaphors" one creates (2022, p. 11). The aim of creating a contemplative aesthetic is viewed as artistic, therefore the proposed system is valued based on its efficacy of conveying this aesthetics coherently. The term 'system'

[26] Sullivan (2009) discusses a similar typology of *theoretical*, *conceptual*, *dialectical* or *contextual* practice-based research.

generally refers to hardware modules, but here it extends to any tools, techniques and methods developed in support of these modules. Consequently, the numerous studio sessions held between 2022 to 2023 veered between planning, creating sketches, performing and reflecting on the process. This phase was documented using text-based journal that were usually written after the fact. At first, they were written in narrative format but eventually were structured into three questions:

- What was the plan?
- What *actually* happened?
- What are the next steps?

Thus, my hope was to increase chances of reflexivity by incorporate elements of reflection *for-action*, reflection *in-action* and reflection *on-action*, which are bedrocks in reflective practice (Schön, 2017; Candy, 2020).

Alongside textual journals, performances were recorded in audio-visual format, to capture the different aspects of operating the so-called system and performing with it. Those constituted a rich source of data that helped investigate compositional, performative and practical aspects of the performances, as well as their success in achieving the desired criteria. Ahead of analysis, videos were annotate using timeline markers, to include interpretive insights with respects to different moments. This also ensured that annotations could be coded efficiently. Once a system was developed, the documentation captured was analysed, once again, using reflexive TA (Braun and Clarke, 2022). In searching for patterns in the dataset, my aim was to examine whether “specific application of general theoretical knowledge” could

"not only produces specific knowledge about [its] particular context but also enriches the theoretical knowledge itself" (Zagorski-Thomas, 2022, p. 18). Therefore, the following questions were posited:

1. How does the contemplative framework, i.e., the themes generated in Phase 1 inform the development of a modular system?
2. What are contemplative considerations for composing and performing with modular synthesisers?

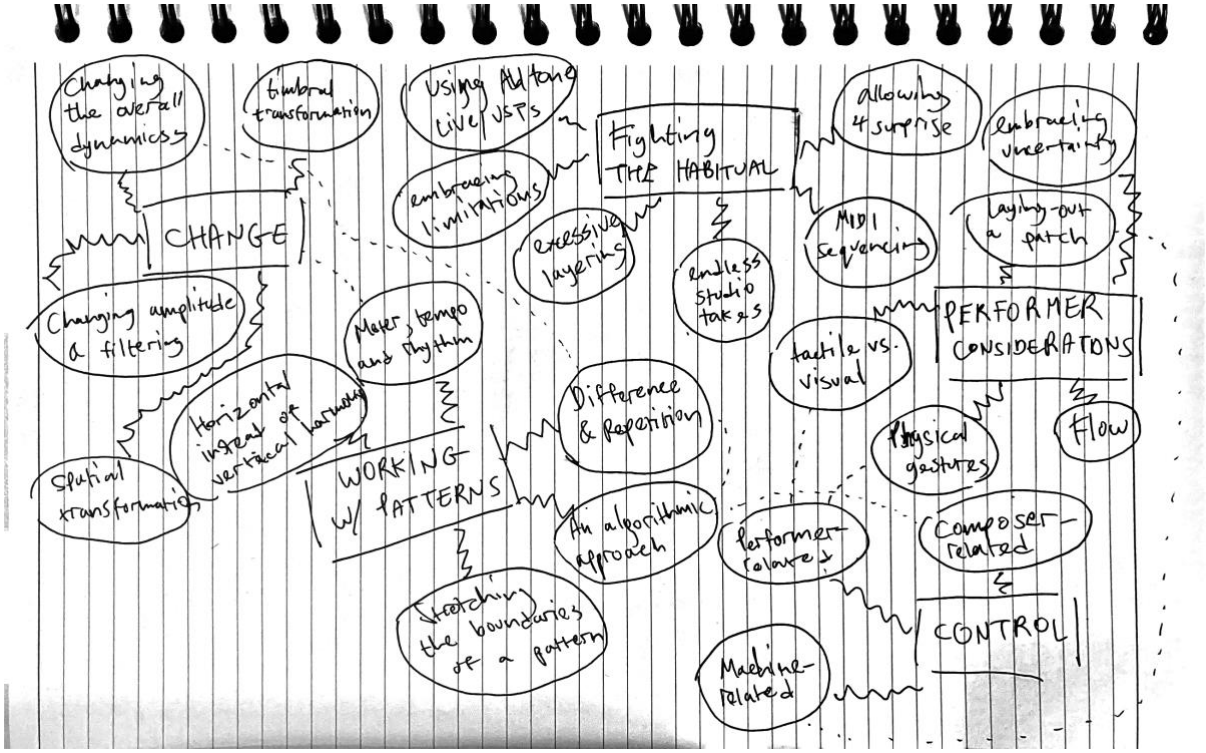

Figure 2-5 – Thematic Map for Phase 2

Following a process similar to that described in Phase 1, the data was coded, and themes were generated, then further developed, reviewed, and refined. The thematic map in Figure 2-5 illustrates potential themes, assessed based on their interconnections and the codes they encompass. The refined themes, discussed in Chapter 4, highlight how practitioners might develop a modular toolkit for creating contemplative works. Additionally, they reflect the

considerations that emerge throughout this process, serving an autoethnographic function by positioning modular praxis as a cultural act. This system and its themes were further applied in the next stage: performance development.

2.7.3 Phase 3: Performance Development

The penultimate phase involves the composition of a body of contemplative pieces with the system built in Phase 2. Its aim is to develop and conduct a performance that showcases the aesthetic framework that had been established. During the ensuing sessions, which took place between 2023 and 2024, sketches were developed into compositions, and those were 'translated' to the 'language' of the system. In addition, different patching techniques were explored for each composition and for the performance as a whole, and those pieces were ordered and rehearsed. A short trial performance at The Albany, London was organised mid-phase (March 2024) and filmed for later reflection, afterwards the same methodology was re-applied to generate, translate and rehearse more pieces. Another trial was held at the Innovation in Music 2024 conference, before the final performance, which was held at Lawrence Hall, University of West London in July that year.

This phase was documented using *practice journals*, *patch schematics*, *notation*, and *video documentation*. Practice journals were written in the format described in the Phase 2—specifying what was planned, what happened and what was the plan moving forward. Patch schematics were often appended to journals, and here, different approaches were experimented with. Austin (2016) delineates two types of patch graphics—*block* and *diagram*. While diagrams

show the relationship between modules by representing their appearance, block graphics illustrate this relationship using an abstracted form. The former provides accuracy, while the latter is simplified and prevents the usual sensory overload that accompanies working with modular synthesisers. The approach eventually chosen combined photos and text written in a markup language called *Patchbook* (Ferre, 2023). Patchbook provides modular enthusiasts the option of representing patches in a linguistic format that can be compiled into Graphviz code to enable block visualisation (exemplars are seen in Chapter 5, Figure 5-19, Figure 5-20, Figure 5-21).

The video captured during the trial performance (also annotated by means of timeline markers) proved to be a rich source of data, revealing crucial performative aspects as well as 'successful' and 'unsuccessful' moments. Finally, scores were also generated during this phase, to help with the process of composition. As such, they provided insight on compositional aspects of this phase. Once preparations for the final performance were complete, thus concluding this phase, another Reflexive TA process was initiated. This time posing the following question:

- How can practitioners make sense of the process of developing a modular performance?
- How might this process demonstrate and inform the contemplative framework established previously?

In search of patterns, the six stages of Reflexive TA were applied to the dataset. Once again, themes were visualized in a thematic map (Figure 2-6) to assess their validity and their relationships with one another, as well as the

codes they encompass. The themes developed in this phase— *'Slow Evolution', 'Ideating, Translating, Indexing', 'Generative Patching',* and *'Seamless Performance'*—align with those identified in earlier stages, offering both practical and cultural insights. The richness of the data allowed for deeper interpretation of compositional, patching, and performance processes.

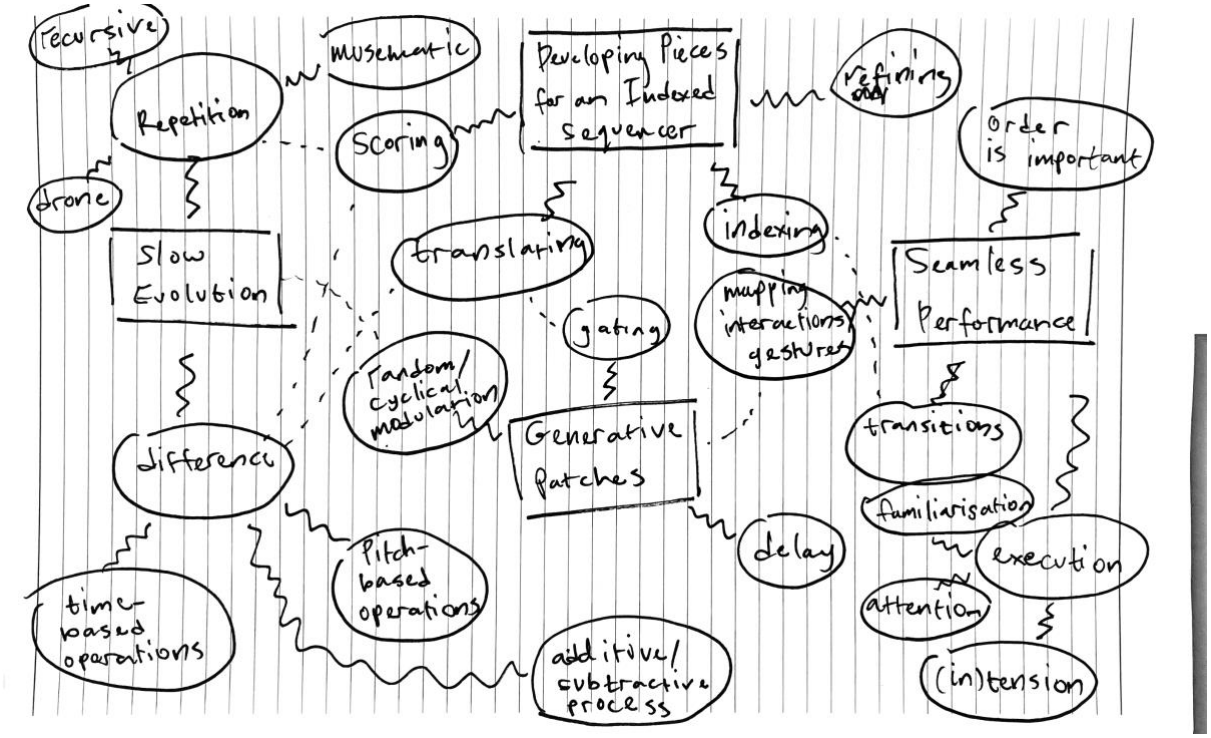

Figure 2-6 – Thematic Map for Phase 3

2.7.4 Phase 4: Exegesis

The final phase involves the writing of an exegesis, as a complementary component to the filmed performance. In accordance with the connective model discussed earlier (Hamilton and Jaaniste, 2010), the aim of this phase was to contextualise the performance within the theory established and provide a personal and methodological statement regarding the creative work. In this vein, the exegesis critically reflects on the practical element while offering

insight into the motivations, decision-making processes and outcomes of the performance in relation to the research questions.

Drawing on Ings' (2015) and Goddard's (2010) aforementioned approach, the exegesis attempts to reflect a conversation between three narrators:

1. The contemplative listener: a *poetic* voice that describes the experience of listening to the performance.
2. The reflective practitioner: a *prosaic* voice that relates to the creative process and its outcome.
3. The academic: a critical voice that moderates the previous two, it provides context and attempting to generalise.

To achieve this correspondence, the footage from the performance was examined in two stages. First, the audio was listened to, and the experience was captured in the form of a listening diary or journal. During the second stage, the video was annotated, whereby annotations were embedded in the video. The journal and annotations were combined to form a conversation (see Section 9.4.1 of the appendix), which showcases the contemplative listener ruminating on his experience and the reflective practitioner elaborating in response.

This conversation provides insight into the creative artefact, however, it needed to be contextualised within this body of research. To do so, the correspondence was reviewed and coded using the themes established in previous phases. And during writeup, the two voices were 'moderated' in a way that both reflects their meaning and creates a cohesive, non-fragmented narrative. The resultant exegesis relates to each performance piece in chronological order, trying to

pick apart its aesthetic, experiential dimensions, the process of making it, and the way it embodies the contemplative paradigms it aims to reflect.

2.8 Chapter Summary

This chapter responds to a gap in research at the intersection of modular synthesis and contemplative Buddhist practice. It revisited the central research questions and objectives and outlined key methodological considerations for addressing them. These included integrating meditation meaningfully into the research design, drawing parallels with practices such as Deep Listening, and adopting an autoethnographic framework to ground the study in lived, embodied experience. The practical aspect of this research—modular performance—is examined through the paradigm of practice research. Its intersection with autoethnography enables a personally situated approach to inquiry, combining creative exploration with reflective analysis.

Various data collection formats—audio, video, photography, and journaling—were evaluated for their capacity to capture both external actions and internal states. To analyse this material, Reflexive Thematic Analysis was introduced as a method that embraces subjectivity, allows for inductive coding, and supports the iterative refinement of research questions. The chapter also explored the role of the exegesis in practice research, emphasising how writing can serve as a dynamic mode of critical reflection—one that integrates narrative, analysis, and creative insight in response to the artefact.

The proposed four-phase research structure was then outlined. Phase 1 begins with a listening-based analysis of existing modular works, to identify emergent

contemplative themes. Phase 2 develops a modular system informed by these themes; Phase 3 applies this system in the creation and performance of new compositions; and Phase 4 comprises an exegesis that critically reflects on the creative process. The next chapter begins with Phase 1, investigating how contemplative themes might be located in modular-based compositions through focused listening.

3 Listening as Contemplation[27]

While the previous chapter outlined the research methodology and proposed a four-phase approach, the present chapter addresses Phase 1 (introduced in 2.7.1), responding to the following research question:

- What contemplative themes might emerge from listening to modular-based compositions?

To explore this, I conducted a focused analysis of listening experiences using a methodology grounded in Deep Listening (Oliveros, 2005)—an embodied mode of attending to auditory phenomena—and systematic self-observation techniques commonly used in autoethnography (Chang, 2008).

Listening sessions were documented through journals, which were then analysed using Reflexive Thematic Analysis (Braun and Clarke, 2022). This approach enabled the development of themes associated with contemplative listening, which, in turn, informed the creative process in subsequent phases of the research, shaping aesthetic sensibilities and compositional strategies.

Figure 3-1 (below) maps the resulting themes and subthemes, illustrating their internal structure and relationships. In the sections that follow, I define each theme conceptually, outline the codes that constitute them, and demonstrate how they manifest in the data. Drawing on selected journal excerpts (cited using the abbreviated journal names listed below in Table 3-1, e.g. *LAWL*), I

[27] An earlier version of this chapter was published by Routledge in the proceedings of the Innovation in Music 2023 conference, which took place in Edinburgh Napier University, UK.

aim to establish a conceptual frame around each theme while also reflecting on their interconnections.

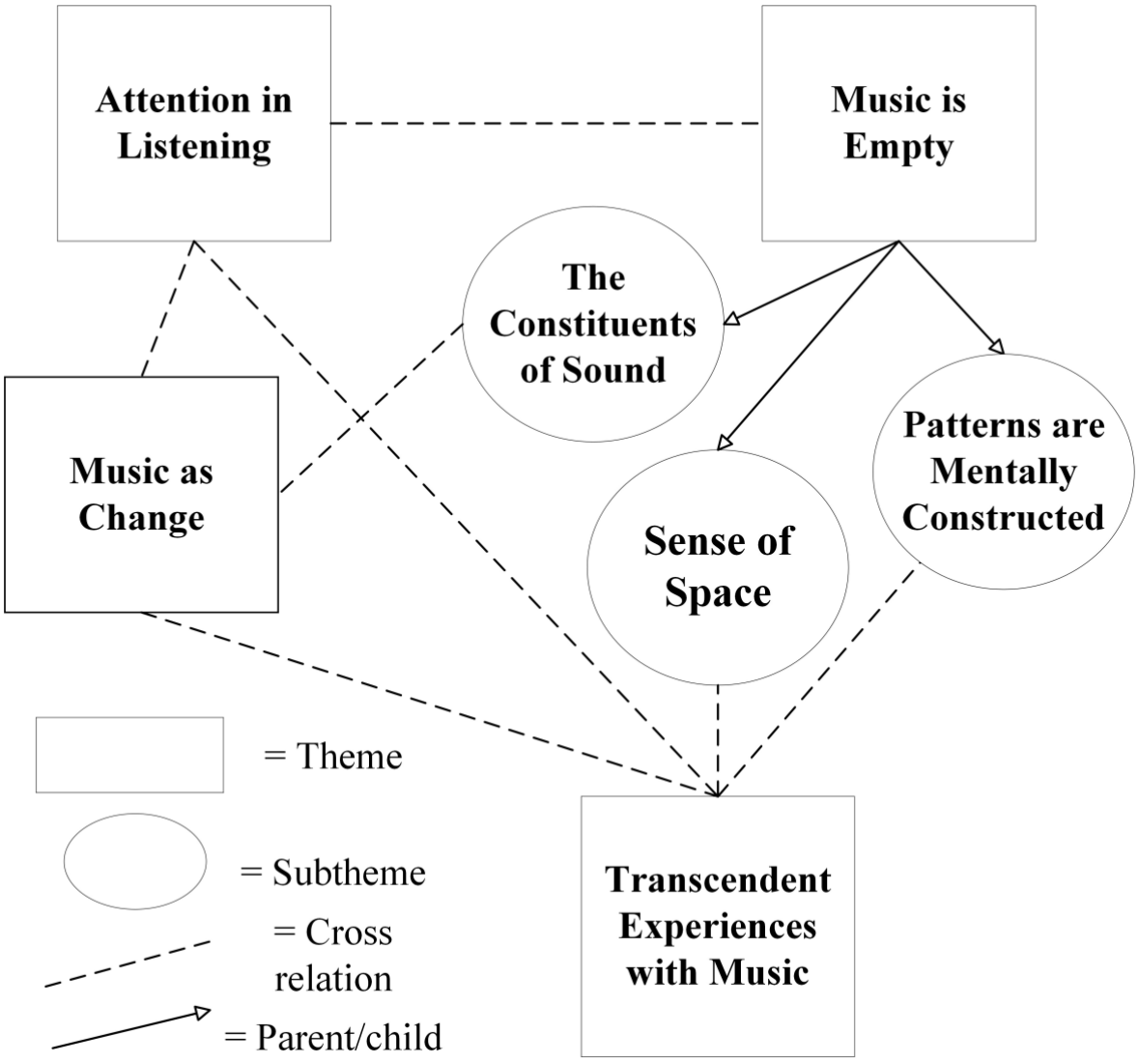

Figure 3-1 – Thematic Map

Abbr.	Artist	Track	Date Captured
BU	Abul Mogard	Bound Universe	01/08/2022
MUT	Barker	Maximum Utility	29/07/2022
UT	Barker	Utility	31/08/2022
PNU	Caterina Barbieri	Pnuema	10/08/2022

TCCTF	Caterina Barbieri	This Causes Consciousness to Fracture	08/08/2022
INTCAEB	Caterina Barbieri	INTCAEB	11/08/2022
SOTRS	Caterina Barbieri	SOTRS	10/08/2022
TLL	Caterina Barbieri	The Landscape Listens	11/08/2022
VW01	Donatto Dozzi	Vaporware 01	10/08/2022
KYE	Eliane Radigue	Kyema	13/08/2022
DA	JakoJako	Deine Augen	08/08/2022
MPVV	Jonathan Harvey	Mortuos Plango, Vivos Voce	02/08/2022
XE	Kara-Lis Coverdale	X 4Ewi	10/08/2022
DI	Lisa Bella Donna	Double-Image	04/08/2022
DPV3	Venetian Snares	Dreamt Person v3	10/08/2022
LAWL	Abul Mogard	Live @ Waking Life	29/08/2022

Table 3-1 – List of Journal Abbreviations from Phase 1

3.1 Attention in Listening

The term 'attention' appears frequently throughout the dataset, hence the first theme, labelled *'the role of attention in listening'*, was generated at an early stage of analysis. The theme conceptualises listening as an act of directing attention to auditory information and emphasises the structure and form of attention to sound. As such, journal segments were labelled with codes like *shifts of attention, types of attention*, and *concentration*, while others were seen to demonstrate *present-moment temporality* of attention and the *reflexive* capacity it enables. Table 9-1 in the appendix shows the codes nested under

Theme 1, alongside examples of coded segments. In the following paragraphs, I will attempt to describe each of these codes and the way they are reflected in the data.

Following Styles' (2006) definition of attention (established in 1.2), the journals demonstrate the directedness and finitude of attention. For example, an excerpt written after listening to the track *Utility* (Barker, 2019), states: "I noticed my attention shifted from moments where […] I was focused on a single sound and the way all sounds appear together" (UT). This demonstrates the inextricable link between the directed and limited capacity of attention. When we listen, we experience 'shifts' not only between different objects within the auditory scene, but also between different auditory perspectives. This relates to a distinction made by Oliveros, between 'global' and 'focal' attention, as she writes:

> Focal attention, like a lens, produces clear detail limited to the object of attention. Global attention is diffused and continually expanding to take in the whole of the space/time continuum of sound. Sensitivity is to the flow of sound and details are not necessarily clear. (2005, p. 13)

These shifts occur exactly because of the bandwidth of attention, its finite nature, and this is further illustrated in instances where the mind 'wanders away' or when concentration is lost. When we lose concentration, we are subject to an involuntary shift of attention. Indeed, this unintentional drift challenges the controlled nature of attention, for it shows two sides to the direction of attention: the voluntary vs. involuntary.

Concentration as an act of sustained attention is seen across the data set, as journals show efforts to maintain concentration despite habituated patterns and interruptions, for example: “I found myself fighting the urge to look at my phone, check the time, go to the toilet, and not always succeeding” (KYE). This sentiment evokes the experience of certain mindfulness exercises (e.g., ānāpāna), where one quickly recognises the ease with which their mind wanders away from the breath to a thought or another sensory experience. Segments pointing toward a tension between concentration and distraction (‘phone’, ‘time’ and ‘toilet’) imply something further—like in ānāpāna, attention can be trained.

Another aspect of this theme relates to the temporality of attention. One journal segment, for example, concerning the piece *SOTRS* (Barbieri, 2017a), describes its “steady growth [...] tempo and moving elements” as facilitating “a moment-to-moment observation of unfolding phenomena”. Similarly, after listening to the drones of *Kyema* (Radigue, 1994), a segment observes “what appears to be fixed objects” (KYE); and a third segment describes “sound as a phenomenon [comprising] endless changes in each moment, all framed through our memory and anticipation” (MPVV). Listening connects the listener to a phenomenological present charged with the memory of the past and an anticipation towards the future. Paying attention enables us to recognise change in what would otherwise appear fixed, and this will be further explored in the discussion below.

The last aspect refers to how attention might be turned back at itself, enabling a particular type of reflexivity. The following quote refers to the end of a live

performance by artist Abul Mogard: “the disappearance of sound meant that I could momentarily witness awareness itself, and that was very powerful” (LAWL). Reflexivity is implicit in the very act of journal-writing and conducting research, however here we see reflexivity in attention—attention of attention. The idea of *awareness itself*, underlying all experience, can be described in terms of nonduality, an aspect of transcendent experiences discussed previously in 1.5. Transcendence will be discussed in 3.3, but before, let’s explore the theme music as change.

3.2 Music as Change

Formed around notions of musical process, materiality, and musical time, the second theme examines music as a vessel for change. It recognises the mechanisms by which change (material or compositional) occurs and is perceived and reflects an understanding that, as a matter of experience, an awareness of change is synonymous with or, at the very least, linked to our perception of time. Once more, the appendix provides an overview of codes and subcodes constituting this theme, including example segments for each (Table 9-2). The following paragraphs will explore each in detail, while providing some examples from the journals.

The first aspect, *‘music as process’* borrows from the work of minimalist composer, Steve Reich (2017), who famously described his attempt to lay bare a slow musical process and watching it unfold. Thus, journal segments were assigned with this code, if they referred to different types of processes applied to pitch, note length, and tempo. One journal refers to a piece that “opens with a [...] sparse pattern, and very clearly” undergoes “an additive process,

whereby notes are added at the end of each pattern cycle" (TCCTF). Another reports: "a system [of composition] with rules I cannot hack, but […] they are somewhat observable" (VW01). No matter the type of process (e.g., additive or random), there was a tendency to favour *audible* processes*,* as gleaned in the following quote, referring to *Diene Augen* by JakoJako (Koçer, 2020): "while […] the piece utilises modular synthesis […] it doesn't bring to the fore any process, and so I am left wondering—what do I take from this?" (DA).

Another aspect of this theme, *'change to sonic material',* is evoked in the following quote:

> The piece evokes a sense of materiality in me […] It does this in a myriad of ways: 'real' sounds (bells) are played as they are; they are reversed; their envelope is altered; they are constructed using additive methods (synthesis); voices are blended with pure tones, fragmented to create pops, and clicks. (MPVV)

This metaphor of sound as material is situated within debates on the aesthetics of electronic music. In her book, *Listening Through The Noise*, Demers (2010) argues that sound in electronica is often portrayed as being malleable, and her taxonomy of three activities in electronic music (construction, reproduction and destruction) builds on that concept. Segments, like the one above, were assigned with the code 'change to sonic material' since they explore change, while utilising this metaphor.

The last aspect labelled '*change is linked to a sense of time'* is concerned with notions of temporality, its perception, and punctuation. As such, it includes

segments that refer to the tempo and meter of a piece and the feeling it contributes to—e.g., calmness, stability, urgency, or disorientation (see appendix, p. 214). This aspect also relates to terms like ‘pulse’ or ‘beat’ and includes instances accentuated with percussive elements and strong transients (see p. 215). Thus, change constitutes our perception of time, and music can facilitate or alter our experience of time through tempo, meter, and rhythm.

These notions of process, temporality, and material transformation signify the Buddhist idea of impermanence, as seen in the following excerpt referring to Radigue’s piece (1994):

> Occasionally, I notice great change has occurred to the soundscape, one that occurred without me noticing. This is a huge lesson in impermanence […] But it is also a lesson in memory and our clinging to what occurred in the past. (KYE)

Sound is a vessel for change, and Buddhist insight lies in *listening* to change. During listening, we might note latent change—temporal breaks in continuity—as we observe our own patterns of clinging.

3.3 Music is Empty

An understanding of music as a vessel for change challenges our perception of fixed, stable objects. When one comes close to what is truly happening, one finds ‘cracks’ in concepts that would otherwise seem solid and perpetual. Music as change provides context for another latent theme generated in the dataset, one which relates to the insubstantiality of music, its empty nature. The theme *‘music is empty of its own existence’* was organised around segments that

reveal music's lack of self-existence. It comprises three subthemes concerned with: 1) what constitutes a sound; 2) patterns as both physical and *mental* constructs; and 3) the relationship between sound, space, and silence. Examples of coded segments can be found in Table 9-3 of the appendix, and the subsequent sections will describe each subtheme, with reference to the journals.

3.3.1 The Constituents of Sound

> I start noticing the different constituents of the piece, picking them apart as well as appreciating them together (MUT).

Sounds in a musical piece are often conceived as of being unified, yet upon closer examination, we might notice their constituent elements. The term 'constituents of sound' refers to the sonic components or aspects of sounds within the composition. It focuses on auditory qualities rather than on conceptual or intellectual aspects. Harvey's composition *Mortuos Plango, Vivos Voco* (1980)—discussed in p. 42 and described in the journal segment above—illustrates the exploration of these constituents. The piece incorporates the voice of Harvey's son and the sound of a bell, and as it progresses, one can discern different practices of construction and fragmentation facilitated by digital technology. These practices reveal the fundamental building blocks of sound, like the individual 'hit' and resonating partials produced by the bell (Harvey, 1981).

Bells connote the experience of a meditation retreat, where gongs are used to notify meditators about different aspects of the schedule, like the start or end

of a meditation. Their manipulation in this piece brings forth the notion of emptiness, explored by American Buddhist teachers, Goldstein, and Kornfield:

> If a bell is rung, what do we hear? Most people hear a ‘bell’, or if there’s a noise outside, might say that we hear a car or a truck going by. But that’s not what we hear. We hear certain sounds, certain vibrations, and then immediately the mind names it as ‘bell’, ‘car’, ‘truck’, or ‘person’. We confuse the concepts of the thinking mind with the reality of direct experience. (2001, p. 25)

The focus on the ‘reality of direct experience’ corresponds with a fascination with timbre. Whereas previously, timbre was associated with material transformation, here it is seen as a constituent within a constellation of auditory perception. This is reflected in the following entry:

> Amidst this a tone is approaching. Indiscernible at first, it quickly becomes more present. My focus is drawn to its shifting spectral quality, its inner dynamics and timbre. [...] The tone, while singular, is accompanied by discernible frequencies in consonance with it. The harmonic series is alive! (KYE)

Timbre and its associated terms, harmonics and spectra, alongside additive/subtractive process of synthesis and the example of the bell, seems to point toward the paradoxical question ‘what constitutes a sound?’, which challenges our conception of sound as an indivisible object.

3.3.2 Patterns are Mental Constructs

Another cluster of meaning revolves around the term ‘patterns.’ Initially, segments that include this term were coded semantically, but as analysis progressed, this code developed into a subtheme. The label *‘patterns are mentally constructed’* represents a multifaceted concept that includes the role of musical repetition in establishing patterns, the workings of memory and anticipation, and their connection to familiarity and attachment. This concept assumes a nondual stance on the paradoxical question ‘what constitutes a pattern?’. It suggests that our experience of patterns results from a simultaneous interaction between a listening subject and a sounding world.

Patterns are mentioned as a sequence of pitches organised in time. Sequences form melodies, but they can be expanded to include harmonic movements. Regardless of what defines them, patterns are established in a process of repetition or ‘looping’ as an affordance of our memory (Margulis, 2014). Contrasting past iterations with current ones, we might note *similarity* or *difference*. Variation—a form of melodic difference—is seen in several examples in the journals, causing “familiarity with a sense of shifting” (DA) as well as “intrigue as to when will the notes appear at each iteration [sic]” (TCCTF). Whereas prolonged similarity in pitch can often facilitate a shift of attention toward other, less obvious elements—timbral or other subtle nuances (Margulis, 2014).

Another aspect of our experience of repetition can be gleaned through the following quote:

> As [the drones] gained prominence, the main sequence [faded] to the background, yet I was clinging to [its return]. When it came back, I was almost relieved (BU).

Repetition is central to contemplating suffering—namely ‘clinging’ and the pleasant feelings associated its gratification (Hart, 2018). This certainly relates to memory, but often it is caused by anticipation—a ‘crescendo’ or the all-too-familiar riser of Electronic Dance Music.

An important aspect of this theme suggests the role of the perceiver in the formation of patterns. When listening to the track ‘The Landscape Listens’ by Barbieri (2022), the pattern, which is often conceived as the essence of the sound object, is experienced as transitioning from an undefined state to a more distinct one:

> [My mind was] trying to grasp a pattern in the pitch, yet its materiality is in constant transformation [...] That which constitutes the pattern is never obvious, it is empty of substance (TLL)

This quote emphasises the notion that patterns are mental constructs of tonal relations, insubstantial when held against the scrutiny of present-moment experience.

3.3.3 A Sense of Space

While the subthemes above suggest the insubstantiality of music by considering its constituents and patterns, this subtheme does so via the interaction between sound and space. On an apparent level, the journals repeatedly refer to an appreciation of space and an awareness of spatial

practices in the works of other composers. Those excerpts were originally organised under a standalone theme, labelled *'a sense of space'*. However, since they imply a nondual stance on the relation between sound and the space it inhabits, they were eventually nested under the theme '*music is empty of its own existence*'. To explore the different aspects of this subtheme, it is worth introducing the idea of space as a material encounter.

In his essay, 'The Materiality of Space', Nelson (2015) challenges the conventional associations of materials with solidity and spaces with emptiness. By considering a material encounter between sound and space, Nelson rejects the idea of space as an abstract and neutral geometry. Drawing from social and ecological theories, he argues that space is actively produced by human action and is present in an ontology of transformation characterising materials and their interactions.

Aligning this perspective with the Buddhist doctrine of *emptiness*, a material engagement with space disrupts the notion of space as a stable object. It emphasizes the dynamic nature of space, which is influenced by social, political, physical, and ecological factors in continuous development. The spatial development of sound suggests a reciprocal, non-dual relationship between sound and space. Sound (as subject) is not merely present in space (as object); space (as subject) is also actively explored by sound (as object).

Nelson also proposes that proximity or distance in sound mirrors the compactness or expansiveness of space, achieved through practices of amplification and attenuation, reverb and delay. Loudness implies presence, while distance suggests separateness or longing. When standing in opposition

to loudness, musical silence becomes a spatial practice. This relationship is exemplified in the following two excerpts:

> [The sense of] space is achieved by silence and by virtue of the reverb and delay (TCCTF).

> The beauty is partly in the payoff. There was so much sound, and the 'silence' that follows is equally loud (PNU).

The contrast between sound and silence invokes subjective notions of proximity and historicity, alluding to what was once present and is currently absent. Much like the reflexive aspect of attention, the relationship between sound and space demands prompts a reflection on nonduality and this will be discussed further in the next theme.

3.4 Transcendent Experiences with Music

Based on transcendence—a feeling of departure from one state of being to another (Aldridge, 2003)—the theme *'transcendent experiences with music'* represents a multifaceted concept already contextualised in Section 1.5, that is shaped by my lived experience as a meditation practitioner. The theme was constructed around segments that refer to profound leaps of knowledge promoted by listening to musical works. Such segments note a mysterious, otherworldly, or eternal presence; a connection to other people; and a feeling of immersion or blurring between self and world. Those facets are seen in appendix Table 9-4, alongside coded excerpts from the journals.

Multiple journal segments refer to feelings of something greater, mysterious, or eternal. One segment, for example, writes: “I feel as I am participating in the construction of this mystery [sic]” (TCCTF). Another states: “the piece evokes holiness in me. A feeling of divine presence. (PNU). A third describes a feeling of “connection to something bigger, more eternal, that was there before me and will exist after me” (KYE). Such experiences qualify Gabrielsson’s (2011) framework of Strong Experiences with Music (SEM).

However, one journal entry alludes to a second aspect that, due to its lack of recurrence, cannot be considered a pattern. Nevertheless, this aspect is worth mentioning. In the summer of 2022, I attended a music festival in Crato, Portugal, where a performance by Italian musician, Guido Zen (stage name, Abul Mogard) felt particularly significant. So, I decided to document it in a listening journal. A segment from this journal states:

> My heart opened up. I felt elevated and sensed all humans around me […] Opening my eyes, I looked around and noticed the looks on people’s faces. I realised they went through a similar, transformative experience. (LAWL)

While previous journal entries suggest a connection with an otherworldly entity, the excerpt from LAWL discusses *human* connection. This experience is reminiscent of *metta bhavana*, or *lovingkindness* meditation, where practitioners strive to cultivate compassion towards themselves and others. My experience of metta bhavana has been transformative and therapeutic, evoking a sense of softening and upliftment. The power of metta bhavana meditation is

amplified when practised collectively, and the scarcity of similar experiences in the journals may be attributed to the fact that most journals were written in solitude.

The final aspect of this theme refers to feelings of transcending one's physical boundaries. This form of transcendence also manifests as sound causes strong physical sensations or contributes to a feeling of 'immersion'. Immersive experience should not be conflated with immersive audio systems, which feature multiple speaker configurations or binaural audio[28]. Here, immersion is associated with a lack of dualistic perception, namely a collapse of subject-object experience, as seen in the following two segments:

> There were moments of pure awareness to sound, where there was no difference between the sound and myself (SOTRS).
>
> In several moments the external and internal are indistinguishable. I feel immersed. (KYE)

During immersive experiences, we do not feel like a subject *looking at* experience. Rather, we experience *oneness* or *submerging* with the totality of experience[29]. This nondual aspect of listening can manifest when we direct attention at itself, or when we contemplate the paradoxical relationship between sound, space, and silence. A Buddhist interpretation of this

[28] Lee (2020, p. 5) establishes a conceptual framework for the term *immersion*, distinguishing "immersive experiences" from "immersive systems".
[29] My own use of the term immersive is associated with, but is not identical, to the cognitive definition of immersion, in the sense of being involved in an activity. However, it also draws on the metaphor of being covered in liquid, suggesting a blurring between substances (Lee, 2020).

experience enables us to view it not merely as an alteration of an enduring subjectivity, but rather as a momentary glimpse into the truth of non-Self, or ‘mere awareness’ as the Buddha calls it (Goenka, 2017).

3.5 Chapter Summary

This chapter set out to explore contemplative themes associated with meditation through a focused listening practice of modular-based compositions. It demonstrates how deep listening can function as a method of self-study and a mode of generating data. The resulting themes contribute to a discourse on listening as a form of attention, revealing a phenomenological shift when one is fully immersed in sound. They also suggest how musical works might convey concepts like impermanence and emptiness—through process, repetition, and spatial or material strategies.

As attention is directed toward the transient nature of auditory experience, listeners may begin to perceive shifts not only in sound but in their own subjectivity. In this flux, musical material becomes a vehicle for insight: stripped to its meaningful elements, it reveals the absence of any fixed essence. The journals examined patterns and spatial dynamics as sites where the boundary between subject and object begins to dissolve. Some entries recount moments of absorption or “subject-object collapse,” which are interpreted here through the Buddhist teachings of non-Self and nonduality.

Given the focus on listening and lived experience, this phase does not attempt to catalogue the specific tools or techniques used to make the compositions.

Nor are the themes identified exclusive to modular synthesis; similar qualities may be found in other forms of electronic and acoustic music.

So, where does this leave us? By thoroughly examining of my own listening experiences, I was able to identify contemplative qualities present in certain modular-based compositions—pieces that seemed to embody and promote meditative insights. Just as significantly, I observed that other works did not elicit similar forms of contemplation. This contrast has allowed me to approach my own compositional practice with greater clarity of intention. These intentions now function as aesthetic criteria: not simply shaping how a piece should or shouldn't sound, but guiding the affective dynamics it might evoke in listeners. The desired *qualia*—the felt qualities of listening—thus become an emotional and affective compass, orienting decisions around module selection, patching strategies, and compositional structure. More specifically, the findings from this phase open up a new line of inquiry: how might these contemplative themes inform and be conveyed through the design of a modular ecosystem? This question will be taken up in the next chapter.

4 Thoughts on Building a Modular System[30]

The previous chapter explored contemplative themes emerging from the listening experience of modular-based compositions. This chapter turns to research Phase 2 (see 2.7.2), addressing the following refined research questions:

- How might the contemplative themes generated through listening to modular-based compositions inform the design of a modular-system?
- How could building a modular system ground these contemplative themes while also generating new ones?

To address these questions, I undertook a series of studio sessions involving trial and error with various modules, configurations, and workflows, alongside compositional sketching. These sessions were documented using audio-visual and text-based journaling methods to capture both reflections and actions (Chang, 2008). The data was analysed using Braun and Clarke's (2022) Reflexive Thematic Analysis, following a process of familiarisation, iterative coding, theme generation, and refinement. This led to the creation of a modular system for composition and performance, and the emergence of five key themes that subsequently informed the development of a portfolio of performed works.

The thematic map seen below illustrates these five themes and their interrelations. In the sections that follow, I define each theme with reference to

[30] An earlier version of this chapter is currently under review and is due to be published by Routledge, in the proceedings of the Innovation in Music 2024 conference, which took place in Kristiania University College, Oslo.

journal entries, audio, and video materials, while situating it within wider theoretical frameworks—including ecological perception, the social construction of technology, minimalism, algorithmic music, and embodied cognition. Journal entries are cited using the abbreviations listed in Table 4-1 (e.g., VL01).

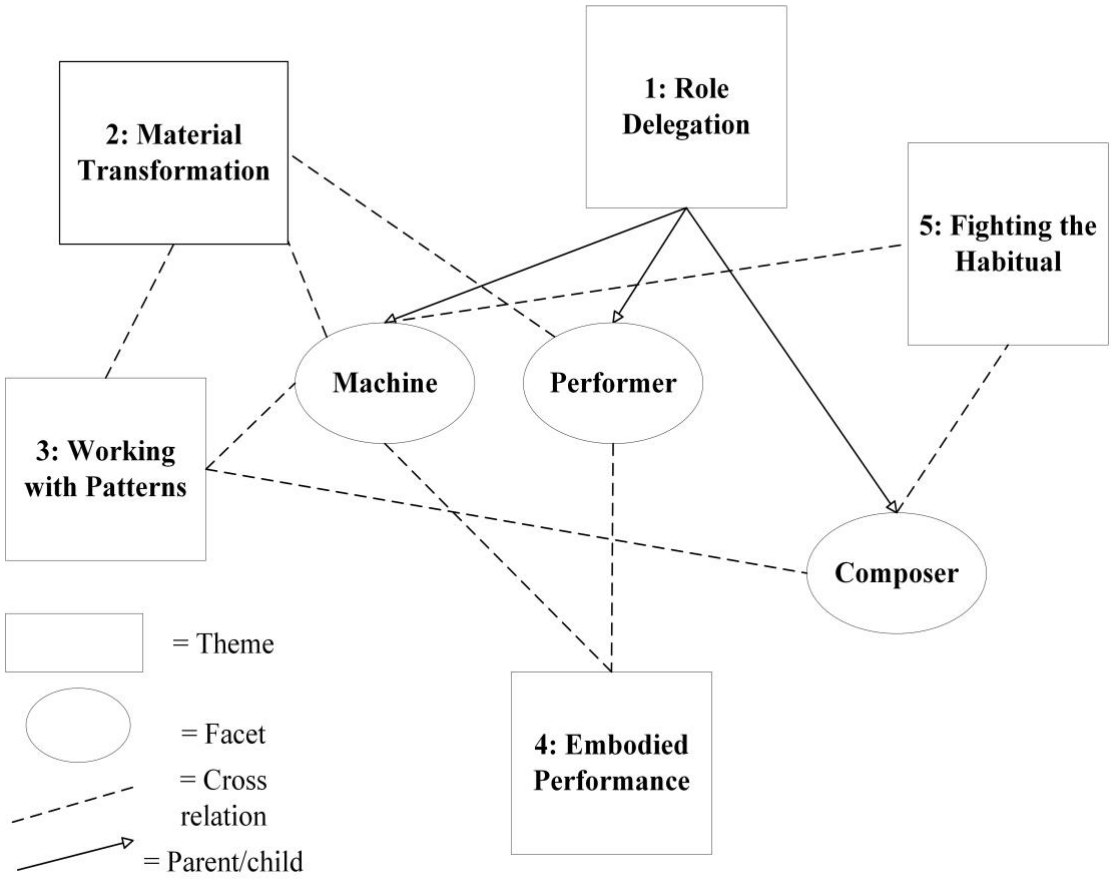

Figure 4-1 – Thematic Map

Abb.	Format	Date Captured
VL01	Video	06/12/2022
VL02	Video	13/12/2022
VL03	Video	13/12/2022
VL04	Video	13/12/2022
VL05	Video	13/12/2022
VL06	Video	13/12/2022

VL07	Video	13/12/2022
VL08	Video	13/12/2022
VL09	Video	13/12/2022
VL10	Video	14/12/2022
VL11	Video	18/12/2022
VL12	Video	18/12/2022
VL13	Video	18/12/2022
VL14	Video	18/12/2022
ConSyn	Text	28/11/2022
LoC	Text	26/01/2022
Planning	Text	06/10/2022
PL01	Text	14/01/2022
PL02	Text	07/03/2022
PL03	Text	09/11/2022
PL04	Text	15/11/2022
PL05	Text	17/11/2022
PL06	Text	22/11/2022
PL07	Text	24/11/2022
PL08	Text	06/12/2022
PL09	Text	13/12/2022
PL10	Text	14/12/2022
PL11	Text	04/01/2023
PL12	Text	28/06/2023

Table 4-1 – List of Journals Abbreviations from Phase 2 (VL = Video Log, ConSyn = Contemplative Synthesis, LoC= Levels of Control, PL=Practice Log)

4.1 Composer-Performer-Machine Delegation

An initial thread that runs across my attempts to devise a modular system suggests that the activities performed in the process of system development can be divided into three categories: *composer-related*, *performer-related,* and *machine-related*. Drawing from theories of ecological perception and the social construction of technology (SCOT), I explore how such activities can be associated with traditional *roles*, consisting of:

1. The composer, who is in charge of generating patterns, sequences, and structures
2. The machine, which comprises modules and their configuration within a patch; and
3. The performer, whose task is to interpret the composition and interact with the machine.

I argue that these roles exist within a constantly changing network, whose structure and output are empty. Lastly, as I explore the various aspects of this theme, I will refer to coded segments seen in Table 9-5 in the appendix.

4.1.1 Composer

To discuss the *composer's* role within this creative structure, it is worth examining Zagorski-Thomas' (2014) application of the theory of ecological perception in the context of record production. The ecological approach developed by Gibson (1979) suggests that perception emerges from a system comprising an animal and its environment. This relates to the idea of *connectionism* (Thelen and Bates, 2003; Varela, Thompson and Rosch, 2016), according to which patterns of action and stimulation are entrained within the structure of the brain, creating 'pathways' of perception and action that also include an expectation of how the action or stimulation might continue.

The idea that perception and action cannot be separated and that connectionist structures involve stimulus and bodily response leads to the idea of *affordance*—a potential for future activity suggested by perception. Thus, pathways of perception are associated with affordances that may or may not be followed (Gibson, 1979).

Exploring the use of *tools*—"machines or devices that apply […] scientific knowledge for a practical purpose"—Zagorski-Thomas (2014, p. 98) also draws on the social construction of technology (SCOT). SCOT helps compare the 'action scripts' inherent in the design of tools with the interpretive flexibility of participants. It suggests that different users have different relationships with this action script, since they perceive different affordances in the same object. Most importantly, tools have the power to re-configure users and re-enforce pre-existing geographies of responsibilities, namely *roles*.

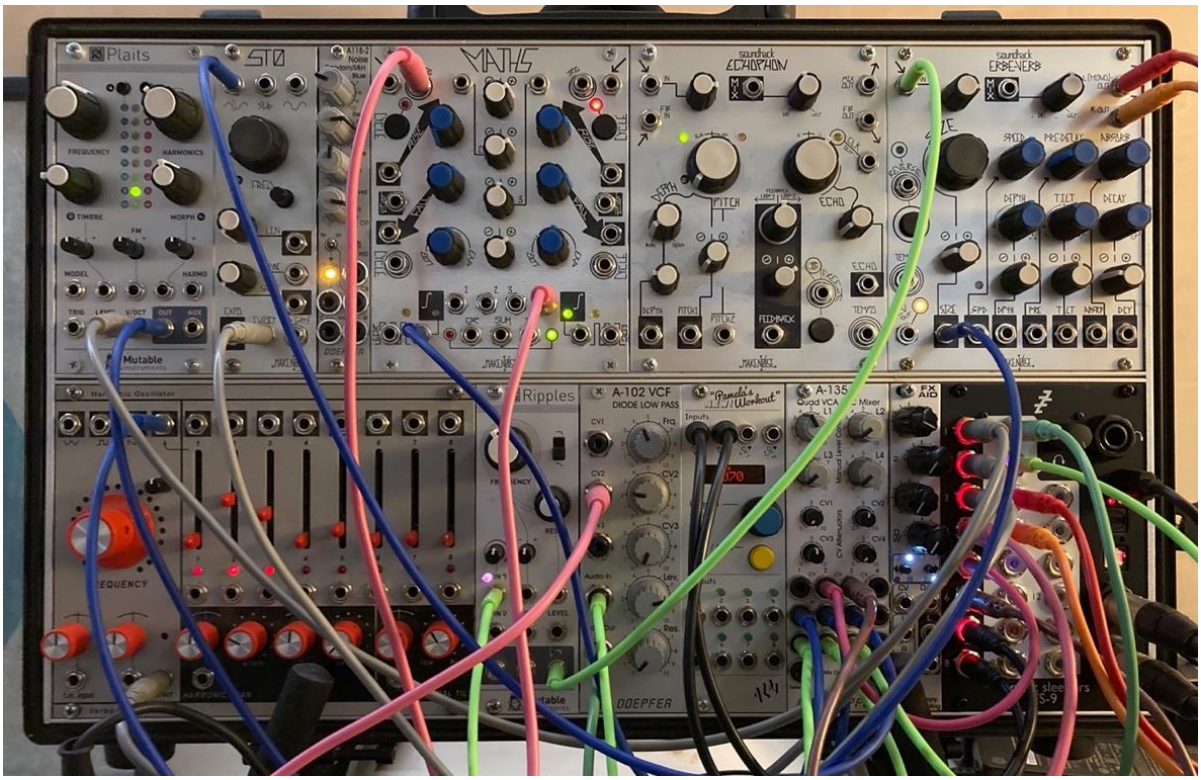

Figure 4-2 – An early version of the system, featuring MIDI-to-CV conversion via the Expert Sleepers *ES9*.

The role of the composer is described in the following segment as: "all aspects […] that are decided upon in advance and tend to remain constant from one performance and another" (LoC). My own compositional approach is common

to many practitioners, including those mentioned previously, and consists of generating patterns; expressing them as sequences; developing permutations; and structuring those into sections.

My background as a producer initially led me to the DAW Ableton Live as a host for programming MIDI patterns. Initial studio performances featured MIDI sequences converted to CV using the CV Tools plugin suite and via an Expert Sleepers ES9 (Figure 4-2 above). The action scripts inherent in Ableton Live lend themselves to advanced MIDI editing, but they also foster activities that were deemed less desirable for me, like as multi-track recording and audio editing (Figure 4-3 below).

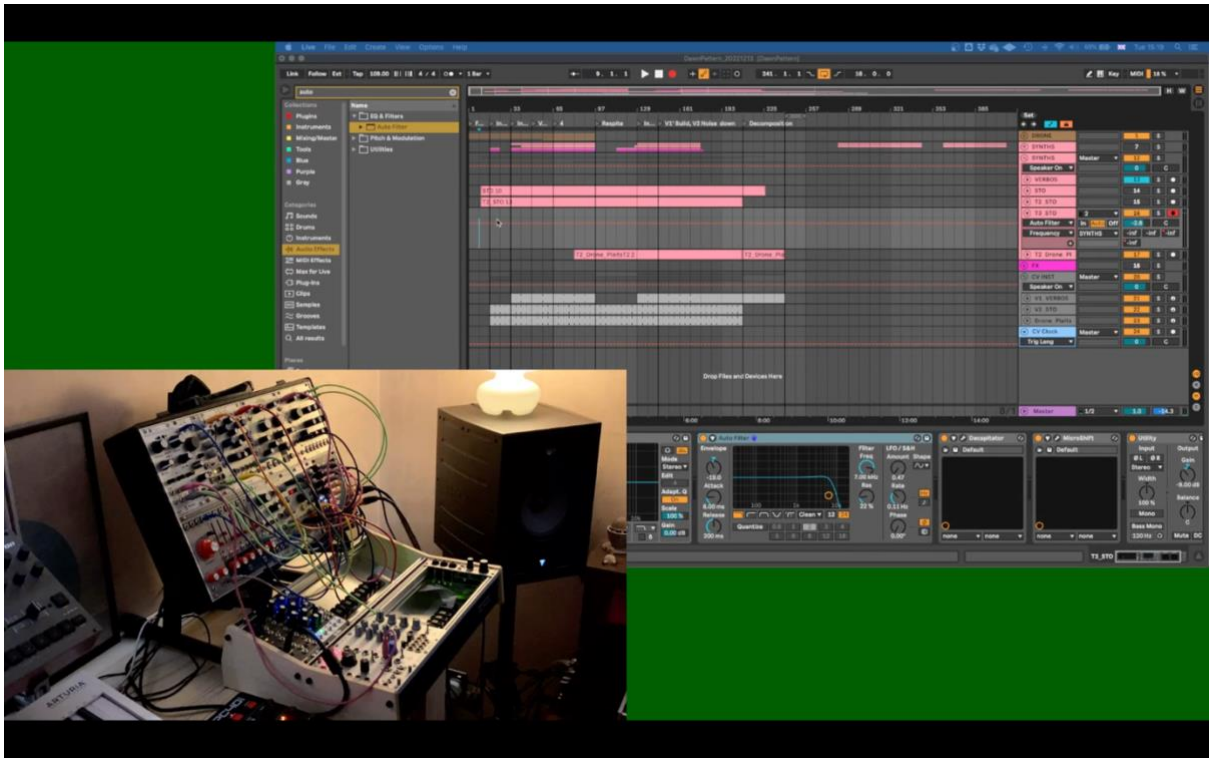

Figure 4-3 – Ableton Live as a MIDI host

The introduction of a *capable* hardware sequencer module—an ER-101—into the setup rendered MIDI-to-CV conversion redundant, however the sequencer

did not feature a timeline view of programmed patterns. In order to mitigate this, I began using traditional scoring using Avid Sibelius was used as a way of structuring the composition in advance of programming it into the sequencer. My compositional workflow with the ER-101 will be discussed in detail in the next chapter, however it is discussed here to reflect on how my role as a composer was reconfigured and reinforced based on changes in my sequencing setup.

4.1.2 Machine

The second aspect of delegation, the role of the *machine* was captured around instances that refer to the design and assembly of the means for carrying out compositions. For the modular synthesist, the configuration of *modules* into *patches* is a primary activity. Thus, multiple segments across the dataset describe experiments with different modules, and how those modules might be used by the performer and composer. Below are two examples:

> Upon starting the session, I had two sequences in 4/4 that went along with one another and a 'rough' idea for a patch that incorporated the Verbos HO [harmonic oscillator] and the STO [sub-timbral oscillator], both with noise going into their Pitch-CV input. (PL06)

> I worked with the idea of accentuating certain notes in the sequence, mapping the velocity expression to a CV out that opens the filter. (PL07)

These examples showcase patching approaches that execute the composition in a more-or-less direct way. These examples are complemented by ones that involve generative approaches. For instance, the patch seen in VL08

demonstrate sub-divisions of the clock signal that are used to trigger partials of the sequence. This approach introduces variations on the score and is described in one segment as “effective and worth further exploring to create intricacies within a given sequence.” (PL09)

Alongside the role of the machine in interpreting the composition, journal entries also refer to the machine’s capacity for affording interaction, as one video annotation writes:

> The performer creates a significant change in amplitude of the voice to emphasize the change in the composition (VL14).

Designing the machine is thus understood not only as an act of interpreting the composition, but also as a means of shaping a broader creative context. Echoing Rodgers’ (2011) notion of *technological worlding* (see 1.1), this design process enables the emergence of what Strange (1972, p. 3) described as “a collection of possibilities […] in an undedicated state”—a resource available to both composers and performers.

4.1.3 Performer

The role of the performer, according to one journal entry, comprises “interactions with the piece and its sonic contents”, including “any intentional change of parameters” (LoC). This sentiment is echoed by Dahlstedt (2018), who distinguishes *interaction*—any action that has direct audible effects—from *influence*, which involves changes to the internal mechanisms of a generative system that only take effect in the longer term. My own approach to performing with modular synthesisers is mostly characterised through interaction, whereas

influences are comprised of re-patching or changing sequencer patterns, which occur seldom and do not always have audible results.

While exploring interactions during performance using knobs and faders, the journals also bring up questions regarding *what* to manipulate and *when*, as seen in the following quotations:

> More intention needs to be placed on which parameters change at which time. This can be done using a more refined performance plan that functions as a score. (PL08)

The need for a "performance plan" that maps interactions is matched by another requirement, as expressed in another video annotations— "to learn the different elements in the piece and become closely intimate with them in order to build the right tension" (VL03).

The question of what aspects should be delegate to the performer in the first place also comes up in some journals. One video annotation refers to a drone that "doesn't come in the right volume [*sic*]", a matter that "could have been solved if the performer had more control over it" (VL06). Another annotation notes how in one performance, "the performer has no way of interacting with the structural elements of the piece (i.e., transitioning between the different sections)" (VL11).

According to composer Laurie Spiegel (2018), the delegation between automated processes (machine) and non-automated processes (performer) is crucial to the design. Spiegel delegates to algorithms those subsets of her decision-making process that she is able to sufficiently automate, reserving to

herself any real-time interaction with subsets that she is unable to decode. In the example above, the choice between which patterns to sequence automatically versus which to manually trigger constitutes part of designing a system, since it has implications on the performance. Indeed, the need to balance complex structures whilst maintaining control drove me to choose the ER-101 sequencer, and this will be explored in detail in the next chapter.

The exact behaviour of the composer-machine-performer network is hard to pin down. However, examining the accounts provided thus far, we can speculate how this non-hierarchical, complex web may lead to the development of modular performances. For example, as the composer develops ideas and attempts to implement them using his system (i.e., machine), certain affordances are made apparent, which prompt changes in the system and inspire the generation of new compositions. As the performer encounters the system and realises the scope of interactions it affords, this may influence the machine's design and prompt the conception of compositions that rely on these affordances.

This reciprocal relation connotes the Buddhist idea of emptiness. In this sense, the musical works developed in this process are products of a network of relations between aggregates, or roles. Next, we will explore yet another Buddhist idea, impermanence, in the following two theme.

4.2 Material Transformation

The second theme labelled 'material transformation', explores a core concept expressed in various ways throughout the journals—that pieces, patches, and

performances serve to embody gradual change in sonic material, and that this is done with the help of modular tools and performed gestures. I have interpreted two levels of material transformation—the modal and the global—and those will be described in the following sections with reference to journal segments seen in the appendix, Table 9-6.

This notion of changing sound is embodied in the compositional philosophy of Stockhausen (1972), whose Four Criteria of Electronic Music include 'Splitting of the Sound', that is to say the decomposition of a sound into separate components whose inclusion or omission over the course of a piece constitute a compositional choice. Yet, the idea of material transformation is closely linked to another musical tradition—minimalism. The term 'minimalism', often rejected by its key proponents, generally refers to music that is built on austere limitations, due to the devices and techniques it utilises (Gann, 2017).

As mentioned in Section 1.4, key features of pulse-based minimalism are its audible structure and linear transformation. This is encapsulated in Reich's idea of *Music as Gradual Process* (2017), where he explores gradual evolution of sound through human or mechanical means. By running material through a process, one has 'impersonal' control over the results, and "even when all the cards are on the table and everyone hears what is gradually happening [...], there are still enough mysteries to satisfy all" (2017, p. 305).

This is echoed by minimalist composer and modular synthesist Caterina Barbieri (2018), according to whom minimalism implies a focus on process rather than form. This gradual process of change to musical material, she suggests, produces a change in the mind of the listener. The following two

themes depart from thes ideas—the current focuses on changes in the modalities of sound, while the next examines change in patterns. In my own work, these themes are utilised as devices that encourage listeners to contemplate the nature of change in their physical and mental experience, a contemplation prescribed during Vipassana meditation.

Modal change reflects changes to modalities of amplitude, spectrum, timbre and space. The first, amplitude, was captured in journal entries that refer to changes in volume, either by manually adjusting the parameters of “envelop generators to change the intensity of sequences” (PL08); by adjusting “[velocity] automation on MIDI tracks” to change “the depth of the envelope” [...] modulation” (PL09); or as the performer alters the VCA depth manually (see VL04).

Alterations to the frequency spectrum were seen across different instances. One journal segment recounts an early experiment, where the Mutable Instruments Ripples’ cutoff frequency was modulated using pitch CV, to alter the spectral contents of noise signals (PL04). Another instance refers to a more standard use of filters: “there is a ‘build’ as all the parts are slowly growing in amplitude, due to the changes in the VCA and Filter settings” (VL05).

Changes to amplitude and spectra are joined by instances of spatial transformation, namely changes to reverb effect parameters. One journal segment reflects—

> How can the idea of space—understood through emptiness as a precondition for phenomena—be explored within modular based

> compositions? [...] The Make Noise Erbe-Verb can be used [...] to generate overtones through its decay parameter. Often the Erbe-Verb is more colorful when there is silence. (Planning)

In response to this reflection, several journal entries highlight the use of the Erbe-Verb. An early sketch titled *Memory Leaves*, for instance, employs "a reverb chain" to create a sonic "bed" (ConSyn). As one entry describes: "when the [Erbe-Verb's] decay is at the point of feedback [...] it enables the reverb to sound endless, as it reaches the cusp of self-oscillation" (PL06).

This effect recurs elsewhere. In VL10, for instance, the sequence's envelope CV is routed to modulate the Erbe-Verb's 'size' parameter, dynamically shifting the reverb's spatial depth. Together, these strategies reflect an effort to work with impermanence and spaciousness not just as abstract concepts, but as compositional material.

Timbral transformation refers to various manipulations of oscillator parameters—such as wave shape, harmonic content, and frequency modulation—as observed in PL09, PL12 (seen in segments in p. 218), This theme also includes journal segments that explore the sculpting of distinctive sonic textures (PL03), the simulation of real-world sounds (e.g., a "sub-kick" in PL06), and representations of extra-musical ideas, such as "darkness" and "light" (PL07). These examples suggest a movement beyond technical modulation toward metaphorical listening—where sound becomes a vehicle for affective and contemplative associations. In this sense, timbral choices do not

merely colour fixed sounds but serve as tools for conveying impermanence and sonic ambiguity, aligning with the meditative ethos underpinning the research.

Finally, material transformation also occurs at a global level—within the overall dynamics of the piece, or the sonic field as a whole. The term *global* is borrowed from Oliveros (2005), who distinguishes between *global* and *focal* listening, as previously discussed (p. 83). Just as global listening pertains to an awareness of the entire auditory field, *global change* refers to shifts in the piece's overall dynamic or structural contour, rather than in a single modality or parameter.

Several excerpts across the dataset refer to attempts to introduce such global changes to shape or respond to the evolving narrative of a piece. One journal entry describes how, in an early sketch titled *Dawn Patterns*, a drone was used to evoke a growing sense of brightness: "the gradual increase in intensity of the drone and sequence mirrors the intensity of the light, moving from dim to bright" (ConSyn).

Elsewhere, a video-log annotation highlights the absence of effective global shaping, framed through a critical reflection:

> This lack of clear contours in the performance causes the next section to fall flat. We see the influence of dance music motifs on [my own] quality judgement in the piece. There needs to be a 'build' followed by a 'release' in the form of a drop section (VL03).

Here, the *build-up*—a term drawn from the language of electronic dance music—serves as a reference for articulating large-scale dynamic change.

Other positive instances reinforce this sensibility, noting moments when “[t]he performer creates a significant change in [the] amplitude of the voice to emphasize the change in the composition,” or uses “filter changes” to punctuate the end of a phrase (VL03). These observations reveal how global change emerges from the interplay between compositional intention, performative responsiveness, and the affordances of the modular system.

4.3 Working with Patterns

> Once it is created, the pattern stands as an object exactly like the sound waves which generate it. We are at the same time inside and outside of the object. While being it, we observe it. (Barbieri, 2017b)

As discussed earlier (Section 3.3.2), my listening experiences often centre on patterns. Drawing on Buddhist theories of mind, I’ve suggested that this perceptual focus reflects a non-dual perspective—aligned with the notion of emptiness. The theme *working with patterns* builds on this idea that is echoed by Barbieri (2017b) and Harvey (1985), that patterns emerge through the co-construction of listener and sound. Existing within an ontology of pitch and time, patterns are performed in the process of sequencing. Engaging with patterns, then, requires a particular orientation within the composer-performer-machine network. The following paragraphs explore aspects of this theme, drawing on journal segments (listed in Table 9-7) and video logs.

Like the theme Material Transformation, working with patterns is emblematic of minimalist traditions, and many minimalist pieces are grounded on repetition of patterns with a steady beat, alongside additive and permutational processes

(Fink, 2005; Gann, 2017; Sherbourne, 2017; Magnusson and MacLean, 2018). However, when considering working with patterns, it is also useful to draw from longstanding discourses on algorithmic music.

Dean and MacLean (2018, p. 2) define an algorithm as “a finite sequence or structure of instructions”. The roots of algorithmic music can be traced to the confluence of music and mathematics, e.g., the vowel-to-pitch algorithms of Guido d’Arezzo in 1026 AD (Collins, 2018), yet much of its extant momentum stems from experimental process-music from the 1960s, including works by minimalist composers like Glass and Reich (Collins, 2018; Magnusson and MacLean, 2018). The additive and permutational processes seen in prior minimalist music are based on pre-defined sets of operations performed on domains like pitch and time, therefore they can be understood as *manual* or *analogue* algorithms rather than *computational*.

The first aspect of the *working with patterns* theme concerns one of their fundamental components: time. This cluster centres on repeated references to rhythm, metre, bar length, and the influence of delay effects (p. 219). Several segments reflect on the construction of percussive elements that articulate pulse. For instance, the early sketch *East Wind* features “oscillation and pulsation” (ConSyn) produced through “the STO’s wave-folding output” modulated by a heartbeat-like LFO (PL03). A similar approach appears in VL01, which documents an experiment using pulse-based sequencing alongside a triplet pattern.

Complementing time, pitch emerges as another key parameter in the construction of patterns. Relevant segments refer to scale, key, melody, and

the perceived horizontal harmony produced by adding partials to a monophonic line (also on p. 219). While pitch and time can be discussed separately, they often operate in tandem—as seen in the following entry: “I worked with a 2-bar phrase of 16th notes playing staccato in an F minor key” (PL01).

My work assumes, as others have also suggested (Margulis, 2014; Magnusson and MacLean, 2018), that patterns are established through repetition. However, an additional aspect of *working with patterns* emerged around a related cluster of meaning, captured in the following reflection:

> This repetition with no variation ends up sounding too drowsy in my opinion. It’s a balance between repetition and change that needs to be emphasized and this configuration/composition isn't quite delivering (VL02).

While repetition remains a defining feature of patterns, the journals underscore the importance of development. Specifically, they refer to techniques for introducing variation using algorithmic processes, akin to those found in minimalist process music.

This concern gains added relevance in the context of contemporary Eurorack practice. Modern sequencers—such as Erica Synths’ Black Sequencer, inspired by vintage designs like the Moog 960 or Korg SQ-10—enable users to repeat patterns indefinitely. In parallel, manufacturers like Qu-Bit have introduced modules (e.g., Bloom) that facilitate real-time algorithmic variation. Examples from my sketch *Made Flesh* demonstrate how operations such as

rhythmic displacement, interval resizing, amplitude-based selection, and reversal (see p. 220) contribute to dynamic, evolving patterning.

A final aspect of this theme emerged from segments that conceptualise variation as a form of ontological expansion. These were labelled '*stretching the boundaries of a pattern'*, inspired by the following excerpt:

> Expanding on the notion of pattern as object, I can apply different operations on this object [thus] stretch its ontological boundaries, to achieve different perceived results (PL02).

In sum, *working with patterns* captures a multi-faceted concept running throughout the dataset: patterns are established in the listener's mind through repetition, yet demand variation to remain perceptually engaging. I explored this balance using algorithmic approaches to create evolution across iterations. As each variation is registered in relation to its previous, the listener's perception expands—from what *was*, to what *could be*. This temporal synthesis, discussed further in Chapter 5 via Deleuze (1994), suggests that transforming a pattern's structure—much like altering its sonic material—is a fundamental mode of musical change.

4.4 Embodied Performance

After discussing expressions of change in developing a modular system, the fourth theme, *embodied performance* explores how a contemplative engagement with modular synthesis should implicates the body in modular musicking, highlighting the role of attention for both *listeners* and *performer*. From the performers' side, the theme emphasises tactile engagement with

interfaces. As such, performers lay out a patch, where *thought equals gesture, equals sound*, in order to promote a state of flow. This approach involves developing a relationship with a patch and exploring its boundaries, namely understanding in a cognitive, sensory-motor fashion which knob, or fader position is 'right', and which is 'wrong'. Buchla pioneer, Suzanne Ciani addresses the topic, as she writes:

> [A] performer must be familiar with his patch, to the point of not having to 'think twice' (at least not more than once) about what effect or series of consequences will be produced by a given action (1976, p. 2).

From the perspective of the audience, embodied performance helps connect gestures with their sonic effect (although this might not be easy when gestures are minimal), which is important in electronic music that has been previously considered *disembodied* (Dahlstedt, 2018). These two sides of embodied performance—the perspective of the performer and that of the audience—will be delineated in this section, by referring to coded segments detailed in Table 9-8 in the appendix.

The first aspect, *'uniform and tactile interfaces'*, suggests that as attention shifts away from the modular instrument toward visually oriented interfaces, focus becomes fragmented. The hybrid setup discussed previously (see 4.1.1)—where MIDI is sequenced in the DAW and converted to CV—was experienced as intuitive and user-friendly. However, several audio-visual journals depict the challenge of navigating back and forth between the modular system and the computer screen, often disrupting creative flow (e.g., VL01,

VL06, VL10). Conversely, by limiting attention to the modular system itself—such as through the use of the ER-101 sequencer—the performer may experience a deeper sense of focus and satisfaction (see PL12, p. 220).

Bullock (2018) discusses approaches to the design of musical interfaces, stressing the importance of enhancing tangibility and immediacy by pairing intention and effect. He suggests that an interface's pliability is highest when "tactile, visual and auditory cues are all aligned to a common model, thus minimizing potential 'dissonance' between modalities" (Bullock, 2018, p. 475). It should come as no surprise that the tactility of Eurorack systems is considered a key attraction, especially when compared with visually-oriented digital interfaces (Holmes, 2020; Randell and Rietveld, 2024). This serves to elucidate my own interest with modular instruments—they enable physical engagement with sonic manipulation.

In chapter 1 (p. 31), I drew on Csikszentmihalyi's (2008) theory of *flow* to describe certain listening experiences. As stated, flow states are characterised by clear goals, merging of action and awareness, concentration on a task, sense of control over an activity, a loss of self-consciousness, and sense of expanded present. An activity is conducive for flow if it requires learning skills, enables control, and provides feedback. In surveying the applications of flow within interface design, Bullock (2018, pp. 463–464) discusses systems which rely on "motor skill acquisition as a key to achieving virtuosity", suggesting that in order to allow flow, instruments should have "rapid feedback cycles and responsiveness".

Similarly, a second aspect of this theme, ‘focusing attention, promoting flow’ conceptualises uniform, tactile, and responsive interfaces as conditions for flow. It was captured around instances that describe the achievement of flow through tactility and even feedback. When attention is not split between interfaces, video annotations report enhanced focus and enjoyment (p. 221).

The basis for an engaging user experience, according to Bullock (2018, p. 463), lies in the cultivation of “flow, virtuosity, and the see-hear-understand learning cycle”. Instead of visual and user-friendly approaches to design, he argues for systems that allow beginner users to become experts through motor-skill acquisition. Much like acoustic musical instruments, electronic and digital interfaces should have an inherent difficulty curve, allowing development over time.

This is echoed by Zagorski-Thomas (2014), who urges us to think of tools not only in terms of the jobs they afford doing, rather through the sensory-motor activity and haptic feedback they imply. This “continual feedback loop of thinking and doing, and the combined flow of consciousness, gesture and the affordances of the material” constitute the final result (2014, p. 147). The notion that tools or interfaces have the capacity to promote flow lies, therefore, in their built-in learning curve and their ability to merge action and awareness through constant feedback. Eurorack systems are flow-promoting, due to their tactile nature, even feedback, and the fact that they stress the achievement of mastery with a specific set of modules.

However, mastery is often patch-dependent—that is, shaped by the performer’s relationship with a specific module configuration. A third aspect of

the theme, then, centres on attempts to map parameter states to their sonic outcomes, in order to develop competence and expressivity. One journal segment describes how “the performer feels the boundaries of the patch, trying to 'tease' a position in the knobs that would create the smoothest transition” (VL06). Other excerpts reflect how parameters are adjusted to match the energy of a piece, how gestures are tested for their audible effect, and how crossing the patch’s perceived boundaries can result in producing the ‘wrong’ sound (see p. 221).

Alongside embodied aspects from the performer’s side, this theme considers performative gestures from the audience’s standpoint. Zagorski-Thomas (2014) discuss the metaphorical links between perceived phenomena and its embodied experience. He examines the correlation between action and sound through the idea of ‘image-schemata’, the mental structures that link sensorimotor experience across different modes. He claims that this correlation exists on a spectrum between *direct*, like mapping the sound of a drum to the act of hitting it, and *indirect*, such as the case of the synthesiser, which has no direct links to real-world objects.

Similarly, Dahlstedt (2018) discusses the detection of agency in the embodied experience of music through sensory overlap of visual, motor and audible information. He suggests that listeners in electronic music often have no visible cause or source to the sound, resulting in its disembodiment. He observes that some forms of interaction involving “minimal finger gestures” can cause a sense of “intimate sonic interaction” (2018, p. 61). Synthesized sound cannot always be mapped by audiences to a particular gesture; therefore, modular live

performances with their touchpads, faders, and knobs enable the formation of novel sensory-motor connections.

The last aspect, *'visual gestures, audible results'* illustrates these points—revolving around instances where small finger gestures cause significant sonic change. This is captured in VL02, where "a twist of a knob brings in a melody unheard before," and echoed in other examples (e.g., VL01, VL05, and VL06; see p. 221). These moments highlight how the audience's perception of sonic transformation is closely tied to the performer's visible gestures—making the relationship between motion and sound a key consideration in modular performance.

From both performer and audience perspectives, the core concern of *embodied performance* is how attention is facilitated and directed. In this context, attention—our awareness of phenomena—presupposes embodiment. Recognising that awareness underpins all phenomenal experience is central to the contemplative framework explored in this research.

4.5 Fighting the Habitual

The final theme, *fighting the habitual* explores a multi-faceted idea reflected throughout the dataset—that in the process of refining my approach for composing and performing with a modular system, I had, to a certain extent, let go of some of the habits that characterised my previous work as an electronic music producer (Haguel, 2020). These habits include sequencing parts from my DAW using MIDI; recording multiple takes and arduously editing them to capture the 'perfect' performance; and excessively layering recordings

as an arrangement tool, using the DAW's multi-channel functionality. This theme also examines how modular synthesisers force their users to embrace physical and financial limitations, as well as the uncertainty that they invite. In the following section I will attempt to describe this theme and its various facets, referring to the coded segments seen in appendix Table 9-9.

As discussed earlier (4.1), tools reconfigure their users—illustrated by the influence of Ableton Live on my compositional approach. In today's recording and production environments, DAWs such as Live, Cubase, and Logic are often considered integral, as they enable a wide range of functions. The first aspect of this theme centres on moments where features typically associated with DAWs—mainly MIDI capabilities and digital signal processing (VST)—were consciously employed at early stages of system development (see coded segments, p. 221).

As development progressed, I came to realise that my reliance on the DAW often led me down pathways that no longer served the work. This is captured vividly in a video log documenting the sketch *Dawn Patterns* (VL06), where—after recording a take—I turn to the DAW to listen and edit, only to become absorbed in the editing process and lose the creative thread. Similarly, many journals indicate efforts to record multiple takes and painstakingly edit them, in order to achieve the 'right' performance. This habit, born out of past conditioning, can be considered unnecessary within the ephemera of live performance.

Another example appears in segments describing how Ableton's multi-track layout encouraged arranging for multiple parts, recording them, and

experimenting with their processing. One journal entry, reflecting an intuitive stance while working on the same sketch, notes:

> I figured that as I record one element over another, the piece will start taking shape and the parameters that are appropriate for modification will become apparent (PL09).

While this workflow made sense in a studio context—where layering and editing are expected—it soon proved limiting in performance. Trying to control multiple parts live felt cumbersome and, as I discovered, required additional modules that I didn't have. As one video annotation captures: "the multiplicity requires many modules to support, and I do not have enough filters" (VL02).

This realisation marked a turning point. Working with modular synthesis wasn't just about letting go of old habits—it meant committing to new ones. Across multiple entries, I began to favour simpler, more focused patches. I reflected on how two parts "could be merged into one voice" (PL04), or how I might "exploit as many parameters within one oscillator" (PL10). At one point, I simply concluded: "I elected to keep the patch simple" (PL06).

A last aspect of this theme embraces the uncertainty inherent in working with modular instruments—inviting experimentation, unpredictability, and disparity between performances. One entry captures this vividly:

> Then, by pure accident, I disabled the pitch CV out from seq.1's CV instrument, and what I got was a tone hitting in the rhythm of the original

sequence but in C. Together with the heavily modulated reverb and seq.2 playing at the same time I got something really interesting (VL10).

Moments like this taught me to value the unexpected, and to accept that not everything needs to be planned or repeatable. *Fighting the habitual,* then, isn't just about letting go of established workflows—it's also about making space for new ones to emerge. This echoes Suzuki Roshi's philosophy in *Zen Mind, Beginners Mind* (2020), where he emphasises the importance of approaching each moment with openness and without striving for control. A contemplative approach to modular synthesis—and indeed to any form of music-making—requires exactly this kind of open-mindedness: the willingness to listen, adapt, and let the system lead.

4.6 Chapter Summary

This chapter extends the inquiry of the previous one. Shifting from a listening-based exploration, it asks how contemplative themes might manifest through the development of a modular system. Through the analysis of a series of studio sessions—documented in textual and audio-visual journals—patterns of meaning were generated that articulate key aspects of modular praxis. These themes reflect how modular practice distributes roles across composer, performer, and machine, with each configuration shaped by the tools employed. They also capture attempts to embody change in musical material—whether through shifts in amplitude, spectral content, timbre, spatial placement, or broader formal development. Dimensions of pitch and time, examined through the theme of pattern, offer another conduit for musical

evolution and are often contextualised within the aesthetics of minimalist process music.

As the system took shape, the journals illuminated how modular instruments implicate the body in sonic manipulation—offering tangible correlations between gesture and sound to both performer and audience. This embodied dimension of practice frequently gave rise to flow states, whose characteristics—total immersion, clarity of focus, and loss of self-consciousness—resonate with contemplative practice and mindfulness.

Finally, a recurring thread highlights how modular work fosters the ability to let go of inherited or habitual workflows in favour of those more attuned to the system's affordances. System-building—through assembling, configuring, and developing supporting tools—is revealed as a central act within modular practice. The questions raised throughout this chapter extend naturally into the next: how might these contemplative themes manifest in performance development, and how can the system support their expression?

5 On Developing a Modular Performance

The previous chapter raised a central concern: how can modular systems support the creation of contemplative performances? The current chapter responds by tracking Phase 3 of the research, which focuses on the development of a modular performance—composing pieces, patching modules, and devising performed interactions. As outlined in 2.7.3, this phase saw me develop some of the sketches discussed previously, as well as compose new pieces. It also involved refining my system (seen in Figure 5-1), my patching and my creative workflow.

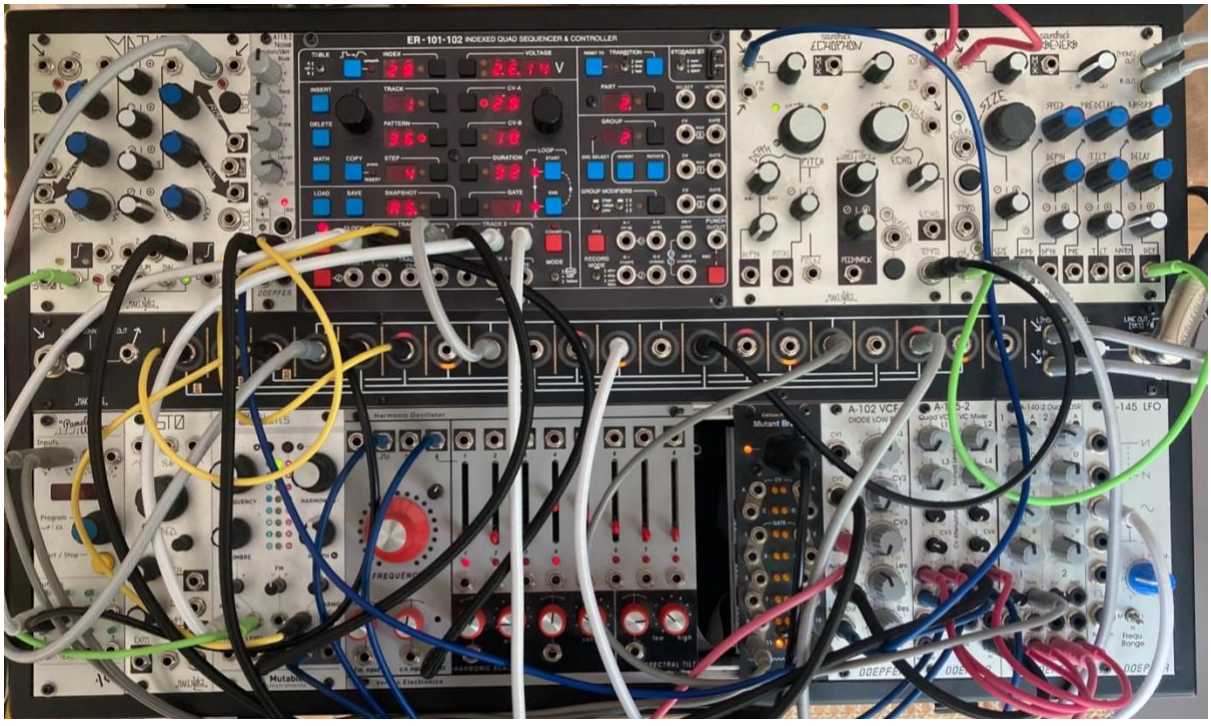

Figure 5-1 – The modular system used in my final performance.

This stage of the research was journalled, and a trial performance held at The Albany (London) was filmed for further reflection. Additionally, practical artefacts, like scores and patch diagrams—written in the markup language

PatchBook (Ferre, 2023)—were also collected. Finally, these materials were analysed using Reflexive Thematic Analysis (Braun and Clarke, 2022), as mentioned in previous chapters. Analysing these different data sources, my aim was to address these two research questions:

- How might the contemplative themes generated through listening and modular-system building inform the creation of a modular performance?
- How can the act of developing performance pieces support existing themes and contribute to the generation of new ones?

The resulting four themes and their interrelations—summarised in the thematic map below (Figure 5-2)—address the question of how contemplative principles can inform practitioners' sense-making as they develop modular-based performances. The sections that follow introduce each theme in turn, using coded segments drawn from the dataset, with abbreviated journal names listed in Table 5-1.

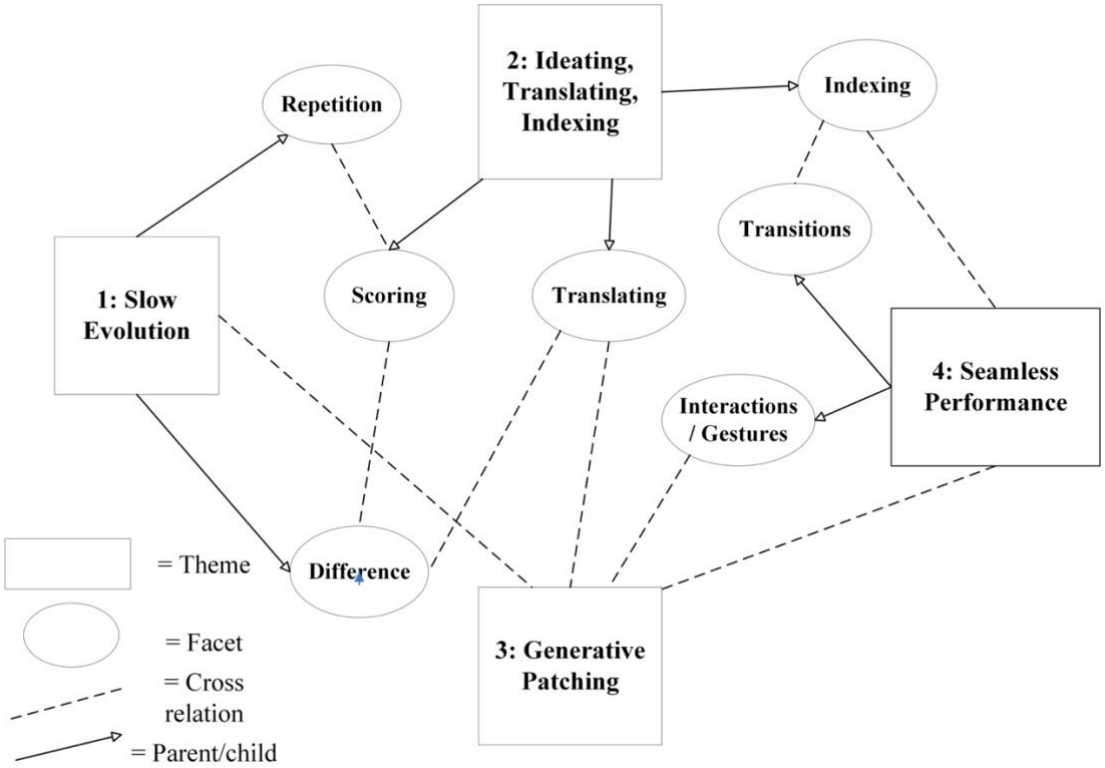

Figure 5-2 – Thematic Map

Abb.	Format	Date Captured
PL13	Text	27/07/2023
PL14	Text	08/08/2023
PL15	Text	05/10/2023
PL16	Text	24/11/2023
PL17	Text	25/11/2023
PL18	Text	29/11/2023
PL19	Text	05/12/2023
PL20	Text	12/12/2023
PL21	Text	02/01/2024
PL22	Text	05/02/2024
PL23	Text	12/02/2024
PL24	Text	20/02/2024
PL25	Text	21/02/2024
PL26	Text	28/02/2024
PL27A	Text	29/02/2024

PL27B	Text	29/02/2024
PL28	Text	05/03/2024
VL15	Video	20/03/2024
PL29	Text	03/04/2024
PL30	Text	04/04/2024
PL31	Text	11/04/2024
PL32	Text	12/04/2024
PL33	Text	04/05/2024
PL34	Text	05/05/2024
PL35	Text	06/05/2024
PL36	Text	07/05/2024
PL37	Text	09/05/2024
PL38A	Text	13/05/2024
PL38B	Text	13/05/2024
PL39	Text	19/05/2024
PL40	Text	20/05/2024
PL41	Text	04/06/2024
PL42	Text	05/06/2024
PL43	Text	06/06/2024
PL44	Text	14/06/2024
PL46	Text	28/06/2024

Table 5-1 – List of Journal Abbreviations from Phase 3 (PL = Practice Log, VL = Video Log)

5.1 Slow Evolution

> The role of the imagination, or the mind which contemplates in its multiple and fragmented states, is to draw something new from repetition, to draw difference from it. (Deleuze, 1994, p. 100)

The first theme, *'slow evolution'* represents a key compositional approach seen across journals and scores captured during this phase. According to this approach, a contemplative aesthetic encompasses gradual change in musical

material (patterns) and involves a balance between repetition and difference. This theme is a consequence of the theme ‘working with patterns’ discussed in 4. Philosophically, it links to some of the discussions in 0, concerning the temporality of attention, the notion of music as change and the idea of patterns as mental constructs. To provide a framework for the dynamics of slow evolution, let us examine key concepts from the philosophy of Deleuze, before exploring forms of repetition and difference interwoven within this body of work.

In *Difference and Repetition*, Deleuze (1994) challenges the notion of repetition as mere generality or habit. Instead, he argues that the systematisation of experience—the formation of habit—is the constitutive root of the subject (Self). As an organisation of impressions, the subject is *constituted* through a synthesis of time rather than acting as its agent. His three syntheses of time—habit (present), memory (past), and future—offer a complex model of temporality in which repetition and difference operate (Deleuze, 1994; Somers-Hall, 2013). Certainly, a comprehensive account of Deleuze’s thinking in Difference and Repetition is far beyond the scope of this chapter. Nevertheless, I will attempt to briefly outline his three syntheses of time and examine their relevance to this theme.

The first synthesis of time—the passive synthesis of *habit*—produces a variable present, with the past and future existing as its dimensions. This synthesis structures experience by linking past and future to the present through anticipation and retention. (Deleuze, 1994; Smith, 2023). The first synthesis gives rise to *bare repetition*, where indifferent events are synthesises in a

temporal field (Somers-Hall, 2013). The synthesis of habit is easily applied to listening, where experience is structured through memory and expectation.

Unlike the first synthesis of time, which operates through succession, the second synthesis of *pure past* operates *non-chronologically*, shaping memory not linearly but as a contraction of past experiences into a dynamic field. In this sense, the past is not merely a sequence of former presents but a virtual whole that is contracted into habit through *contemplation* or *imagination* (Deleuze, 1994; Somers-Hall, 2013)[31]. When we contemplate the past, we contract similarity from an expansive field of co-existing differences. Once again, we can think of musical experience, which is grounded on a co-existing past of experiences[32].

For Deleuze, habit (succession) and memory (co-existence) are not opposed but two modalities of the same ontologically prior, pure form of time. This form is neither successive nor co-existent but generates both. Considered independently of any subject, time exists as an empty structure that bifurcates into past and present. Deleuze links this synthesis to Nietzsche's *Eternal Return*:

> What if a demon crept after thee into thy loneliest loneliness some day or night, and said to thee: "This life, as thou livest it at present, and hast lived it, thou must live it once more, and also innumerable times [...]

[31] Deleuze (1994) borrows Hume's term *imagination* as the faculty that contracts habit from the past. Notably, the Hebrew word *dimyon* (דמיון) exhibits this duality, for it signifies *likeness* or *resemblance*, while also carrying the meaning imagination. God made man in its *image*, and so we *imagine* something to have a similarity with something else.

[32] Think of the difference between experiencing a certain piece of music for the first time, versus second listen, etc.

> Wouldst thou not throw thyself down and gnash thy teeth, and curse the demon that so spake? Or hast thou once experienced a tremendous moment in which thou wouldst answer him: “Thou art a God, and never did I hear anything so divine!” (Nietzsche, 2012, sec. 341).

For Deleuze (1994), the eternal return does not mean the repetition of events—this would assume time as externally structured. Instead, it brings back only what can persist through transformation: pure difference, not fixed identities. The eternal return is the expression of the third synthesis—the synthesis of the future (Deleuze, 1994; Smith, 2023). In this way, slow evolution can be understood as a process of perpetual differentiation. While musical forms repeat and structure dissolves, listeners are invited to observe changes in their subjectivity, as an ongoing cycle of emergence and transformation.

To expound on the repetitious forms within this body of work, I will utilise a distinction that originates in linguistic readings of popular music, between *musematic* and *discursive* repetition. *Musemes*, according to Tagg (1982, p. 48) are “minimal units of expression in any musical style”. In the writings of Middleton (1983, p. 238), musematic repetition involves the reiteration of these musical *atoms*, while discursive repetition encompasses “the repetition of longer units, at the level of the phrase (defined as a unit roughly equivalent to a verbal clause or short sentence, not too long to be apprehended ‘in the present’)”.

This theoretical typology is useful. In practice, musematic and recursive repetition are mutually inclusive, and the former is often contained within the

latter. For illustrative purposes, the series *AAB*, *AAC*, *AAB*, *AAC* shows the museme A repeated in the elements AAB and AAC, but it also shows recursive repetition when the element AAB is repeated again. We might think of the coupling of AAB and AAC as constituting a theme that is also repeated in the series. Figure 5-3 shows an example of musematic repetition, wherein an eight-note diatonic sequence is repeated with variations on the 4th, 5th and 8th notes of each iteration (also on the 6th and 7th in the last bar). Similarly, the opening sequence of "Made Flesh" (Figure 5-4) also provides an example for this. There, an eight-tone museme is repeated eight times, but each time with varying rhythmic values (more on this later).

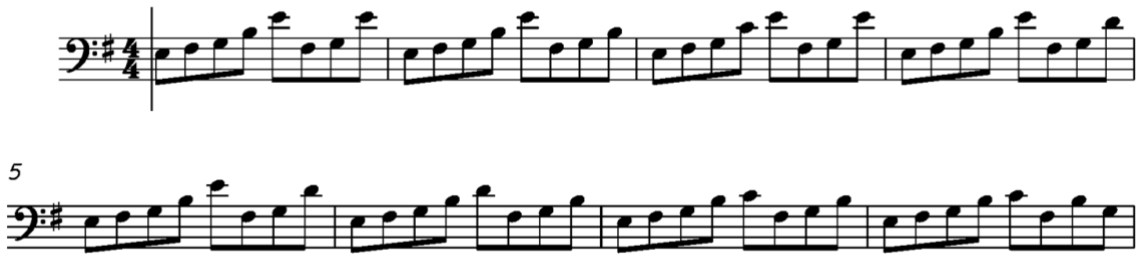

Figure 5-3 – *Lighthouse II*, introductory sequence

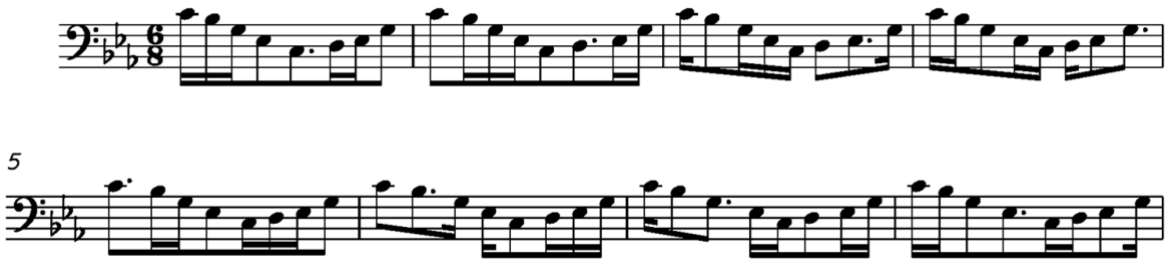

Figure 5-4 – *Made Flesh*, introductory sequence

In these examples, repeated musemes result in larger phrases that are also repeated recursively, as seen in other instances. For example, the 17-bar phrase from shown in Figure 5-5 illustrates this point further. There, the underlined phrases 1 and 2 form a larger iteration, 1-1-2-2, which is repeated over the course of the piece (still, with a variation in the second iteration of 2). Similar overarching iterations or *themes* are repeated in a recursive manner in various instances, like in Figure 5-6. Similarly, the opening theme of *Interlude* (Figure 5-7) was lifted from the second theme of *Intensity* (Figure 5-8) and juxtaposed over a new context—a recursive repetition between different pieces, with some difference.

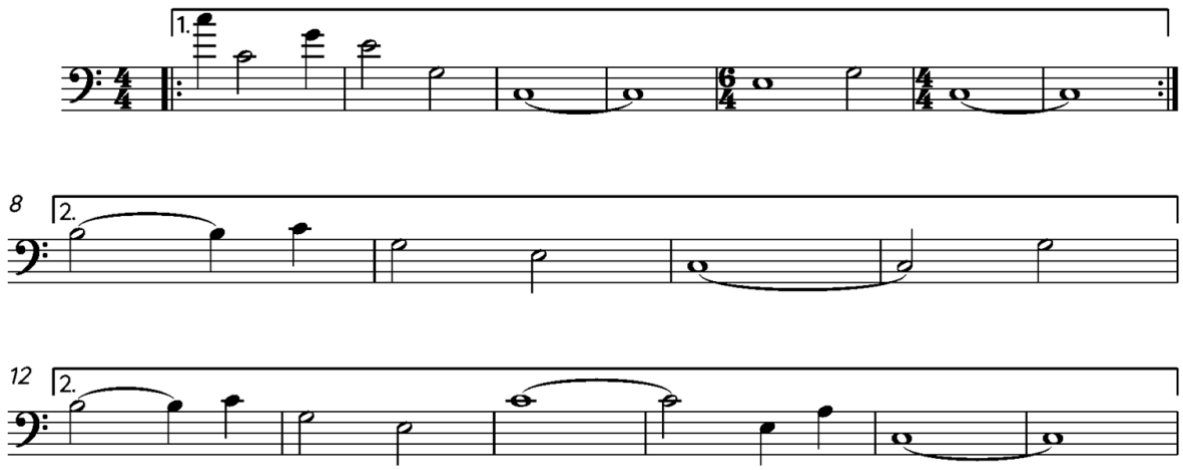

Figure 5-5 – *Pythagorean Age Love*, opening theme

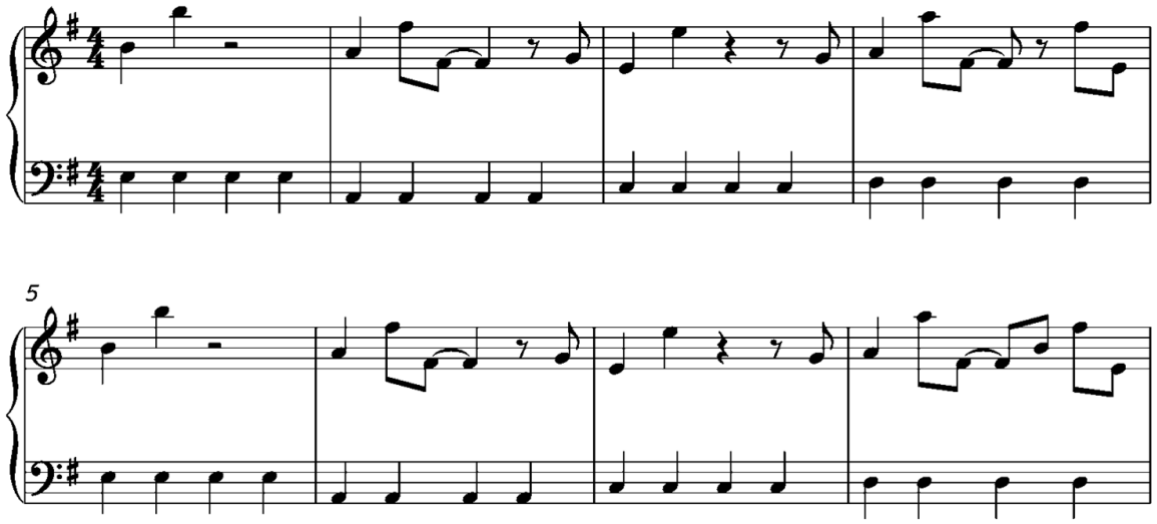

Figure 5-6 – *Intensity*, opening theme

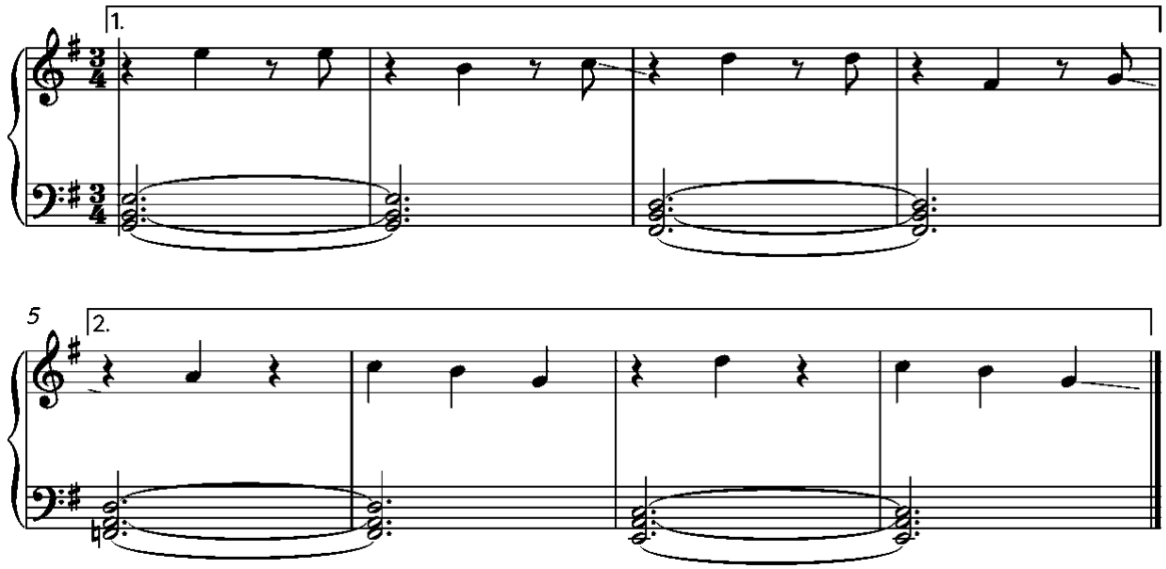

Figure 5-7 – *Interlude*, opening theme

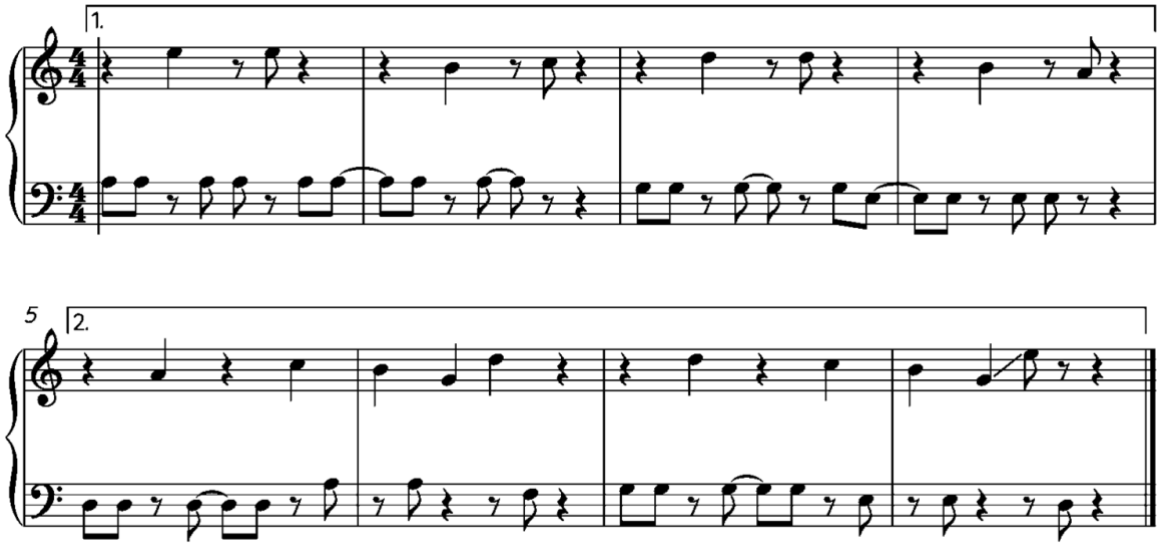

Figure 5-8 – *Immanence*, second theme

Another repetitious form, *drone* is also explored within this body of work. Drone as a meditative practice has been established in chapter 1, mainly due to its function of contrasting variety and change with stasis and its ability to centre listeners in the present moment (Boon, 2002). This aesthetic is exemplified in the minimal works of La Monte Young and the slowly evolving pieces of Éliane Radigue. Similarly, during a lull in the final piece, *Rite Of*, a sparse melody based on an E-minor key is played, and a low E1 note slowly fades in. This simple yet effective device provides an anchor for the listener, cementing the tonal centre of the piece and creating "a constant from which the mind can move, back and forth" (Boon, 2002, p. 65).

So far, we have related to *repetition* across the compositions developed in this phase. However, in order to fully account for *slow evolution*, we must unequivocally relate to attempts at creating *difference*. In line with the theme

Working with Patterns, I will utilise a formalist distinction between *pitch*- and *time*-based operations, referring to coded segments seen in Table 9-10.

Pitch-based operations observed across journals and scores are manifold, ranging from simple intervallic shifts to more complex forms of melodic and harmonic development. Examples include altering the pitch of individual steps within a sequence—such as transposing certain notes by 12 semitones—to generate variation, as in: “steps are transposed by 12 semitones, and following that, those same steps start varying melodically” (PL23; see Figure 5-9). Another instance involves creating “variations on the low notes” of a pattern (PL25; see Figure 5-10). This also extends to the intentional use of glissando, implemented via the sequencer’s smoothing feature (Figure 5-11), which anticipates the next theme concerning my work with the ER-101 sequencer.

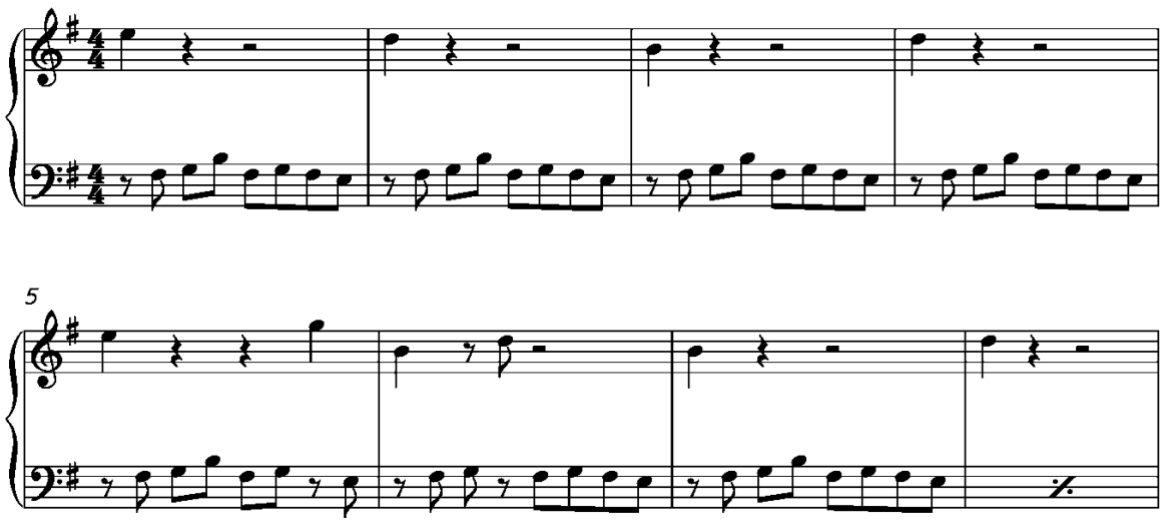

Figure 5-9 – Melodic interval resizing in *Rite Of*

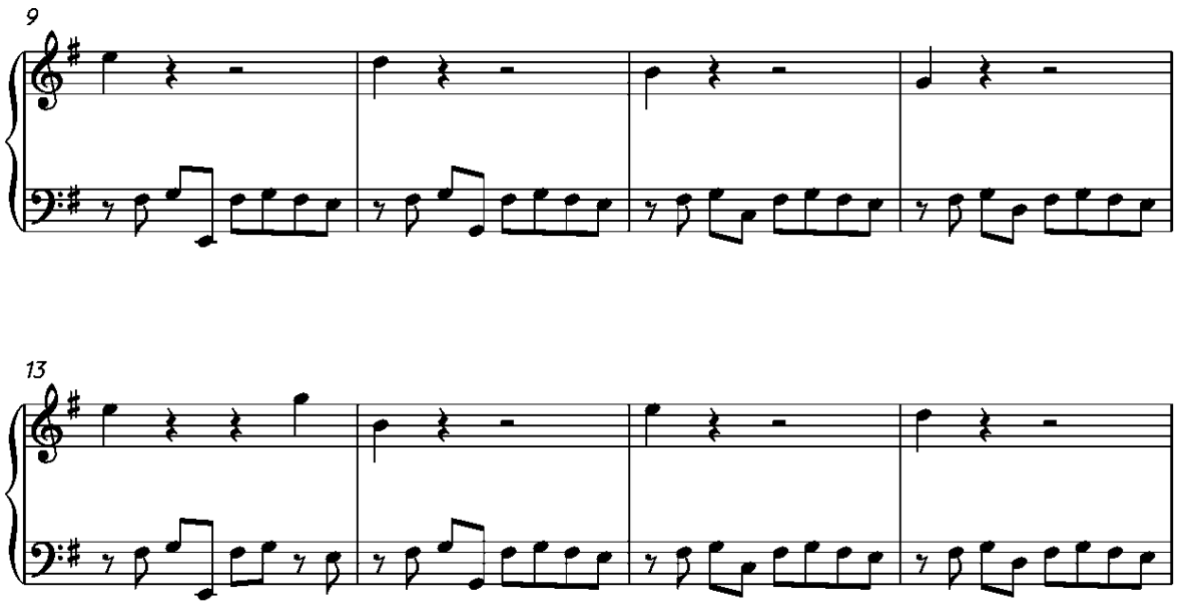

Figure 5-10 – Harmonic interval resizing in *Rite Of*

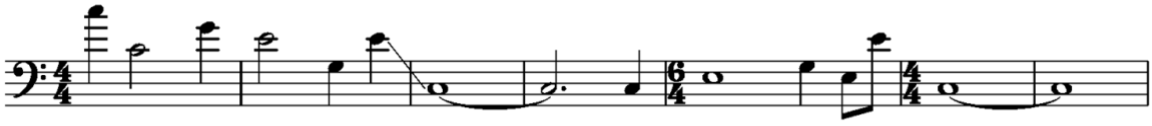

Figure 5-11 – Glissando in 5th iteration of *Pythagorean Age Love* (04:05)

Alongside pitch-based operations, time-based techniques were also documented across various journal entries and scores. These include established methods such as rhythmic variation, diminution, and augmentation. In *Pythagorean Age Love*, for instance, “different notes in the sequence [were manually divided] by two” (PL33). A similar process was explored in *Immanence*, this time using the sequencer’s ‘ratcheting’ feature to subdivide notes. Another approach appears in the second and third movements of *Lighthouse*, which share a common score but differ in tempo—one being performed at four times the speed of the other. As reflected in the following journal entry:

> The work on the fast version was really interesting, because it involved using the slow version as a baseline and expanding it. The expansion was done simply because playing the baseline version four times faster leads to an incredibly short piece. To expand this baseline version to be played at 232bpm (4 times 58), I had to work with multiple algorithmic processes that unfold simultaneously over time. (PL39)

Another prominent example of a time-based process appears in the piece *Made Flesh* (Figure 5-4), discussed earlier. In this work, the introductory sequence presents a series of tones with defined rhythmic values. With each iteration, the rhythmic set shifts by one step, producing eight variations of the same pitch sequence. This technique closely resembles Steve Reich's phase-shifting experiments. The process is captured in the following compositional prompt:

> "Take a series of lengths [S^1]—*listen*
>
> Shift it to the right and repeat this process until all combinations are exhausted [S^1...S^n]—*listen*
>
> Choose a small set of members [A] of the series and shift them by a certain interval (as composed)—*listen*
>
> Choose another small set of members [A'] and shift their intervals again—*listen*." (PL23)

In addition to temporal phasing, other forms of difference—discussed previously in 3.2 and 4.3—emerge from journal entries and scores depicting subtractive and additive procedures. Additive processes are particularly evident in work on the piece *A6*, which unfolds an 8-bar sequence that evolves from a 'minimalist' state (Figure 5-12) into a 'maximalist' one (Figure 5-13). This progression allows listeners to witness change that is, on the surface, both

predictable and detached from their control. Subtractive methods, meanwhile, are also revisited in *Made Flesh*, as reflected in the following journal entry:

> I realised that it would be easier to work with the sequence and have the gate of some steps = 0, to reveal only those notes of the sequence I want to emphasise. One pattern at a time, I silenced notes that I didn't want to hear (PL30).

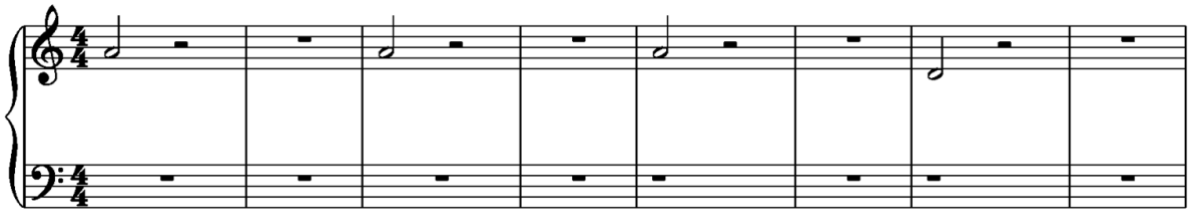

Figure 5-12 – *A6*, minimalist iteration

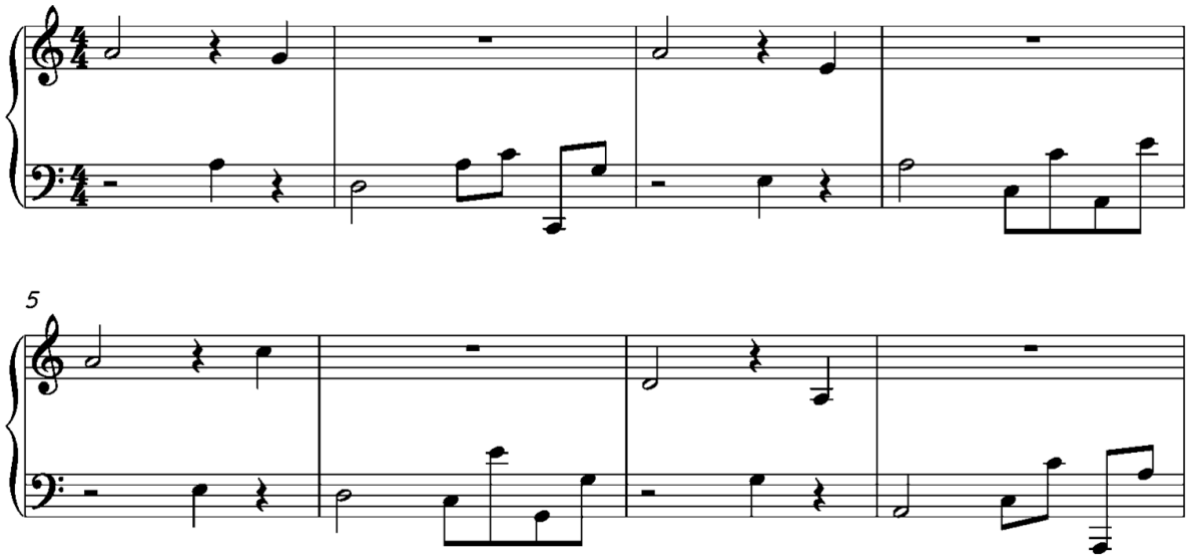

Figure 5-13 – *A6*, maximalist iteration

The devices expounded upon in this section—musematic and recursive forms of repetition, additive and subtractive processes, and operations based on time and pitch—were all nested under the theme *slow evolution.* Repetition and

difference, when intentionally explored, seem to invite reflection not only on musical time—how the present is shaped by memory and expectation—but also on my own role as composer and performer. In this sense, *slow evolution* has become more than a technical strategy; it reflects a compositional aesthetic that aligns with the contemplative aims of this project, and relates directly to the shifting role of the composer as discussed in Chapter 4.14. The next theme continues this line of inquiry, examining how that role is reconfigured through my interaction with an indexed sequencer.

5.2 Score, Translate, Refine, Index

A multi-faceted pattern of meaning generated from different references across the dataset, the second theme refers to my attempts of working with the ER-101, an 'indexed sequencer' manufactured by Orthogonal Devices (2021). At the heart of the indexed paradigm: stepped voltage values are retrieved from a customisable voltage table—an index. The ER-101's unique design and functionality fostered a unique workflow, which I divide into four:

1. Developing ideas in a score
2. Translating scores to sequencer language
3. Refining scores and patterns based on listening; and
4. Creating and maintaining a score-to-sequencer index.

These are conceptualised as different facets of the theme *Score, Translate, Refine, Index*, and in describing them I shall refer to coded segments seen in Table 9-11. Together, they serve to illustrate a point already established—that the affordances inherent in tools have the capacity to reinforce 'geographical' roles within music production (specifically, the role of the composer). Moreover,

using the example of working with the ER-101, I argue that these roles, while seemingly defined, hierarchical, and separate, are blurred, mutually dependent, and thus empty.

Unlike many modular sequencers—which support a limited number of steps, usually equal in length, and extending in multipliers of four (e.g., Intellijel's Metropolis below or the Make Noise René)—the ER-101 (seen in Figure 5-15) is centred on *pattern* entities, with each holding 0–99 *steps* of variable lengths. It also affords sequencing said patterns using customisable loop points, allowing the creation of larger structures. This architecture was used to create the slowly evolving aesthetic, discussed in the previous theme.

Figure 5-14 – Metropolis by Intellijel

However, the ER-101's interface seen below does not allow users to examine patterns 'at a glance', and this can pose a challenge for composers seeking a quick snapshot of their composition, as a whole. This limitation led me to develop compositions using a traditional system of representation—musical notation. This aspect is reflected in the notated examples provided in the previous section but is further cemented in the following excerpt:

In the past two weeks I have been experimenting with a new approach for composing. That is, writing sequences into Sibelius, making an initial structure in score form, before moving it into the ER-101 sequencer. Through this process, I am finding that I am provided with a [workflow]. It means that I can organize these 'simple' musical phrases, writing them in notated form, then see what types of operations I can perform on [them] [sic]. (PL13)

Figure 5-15 – ER-101 Indexed Quad Sequencer

The process described above, which involves scoring to develop *Ideas*, is evident across the dataset. Constituting a facet of this theme, it is interpreted as a complementary practice of generating and structuring ideas for the ER-101. It is important to note that scores are themselves representations, which is why describing them in a Platonic, idealistic sense might seem problematic. However, in this context they are treated as such, since they were used as a *primary* form of articulation.

Another facet of this theme was formed around efforts to translate scores to the language of the sequencer. As established, the ER-101 is distinguishable from other sequencers due to its ability to store large number of steps with the following parameters:

1. CV-A: assigned to pitch.
2. CV-B: can be assigned to any parameter.
3. Duration: the total length of a step measured by number of clock cycles.
4. Gate: the length of a step's logical on time, measured in clock cycles.
5. Ratchet (ON/OFF): note repeat.
6. Smoothing (ON/OFF): creates a CV portamento or ramp

To program patterns into the sequencer, one has to be involved in converting one system of musical representation (notes) into another (steps and their parameters), and this process involves some level of decision making, as users asks themselves questions like: *how can CV-B be used within a composition? How can gating and ratcheting be incorporated?* More generally, *how can steps be structured into patterns within the ER-101's memory?*

We have previously discussed glissando (p. 136), an operation on pitch, and its translation to voltage smoothing, in the language of the sequencer. This process of translation is seen in a one journal segment, which considers two approaches for translating the passage seen in Figure 5-16.

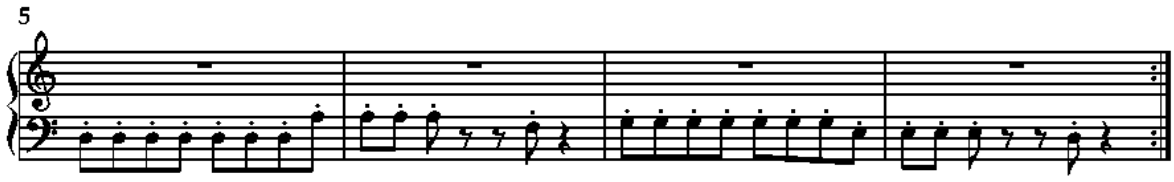

Figure 5-16 – Example from the piece *Immanence*

> [T]he two bars above can be represented in several ways, depending on the resolution of the clock. Let's assume the clock beats at 16th note intervals, then every musical bar would contain 16 beats of the clock. Thus, each note or rest in the above could be represented by its own step, a total of 16 steps, each with a duration=2, with gate=2 for notes and gate=0 for rests. This of course, allows the most flexibility [...] But it's not very economic (PL13).

A second, more economic approach—and the one eventually employed—is seen in Table 5-2. Its utility does not only lie in its storage efficiency, but also in the set of new affordances it brings. For instance, by applying an operation like smoothing to steps in the second approach, we stand to achieve results that are less accessible otherwise. Decisions concerning how to translate a musical passage become compositional since they imply ways in which passages can be transformed.

Step	CV-A	Duration	Gate	Ratchet
1	D2	14	1	ON
2	A2	8	1	ON
3	F2	4	0	OFF
4	F2	6	1	OFF

Table 5-2 – Economic representation of Figure 5-14

Once scores are translated, the journals recall the necessity for mapping sequencer patterns with corresponding sections of the score. As performance development progressed, an indexing method emerged, as described in the following:

> I began mapping my parts in a table-like format, in order to help understand their function and how they relate to each snapshot and other parts. This is akin to charting or writing a screenplay of the performance, whereby each scene is roughly planned all the while leaving room for improvisation (PL21).

This index table (seen in Figure 5-17) did not only track the process of translation, but also helped established a mechanism for recalling what each pattern does and how it relates to the overall performance plot. Instances that referred to creating and maintaining this index were assigned with the label ‘developing a score-to-sequence index’ and were interpreted as a facet of working with the indexed sequencer.

A1

Title	Trac	Patt	Bar #	Pattern Desc	Part #	Part Desc	Performance notes
Intro to min desc	1	1	73–80	Min desc alt melody	1	*	Start with shimmery sequence 1, looped
	2	1	Null	Chord sequence	1	loop	Slowly fade the chords, and play
	1	2	(1–6.75)x2	Sequence 1	1	loop	
Min Desc	2	2	Null	Silence (1 bar)	2, 3	loop	
	1	3	1–8	Intro	2	reset	Bright and thin
	1	4	9–24	A	2		
	1	5	25–32	B	2		
	1	6,8	17–24*	A (2nd/3rd rpt)	2		
	1	7,9	25–40*	B (2nd/3rd rpt)	2		
	1	10	41–56	B'	2	?	build
	1	11	57–80	B''>> B'''	2	loop	x1/1 peak, x2/2 reduce
	1	12	(81–88) x2	C (Bass)	3	reset	Dull and distant
	1	13	89–104	C1 (Bass, Melody)	3		
	1	14	Null	C2 (C Bass, B Melody)	3		
Min Desc >> Min Desc Var	1	15	129–136	A'	3		
	1	16	137–152	B'''	3		
	1	17	Null	Outro (and transition?)	3	Loop	Intro bass from next song

Figure 5-17 – Score-to-sequencer index, example

The last aspect of this theme labelled '*refining compositions based on listening*' was constructed around fragments that focus on fine-tuning compositions based on reflective listening, as one segment writes:

> I started by listening to the piece so far. I noticed there were some minor issues that prevented listening flow, and so I made some adjustment that created the appropriate amount of evolution and repetition (PL26).

Through this process of refinement, the journals recall how patterns were edited, copied, and deleted, as well macro changes, such as modifying the tempo of a piece in an attempt to ensure 'listening flow' (see appendix, p. 226). This closes a feedback loop, from idea (notation), its representation (sequencer code), to its bodily experience (sound coming out of the

synthesiser)[33]. It also emphasises the desire for listening *flow*, which helps position this theme within a contemplative paradigm.

The approaches discussed in this section help establish a practice-led typology of four processes for composing for an indexed sequencer. This typology exists in an iterative model (illustrated below), whereby the process of *scoring* leads to *translation*, followed by *refinement*, and, in turn, leading to further scoring, and so on. This model also incorporates the *index*, an intermediary block that connects scores with their translated patterns, enabling the composer and performer a way of navigating and tracking this process. Of course, as a practical guide for working with the ER-101, this unique model may not be easily applicable to other cases. Still, it stresses the influence of tools on the composer-machine interactions and, as such, shows how these roles are mutually dependent.

[33] The gap between symbolic representation and physical manifestation, according to Dahlstedt (2018), echoes a long philosophical and cultural history. He traces this transformation from the classic mind-body problem—debated by thinkers from Plato to Descartes—through the notion of magic as performative speech, and finally to computational systems where code materialises as sound. Similarly, the idea of 'words becoming flesh', originating from the Gospel of John (1:14) in the New Testament, speaks of the divine Logos taking physical form. In the context of music technology, this resonates with the feedback loop between notation, sequencer code, and the embodied experience of sound synthesis.

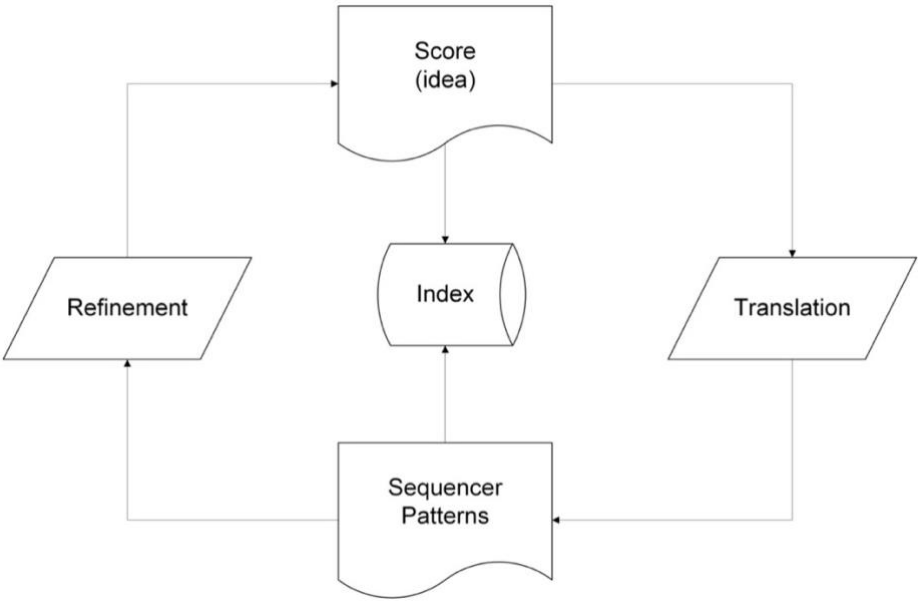

Figure 5-18 – An iterative cycle for working with an indexed sequencer

5.3 Generative Patching

The third theme, titled 'generative patching' was constructed from journal entries, videos, and patch schematics that reflect attempts to expand on the compositional vocabulary developed in the scores by employing modular hardware. Referring to Brian Eno's (1996) term *generative* in its procedural sense, this theme denotes the creation of music using processes established by the composer. As such, it relates to discussions vis-à-vis music as process and the role of the machine, which were explored in chapters 3 and 4.

Before addressing the aspects constituting this theme, let us first revisit the concept of generative music and explore its relationship to modular performance. Eno's generative paradigm draws from works of minimal composers in the 1960s. According to this paradigm, composers can set certain procedures in motion that result in complicated or unpredictable combinations. Procedures in the works of Terry Riley, Phillip Glass and Steve Reich were

either performed manually (by musicians) or mechanically (using tape loops), while algorithmic music today is based on similar procedures performed digitally (using computers).

Indeed, the idea of generative music also extends to analogue synthesisers. With their noise generators and LFO's, modular synthesisers not only afford procedural and algorithmic techniques using analogue means, but they also provide users the ability to interact with these algorithms via buttons, knobs and faders. The different patching techniques nested under this theme were split into three *groups*. In discussing them, I shall utilise the coded segments seen in Table 9-12.

The first patch group is concerned with using *gate* and is expressed in two methods. One is discussed in a journal entry that describes the preparations for the trial performance, referring to "the concept of using the same gate trigger for two different [voices], creating a strange harmonisation" (PL21), and "adding noise bursts as a way of creating timbre-rich sounds". The transition from *Immanence* to *Intensity* showcases this method, where two voice and a noise signal are all triggered using the same gate (see Figure 5-19).

The second method—previously mentioned when discussing the role of the Machine—was seen in my work on *Pythagorean Age Love*, where multipliers of the clock (an ALM Busy Circuits Pamela's Workout) were used as triggers, alongside the gate produced by the sequencer (PL14 and PL32, p. 226).

Figure 5-20 illustrates this approach, whereby CLOCK OUT 2—a multiplier of 1.3 times the clock—is sent to an ADSR envelope generator. In turn, the output of the envelope generator modulates the amplitude the noise sound.

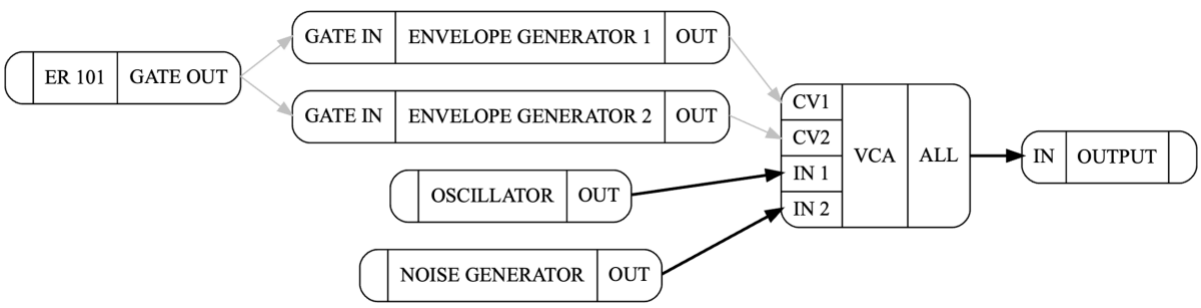

Figure 5-19 – Single gate-CV triggering a noise generator and an oscillator

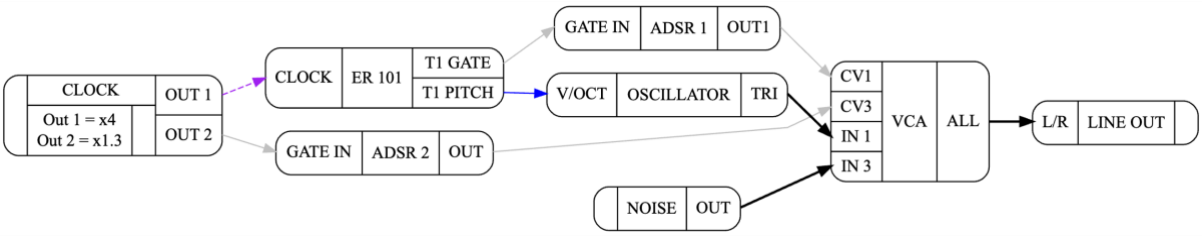

Figure 5-20 – Triggering voices using multipliers of the clock

The second patch group relates to *modulation* and is also conveyed in two methods. The first method was observed in journals, videos, and patch diagrams that describe the use of LFOs to modulate different components within a patch. For example, two journal entries, reflecting on the piece *A6*, note using an LFO to modulate “the length of the envelope” (PL36) as well as the ‘morph’ parameter on the Plaits oscillator (PL37). It is also seen in the

performance of *Interlude*, where the LFO is assigned to the filter's cut-off frequency. This deterministic, cyclic form of modulation joins other cyclical phenomena to create more complex results.

The second modulation method emerged through experiments with random-stepped voltage applied to various parameters within a patch. I explored this technique across several pieces, but it ultimately featured most prominently in *Pythagorean Age Love*. As one journal reflects, in the third iteration of the sequence, the performer is instructed to add random-step filter modulation (PL42). This is achieved using a sample and hold (SH) circuit synced to a clock, producing random shifts in the filter's cut-off frequency (see Figure 5-21). While Spicer (2016) identifies random processes as central to his class of standalone generative patches—where musical material is autonomously created—in *Pythagorean Age Love*, these abrupt voltage 'jumps' create noticeable transients. Rather than sounding generative in the ambient sense, the result is a percussive texture embedded within the patch.

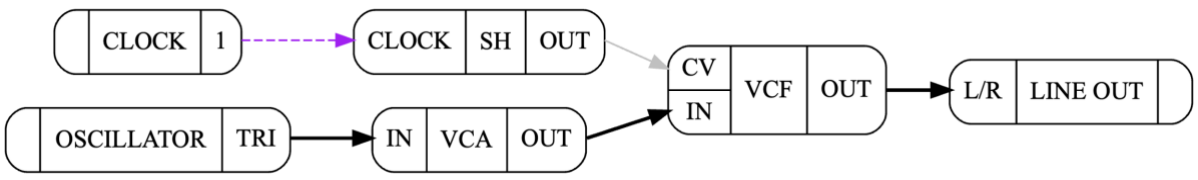

Figure 5-21 – Random-stepped voltage modulation

The last group of patching techniques relates to the use of *delay*, which was discussed in the theme Music as Change, in relation to time perception and

awareness of transformation, and in Working with Patterns. A staple in contemporary production environments, delay was explored extensively throughout the development of the performance. At its core, delay is a simple procedural effect: it plays a signal against a time-shifted version of itself. Across the journals, patch schematics, and video recordings, its use is evident—most notably through the Make Noise Echophon (Figure 5-22) and the digital delays integral to Ableton Live. One journal entry, written during preparations for the trial performance, captures this approach:

> I started using the different FX sends, [...] switched software delay to the Echo[phon] and added a 16th & 8th-note delay to go with the dotted 8th note [*sic*] (PL28).

While easily overlooked, delay was thematically significant due to its generative capacity: by overlapping a pattern with its delayed counterpart, it can produce emergent polyphony and rhythmic complexity beyond the original monophonic line. This technique can be seen in action in an excerpt from the performance of *Immanence*.

Figure 5-22 – The Make Noise Echophon, frequently used throughout performances and recordings for its distinctive delay and pitch-shifting capabilities.

Unlike more recent approaches to generative music, which emphasise algorithmic autonomy, the techniques explored here rely on analogue processes. Generative patching, in this context, becomes a hands-on manipulation of material in pursuit of what Eno (1996) calls “music that you’ve never heard before.” I understand these procedures not only as expressions of impermanence—where fluctuations in voltage yield shifts in sound—but also as manifestations of emptiness. This emerges, first, through the interdependence of machine, composer, and performer: the machine executes, the composer initiates, and the performer responds. Second, it is found in the way simple voltage-based logic combines to produce unexpectedly complex auditory phenomena.

5.4 Seamless Performance

This notion of interconnectedness and real-time sonic transformation naturally extends to the theme of *seamless performance*. Initially labelled 'approaching modular performance,' this theme risked resembling a topic summary—an undesirable outcome in Reflexive TA (Braun and Clarke, 2022). Refining the title helped establish a clearer conceptual boundary, framing it as a multi-faceted idea central to contemplative modular practice. Unlike previous themes, which focused on composition, this theme centres on performance and its continuous nature. It examines four key aspects—*order*, *interactions & gestures*, *transitions*, and *execution* (see Figure 5-23)—linking it to the theme Embodied Performance as well as previous discussions on algorithmic, process music, and listening as focused attention. In delineating these four aspects, I will refer to the relevant data segments presented in Table 9-13.

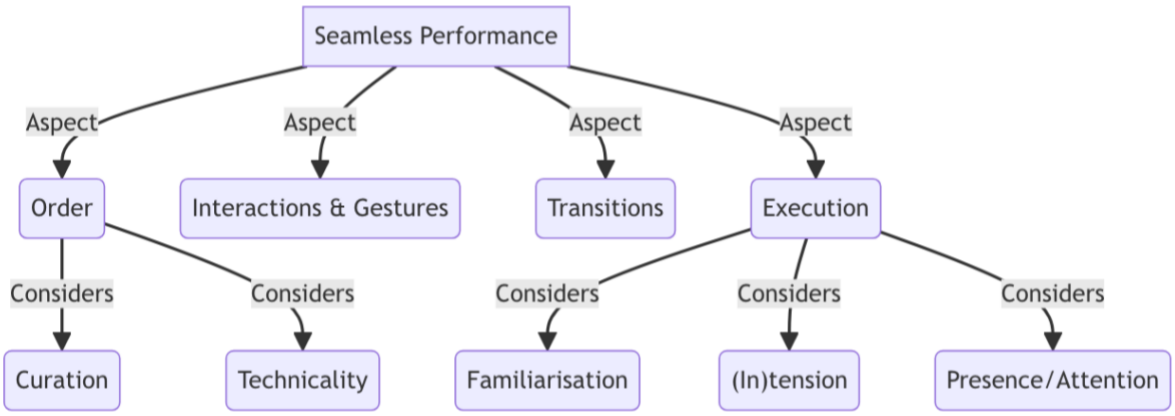

Figure 5-23 – Structure of the Theme Seamless Performance

If we conceptualise seamless performance as movement between states, then two pertinent questions are: *which states should the performance traverse?*

And *in what order?* The first aspect, *'order'* was captured around segments concerned with these questions. It deals with building a set list, the choice of *what* to play and *when*, through two types of considerations.

Curatorial considerations relate to the narrative shape or arc one attempts to create by placing pieces in a specific order. For example, a journal entry reflecting on the development of *Pythagorean Age Love* notes the idea of "opening with this piece, since it feels the slowest." It then suggests "going into sequence 1 [*Made Flesh*], via 'exciting loop' [*A6*] as a transition" (PL34). Another entry proposes shortening the second movement of *Lighthouse*, the slower one, "because the fast version will be played at some other point of the set. That way they might serve to complete each other" (PL38A).

Beyond curatorial concerns, the journals also reflect attention to technical factors. While planning a set list, journal PL40 highlights the importance of "taking into consideration mood and patch transitions." It later classifies pieces by tempo and proposes a sequence that is both narratively engaging and minimizes re-patching. A few weeks on, another journal captures an external perspective:

> I met up with Y, who came to the studio and listened to the set. Her main point related to the set order, claiming that there is a build [of intensity] in the beginning [...] but when it gets to A6, we are reaching a plateau. Per her request, I tried to re-order the set in a way where there are some peaks on the way to the end (PL44).

As the final performance approached, more experiments were made with the sequence until I eventually settled on a set list. Once that was in place, as another entry recounts, “I started practicing these pieces one after the other. In doing so, some ideas began to emerge, and some approaches were revised.” The order of pieces informed several other aspects of the creative process, which will be explored in the following sections.

Another important aspect, *interactions & gestures*, emerged in segments concerned with two central questions: what interactions are available or suitable for each piece, and how are those interactions made visible? This is reflected in journal entries that call for deciding “what happens in rough terms at each point of the set” (PL17), and for mapping the “gestural vocabulary” of each piece (PL20).

This aspect also extends to the specific interactions documented in the journals and observed in video transcripts. For instance, one entry offers a detailed overview of the performance gestures across iterations of *Pythagorean Age Love*:

1. HO: Triangle wave starting to pulse
2. Increase the envelope of the pulse and add filter modulation
3. Add the noise at x1.3 the clock
4. Increase the envelope time and filter cutoff
5. Increase noise pulse to x2
6. Fading out all things that don't serve, preparing the next patch (PL42)

These types of interactions—including manipulations of oscillators, VCAs, envelope generators, and filters—are frequently documented in the dataset.

The journals also reflect on how such gestures might be visualised in performance to engage audiences more directly.

Auricchio and Borg (2020) propose *centrifugal* and *centripetal* aesthetics to describe attention in modular performance. Centrifugal aesthetics draw the audience's focus outward—toward themselves or the broader environment—whereas centripetal aesthetics pull attention inward, toward the performer's body and actions. This dynamic is echoed in one journal reflection:

> Performance 'glitches' should be included. […] I shouldn't be afraid if things aren't as smooth as I want them to be, because it adds interest, contrast, and an embodied connection to the sound (PL44).

These "glitches", though seemingly contrary to the idea of seamlessness, offer moments of embodiment—both sonic and gestural. They reveal the inner workings of the system and the performer's involvement, creating a sense of humanity within the machine. From the perspective of embodied cognition, the modular system can be seen as an extension of the performer's mind. In this light, glitches become expressions of presence.

Creating seamless transitions—fluid movements between states or pieces—requires significant preparation. The label *'transitions'* was assigned to journal segments that detail this process. PL42, for instance, documents a carefully designed shift out of *Pythagorean Age Love*:

> It's important […] to do the following:
> 1. HO: Triangle to Square out
> 2. HO: 1st and 4th harmony

3. ER-101: Gate 2 >> ADSR: Gate 2
4. Clock: 2 to PB 2 >> Maths: Ch. 4 trigger (PL42)

This quote, while written in shorthand and difficult to decipher, reflects real-time instructions to change module parameters and re-patch cables. Likewise, video segments that reveal those transitions were interpreted through this lens—for example, a scene from the trial performance shows the performer queuing the next piece, adjusting envelope generator, VCA, and filter parameters in preparation, and finally triggering the sequencer.

The last aspect, *'execution'* was developed from three codes that were assigned to various journals and video segments. The first, *'familiarisation'* was allocated to instances that describe the need to rehearse the performance. This is seen in the segment below, which followed an attempt to run the set:

> While I managed to remember broader aspects about [the performance], like its patch and overall structure, I seem to have forgotten the ins and outs of each piece, and the parameters settings it should have [sic]. (PL27A)

To execute performances effectively, performers need to set their intentions ahead of performing and then follow them, and this was demonstrated in both journals and video excerpts. Such segments were assigned with the code '(in)tension'[34], capturing the ideas of *intension* and *tension*. On one hand,

[34] This concept resonates with Nancy's book *Listening* (2007, p. 20), where he ruminates on the conflict between tension and intention created in listening: "sound (and/or sense) is what is not at first intended. It is not first 'intentioned': on the contrary, sound is what places its subject, which has not preceded it with an aim, in tension or under tension".

intention implies that performers need to envision the shape of the performance—what it needs to do and *where* it needs to go—and, as a result, determine the shape of the individual pieces that comprise it. For example, the entries seen in p. 228 (see PL17 and PL20) describe the need to have an “intro” and “outro” while creating “peaks” throughout.

On the other hand, the idea of tension was conceived through a journal entry that states: “I was also able to build tension effectively, whilst also anticipating tempo changes, and the surprising bits” (PL28). This side of execution, that of directing musical tension was also interpreted in excerpts that reflect on the execution of performance plans, whether poor or successful. Thus, observations of gestures—including fading voices, adjusting parameters, and emphasising sections—were coupled with reflections on how to conduct them more effectively.

This echoes the theme Embodied Performance discussed previously, as well as Ciani’s (1976) reflections on developing her Buchla performance, calling performers to be familiar with their patches. (In)tension is similar to the previous facet ‘*interactions & gestures*’, since both are concerned with *the things that performers need to do*. The latter is about *what* performers do, whereas the former is concerned with *how* they do it and *when*.

A third code under the category of *execution* was labelled ‘*attention/presence’*, and it emerged from instances that describe the performer’s awareness of sonic events and their corresponding actions. This was particularly evident in the trial performance transcript, which captured several moments where something “goes wrong,” prompting an immediate response from the

performer. In one example, the performer fades in an out-of-tune oscillator (video link), while in another, a patch cable is seen being corrected after being plugged into the wrong socket (video link). These moments illustrate the coupling of perception and action: real-time listening gives rise to real-time adjustment.

Given that listening is understood as an attentive act (as discussed in Chapters 1 and 3), and that modular instruments are often associated with *reduced listening* (Auricchio and Borg, 2020), modular performance necessarily involves a heightened sense of presence—not only with musical structures but with the sonic surface itself. This demands that the performer act in alignment with what is perceived in the moment. *Seamless performance*, therefore, is inherently contemplative: it hinges on sustained attention, both from the performer and the listener, and unfolds through continuous, subtle transitions between states.

5.5 Chapter Summary

To conclude this chapter, it is worth considering how it sits within the broader research arc. Specifically, we might ask: how might the contemplative themes generated through listening and system-building inform the creation of a modular performance? And how can the act of developing performance pieces, in turn, support and extend these themes?

As with the preceding chapters, this one uncovers themes that emerge through artistic processes. Whereas earlier chapters focused on contemplative listening and the construction of a modular system, this chapter explores how

those activities converge in the act of performance development. Informed by the author's meditation practice, this stage of the inquiry continues to distil recurring patterns of meaning—yet does so through composition, rehearsal, and live interaction with the system.

Practically speaking, this chapter represents a shift from building a modular environment to navigating and shaping its potential. Where the former created a set of compositional possibilities, the latter investigates how such possibilities are enacted through the setting of voltage pathways, piece development, and real-time performance.

This developmental process supports and expands the research's thematic landscape in several key ways: i) it reinstates the earlier distinctions between composer, machine, and performer within live practice; ii) it elaborates the role of patterns—objects central to contemplative engagement—through evolutionary compositional strategies; iii) it foregrounds material transformation as a product of performer interaction and directed "(in)tention"; and iv) it deepens the role of embodiment through gestural vocabulary and the performative presence of system 'glitches'.

Thus, the creation of a modular performance not only draws on themes generated through listening and system-building but also becomes a generative act in itself—testing, validating, and expanding the conceptual framework of contemplative modular practice. The next chapter follows this trajectory by asking how a contemplative modular performance might affirm, refine, or extend the thematic framework established throughout this research.

6 *All These Moments* — An Exegesis

So far, modular practice has been investigated across multiple instances in an attempt to extract general knowledge *inductively*. This chapter marks a shift in approach: it attempts to *deduce* theory by examining my final doctoral performance, *All These Moments*, held at University of West London's Lawrence Hall, on 11th of July 2024 (Figure 6-1)[35] [36]. As noted previously (see 2.7.4), this performance was filmed both to document the practical element of the research and to enable further reflection and analysis.

The chapter that follows is the outcome of this reflective process. It not only recounts the motivations and decision-making that shaped the performance but also undertakes a critical analysis of the event itself. In doing so, the themes developed in previous chapters are used as analytical tools to situate personal intentions and compositional choices within the broader aims, questions, and findings of the research. The central question guiding this chapter is: *In what ways can a contemplative modular performance qualify or modify the themes postulated in this research?*

Drawing on the connective exegesis model (Hamilton and Jaaniste, 2010; Ings, 2015), this chapter incorporates three internal voices:

1. the *contemplative listener* (CL)—a first-person poetic narrator who describes the experience of listening to the performance

[35] The performance was accompanied by visuals that were specifically made for this event. Since this research project is primarily concerned with music, I chose to omit any discussion on the creative process that led to the creation of the visuals.
[36] An earlier performance was conducted on 15th of June 2024, at the Innovation in Music Conference held in Kristiania University College, Oslo. However, the performance was not filmed and therefore could not be used for reflective or evidence purposes.

2. the *reflective practitioner* (RP)—a voice that accounts for the creative process behind the work; and
3. the *researcher*—a critical, third-person voice that contextualises, interprets, and attempts to generalise the insights offered by the two.

Borrowing from Goddard (2010), the voices of the contemplative listener and reflective practitioner were combined into a single written correspondence, reproduced in Appendix 9.4.1. This chapter examines and contextualises that dialogue through the voice of the researcher. In the following sections, I will engage with each piece in performance order, referring to specific time markers in the performance video (e.g., “Video Marker 1”) as analytical anchors.

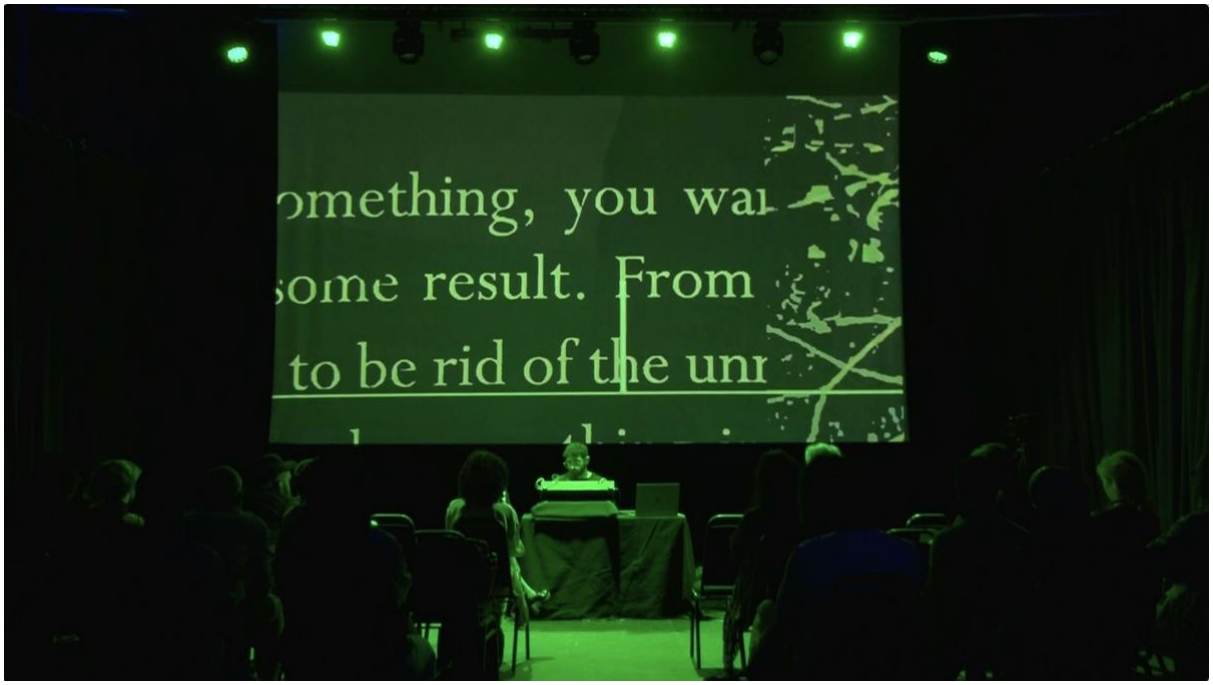

Figure 6-1 – An image from my final PhD performance, *All These Moments*.

6.1 Not the Wind, Not the Flag

A 13th-century Zen koan recounts the story of two monks debating a temple flag flapping in the wind. One monk asserts, “The flag moves,” while the other

insists, “The wind moves.” Their teacher interjects, saying, “It is neither the wind nor the flag that moves; it is your mind that moves.” *Lighthouse I* is inspired by the metaphor of the flag and wind. It aims to move away from traditional oppositions, like *sound-noise, sound-silence,* and *sound-space*. These dichotomies are re-examined through a material engagement with space (as discussed in 3.3.3) that questions space as fixed geometry and the notion that sound occupies space (Nelson, 2015). This is echoed in the words of Nancy (2007, p. 17):

> So, the sonorous place, space and place [...] *as* sonority, is not a place where the subject comes to make himself heard [...] on the contrary, it is a place that becomes the subject insofar as sound resounds there.

To tie the first movement of *Lighthouse* with the second, I used an ostinato (a repeated phrase) from the second movement, seen in Figure 6-2. I experimented with running it through the Make Noise Erbe-Verb, the digital reverb module discussed previously, which allows continuous CV modulation through its algorithm (Make Noise Co., no date b). Initial experiments included modulating the reverb’s ‘size’ parameter using an LFO or by using the sequencer’s random-distribution function. The results of these experiments were interesting but were rejected for aesthetic reasons. Looking for other solutions, I discovered that by manually increasing the reverb decay time, it starts to feed-back, even if there is no input signal.

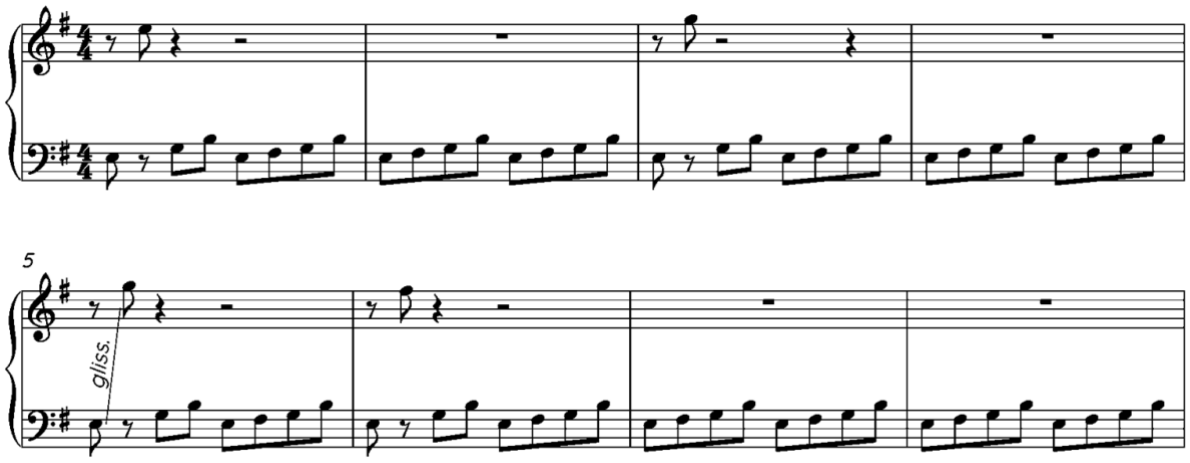

Figure 6-2 – An ostinato from *Lighthouse I*, borrowed from *Lighthouse II.*

This presented an issue, since feedback would increase exponentially and needed to be curbed. By inverting the Erbe-Verb's 'CV out' signal—an envelope follower that "goes higher as the reverb signal gets louder" (Rolando, no date)—and feeding it into the 'decay' CV input of the same module, I was able to create an internal compressing mechanism, which reduces the reverb decay as the signal gets louder. And all along, through increasing the level of incoming signal (via raising the VCF cutoff frequency), I could increase the proximity of the ostinato.

So, the process of performing this piece involved moving between states. As expressed in the listening journal written after the performance:

> I hear silence, and gradually, noise that becomes the sound of a distant object [...] A pattern emerges, slowly taking shape (CL).

At the start, the reverb decay time is increased to a point of self-oscillation, creating a slow fade from silence to inharmonious noise (Video Marker 1). Then, the pattern is gradually revealed to the listener, in a shift from noise to

sound (Video Marker 2). Once this process is complete, the reverb's input signal is turned off again, and as the reverb decays slowly, the sequencer is reset to the second movement of Lighthouse (Video Markers 12–13).

The blurring between *pattern* and *noise* in this piece promotes a contemplation on the insubstantiality of a pattern, and this evokes the theme Music is Empty. In addition, the segue into the next piece, which involves resetting the sequencer while the previous pattern tails off, reflects another theme explored previously, Seamless Performance. This theme, which considers how pieces should transition from one another, will be explored later on.

6.2 From Darkness to Light

The second and third movements of *Lighthouse* are the result of an experimental and somewhat minimal approach that involves playing the same material in different tempos. The interplay between the meditative pace of *Lighthouse II* and the abruptness of *Lighthouse III* demonstrates the influence of tempo on our perception and the distinct experiences it might induce. Using repetition and difference, both movements explore slow evolution as an aesthetic principle to evoke changing music. This is approached by dividing patterns into smaller elements and applying gradual process to each. Lastly, stimulated by the image of dawn, *Lighthouse I–III* evoke gradual transitions from darkness to light through shifts in timbre and dynamic range.

Inspired by works in Caterina Barbieri's *Patterns of Consciousness* (2017a), Lighthouse combines different elements that operate at different pitch registers to form a single pattern (see example in Figure 6-3). The division of

monophonic patterns into smaller elements not only creates the illusion of polyphony, but it also promotes a contemplation on the question ‘What constitutes a pattern?’. This relates to the idea of emptiness echoed in the previous piece, according to which all things exist within a network of relationships and lack an inherent self-existence (Williams, 1998; Priest, 2009).

This device of combining elements to form a larger whole is a mechanism through which slow evolution can be applied. As discussed in 5.1, slow evolution suggests that patterns should evolve in a balance between repetition and difference. Accordingly, as a pattern is repeated, the different elements comprising it undergo gradual processes, including:

1. Moving from a harmonic stasis to harmonic movement, by either fixing or shifting the lowest note of the underlying sequence.
2. Alternating between melodies A and B in the top element, while creating additive processes and permutations over time.
3. Creating an ostinato section, where the underlying element repeats a 1-bar museme.
4. In the final A, creating permutations in the underlying sequence.
5. Finally, Creating a subtractive process of note omission at the end.

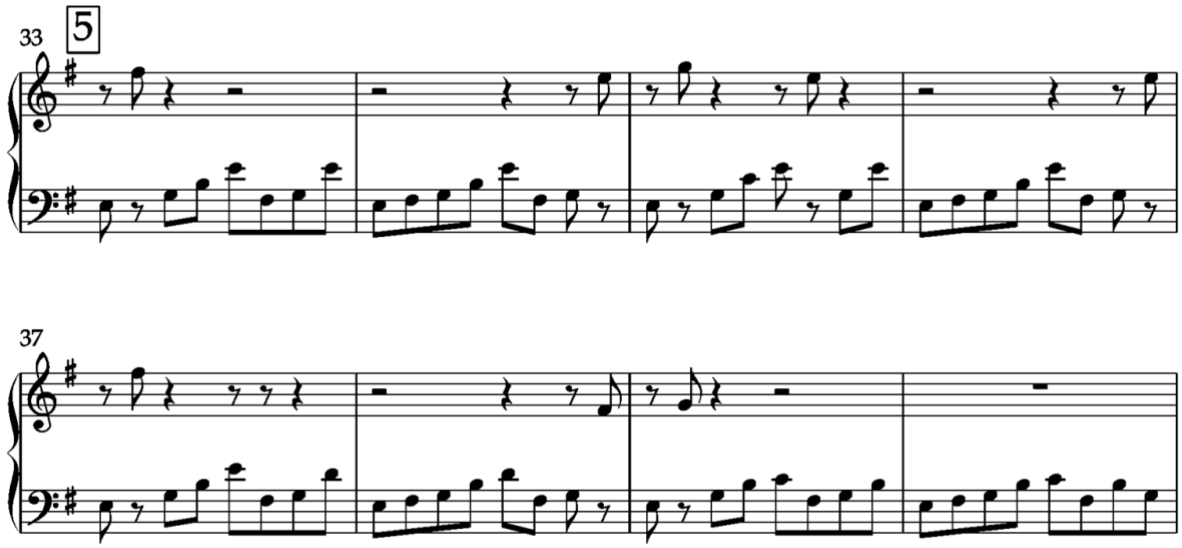

Figure 6-3 – Opening segment from *Lighthouse II*, showing the division of a monophonic pattern into elements

A further aspect relates to the interplay of tempo. While working on this piece, I experimented with varying tempos. And this formed the basis for two movements: one set at 60 BPM and the other at 240 BPM[37]. However, when I played the same material at different tempos, something felt misaligned. This misalignment revealed a further aspect of slow evolution—its relation to pace, or tempo.

As established, slow evolution aims to foster listening flow by balancing repetition and difference. This balance is deeply linked to the tempo of a piece. Faster tempos demand more repetition, and slower tempos necessitate more variation. In the case of *Lighthouse II–III*, running the exact same material through different tempos wasn't enough: to maintain flow, a compositional

[37] Technically speaking, the tempo shift is achieved by dividing the clock signal of one piece and doubling it in the other, thereby quadrupling the overall tempo.

distinction was necessary. This led to the removal of ‘unnecessary’ iterations in the second movement, while allowing section to repeat twice as much in the third.

A final point relates to the imagery of the two pieces, both inspired by the experience of early-morning walks during autumn meditation retreats.

> At 7am, the sun isn’t out yet. Over the span of 20–30 minutes, the trees almost miraculously illuminate, and I would observe this transition with great interest (CL).

In this piece, the transition from darkness to light is evoked through shifts in timbre, particularly using the prominence of the saw wave: as its volume increases, the timbre becomes more vibrant (Video Markers 21, 25). This imagery is also implied in the title *Lighthouse*, which connotes both the second, hypnotic movement characterised by a slow, steady pace as well as the focus and urgency of the third movement achieved through rapid tempo and staccato. A comparable relationship is can be seen in Barbieri’s sister pieces *Scratches on the Readable Surface* and *SOTRS* (2017a), wherein similar patterns are played at different speeds to produce distinct auditory experiences.[38]

[38] There is a sense in which the first three pieces—the first, second and third movements of Lighthouse—add up to what Dunsby (1983) has called ‘multi-piece’ with respect to Brahms’ Op.116. In other words, they exhibit an overall thematic unity and key coherence. Therefore, analysis should not be restricted to each piece on its own but rather consider all pieces together.

6.3 Three Types of Change

> A new sequence fades in. It has great melodic contrast and a descending contour. When it hits the lowest tonic, I am transfixed by its subtle vibrato (CL).

Pythagorean Age Love explores the role of attention in listening, a theme discussed in heading 3.1 that situates listening as an attentive act and examines the nature of attention to sound. While the piece repeats a basic pattern, it demonstrated material transformation through generative patching and performer actions. As the piece progresses and the pattern is repeated, listeners drifts away from Schaefferian modes of *causal* and *semantic listening*, towards an acousmatic, *reduced listening*, where attention is directed toward the properties of sound itself.

At the centre of the piece is a 24-bar sequence in C major, comprised of two parts: a repeated 7-bar segment (14 in total), and another 10-bar one (see Figure 6-4). The sequence opens with the tonic C—a semi-tone above the final note of the previous piece, B (the dominant of the hitherto key of E minor). This makes the key-relation between the first three pieces and *Pythagorean Age Love* feel like a modulation, since the latter is raised by a semi-tone and positioned in a key that is a relative fourth above the previous. Over the course of the piece, the 24-bar sequence is repeated seven times, and each iteration offers a slight permutation when compared to its former.

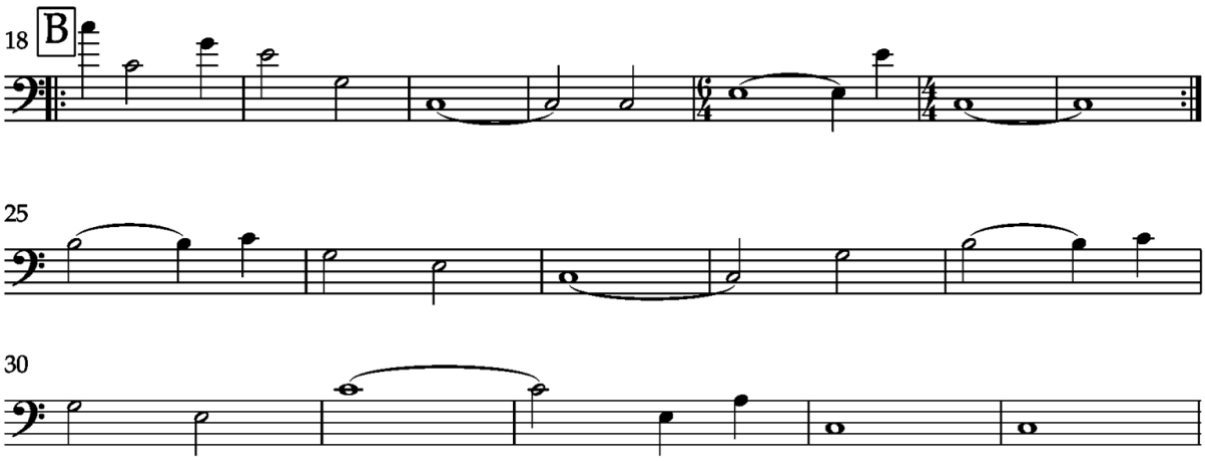

Figure 6-4 – 24-bar sequence in *Pythagorean Age Love*

However, the most significant change in the piece occurs at the *material* level, and this is made possible through *generative patching* techniques and performer actions. More precisely, after each iteration is complete, the performer introduced a new layer of sound that is somewhat derived from the same source material. The first iteration opens with a single tone from the Harmonic Oscillator, set to emphasise the 3rd harmony (5th above the octave), and this remains consistent throughout the piece with some minor deviations. This means that the listener perceives the fundamental tone, but upon closer listening, they might distinguish quintal harmony (as illustrated in Figure 6-5).

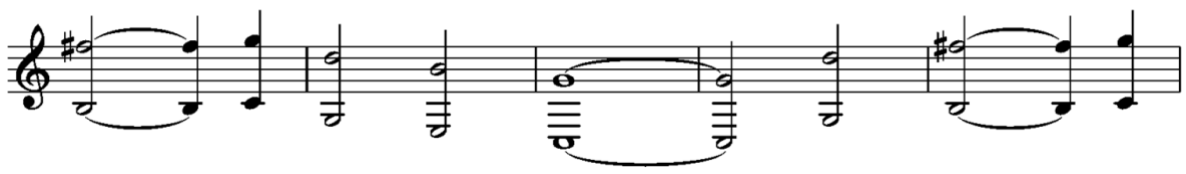

Figure 6-5 – A segment from *Pythagorean Age Love,* with the 3rd harmony

During the second iteration, the performer introduces a triangle-wave pulse coming from the same oscillator and, therefore, at the same pitch. The triangle

wave was chosen for its tone, while pulsing was achieved by assigning a ratchet (note repeat) function to steps. The application of ratcheting ensured that the result would pulse steadily on the 'on beats', as seen in the illustration below (Figure 6-6). This relates to the theme Score, Translate, Refine, Index, which explores a practice-led division of compositional processes oriented around the ER-101 indexed sequencer. In this context, the composer creates pulsing in the process of translation, rather than during scoring.

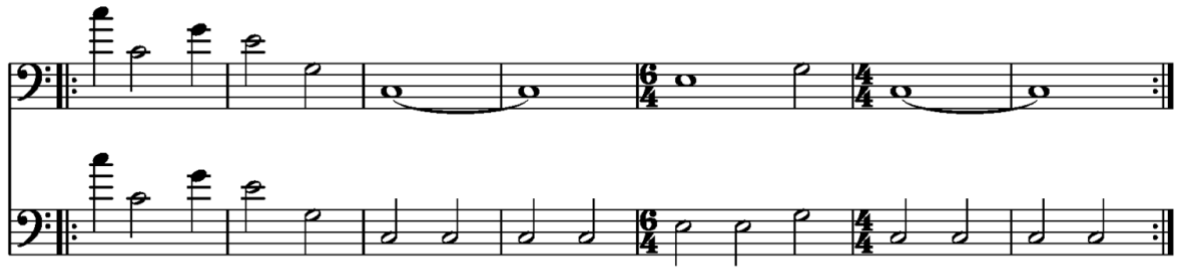

Figure 6-6 – The original sequence (top) accompanied by the pulse (bottom)

The next iterations of the sequence demonstrate a theme discussed previously, Generative Patching. That is because they entail using analogue modular procedures to affect musical outcome, creating complicated or unpredictable results. For example, in the third iteration, the performer introduces a random-stepped voltage modulation (S&H) of the filter cut-off frequency, clocked at semi-quaver intervals. This creates steady high-frequency transients that are constantly changing in timbre. Similarly, as the piece progresses, the performer introduces a noise signal, triggered at different clock sub-divisions, to accompany the other sequences (Video Marker 58). Combined with the stepped-voltage modulation and a 3/8^{ths} delay, this creates a rhythmically complex result.

In previous chapters, I have argued that the theme Music as Change might provide a useful framework for this study. Drawing from the Buddhist notion of impermanence (in Pali, *annica*), this theme recognises the ways in which change (material, compositional, and subjective) unfolds and informs our sense of time. In *Pythagorean Age Love*, we can conceive of change propagating in several ways:

- Ideal change (change in notation) does occur through operations on pitch and time (e.g., augmentation and glissando), but this is minimal.
- Material change occurs focally, as sound objects change their timbre and amplitude, and globally, as the piece changes its intensity in an additive fashion, by virtue of performer interaction.
- Change propagates electronically, through the proliferation of voltage in the system, which is rising and falling periodically or triggered based on events.

Pythagorean Age Love, therefore, promotes contemplation on changing sound. Despite the fact that notes stay the same, listeners can focus their attention on attributes of sound objects and the different layers that are added to the auditory scene.

6.4 Sonic Plasticity

As I was developing *Made Flesh*, I was influenced by Reich's idea of phase shifting seen in his piece *Clapping Music* (Reich, 1972). However, unlike in Reich work, I was interested in exploring the shifting of a rhythmic patten over a static pitch pattern. In the key of C minor, *Made Flesh* starts with a series of 8 notes of varying pitches and lengths, and in each iteration of the series,

lengths are shifted while pitches maintain the same order. This, of course, results in an underlying pattern of 8 permutations of the same melody. As the piece progresses, pitches within this pattern are resized to create an additional, top element, and this element undergoes a further process of thematic development. Through an algorithmic approach that focuses on pitch, time, repetition and difference, *Made Flesh* exemplifies the theme Working with Patterns, which draws on a contemplation on patterns as mental constructs.

While working on the patch for this piece, I was interested in percussive instruments like the xylophone or the marimba and was driven to re-create them using my setup. The tones of such instruments are usually reconstructed by combining a transient, timbre-rich sound with multiple longer-decaying sine overtones[39]. Likewise, I decided to combine the sound of a noise generator with that of the Harmonic Oscillator.

During the first part of the piece, the constituent sounds of the synthesised 'xylophone' are subjected to constant transformation, exhibiting, as the journal writes, "a great degree of malleability and sonic plasticity" (CL). Such changes include envelope manipulations and an LFO modulation that veers from revealing the noise channel to concealing it. In transforming the components of the xylophone, my aim was to encourage a contemplation on the xylophone's lack of self-existence, in a way that resembles *Mortus Plango, Vivos Voce* (Harvey, 1980).

[39] Evidence for this approach dates back to the early days of additive synthesis and can be gleaned in a BBC documentary featuring Wendy Carlos 'recreating' a xylophone (1989).

The segue from *Pythagorean Age Love to Made Flesh* was carefully considered. The disparity between patches is quite significant, and this posed a challenge of seamlessly transitioning between the two pieces during the performance. To mitigate this, I used the final iteration of one to prepare for the other. The key-relation between the two pieces (C major to C minor) is also seen to enhance seamlessness, especially since the final note of the former is the same as the first note of the latter.

In line with the principle of slow evolution, the piece is structured based on the themes played on the top element. Table 6-1 lists the piece's structure with links to respective video segments. After *Tagline 1*, a saw wave is slowly introduced, marking an increased intensity that is carried through Sections *A''*, *C*, *B* and *Tagline 2*. Section *D* expands on the previous themes by adding notes *in-between* those of the underlying element. This results in a 'busier' pattern, distinguished through a brighter tone. During the octave section, I introduce a second voice from the Plaits oscillator, playing the original underlying sequence, without interval resizing (Video Marker 82).

Section	Description
Intro	Establishing the underlying sequence
A	Members of the sequence are resized by an octave
A'	Variation on A
B	Members are resized by octaves, fourths and fifths
Tagline 1	Variation on the introduction
A''	Variation on A with glissando
C	New melody entirely
B	As before
Tagline 2	As before
D	Busier sequence

D-8va	D Section, an octave up
D/G	D Section, over G (minor dominant)
D/Eb	D Section, over F (minor mediant)
Subtractive	A subtractive process on D-8va

Table 6-1 – Structure in "Made Flesh"

The voice on the Plaits is embellished with voltage-based automation of its "model" parameter, resulting in sudden changes of timbre from one note to the other (Video Marker 85). The overlap between the hitherto evolving sequence and the new static one creates interesting harmonic results and aligns with principles of algorithmic, generative and process music discussed previously. In the final section, the static, automated sequence continues to loop as the evolving sequence begins a subtractive process, whereby notes are gradually removed at every iteration. At the end of this process of subtraction (Video Maker 90), we hear the note C playing in the beginning of every bar, and this was used to cue the tempo change ahead of the next four pieces.

6.5 Interlude

The next piece, *Interlude* was developed after listening to Chantal Michelle's *Departure of Light* (2023), which I had stumbled upon one day. A short ambient track, it combines field recording with harmonised vocals, synthesised layers, and sparse saxophone. Listening to the minor chord progression in Michelle's piece, I realised that a similar harmonic approach could be utilised through my modular system. Thus, *Interlude* is written for two voices—the Plaits oscillator on 'chord' mode and a Harmonic Oscillator—making it the first piece in this portfolio that features two voices simultaneously. At the centre of this harmonic approach, a sequence of four pitches (E, B, D, and A) is looped, while the

oscillator uses each pitch as a root for a minor chord. The resultant chord progression constitutes the basis for *Interlude,* which forms an introduction to its subsequent piece, *Immanence*.

The title, *Interlude* suggests the piece's role within the performance — it marks the beginning of the second half of the show through its change of tempo and key (which will remain constant for the remainder of the performance). Additionally, the piece provides an exposition for the next piece, opening with a leitmotif that will be heard in *Immanence*. This leitmotif is slightly varied here, to fit with the time signature and chord progression (see Figure 6-7 and Figure 6-8). Nonetheless, referring to the same melody across pieces is interpreted as recursive repetition (Tagg, 1982; Middleton, 1983), a facet of working with patterns.

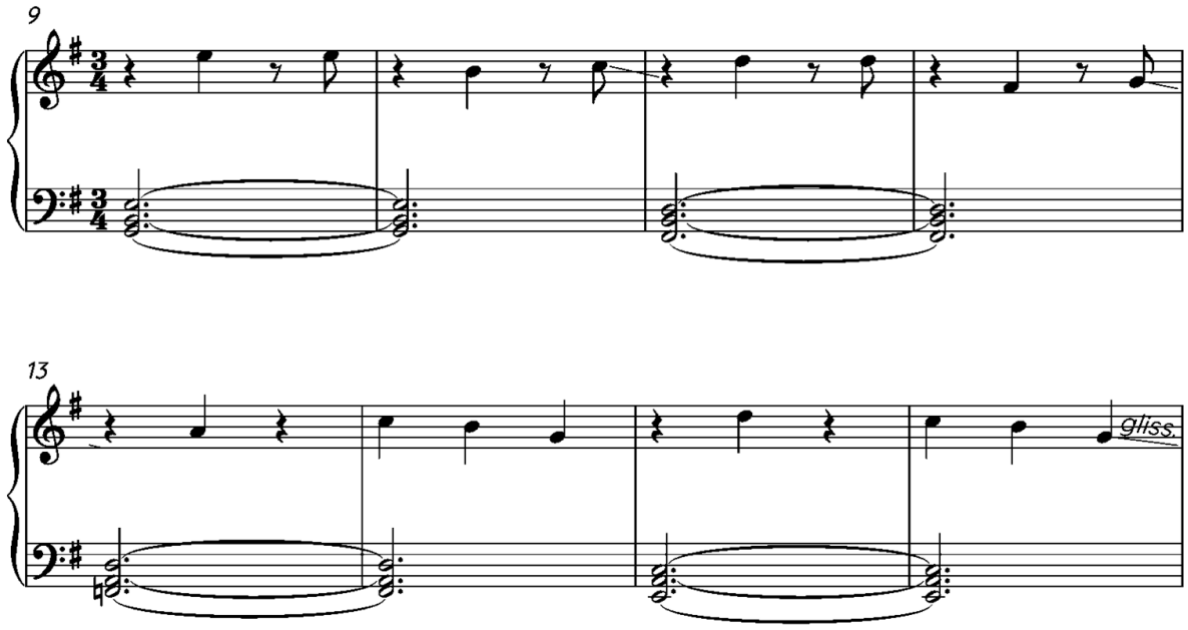

Figure 6-7 – Leitmotif in *Interlude*

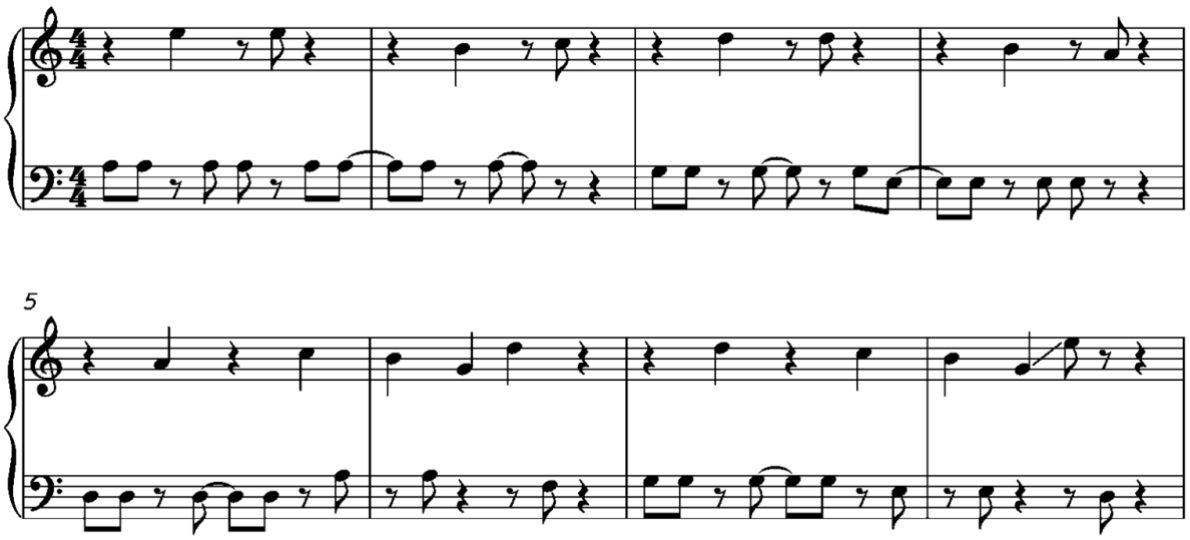

Figure 6-8 – Leitmotif in *Immanence*

In 4.1, I have argued that the role of the composer is reinforced through technology and its affordances. And this is seen in the act of 'translating' notation to the language of the indexed sequencer. The notes notated with glissando, shown in Figure 6-7, were translated using voltage smoothing between steps in the sequencer. Since smoothing starts when a note's gate ends and continues until the start of the next note, it is only audible during the release stage of an ADSR cycle. The implementation of glissando in *Interlude*, therefore, is initiated by the composer and later on interpreted by the performer based on the length of the release time.

In addition to its functional role as an intermediary piece, Interlude also demonstrates *material transformation* the performed gestures. A concept that builds on music as change, material transformation distinguishes modal change—which occurs at the level of sounds' amplitude, timbre and space—from global change, occurring to sound as a whole. This is seen after the

introduction of the leitmotif, where the performer fades the chords in and introduces filter-envelope modulation triggered by the gate signal of the melody. It is also demonstrated after, when the monophonic pattern fades out and the chords are left on their own. The performer then introduces the final pattern of the piece, before transitioning to the next piece. Thus, while harmonic and melodic content generally repeats itself, the performer is in charge of fulfilling the structure of the piece and directing its tension and dynamics.

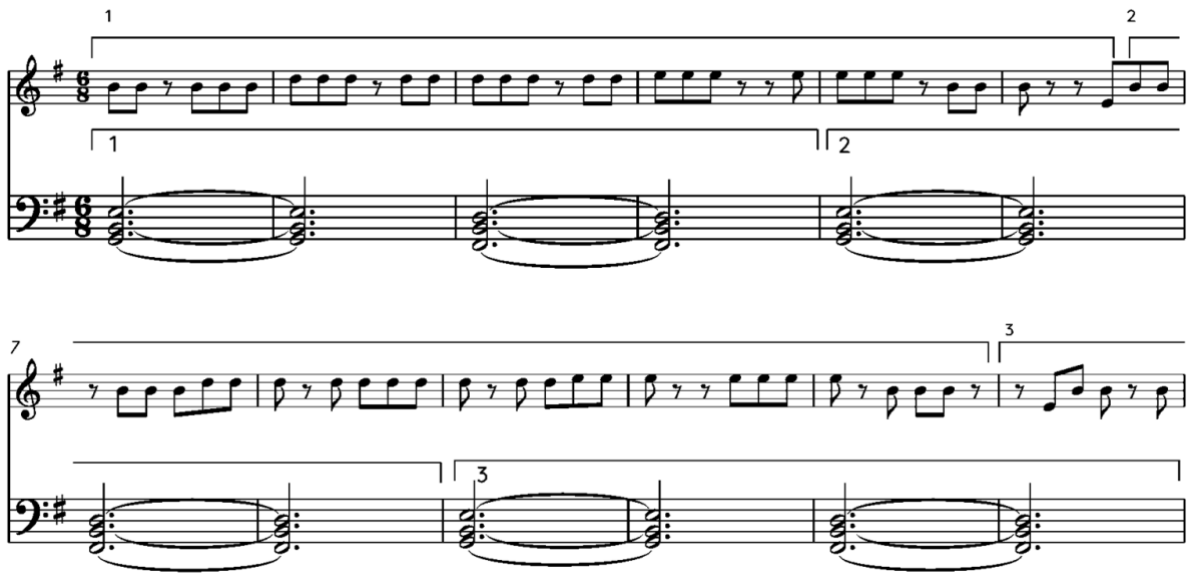

Figure 6-9 – Juxtaposition of final monophonic pattern over chord sequence in *Interlude* (Video Marker 101) — the two patterns re-align after 140 bars (!)

Lastly, *Interlude* also explores generative approaches to patching and composition. This is achieved, on one hand, through LFO procedures, the rate of which is manually adjusted to match the pace of the music, despite not being synced to the clock. On the other hand, generative composition is exemplified in the final section of the piece (Video Marker 101), when a 35-step long pattern is played over the four-bar chord sequence (see Figure 6-9 above). Both the

‘autonomous’ movement of an LFO, whose rate is slightly longer or shorter than the rate of a musical bar, and the juxtaposition of two patterns at different lengths are examples for the use of simple material for generating complex and unpredictable results. This final, odd-timed pattern provides a segue into the next piece, *Immanence*, discussed below.

6.6 The Shape of Trance

The seventh piece, *Immanence*, is a dance-inspired composition that aims to evoke transcendent, psychophysiological experiences associated with listening to electronic dance music (EDM). This effect is achieved through the manipulation of timbre and pitch/time (patterns). Transcendent experiences with music were discussed in Chapter 1 through Gabrielsson's (2011) work on Strong Experiences with Music (SEM). Here, it is expanded upon using Harrison and Loui’s (2014) descriptors, *chills*, *thrills*, and *frissons*, which capture the positive sensations and physiological responses often reported in transcendent experiences. Transcendence, they argue, should be understood not only emotionally but also physically, through sensations like tingling, goosebumps, changes in skin conductance, tears, and the alternation of muscle tension and relaxation.

How are physical/dermal dimensions of transcendence explored in *Immanence*? According to Garcia’s (2015) EDM engenders tactility through three modalities: *beats,* associated with impact; *flesh,* implied by timbral qualities*;* and *grain* or microsound, which is mapped to physical texture. Accordingly, the *tactile* experience of transcendence is evoked in this piece through the transient attack, rich harmonic content, and the shimmering nature

of the synthesiser. The effect was achieved using the Harmonic Oscillator's sum and saw output with short envelope settings, as well as through the high depth of the reverb modulation.

In addition to using timbre as a signifier of tactility, this piece conveys transcendent experiences through dynamic and structural elements characteristic of EDM. These elements are encapsulated in the concept of the *break routine*, which, according to Solberg and Dibben (2019), comprises a breakdown, build-up, and drop. Recent studies have linked the musical features of the break routine to peak experiences (Solberg, 2014; Solberg and Dibben, 2019).

In *Immanence*, the break routine is represented through an evolving, euphoric pattern played on the Harmonic Oscillator. Like other pieces in the portfolio, which centre around monophonic parts, this composition includes both an underlying and a melodic element. The underlying element is introduced in the opening sequence (see notation in Figure 6-10) as a series of bass notes with a semi-quaver subdivision. The descending-ascending contour of this pattern reflects the emotional trajectory typical of the break routine.

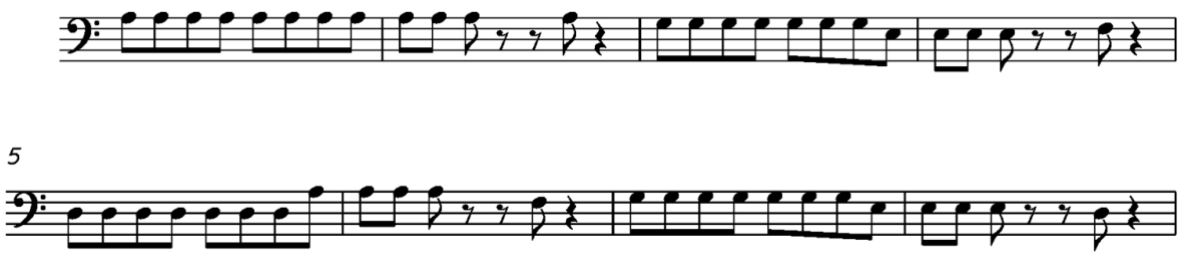

Figure 6-10 – Underlying sequence in *Immanence*

Similar to *Made Flesh*, *Immanence* incorporates an algorithmic approach for melodic construction and development. The melody in Section A, for example, is constructed by means of resizing the pitch of notes from the underlying element by an octave, whereas in Section B interval resizing is more elaborate. Once A and B have been recapitulated, B is repeated several more times, with pitch and time-based variations. Time-based operations consist of slurring notes of the underlying element notes in the melody, whereas pitch-based operations occur as some pitches are resized and others are expressed with smoothing. Of course, these permutational processes are linked to previously mentioned themes—Working with Patterns and Slow Evolution.

When discussing *Pythagorean Age Love*, my work with the ER-101 indexed sequencer was explored through the theme of Score, Translate, Refine, Index. According to this paradigm, a notated passage like the one seen in Figure 6-10 can be translated to the language of the sequencer in a more economic fashion, using *ratcheting*. During my work on *Immanence*, I began exploring the use of ratcheting not just as a tool for conserving memory, but also as a time-based operation that can create variation. In other words, to differentiate between two iterations of a pattern, one of the notes would be assigned with the ratchet function, which would cause it to repeat based on its gate and duration values.

This experimentation led to the combination of both ratcheting *and* voltage smoothing functions for the same step (*time*- and *pitch*-based operation). The result is heard in the performance of *Immanence*, where notes of an even duration glide linearly, as a cluster, at the end of the phrase (Video Marker 113). Working with the ER-101, therefore, provides affordances that are

otherwise less accessible in standard notation (precise glissando over a cluster of notes). And this serves to demonstrate how tools re-configure their users through the action scripts inherent in their design.

Once all permutational processes in the piece are realised, a transitional section is triggered by the performer, which omits most of the underlying notes, while keeping the melody (see top-two clefs, Figure 6-11). The performer then fades-in an accompanying bass sequence borrowed from the next piece, *Intensity* (Video Marker 128). Played on a separate oscillator, the bass sequence uses the same gate signal as the other voice, resulting in a harmonised passage (see bottom-bass clef, Figure 6-11).

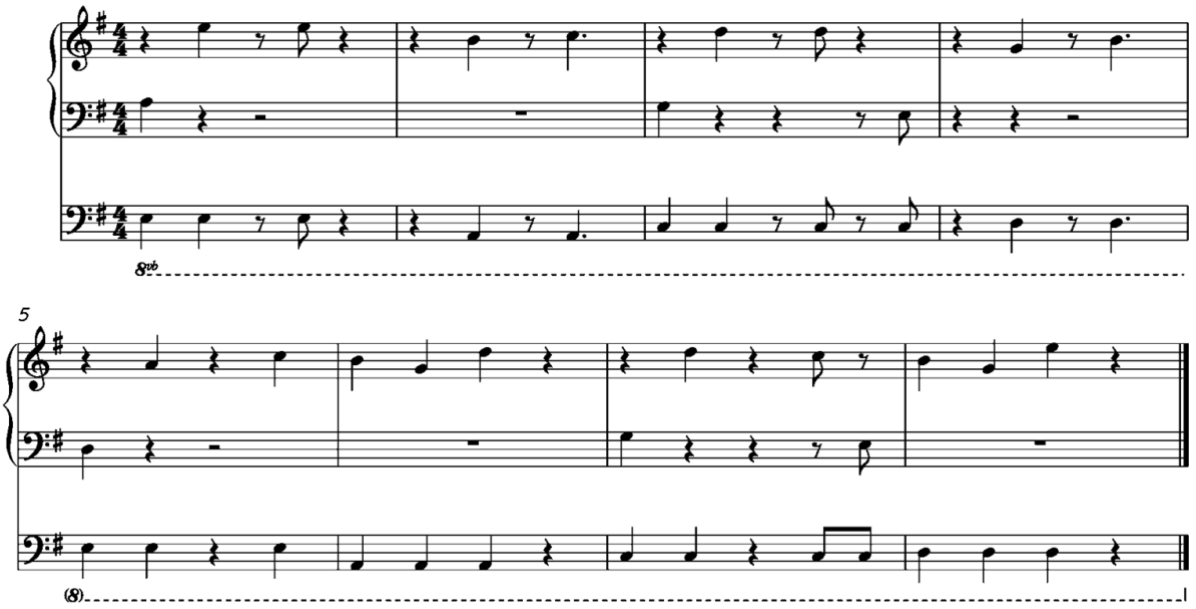

Figure 6-11 – Transition from *Immanence* to *Intensity*, Video Marker 128

This technique of using one gate signal for two voices is a feature of the next piece and will be explored below. Furthermore, the juxtaposition of patterns from one piece against another piece constitutes a facet of Seamless

Performance, given that a transitional scene is created as a segue between two different pieces.

6.7 Glitches in the Apparatus

> Suddenly, the assemblage of elements leaps into a new sphere. Layered over the bass voice established earlier, a new voice is introduced and seems to be connected in key and overall shape to the one heard previously (CL).

The juxtaposition described above was made possible because *Intensity* was developed as a variation of *Immanence*. Specifically, the main pattern from the latter was transposes by an octave, and all its note repeats were removed. The resultant, 'striped-back' pattern was appended with a new theme and reharmonised through the addition of moving bass notes. This approach, according to which patterns are established in listeners' memory in one piece and repeated in another, was seen in other examples in the portfolio. As a form of repetition across pieces, it aims at creating a sense of familiarity and seamlessness as pieces come and go, constituting a facet of themes discussed previously.

The patching technique utilised in *Intensity*, in which two voices of different pitches use one gate CV, was originally employed to overcome the limit on the number of envelope generators in my rack. Since I found the results interesting, this technique was adopted during the transition and introduction to the piece. This, of course, resonates with the theme Fighting the Habitual, that conceptualises modular performance as a practice experimentation and risk-

taking. Figure 6-12 shows the original, notated introduction (i.e., 1st gating configuration), while Figure 6-13 captures the introduction with the gating technique (i.e., 2nd gating configuration) applied on the bass clef.

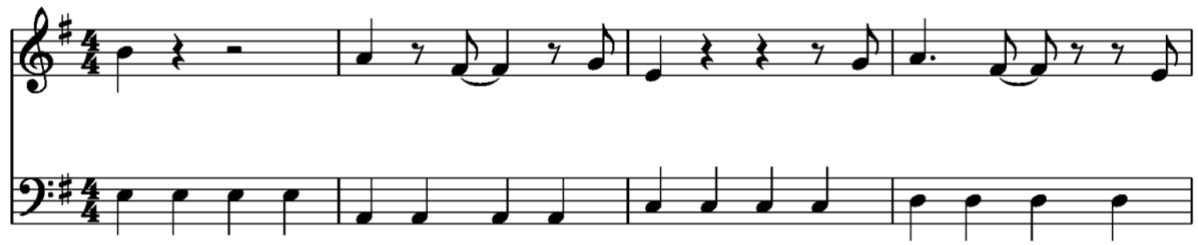

Figure 6-12 – Original introduction to *Intensity* (1st configuration)

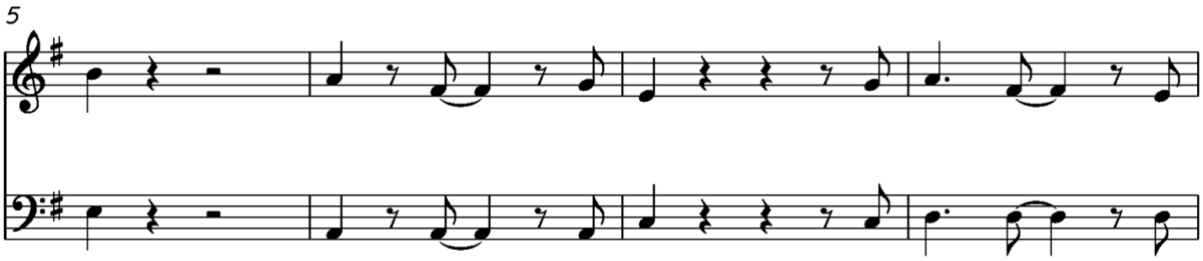

Figure 6-13 – Actual introduction to *Intensity* (2nd configuration),

The piece starts in the second configuration, which is kept through the introduction, A, and B sections. Following the first B section, the performer switches to the first configuration (Video Marker 133), and this introduces the rhythmic pattern originally programmed for the bass. And from then on, the performer toggles between these modes to create bass development. This technique is considered a form of generative patching, in the procedural sense of the word. It also exemplifies the role of the Machine in modular performance, which can alter fundamental elements of the composition in unpredictable ways. Moreover, the act of plugging/unplugging patch cables also constitutes

a facet of Embodied Performance and Seamless Performance, since performer actions (cable in/out) yield audible results. In *Intensity* these results include glitches, which contribute to the 'liveness' of the performance as they reveal its undergirding apparatus.

A further facet relates to the theme on material transformation. Particularly, the transformation of spatial characteristics. After the final stage of development in the piece is complete, the bass is re-patched yet again, to move in harmony with the melody. A transitional loop (Video Marker 150) is then triggered, where the bass pedals on D—the 7th degree of the E minor scale—to create tension. At the same time, each step in the second pattern is assigned with a randomised CV-B value, determined by a jitter function (Figure 6-14). This is used to automate the reverb size parameter, creating a sense of spatial instability that enhances the tension created by the D pedal. The final moments of *Intensity*, therefore, demonstrate material engagement with space through stochastic CV processes, leading to the next piece, *Rite Of*.

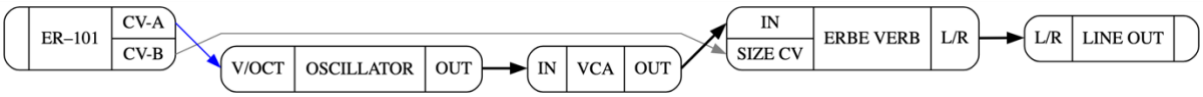

Figure 6-14 – Spatial Transformation Patch in *Intensity*

6.8 Beyond Suffering

Rite Of shares the same clock (170 BPM) and key signature (E minor) as the previous three pieces. It demonstrates a host of approaches, including merging so-called elements to create patterns, repeating said patterns extensively, and using algorithmic approaches to create slow evolution. The piece's soteriological quality lies in its extremely repetitive and rapid nature, which

entrains listeners to enter a mode of reduced listening and observe change over time. It also incorporates the use of a drone, to create a contrast between variety and stasis, as well as gating to hide/reveal underlying elements. Finally, it incorporates physical gestures—particularly, the unplugging of patch cables—as a means of embodiment.

The underlying element established in the opening segment of *Rite Of* comprises a 1-bar museme, seen in Figure 6-15. This underlying museme is repeated several times and is later appended with melodic elements A, then B, and all undergo different processes of permutation. Such algorithmic processes (e.g., additive, interval resizing, retrograde) of difference, when combined with intense repetition, result in the slowly evolving aesthetic explored across the portfolio.

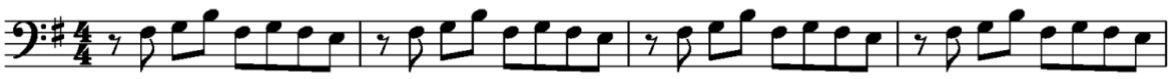

Figure 6-15 – Introductory segment from *Rite Of*

Despite these processes, the piece maintains a certain intensity, due to its steady rhythmic pattern, fast tempo, and musematic repetition. In the listening journal, it is described as ‘oppressive’. Some may even suggest that this piece (and perhaps other pieces in the portfolio) antithetical to the common understanding of how meditation feels like. This conception of meditation is based on the view that meditation is aimed at feeling calm and pleasant. However, whilst meditating, practitioners might feel a whole host of things, and the quality of their meditation is not judged based on the types of thoughts,

feelings, and sensation that they experience. Rather, the emphasise of Buddhist meditation lies in one's ability to observe the contents of their experience in an equanimous, impartial way, transcending suffering by realising the truth of non-Self.

So, how might *Rite Of* relate to meditation? To answer this question, it might be worth reiterating the relationship between repetition and profound experiences of meditation. According to Fink (2005), minimalism's gradual process and repetition are echoed in the non-teleological culture of Soto Zen, advocated by the likes of Suzuki Roshi. Repetitive music practice, he argues, is aimed at making the ego gradually disappear.

Likewise, Margulis (2014, p. 57) examines repetition through ritual, asserting that repetition intimates "that something within the sound itself, rather than an aim towards which things are driving, should be the focus of attention". Like Fink, she suggests that repetition stands to induce transcendent states, characterised by a reduced sense of self. Therefore, the soteriological promise of *Rite Of* resides in listeners' ability to suspend their desire for this goal or that goal, and return to the present moment, listening to sound itself.

> The melody shifts, and the piece becomes more introspective. I notice a low tone creeping in. Faint at first, it quickly becomes part of the foreground, providing an eternal, sustained tonal ground. (CL)

As the segment above suggest, a further aspect of *Rite Of* relates to the use of a drone in low E1, previously discussed as a form of repetition as part of the theme Slow Evolution. Here too, we might interpret the drone as an additional

form of repetition, in the sense of maintaining similarity and providing a tonal ground from which repetitious forms can bifurcate. Perhaps, as Boon (2002) argues, the 'formlessness' of the drone, derived from its lack of contrasts and shifts, stands for an ineffable musical activity and signifies a deeper truth that is otherwise hidden.

Another feature of the piece relates the use of the Gate parameter as a compositional device that carries performative implications. In the *C* section (Video Marker 166–168), the underlying element is replaced with a variation whose notes are assigned zero-gate. This effectively mutes those notes, as long as the VCA level is under a certain threshold and leaves the melodic element on its own against the drone. As the performer turns the VCA level up, so the underlying element is increased gradually (Video Marker 169). In this instance, a compositional gesture (crescendo) is embedded in and through technology, by assigning zero-gate value to sequencer steps.

In the final moments of the performance (Video Marker 176–177), after a sustained crescendo—wherein patterns evolve in an additive fashion and the drone moves to the foreground— the performer increases the intensity of the frequency modulation via an LFO. The rate of oscillation is then gradually increased, until it finally crosses into the hearing range and creates frequency sidebands. At this intense point, the performer unplugs the audio cable going out to the reverb, cutting off all sound except for the tailing of the reverb. This gesture is performed for dramatic effect and serves to contrast the peak of the performance with the ensuing silence. This action constitutes a facet of embodied performance, since it helps the audience of this modular

performance to connect with the sound, pairing a visible gesture with an audible result.

6.9 Chapter Summary

This exegesis chapter provided the artistic and theoretical framing for the practical component of the research. Drawing on video documentation of the final performance, it examined the motivations, creative decisions, and outcomes that shaped the work. To support this analysis, entries from a listening diary were combined with practitioner annotations to form a dialogue. This dialogue then informed a critical discussion of the individual pieces in the portfolio and their relationship to the key themes developed in earlier chapters.

Let us now revisit those themes, with reference to specific works that exemplify them:

1) Music as Change—including material, compositional, and electronic change—is seen across the performance, particularly in *Pythagorean Age Love* and *Interlude.*

2) Slow Evolution, a subtype of change, is expressed through the gradual transformation of patterns. This aesthetic is especially present in *Made Flesh*, as well as other works that employ repetition with variation.

3) Music is Empty, a theme that relates to sonic space and material malleability, is evoked through spatial development in *Lighthouse I* and in *Made Flesh*, where the synthesised xylophone becomes a fluid texture.

4) Transcendent Experiences with Music are explored through different means: in *Immanence*, through timbre shifts and melodic contour; in *Rite Of*, through

intense repetition and drone. This theme is linked to focused listening and is also perceptible in *Pythagorean Age Love*, where attention is directed toward subtle sonic properties.

5) Score, Translate, Refine, Index is a theme connected to my compositional process and expressed through techniques such as ratcheting, glissando, and gating. It also exemplifies Composer-Performer-Machine Delegation, since translation and execution highlight the interplay between human and non-human agents in performance.

6) Generative Patching is explored in *Pythagorean Age Love* and *Interlude*, as well as in *Intensity*, which incorporates non-habitual gating techniques to challenge familiar compositional routines.

7) Seamless Performance, a guiding principle in the development of the live set, is demonstrated through fluid transitions—particularly from *Interlude* to *Immanence* and on to *Intensity*. This theme is also evident in moments where interaction, timing, and transition blur the boundaries between pieces.

8) Finally, Embodied Performance is considered in relation to performer gestures. For instance, in *Rite Of*, the dramatic disconnection of a patch cable at the end of the performance underscores the tactile and physical dimensions of modular musicking.

In reflecting on *All These Moments*, we return to the central concern of this research: how can modular performance promote, reflect and transform contemplative experiences. Through critical reflection, this chapter has demonstrated how performance not only embodies the research themes but

also serves as a site for their refinement and rearticulation. The recursive movement between theory and practice demonstrates the practice-research ethos, wherein musical knowledge is refined through acting and reflecting in parallel. With this in mind, let us see how these insights are integrated in the final conclusion, which will consolidate the key findings and contributions of this research, consider its limitations, and offer potential avenues for future exploration.

7 Closing Remarks

This research set out to investigate how modular synthesis might support contemplative approaches to music-making. I approached this through a cyclical process: closely listening to electronic and electroacoustic works, I identified aesthetic traits associated with contemplative experience. I then developed a bespoke modular system and a live performance practice to explore these traits, culminating in a performance-based portfolio and critical reflection. This iterative movement between listening, making, and reflecting formed the inductive-deductive methodological foundation for the study.

Two key questions guided the inquiry: first, what contemplative themes emerge from listening to modular-based compositions, and how might these inform modular performance aesthetics and practice? Second, how might modular practice itself refine and ground a contemplative paradigm?

In response to the first question, four interrelated contemplative themes were developed:

1. **Attention** was recognised as a foundational faculty—central not only to listening experiences, but to compositional and performance choices. Attention shaped the design of my modular system, favouring a laptop-less, setup that affirms a hands-on approach.
2. **Impermanence** is a concept that was explored throughout the study. This principle underpinned a compositional logic of transformation through voltage pathways, patterns, and human-machine interaction.

3. **Emptiness** and **non-Self**, themes drawn from Buddhist philosophy, were articulated through the fluid nature of timbre, musical patterns, and space. The modular system itself—an assemblage with no fixed centre—became a metaphor for these ideas.
4. **Transcendence**, a strong musical experience, was facilitated by immersive repetition and mutation, blurring boundaries between listener and sound. In performance, this gave rise to moments of absorption, where one lets go of habitual tendencies and dissolves into listening flow.

The second question—how modular practice can refine contemplative musical paradigms—yielded five insights:

1. Modular synthesis encourages **reduced listening**, focusing attention on sound properties independent of source or image.
2. It promotes **embodied engagement**, where tactile interaction fosters even feedback, concentration, presence, and flow for performers and audiences.
3. Modular synthesis aligns with **process-based composition**, supporting gradual, post-digital transformations that unfold in real time.
4. Modular performances are inherently singular, **impermanent** phenomena, and this cultivates a mindset of openness and **non-habituated experimentation**—a beginner's mind.
5. Finally, modular performance offers a **working model for emptiness**, in which the roles of composer, performer, and machine continuously shift and overlap.

These themes were not only theorised but also enacted. My approach relinquished laptop-based, screen-mediated control in favour of a direct, tactile relationship with the instrument. This move involved letting go of total control, embracing unpredictability, and composing through constraint. Using the ER-101 Indexed Sequencer, I developed a workflow that emphasised scoring, translating, refining, and indexing patterns—producing music that was structured yet never static. Each performance became an emergent event: repeatable in form but different in execution.

Generative patching practices supported this workflow, allowing for complex, evolving sonic results from simple initial conditions. A *seamless* performance approach—shaped through careful ordering of pieces, consideration of gestures, and smooth transitions—was central to maintaining the contemplative aesthetic. It also reinforced the importance of real-time awareness in shaping the listeners' experience.

The creative artefact stands as both a product of the research and a site of its unfolding. It demonstrates how practice can serve not only as a mode of inquiry but as a space for theory to emerge, be tested, and refined. Testimonies from listening sessions and practitioner annotations further validated the proposed framework, confirming the presence and relevance of contemplative themes across the portfolio.

7.1 Research Contributions

This study offers a contribution to practice-based research in electronic music by articulating a contemplative paradigm rooted in modular-based musicking.

It invites future exploration into how modular systems, and other open-ended technologies, can support sustained, mindful engagement with the musical-performative present.

Specifically, the study makes the following contributions:

1. It proposes a methodology that integrates *Deep Listening* (Oliveros, 2005) as an embodied, first-person approach for autoethnographic data generation. This deep listening framework shaped both the creative practice and the analytic process, grounding the research in somatic awareness.
2. It applies *Reflexive Thematic Analysis* (Braun and Clarke, 2022) within an arts-based research context, demonstrating how personally situated, interpretative frameworks can generate robust and transferable insights in creative practice research.
3. It examines the phenomenological, sonic, and practical dimensions of modular synthesis—across listening, composition, and performance—contributing to ongoing scholarly discourse on new musical instruments, embodied technologies, and post-digital practices.
4. It explores the contemplative and meditative potential of modular synthesis, situating it within a lineage of experimental music practices while drawing connections to Eastern philosophical interpretations, particularly Buddhist thought.
5. Finally, the study extends Gabrielsson's concept of *Strong Experiences with Music* (2011), offering a Buddhist perspective on transcendence that fram

immersive musical states as a form of ego-dissolution and present-moment absorption.

These contributions position modular synthesis not only as a mode of sound generation, but as a site of contemplative inquiry—opening new avenues for embodied, process-based, and contemplative music research.

7.2 Possible Future Trajectories

An emergent focus on modular instruments, their contemplative dimensions, and the ways in which these dimensions are gleaned through listening calls for new avenues of research. From a theoretical perspective, the current environment of assemblage thinking and related theories in musicology provides a strong foundation for further exploration. A more focused investigation into the interaction between Buddhist philosophies and post-humanist theories of music production or embodied approaches to music cognition could provide valuable insights[40] [41]. The Buddhist emphasis on experiential, embodied, and practical acquisition of knowledge may offer new perspectives on these theoretical frameworks, particularly in relation to music-making practices.

From a practical standpoint, the rapidly expanding field of Eurorack modular instruments presents extensive opportunities for further study. Notably, this research did not fully integrate the generative affordances of modular

[40] Born and Barry (2018) survey the use of Actor-Network and Systems theories within musicology, explore their similarities and trace them to Deleuzian thinking and Adorno's theory of *mediation*.

[41] In the introduction to their book *Impermanence: Exploring Continuous Change Across Culture*, Geismar, et al. (2022) establish a link between such theories and Buddhist thinking and apply this within a socio-cultural context.

instruments. Future inquiries might examine how random, voltage-based processes can expand the possibilities of process music designed for contemplation. Additionally, the integration of biofeedback systems with modular synthesis represents a promising direction. By enabling real-time interaction between physiological states—such as heart rate, breathing, or brainwaves—and sonic outputs, biofeedback systems could deepen the connection between sound, body, and mind, fostering a more immersive and personalised contemplative experience.

Expanding this inquiry to include other meditative traditions and interdisciplinary collaborations could further enhance our understanding of the relationships between sound, technology, and mindfulness. Investigating contemplative frameworks beyond Vipassana—such as Zen, Tibetan Buddhism, or other traditions—might reveal alternative experiential and philosophical connections between modular synthesis and meditative insight. Similarly, engaging with fields such as neuroscience, cognitive psychology, or cultural studies could introduce innovative approaches to understanding how sound influences the human mind and body in contemplative contexts.

Moreover, it would be valuable to move beyond practitioner introspection to examine audience reception of modular performances. By tracking participant responses, researchers could develop a more comprehensive phenomenological framework to better understand the emotional, cognitive, and physical dimensions of contemplative modular synthesis. Within this proposed contemplative paradigm of music-making and analysis, ethnographic inquiry could also play a vital role. Interviews, questionnaires, and discourse

analysis could provide insight into how contemporary electronic artists and composers engage with modular synthesis and other experimental practices. This research could extend beyond modular-based praxis to encompass other forms of electronic, electroacoustic, and experimental music. Such methodologies would not only position these practices within the suggested paradigm but also examine their transformative, immersive, or transcendent qualities.

Ultimately, this study highlights the profound potential of modular synthesis as both an artistic and contemplative medium. As this medium continues to evolve, its intersection with meditative practices invites further investigation that would bridge the gap between sound and mind, human and machine.

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9 Appendices

9.1 Appendix for 3

Code	Example Journal Extracts
Attention can be directed	"At points, my listening becomes *global*, and I hear the sounds, their echoes, and their reverberance all at once" (TCCTF) "I noticed my attention shifted from moments where [...] I was focused on a single sound and the way all sounds appear together" (UT) "Indiscernible at first, [the tone] quickly becomes more present. My focus is drawn to its shifting spectral quality, its inner dynamics and timbre" (KYE)
Attention is finite.	"I found myself losing concentration, and when I came back, I noticed certain elements are different now [sic]" (DA) "There was a moment where my mind wandered" (BU) "I found myself fighting the urge to look at my phone, check the time, go to the toilet, and not always succeeding" (KYE)
Attention affords reflexivity	"I noticed my attention [has] shifted" (MUT) "[This] reminded me of the sound of my own being. A reflexive awareness in listening" (BU) "The disappearance of sound meant that I could momentarily witness awareness itself, and that was very powerful" (LAWL)
Attention in the present moment	"The steady growth of the piece, its tempo and moving elements [...] facilitate a moment-to-moment observation of unfolding phenomena" (SOTRS) "In moment-to-moment experience my consciousness observes what appears to be fixed objects" (KYE) "Sound as a phenomenon comprises endless changes in each moment, all framed through our memory and anticipation" (MPVV)

Table 9-1 – Coded Segments for 3.1

Code	Subcode	Example journal extracts
Music as process	Type of process	"The piece opens with a [...] a sparse pattern, and, very clearly, I hear it undergoing an additive process, whereby notes are added at the end of each pattern cycle." (TCCTF) "There is a strong sense of pulse throughout until the sequence starts to speed up, and this

		process ends when it almost multiplies its speed." (DPV3) "The music was predictable in its progression, yet at the same time slow and gradual, [which] meant you were transfixed by its movement" (LAWL)
	Process needs to be audible	"It's as if notes were inserted into a system with rules I cannot hack, but I know there are rules nonetheless and they are somewhat observable." (VW01) "While [...] the piece utilises modular synthesis [...] it doesn't bring to the fore any process, and so I am left wondering – what do I take from this?" (DA)
Change to sonic material	Material Transformation	The piece evokes a sense of materiality in me [...] It does this in a myriad of ways: 'real' sounds (bells) are played as they are; they are reversed; their envelope is altered; they are constructed using additive methods (synthesis); voices are blended with the tones, fragmented to create pops, and clicks. (MPVV) "As repetition of musical material ensues, I focus more on the timbral transformation of sound" (MU)
	Modulation	"When the envelope became sharp, the bursts would dance around the stereo field." (SOTRS) "At first, I hear an oscillating tone and my attention focuses on it" (PNU) "It rises like a wave and recedes" (XE)
Change is linked to a sense of time	A sense of meter	"At first, when the sequence starts, the serenity of the system strikes me. It is slow and even. No odd time, very repetitive." (INTCAEB) "The piece exhibits a hypnotic quality. Perhaps it is the combination of the tempo, and incessant repetition, followed by a tide-like process, 'washing' over." (SOTRS) "Sounds [are] 'smeared' by the sound of reversed reverbs. This causes a feeling of a-temporality." (TLL)

	The role of percussive elements	The result [...] is punctuated by bursts of percussive energy at different moment of the sequence. (DPV3) "The track starts with percussive noises that establish a sense of meter. It feels like there is an implied beat and I feel like moving. It is relatively up-tempo." (UT)

Table 9-2 – Coded segments for 3.2

Sub theme	Code	Example Journal Extracts
The constituents of sound	The bell	"I was drawn to the timbral quality of the real bells and bell-like tones [...] It reminds me of the gong in meditation."
	Additive/ granular synthesis	"Fragmented to create pops and clicks."
	Timbre and overtones	"The tone, while singular, is accompanied by discernible frequencies in consonance"
A sense of space	Nondual aspects of space	"It's as if the piece explores dichotomies of form/space, sound/silence." "A sudden shift from small-large, narrow-wide."
	Silence as space	"The drone slowly increases in intensity until it reaches a halt." "Space is achieved by silence"
	Spatial practices	"It reveals the tail of the reverberation that was present all along."
Patterns are mentally constructed	Grasping to memory and anticipation	"Upon its return, I was almost relieved"
	Harmonic experience	"The lack of 'obvious' harmonic centre for the piece takes me away from listening to music in a certain way."
	The role of repetition	"I was confused by the sequence, yet I kept on listening as it started to exhibit certain discernible tones. The sequence starts revealing itself."

Table 9-3 – Coded Segments for 3.3

Code	Example Journal Extracts

A connection to something mysterious/ divine/ other-worldly/ eternal	“I feel a connection to something bigger, more eternal, that was there before me and will exist after me” (KYE)
	“This causes intrigue [...] I feel as I am participating in the construction of this mystery.” (TCCTF)
	Enigmatic, oscillating sound. Immediate yet eternal. (MPVV)
	The piece evokes holiness in me. A feeling of divine presence. (PNU)
	"This universal mystery humbles me. We think we know the causes and conditions of ourselves, the world, but we truly don’t." (INTCAEB)
	"[this] adds to the mystique" (VW01)
A connection to other beings	"My heart opened up. I felt elevated and sensed all humans around me." (LAWL)
	Opening my eyes, I looked around and noticed the looks on people’s faces. I realised they went through a similar, transformative experience. (LAWL)
Blurring the boundaries between self and experience	"It is immersive and can be said to take me away from myself, much like the sound of ‘ohm’." (PNU)
	"In those moments, I felt there was no difference between me (subject) and the sound (object) [...] There was a sense of oneness with sound" (LAWL)
	"In moments of deep concentration, I felt immersed in sound." (MUT)
	"There were moments of pure awareness to sound, where there was no difference between the sound and myself [*sic*]." (SOTRS)
	"Like watching the waves of the sea slowly approaching, and letting it immerse you and feel how it slowly goes away." (SOTRS)
	"The piece starts with textured rain which makes me feel calm and safe, but also totally immersed." (VW01)
	"In several moments the external and internal are indistinguishable. I feel immersed." (KYE)

Table 9-4 – Coded Segments for 3.4

9.2 Appendix for 4

Code	Example journal extracts
The role of the composer	"All aspects of a composition that are decided upon in advance and tend to remain constant from one performance and another. This can include structure, instrumental parts, etc." (SoC)

	"I wanted to work with a simple phrase, experimenting with running it through a delay and juxtaposing the 'dry' phrase with the 'wet'." (PL01)
	"The intro can be longer [...] The ending feels abrupt [...]" (PL07)
	"It feels like the drop is very long, compared to the fact no compositional change occurs within it [...]" (VL06)
	"The composition isn't very developed…" (VL11)
	"I started by extending the arrangement ever so slightly, in order to allow the piece time to 'breath' as well as more room for error" (PL09)
The role of the performer	"all aspects of a composition that arise during a single performance, resulting from human interactions with the piece and its sonic contents. This includes any intentional change of parameters done by the performer." (LoC)
	"More intention needs to be placed on which parameters change at which time. This can be done using a more refined performance plan that functions as a score." (PL08)
	"I think that as an exercise, it would be good to see what parameters I want to change at which section. Maybe build a performance plan that honours the fact that it is short?" (PL12)
	"The performer needs to learn the different elements in the piece, and become closely intimate with them in" (VL03)
	"The composition changes, and the performer is unaware, or was unable to anticipate" (VL05)
	"This could have been solved if the performer had more control over what was happening" (VL06)
	"While the performer is no longer in charge of the other sounds in the piece [...] he is free to explore other aspects" (VL07)
The role of the machine	"stochastic/determinist ways" (PL02)
	"This was experienced as deterministic loops with an element of chance" (PL03)
	"I elected to keep the patch simple and started recording a take." (PL06)
	"I worked with the idea of accentuating certain notes in the sequence, mapping the velocity expression to a CV out that opens the filter." (PL07)
	"This patch features clock divisions sent to Math and then triggering different harmonies on the harmonic oscillator". (VL08)
	"Quite effective and worth further exploring to create intricacies within a given sequence." (PL09)

	"[T]his is an example of a patch that relies on user intervention in order to create variation." (VL02)
	"I suppose this form of interaction with the patch [...]" (VL14)

Table 9-5 – Coded Segments for 4.1

Code	Example journal extracts
Changing Amplitude and Spectra	"I used the envelop generators to change the intensity of sequences 1 and 2" (PL08)
	There is a build as all the parts are slowly growing in amplitude, due to the changes in the VCA and Filter settings (VL05)
	"I sent its 1V/Oct CV into a band filter's frequency control" (PL04)
	"It seems that the gradual opening of the cutoff frequency on the filter is effective." (VL02)
Spatial transformation	"I tried working with a reverb, but so far no luck. I might need to look into that further" (PL07)
	"I changed the depth of the reverb modulation" (PL08)
	"Manipulating the envelope modulation the reverb 'decay' control" (VL10)
	"[...] and used a trigger to modulate the Erbe-Verb size parameter" (PL03)
	"I realised that when the decay is at the point of feedback, and the CV out from the Erbe-Verb is routed back into the decay with an attenuator, it enables the reverb to sound endless, as it reaches the cusp of self-oscillation." (PL06)
Timbral transformation	"Texturised is used on all tracks to add, well... Texture" (PL03)
	"I completed this with a sub-kick sound, using the STO's wave-folding out and the Make Noise Maths." (PL06)
	"[The drone] corresponds with the idea of the sunrise, where, at first, there is only darkness and light is gradually accumulated" (PL07)
	"Working with the LPF frequency & resonance params, FM modulation depth and timbre" (PL09)
	"I can assign CV-B to the 5th harmony (M3rd) and, depending on the note, I can change the perceived chord and emphasise a major harmony when I want to." (PL12)

	"the LFO that is modulating the frequency of the Plaits goes into the hearing range, and this creates an FM like timbre which feels interesting" (VL03)
	"The complexity of the waveform increases" (VL06)
Changes to the Overall Dynamics	"There is a process of increasing the intensity of the piece slowly, from far to close (sense of space)" (VL01)
	"This lack of clear contours in the performance, cause the next section to fall flat. We see here the influence of dance music motifs on the quality judgement in the piece. There needs to be a 'build' followed by a 'release' in the form of a drop section" (VL03)
	"we hear that the use of pre-recorded drones allows for more control over the shape of the piece and its intensity." (VL05)
	"Then the performer continues to nudge thhe knob as a means of expanding the dynamics of the composition" (VL06)

Table 9-6 – Coded Segments for 4.2

Code	Example journal extracts
Pitch and Time	"[...] using oscillation and pulsation" (ConSyn)
	"I worked with a 2-bar phrase of 16th notes playing staccato in an F minor key." (PL01)
	"Phrases in even and odd time -> 3/4, 4/4, 7/8, 9/8, 10/8" (PL02)
	"This clip essentially loops 8-bars" (VL13)
	"The delay channel is [...] creating alternate rhythms that, from a psychoacoustic perspective are very interesting" (VL03)
	"I created an 8th note descending line with a harmony that I think is really compelling" (PL05)
	"What I got was a tone hitting in the rhythm of the original sequence but in C." (PL10)
	starting with 2nd harmony, then slowly fading 1st harmony till the respite section (PL09)
	"There is a certain vertical harmony that is created when multiple harmonies are stacked on top of each other" (VL03)
On difference and repetition	"The repetition with no variation ends up sounding too drowsy in my opinion, its a balance between repetition and change that needs to be emphasised and this configuration/composition isn't quite delivering" (VL02)

	"It is so repetitive; it feels like it drags on." (VL03)
	"There is a delicate balance between transformation and stasis that needs to be maintained." (VL09)
An algorithmic approach	"At its centre, a basic pattern with 16-permutations, played consecutively, with a melody that is derived from the rhythmic information in the pattern, using interval resizing." (ConSyn)
	"Where the part goes up an octave" (VL12)
	"After landing on a 7/8 sequence I liked, I omitted some notes from the main sequence that was going into the HO and created a nicer idea." (PL06)
	"I also reversed one of the sequences and played it alongside the others." (PL07)
Stretching the boundaries	"Expanding on the notion of pattern as object, I can apply different operations on this object [thus] stretch its ontological boundaries, to achieve different perceived results." (PL02)
	"This proves to be an interesting way of pushing this ontology of the patterns, its centres of gravity." (PL07)
	"Here we see a way of working with patterns such that a twist of a knob brings in a melody unheard before" (VL02)

Table 9-7 – Coded Segments for 4.3

Code	Example journal extracts
Favoring uniform, tactile interfaces	"The video showcases a hybrid setup where I am controlling the DAW using a controller (channel volume). The synth isn't being manipulated [...] there is attention being devoted to two different interfaces at two sides of the table" (VL01)
	"The composition changes, and the performer is unaware, or was unable to anticipate due to the fact that the interface is separate to the instrument the performer is operating" (VL06)
	"[I] didn't notice that the time region on Ableton was being looped and so the sequence doesn't progress to where it should go." (VL10)
	"I enjoyed running it from the ER-101. It was easy to program" (PL12)
	"The fact that the drone is on track in this performance means that the performer can is able to split their attention between less elements at one moment" (VL06)
	"While the performer is no longer in charge of the other sounds in the piece (i.e., the drone and STO sequence) he

	is free to explore other aspects, like the Verbos and the Echophon delay" (VL07)
Focusing attention, promoting flow	"This configuration allows the performer to focus on the instrument" (VL02)
	"It takes great concentration to know what each gesture does sonically. This means the performer often needs to restrict data from other senses (closing eyes)" (VL03)
	"[The] performer is focusing on subtle changes that are created through gentle gestures" (VL05)
	"The performer is really enjoying the performance given the fact that most aspects are pre-performed" (VL07)
Feeling the boundaries of a patch	"After a little while, where the performer feels the boundaries of the patch, trying to 'tease' a position in the knobs that would create the smoothest transition" (VL06)
	"The performer is reaching out trying to see which harmonies work best for this sequence - testing the limits of the patch" (VL08)
	"Performer is making sure that the right knobs are in the right position before the parts start being sequenced" (VL09)
	"The sequence has started, but the performer needs to find their bearings before they reach the desired setting" (VL11)
	"A small gesture to test its sonic effect" (vL12)
	"Testing the boundaries, only to discover it is inappropriate for that section of the composition" (VL14)
Visible gestures, audible results	"Some really nice touches on the wavetable synth Plaits." (VL01)
	"An intervention in the filter actually changes the sound." (VL02)
	"Subtle changes that are created through gentle gestures" (VL05)
	"By slowly nudging the knob, the performer is able to reveal the underlying pattern very subtly and slowly." (VL06)
	"There is a dual nudging act on both the filter and the envelope that modulates it." (VL12)

Table 9-8 – Coded Segments for 4.4

Code	Example journal extracts
Using Ableton Live, VST	"R&D of compositions with an aleatory principle, using the ES-9 and Ableton's follow actions" (PL03)

plugins and MIDI sequencing	"Using the Akai APC-40 as a MIDI controller for Ableton Live and my modular synth." (PL08)
	"Using Ableton's instrument rack, split the range of a MIDI keyboard across 2–3 external instruments, each going to a different MIDI channel" (Planning)
	The MIDI editor is visible on Ableton's screen (VL13)
	"My USB-C cable for the ES-9 is someplace else, but I can still use my MIDI-to-CV converter" (PL04)
	"I adjusted the automation on the MIDI tracks with CV Instruments on them, mainly changing the depth of the envelope velocity-envelope modulation" (PL09)
	"I wanted to experiment with Drone and MIDIVolve packs on Ableton" (PL07)
	"Some other generative plugins on Ableton, alongside two sequences" (VL02)
Endless studio takes and editing	"[I] started recording a take." (PL06)
	"I figured that as I record one element over another, the piece will start taking shape and the parameters that are appropriate for modification will become apparent" (PL09)
	"[…] and edited them together" (PL11)
	"This section of the video show the performer transitioning from the role of the performer to the role of the producer/editor. The use of Ableton as an editing, arranging, composing environment means that one can transition from on to the other" (VL06)
Excessive layering as an arrangement tool	"I figured that as I record one element over another, the piece will start taking shape and the parameters that are appropriate for modification will become apparent" (PL09)
	"I wanted to add another voice using the second channel of the sequencer, but that ended up being quite long and messy, so I settled for a second voice coming from #Ableton via #ES-9 outs." (PL11)
	"What we hear is a pre-recorded, reversed voice and a top melody. Both are played through a large software reverb" (VL01)
	"We hear that the use of pre-recorded drones" (VL05)
Embracing limitation	"The multiplicity of [voices] requires many modules to support, and I do not have enough filters" (VL02)
	"I noticed two of the voices (high and bass) could be merged into one voice on the modular" (PL04)
	"Set the channel that had all the parts combined" (PL10)

	"I elected to keep the patch simple" (PL06)
	"I wanted to see how I could exploit as many parameters [as possible] within one oscillator" (PL10)
Relinquishing control, embracing uncertainty, inviting surprises	"I then duplicated that line and shifted the notes to create a second voice" (PL01)
	"I omitted some notes from the main sequence that was going into the HO, and created a nicer idea" (PL06)
	"A live experiment - the LFO that is modulating the frequency of the Plaits goes into the hearing range, and this creates an FM like timbre which feels interesting" (VL03)
	"Then, I discovered something amazing: I can assign CV-B to the 5th harmony (M3rd) and, depending on the note, I can change the perceived chord and emphasise a major harmony when I want to." (PL12)
	"The second sequence comes in and it is completely out-of-tune with the main sequence" (VL13)
	"[The] ending is beginning to sound better in the iteration, once the performer starts paying attention to the outro part." (VL07)
	"The ending is much shorter this time. Which feels more concise given the length of the piece." (VL04)

Table 9-9 – Coded Segments for 4.5

9.3 Appendix for 5

Code	Example journal extracts
Establishing familiarity	"This representation could be copied as a unit" (PL13)
	"For example, an intro to "min desc" would take a simplified version of the melody" (PL20)
	"The chords matched the melody I had for min desc, although I had to change the time signature from 4/4 to 3/4" (PL21).
	"The original melody comes back in and that's very satisfying" (VL15)
	"The performer fades the drone in" (VL15)
Pitch-based operations	"And so, slewing one step to the other, say between step 1 and 2 would result in a slew the length of 11/16, which is half the length of this 22/16 step [...] or changing pitch for every step." (PL13)

	"The composition works on the basis that some steps are transposed by 12 semitones, and following that, those same steps start varying melodically" (PL23)
	"I tried working out what the variations on the low notes would sound like... but that didn't prove fruitful so I might need to tackle that next time." (PL25)
	"Pattern 16: D-octave-up; pattern 17: D-over-G; pattern 18: D-over-E" (PL26)
	"I started adding smooth voltage transitions to create additional variation" (PL29)
Time-based operations	"I wanted to start developing the accelerated version of Emergence [...] The work on the fast version was really interesting, because it involved using the slow version as a baseline and expanding it [...] To expand this baseline version to be played at 232bpm (4 times 58), I had to work with multiple algorithmic processes that unfold simultaneously over time."
	"The series of notes is: [C-3, Bb-2, G-2, Eb-2, C-2, D-2, Eb-2, G-2]. This series is repeated, but every member of the series is assigned a different length (measured according to number of clock beats) every repetition. The way to determine the length of each member is by taking the set [2, 2, 2, 4, 6, 2, 2, 4] and shifting it to the right eight times [...]"
Additive/ subtractive processes	"One pattern at a time, I silenced notes that I didn't want to hear." (PL30)
	"I started by writing a maximalist version, then stripped it back to its most minimal form: one note every 2 bars. As I laid-out the process of addition, I realised that the *maximalist* form can be slightly more developed through adding some eighth notes, and that the additive process would be more interesting if notes weren't added in consecutive order." (PL35)

Table 9-10 – Coded Segments for 5.1

Code	Example journal extracts
Developing ideas in a score	"That is, writing sequences into Sibelius, making an initial structure in score form, before moving it into the ER-101 sequencer [...] One starts with a traditional representation of musical phrases (i.e., notation)" (PL13)

	"I started by opening the Ableton Project. I wanted to export the midi files from the Ableton project so that those could be imported to Sibelius." (PL22)
	"I resolved to the structure in the score" (PL26)
	"I started experimenting with the ending, only to realise that I'll probably need to do that with a score." (PL27B)
Translating scores to sequencer language	"I noticed certain different approaches [...] The two bars above can be represented in several ways, depending on the resolution of the clock. Let's assume the clock beats at 16th note intervals, then every musical bar would contain 16 beats of the clock. Thus, each note or rest in the above could be represented by its own step, a total of 16 steps, each with a duration=2, with gate=2 for notes and gate=0 for rests. This of course, allows the most flexibility in performing pattern operations, because we can edit every note. But it's not very economic" (PL13)
	"We can also represent these two bars like so: step 1— duration = 22, gate=1, ratchet=ON; Step 2—duration = 4, gate = 0; Step 3— duration = 6, Gate = 1." (PL13)
	"I realised that, with this composition, there is a way of skipping this process by working directly with a series of note lengths" (PL22)
	"[...] and created a part for the intro that includes a reverb automation via CV-B on selected notes (where CV-B value was determined by jitter around 50 with 35 depth)." (PL29)
	"I realised that it would be easier to work with the sequence and have the gate of some steps = 0, to reveal only those notes of the sequence I want to emphasise." (PL30)
Creating and maintaining a score-to-sequencer index	"I need to identify/map the different snapshots/parts/patterns and consolidate them" (PL17)
	"[...] while noting down bar numbers for each pattern" (PL19)
	"Working with a sequence programming tracker [index], I am documenting each pattern and the way it corresponds with the score." (PL20)
	"I began mapping my parts in a table-like format, in order to help understand their function and how they relate to each snapshot and other parts." (PL21)

	"I used the sequence programming tracker [index] to reacquaint myself with the patterns" (PL29)
Refining scores and patterns based on listening	"I re-opened a piece I've worked on a while back, temporary title 'minor descending', but with a lower tempo of 90 bpm and with the same patch I used for the piece I did yesterday, Boundless." (PL15)
	"I am reflecting on this meeting as I am listening to my own work." (PL16)
	"See if they flow nicely to and from one another [...] make adjustments accordingly" (PL25)
	"I realised that the slurred note between bars 1–2 and 5–6 of the 8-bar sequence made this version feel unsteady, so I decided to re-write the score without slurs" (PL39)

Table 9-11 – Coded Segments for 5.2

Code	Example journal extracts
Gating	"I found interesting the concept of using the same gate trigger for two different tracks, creating a strange harmonisation." (PL21)
	"Adding noise bursts as a way of creating timbre-rich sounds." (PL27A)
	"I made a patch that explores different clock divisions oscillating against this sequence." (PL14)
	"I think that the combination of an evolving pattern and harmonies playing at different sub-divisions creates a sort of generative grammar." (PL15)
	"I started experimenting with having noise being triggered from a clock multiplication" (PL32)
	"Lastly, I added some noise at a clock multiplier of 1.3 which felt really interesting." (PL34)
Cyclic/random modulation	"I tried using LFO modulating the length of the envelope" (PL36)
	"using the LFO from Maths to change the envelope time and the Plaits 'timbre' parameter" (PL36)
	"Change the patch to add S&H modulation of the filter frequency" (PL37)
	"I kept the noises generator as well" (PL38B)

Compounding patterns using delay	"Echophon (Mix Out) -> Erbe Verb (In)" (PL37, PL38A, PL38B, etc.)

Table 9-12 – Coded Segments for 5.3

Code	Example journal extracts
Order is important	"I felt, reducing it to 8 iterations would be interesting, especially because the fast version (A5) will be played at some other point of the set. That way they might serve to complete each other [...] Looks at how the fast iteration of this piece can complement its slow version in a different section of the set or next to it" (PL38A)
	"Devise a set list, taking into consideration mood and patch transitions" (PL40)
	"I started sketching a new set list and landed on the following: 1. "emergence duo", starting slow and reaching a peak 2. "Boundless", lowering dynamics but keeping things slightly rhythmic 3. "Sequence 1", picking up the pace and showcasing algorithmic composition 4. Then, continuing with the already-existing set" (PL45)
Mapping interactions and gestures	"I need to decide what happens in rough terms at each point of the set, and this should be done on a part-by-part basis." (PL17)
	"Map parts, their gestural vocabulary, transitions, peaks and troughs". (PL20)
	"Performance 'glitches' should be included. [...] I shouldn't be afraid if things aren't as smooth as I want them to be, because it adds interest, contrast, and an embodied connection to the sound." (PL44)
Refining transitions	"It's important after Boundless to do the following: 1. HO: Triangle to Square out 2. HO: 1st and 4th harmony 3. ER-101: Gate 2 >> ADSR: Gate 2 4. Clock: 2 to PB 2 >> Maths: Ch. 4 trigger". (PL42)
	[...] then in the end, fade out the Plaits and HO Square. Leave the HO Sum. Wait till end of process the load the next song (PL42)
	"I experimented with unplugging the MIDI clock and manually changing the tempo on Pamela's Workout. At this moment, I am not sure what would be the best way to control tempo changes during the set." (PL29)

	"I made sure that the scenes on the live project are in the relevant tempo. Now, I only need 3 scenes, at tempos 100, 116 and 85 — but perhaps I can do the same as the table suggests?" (PL41)
Execution (familiarisation, in(tension), attention)	The plan was to run the live set from top to bottom, and carefully honing the different pieces (PL27A)
	"Take each piece, one after the other, and rehearse playing them and the transitions between them, inc. re-patching and adjusting parameters to their relevant positions." (PL42)
	"I need to decide what happens in rough terms at each point of the set, and this should be done on a part-by-part basis: 3-compositions; 3-peaks (tempo, part, patch); intro (tempo, part, patch); outro (tempo, part, patch); Then, everything in between" (PL17)
	"Create an intro and an outro to the set [...] peaks and troughs". (PL20)
	"In terms of the structure of Emergence Slow, the piece plays 7 patterns, before it reaches an 8th one and starts looping it. I think that it is useful to emphasise the 1st, 3rd and 4th harmonies overall, and making sure cutoff control and VCA level of the square-wave channel are increased very carefully and with intense focus." (PL43)
	"The voice is slightly out of tune and the performer recognises this and quickly changes the tuning" (VL15)
	“But it is slightly out of tune, so the performer adjusts it (VL15)
	"The performer is adjusting the resonance parameter to balance the lows" (VL15)
	"The performer notices and leans into it" (VL15)

Table 9-13 – Coded Segments for 5.4

9.4 Appendix for 6

9.4.1 Exegesis Correspondence

The following is a correspondence between two internal voices, the contemplative listener (CL) and the reflective practitioner (RP). It was constructed during research Phase 4 (described in 2.7.4).

9.4.1.1 Lighthouse I

CL: I hear silence, and gradually, noise that becomes the sound of a distant object, an occurrence from far away, 'washed' with reverb. It feels timeless and a-temporal. A pattern emerges, slowly taking shape.

RP: To move from a state of silence to a state of wash, I increase the Erbe-Verb's decay control to a state of self-oscillation (1). In simply increasing the filter cutoff frequency that's affecting the oscillator, the reverb starts receiving input, and the "object" becomes tonal (4).

CL: The pattern being revealed comprises two 'elements': an underlying one and a melodic one.

RP: Most monophonic patterns in this performance (including this one) are an amalgamation of distinct elements—parts operating at different pitch registers. This creates the feeling of polyphony, even though there is only one voice (6–8).

CL: After some time, the piece reaches a halt, and I feel that it could have gone for longer—an attachment towards that which used to be.

RP: To transition into the next piece, I had to lower the filter to a point where practically no signal is outputted. While the tail of the reverb decays, I reset the sequencer to the start of Refraction. This is done to not create an odd transition between these two slightly disparate sequences. (12–13).

9.4.1.2 Lighthouse II

CL: From the same plane of immanence, a new pattern emerges. It shares the same DNA as the previous. As it is repeated, my attention drifts to various spectral properties. I notice how, as notes change, the harmonies of one note reverberate against the harmonies of the other.

RP: Once the sequencer has been reset, I fade the voice in. The underlying sequence in the second movement of Lighthouse expands on the 1-bar museme played hitherto, forming an 8-bar pattern. In the introductory section of this piece, my initial attempts are to utilise the reverb wet-dry control, the filter cutoff, and the spectral tilt of the Erbe-Verb and HO, in order to smoothly transition from a distant, muffled state, to a clearer representation of the pattern (15-16). Minimal finger gestures alter the sound significantly, so I have to remain attentive (18).

CL: The sequence becomes brighter. Its spectral movement reflects the light of dawn, reminding me of early-morning, late-autumn walks during meditation retreats in the English countryside. At 7am, the sun isn't out yet. Over the span of 20–30 minutes, the trees almost miraculously illuminate, and I would observe this transition with great interest. This occurrence, which results from the natural cycle of heavenly bodies, illustrates my own understanding of change. Sometimes, change is subtle and unrecognisable. Nonetheless it persists. Behind the horizon, the sun still moves, even if we don't see it. At some point, its movement reaches a critical mass, and suddenly, it triggers conscious perception.

RP: Compositionally-speaking, the pattern in this piece evolves rapidly from one iteration to the other, to compensate for the slow tempo (19). To complement this development, I increase the amplitude of the saw wave output of the Harmonic

Oscillator (HO) to create a sense of drama and crescendo (21). This creates a transition from the dominance of the harmonies to that of the saw wave (25).

CL: The first rays are ecstatic and elating. They cause the top of my head to tingle. Yet, this sensation slowly decays, and the pattern disappears into its own horizon. In the distance, it is still audible, and suddenly it shifts gears, making way for a new process of development.

RP: Here, I am decreasing the filter cutoff frequency to reduce the overall dynamics of the piece. Micro adjustments of some parameters can cause big sonic differences, therefore the result is quite dramatic. At the end of the piece, I used the opening sequence once more (see 15), to create a sense of affinity and closure (27–28).

9.4.1.3 Lighthouse III

CL: The sound shoots, and the sequence quadruples in speed. Though similar to the one we heard before, the accelerated sequence yields different results.

RP: The CV-B output from the ER-101 sequencer is patched into the Erbe-Verb's Size CV. This is used throughout the set as a method of automation (15). Thus, when the sequencer moves from one piece to the other, the size of the space virtually shifts, causing an ascending sound that resembles a laser beam (or a ‘shot’). (30). While both the second and third movements of Lighthouse receive the same clock signal (100 BPM), the sequencer divides the clock signal by 2 in the former and multiplies it by 2 in the latter. This means that one is 4-times faster than the other.

CL: Constituting a central pattern, an underlying element is accompanied with a melody that changes and evolves over time. The balance between stasis and flux keeps me engaged.

RP: Like the second movement, this one starts with a similar underlying element of an 8-bar length. At some point, the melody is introduced again, and it changes in a

rate that supports the fast pace of the piece. Because the piece is faster, it requires a slower rate of change between iterations to create flow. (31–33)

CL: At some point, the delay time changes drastically, creating a temporal glitch that breaks my concentration and demand that I re-enter flow. The piece fades out, until it is finally reduced.

RP: I realised that the delay time wasn't as it was supposed to be and attempted to adjust it mid-track. This wasn't very pleasing and broke the flow of the piece. The final result was better, but it meant that the ear had to adjust to something different (34–35). After the most evolved pattern finished playing, I initiated a decay, in anticipation of a reduced version of the sequence (45).

9.4.1.4 Pythagorean Age Love

CL: A new sequence fades in. It has great melodic contrast and a descending contour. When it hits the lowest tonic, I am transfixed by its subtle vibrato. Is it caused by the juxtaposition of delayed signal and the original? Or perhaps through anomalies in voltage?

RP: The introductory voice heard in this piece is coming out of the HO, from an output that mixes the first eight harmonics above the fundamental as sine waves. This output (henceforth sum) is used in other pieces too, but the nature of the sequence herein, with its long, sustained notes (no envelope modulation) that traverse large intervals, enables to clearly distinguish those harmonies. And the harmonies I usually emphasise are the 1st and 3rd.

CL: Slowly, other sounds enter the scene, and this provides interest and respite from what is otherwise repetitive. First, a steady pulse is introduced, and I feel as though I could have listened to the melody on its own for longer. After a while, noise 'bursts' start appearing, and while they seem to follow a certain pattern, their sonic qualities

are constantly changing. The pulse slowly morphs with each iteration of the sequence, until suddenly the noise 'bursts' change their rhythmic pattern and character, feeling more uplifting and urgent.

RP: The piece revolves around a central sequence that repeats 8 times. In each iteration, I added new sounds to accompany it. (51) Before the start of the second iteration, I introduced a triangle wave pulse. In order to achieve a pulse at an even pace, I used the ratcheting functionality of the ER-101 sequencer. (52–53) For the 3rd iteration, I added a clock-synched sample and hold (S&H) modulation on the filter cutoff, creating short bursts that add strange textured rhythms. To create variation with the pulse, I modified its envelope parameters. (55–56). On the 5th iteration, I introduced noise bursts at 1.3 times the clock, which created a counter rhythm to the pulse and S&H effect. Eventually, this was increased to x2 for even greater urgency.

CL: Toward the end, the tension drops, as the pattern is reduced into a small pulse that goes on for some time.

RP: In the 7th iteration, I began transitioning into the next piece, by adding an amplitude envelope modulation to both HO channels (sum and triangle), which left only the pulse (63), replacing the triangle output for the saw, and taking out the noise channel and re-introducing it again with a different gate trigger (65). The patching differences between those pieces makes it hard to end one in an interesting way, without risking the beginning of the other (67). Nevertheless, they were played in this order as I felt that it served the overall narrative of the performance.

9.4.1.5 Made Flesh

CL: When I listen to this piece, it invokes an array of emotions and thoughts. Firstly, it exhibits a great degree of malleability and sonic plasticity. While the sequences are repeated, they undergo constant transformation. Sometimes this change or oscillation

feels graspable and predictable, and at other times, it escapes rationalisation. It is unruly. Over a fast-paced pattern with evolving voices, there is a slower movement of timbre that reveals the existence of a noise component in the sound, coming in and out. I can also distinguish the different tones of the harmonic oscillator morphing over time. At times, the sound has a bell-like nature, due its short-transient, staccato nature and long decay. At other times, the synthesis is unveiled.

RP: The patch settings for *Made Flesh* involve a single voice played with the HO's sum output and a noise generator. Both run through a Low Pass, Voltage-Controlled Filter (VCF) modulated by an LFO. This creates a sense of 'deterministic' movement between a state where the noise is emphasised and a state where it is inaudible. The path to achieving a pleasing setting for this piece isn't always straightforward, and the result can sound tumultuous. This is compounded by changes to the envelope time, which, at points, is set to short attack and long decay (hence, 'bell-like')

CL: Familiarity is created through mere exposure, as the underlying element is contrasted with a melodic element that oscillates between different themes. The piece creates a sense of alienation and anxiety, perhaps because of its mechanical nature with no rhythmic anchor points. A feeling of unrest as one is trying to work out how the pattern operates. This seemingly 'minimal' piece is maximal, because it actually demonstrates several autonomous processes occurring simultaneously.

RP: This piece cycles 8 pitches, whereby each is assigned with a different length, totalling at 1 bar of ¾ time. In each iteration of the cycle, the series of lengths is phase-shifted, while pitches maintain the same order, resulting in a larger cycle of 8 bars that feels repetitive but lacks any 'catchy' phrasing. Over the course of the piece, pitches within this cycle are resized to create melodies. And these melodies themselves follow algorithmic processes and thematic development.

CL: As the lowest notes of the sequence start moving between two states, a second sequence enters the scene. This creates a sense of pleasing harmonic progression. At the end, the sequence undergoes a process of decomposition, providing a sense of relief from the relentlessness of this piece. The sound becomes more muffled. It slows down.

RP: In the final section of the piece an additional voice from the Plaits oscillator is added, playing the opening sequence (without melodic interval resizing) (83). The oscillator is modulated by two different LFOs and automated via the ER-101's second CV-B, which creates interesting and complex results. At some point, the low notes of one voice change, creating a sense of harmonic movement. To anticipate the subtractive process unfolding on the sequence played on the HO, I reduced the volume of the sequence played on the Plaits (85–86). Over the course of the outro, the volume of the Plaits voice was gradually decreased as the HO voice was subtracted. The final stage of this subtraction reduced the pattern to a single note (90), before the next tempo change is cued in preparation for the next piece.

9.4.1.6 Interlude

CL: In a dramatic shift, a new, ecstatic melody is introduced. Short, snappy and rhythmic, the notes glissando between each other, every once in a while. Slowly, chords are introduced. Sharp yet warm, they are different pitch-wise, yet they ‘stab’ in a similar rhythm.

RP: The theme established in *Interlude* is a variation on themes from the following two pieces, *Immanence* and *Intensity* (92). To achieve the glissando effect, I used voltage smoothing between steps of the sequencer. Smoothing starts when a note’s gate ends and continues until the start of the next note. I left the decay time just about long enough to make this smoothing effect audible (93). Then, I started introducing

the Plaits oscillator in ‘chord’ mode, beating with the same gate trigger as the other sequence (94). The chords are essentially a sequence of tones stacked with a minor triad above them. (97)

CL: Over the melody and the chord stabs, a cyclic undulation changes its rate. The chords are left on their own, and the undulation becomes central. Suddenly, the chord pattern shifts and soon after disappears, while the chords are kept sustained. A second sequence creeps in and is played over the sustained chord pattern, creating a strange, mechanic polyrhythm. The chords fade out, leaving only the melody.

RP: The VCF is modulated by an LFO, and I tried to adjust the rate to match the pace of the music. It creates an autonomous movement that isn’t quite synced to the rhythm but is close enough (95). In the heat of the moment, I cued the next pattern, without reducing the CV depth of the chord’s amplitude envelope. This meant that the pattern of the ‘bursts’ switched abruptly. Eventually, I took the CV depth down, leaving the chords sustained whilst maintaining the undulation fr om the filter LFO. I then faded the voice playing the new pattern—an odd-timed sequenced looped against the chords— and let the polyrhythm unfold (100–103). Finally, I faded the chords out in preparation for the next piece (104).

9.4.1.7 Immanence

CL: Presently, the voice changes its pattern to a fast-paced, low-pitched melody. Despite its minor key and initial downward motion, it is uplifting, because after completing its descent, it goes up again at the start of the phrase.

CL: I notice a timbral movement from sharp bursts of lightning to softer tones. Also, as the piece progresses, the original pattern permutates both rhythmically and melodically. In each iteration, the pattern is varied in a minute way, and by the end, the change is significant.

PL: This configuration aims to enhance the ecstatic nature of the piece by creating short ‘bursts’ of sound. This is done using the HO’s sum and saw output via careful envelope-related considerations. Using the same gate control from the sequencer, the amplitude envelope is short, while the filter envelope is even shorter (106). Thus, changes to the envelope parameters affect the sound drastically (110). The melodic theme is carried by the top element, and it combines two parts—AB. A remains the same, while B undergoes constant transformation. In addition, the rhythmic pattern of the sequence is permutated by slurring some notes and ratcheting others.

CL: There is an interesting sliding effect across a series of notes at the tail end of the phrase. And this segues into a new section, which is marked by a harmonic shift over a similar pattern. It feels quite dramatic. As if in a different space. Within this space, I hear the theme from before, only re-contextualised.

RP: While developing the sequences for this piece, I accidentally discovered that if voltage smoothing is applied to a ratcheted note (a note that repeats), the glissando occurs on the entire group of notes. This immediately felt interesting and was used as a method of variation and to segue into the C section of the piece. This section was built around a rhythmic and melodic variation of the underlying element (120). To accompany this shift, I reduced the filter cutoff frequency, making this section feel more introspective (121). Then, the main theme, a variation on the melody introduced at the start of *Interlude*, is played against this new backdrop.

CL: Returning to its original space, the pattern continues for some time. Finally, the underlying element reduces, leaving only the final melody. Slowly, we hear a foreign tone creeping in. It moves in a different way than the sequence played so far. Its appearance is haunting at first, but I begin to observe its movement, shape and resonance. Its reverberation reminds me of the virtual space in which exists.

RP: After the permutational process had been realised, I triggered a transitional section, which omits most of the underlying notes, all the while keeping the melody. I wanted to introduce an element from the next piece to make the transition smoother, so I used the bass pattern from the next song (played on the Plaits oscillator) and had it triggered by the same gate as the final pattern of this piece. This created a strange harmonisation of the pattern.

9.4.1.8 Intensity

CL: Suddenly, the assemblage of elements leaps into a new sphere. Layered over the bass voice established earlier, a new voice is introduced and seems to be connected in key and overall shape to the one heard previously. Like before, the bass moves the pattern it accompanies, creating an overall busier result, if one could even say such a thing.

RP: *Intensity* was developed as a variation of *Immanence*. Essentially, I took the main pattern from of the original, moved it up an octave and stripped it back. This striped-back, underlying pattern was appended with a new theme. I also reharmonised this pattern, by adding a pulsing bass line. However, since the number of envelope generators in my rack was limited, I toyed with the same gate signal on that bass voice. The result was kind of interesting, and it served as a basis for the transition and overture of *Intensity*. So, when this track starts, the HO and Plaits voices move together in harmony.

CL: After the main theme is introduced, the bass voice starts to pulse suddenly. And this goes on for some time, while the other pattern undergoes algorithmic transformation.

RP: Eventually, by patching the ER-101's second gate output into the envelope generator modulating the Plaits, I was able to ‘separate’ the two voices and introduce

the pulsing rhythmic pattern that was actually programmed. This was also used as a method of bass development (133), which accompanied the evolution of the melodic element, up until the middle section.

CL: There are instances that reveal the ‘liveness’ of the performance, like notes that are a little louder than they should be or when re-patching causes sudden glitches.

RP: Due to the way the synthesiser was patched at this point, the bass notes were affecting the envelope filter for both voices, which created interesting accents on the melody, but could have been slightly less piercing. Eventually, I realised that and reduced the depth of the filter modulation, and this was perhaps too drastic. (145). In addition, by unplugging the gate source cable (as mentioned in 133) a 'glitch' might be caused (147)

CL: There are some underdeveloped moments, like the section in the middle, which starts with a syncopated bass that feels urgent, however the melody that drifts above feels like it never goes anywhere.

RP: The middle section is based on an altered bass sequence with a syncopated rhythm, on top of which I faded an arpeggiated voice in and out. It was created as a development section, to provide contrast. In hindsight, this fell a little flat and perhaps should have been developed further or, at the very least, performed better (143).

CL: After the middle section, the main theme is recapitulated in a move that feels rather cathartic. Slowly, the syncopated bass undergoes variation. There is a degree of growth and decay, especially toward the transition in the end, where the top voice is left against a steady bass note, in an almost-schizophrenic way, and is embedded with a bursting quality.

RP: At this point, I wanted to return to the tonic of the piece, reiterating the main theme while maintaining the intensity that was built through the bass voice. After the

theme completed its final stage of development, the bass was re-patched to move in harmony with the melody (147). I then triggered a transitional loop, wherein the bass pedals on D, the 7th degree of the E minor scale, to create tension. At the same time, I created a randomised reverb size automation using the sequencer's CV-B output, which enhances tonal tension with spatial instability (150).

9.4.1.9 Rite Of

CL: The chaos soon resolves, and the previous pattern is replaced with a new one. Similar in key and tempo, this diatonic sequence echoes in a different space.

RP: *Rite Of* was written in an E-minor key and clocked at a tempo of 170 bpm, therefore it feels relate to the previous piece. Its basic underlying element is 1-bar long and appended with a higher, 8-bar melodic phrase that evolves throughout the piece (153). I increased the reverb ratio and size to create a feeling of a sequence being played in large hall.

CL: Despite its oppressive, repetitive nature, the pattern exhibits a soteriological quality. While musical material is repeated, attention constantly drifts to and from different sonic and musical properties, creating a state of trance, while the pattern gradually transforms and is augmented with harmonic and melodic detail.

RP: As soon as the piece was triggered, it felt different than it should be, so in the next few moments I tried to slowly adjust various parameters, in order to bring it to the right state. Changes to sonic properties, such as filter cutoff frequency and resonance, reverb size and ratio, envelope attack time, can contribute to this type of listening attention (154). This way, my performed gestures accompanied the thematic development autonomously performed by the sequencer (157, 158, 160, 162).

CL: The melody shifts, and the piece becomes more introspective. I notice a low tone creeping in. Faint at first, it quickly becomes part of the foreground, providing an eternal, sustained tonal ground.

RP: When the second theme was recapitulated, I changed the filter settings to create a more muffled sound and began slowly fading-in a low E drone (163). Slowly, I started manipulating the drone's oscillator parameters to make it more harmonically rich, thus making it more present (164).

CL: Suddenly, the underlying element of the pattern disappears. The melody is now played against the backdrop of the drone. It is very dramatic. Out of this minimal setting, a new underlying pattern fades-in seamlessly, changing the feeling of the piece completely, and this goes on for some time.

RP: In this section, the underlying element was replaced by a variation whose notes were assigned a zero-gate value. Effectively, this muted those notes, as long as their level on the VCA was under a certain threshold, leaving the melody to play on its own against the drone (166). By increasing the envelope decay time, I let some of the notes from the underlying sequence in (168). Later on, as I was turning the VCA level up, I was able to fully reveal the latent pattern (169).

CL: In a single swoop, the drone is no longer foregrounded by the melody, both become a single undulating unit of sound. This undulation quickly becomes more urgent, slowly increasing in rate and intensity. It creates a sense of crescendo that builds, until it cuts off suddenly. Its final residue is echoed in the space it once occupied.

RP: At one point, the pattern changed to a reversed version of itself, and I eliminated the depth of the amplitude and frequency envelope modulation, while positioning the VCA level past the audible threshold. This meant that, like the drone, the pattern was

no longer affected by the envelope generator and exhibited an even level. The LFO was therefore more felt (172). As this section progressed, I increased the rate of the LFO, and when it reached the hearing range, I unplugged the cable that's going into the reverb, in effect cutting off the sound while allowing the reverb to decay naturally (176).