University of Southampton

Faculty of Arts and Humanities

Music

***Loop Work* & *Accomplices*:**

Groove and digital aesthetics within collaborative musical works

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by

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Abstract

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This PhD presents two distinct sets of musical works and an accompanying commentary. Loop Work is a set of open score instrumental compositions grounded in the technique of looping. Accomplices is a series of electronic fixed-media compositions made through a collaborative process with other musicians. Both projects are underpinned by an interest in loops and groove, and digital aesthetics, and, in addition, all the works presented here engage with distributed creativity in some way.

The commentary is in two parts: contexts and exegesis. In 'Contexts', theoretical frameworks are presented for understanding loops, groove, and digitally engaged acoustic music in order to contextualise my practice and to provide a foundation for discussing it. Relevant historical, philosophical, musicological and psychological background is presented in both areas and existing frameworks which facilitate discussion and understanding of the works in the project are described. Where frameworks do not already exist or are not specific enough to the work in the PhD, new ones are developed or expanded upon. Examples are given from music other than my own to clarify concepts and to give wider context to my work, and case studies are used to demonstrate a more thoroughly worked application of the concepts expounded.

The exegesis describes the composition processes of some of the musical works contained in the PhD. The two projects - Loop Work and Accomplices - are examined separately through technical information about their construction, discussion of artistic aims, and ways in which research impacted the compositional outcomes. Selected works are singled out for more in-depth enquiry and the frameworks elucidated in the contexts section are used as lenses through which to critique aspects of the work. Finally, the conclusion returns to research questions posed in the introduction and discusses the overarching themes and concepts of the PhD.

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List of Accompanying Materials

All scores, audio and video are available at: https://www.jamiehowell.co.uk/phd-media

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Scores (all scores are in C, where parts are included they are transposing)

- *Loop Work 1* (2021), piano, cello, bass clarinet, electric guitar:
  1.1 “A Sandwich Short of a Picnic”
  1.2 “Trickle Down Aesthetics”
  1.3 “Loop Aware Exaggerate; Mute Silent Reduce”
  1.4 “Blown Fuse”
  1.4 “Blown Fuse” (String Quartet version)

- *Loop Work 2* (2021), open instrumentation:
  2.1 “Divine Intervention”
  2.2 “Három Száz Harminc Három”
  2.3 “Witness Statement”
  2.4 “Realignment”
  2.5 “Disruption”

- *Loop Work 3* (2022), tenor sax, keyboard:
  3.1 “Patch Change”
  3.2 “Bye”

- *Loop Work 4: Musician Reacts To Computer - **FIRST TIME HEARING!!*** (2022), percussion (bass drum, gong), electronics

- *Loop Work 5: Fourth Record* (2024), drum kit, bass clarinet, electric guitar, piano, electric bass guitar, electronics + open ensemble

Recordings

- "A Sandwich Short of a Picnic" – VIDEO
- "Trickle Down Aesthetics" – VIDEO
- "Loop Aware Exaggerate; Mute Silent Reduce" – VIDEO
- "Patch Change" – VIDEO
- "Bye" – VIDEO
- *Musician Reacts To Computer - **FIRST TIME HEARING!!** -* VIDEO
- *Fourth Record* – VIDEO
- *Cómplices* (2020), collaboration with Ausias Garrigos, fixed media – VIDEO
- *Sigh* (2021), collaboration with Claire Ellis, fixed media – VIDEO
    - (NOTE: *Cómplices* and *Sigh* are presented with audio and visual elements in the videos, however, the works are to be considered as audio recordings for the purposes of this PhD submission)
- *'n'* (2021), collaboration with Claire Ellis, fixed media – AUDIO
- *Húg* (2023), fixed media – AUDIO
- *Wide Screen Sonata* (2023), fixed media – AUDIO; Piece by Jørund Fluge Samuelsen based on my work *Húg*
- *tapemash* (2024), fixed media – AUDIO; Piece by Leah Kardos based on Jørund Fluge Samuelsen's work *Wide Screen Sonata*

Naming Conventions for Musical Works

Due to the layered hierarchy of works presented with the PhD, the following convention for the use of capitalisation, italics and quotation marks is adopted:

- The name of an overall project is capitalised but not italicised or enclosed in quotation marks:
    - Loop Work
    - Accomplices
- The title of a whole work within a project is italicised:
    - *Loop Work 1*
    - *Fourth Record*
    - *Sigh*
- The title of a shorter piece or a named section within a whole work is enclosed in quotation marks:
    - “Blown Fuse”
    - “Stumbler”
- For example:
    - “Loper” is a named section within *Fourth Record* which is part of the Loop Work project.
    - The full title of “A Sandwich Short of a Picnic” is “Loop Work 1.1: A Sandwich Short of a Picnic”. It is a short work within the larger work *Loop Work 1* which is the first work in the Loop Work project.

Research Thesis: Declaration of Authorship

Print name: JAMIE HOWELL

Title of thesis: Loop Work & Accomplices: Groove and digital aesthetics within collaborative musical works

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission

Signature: .....Date:.....25/03/2026

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Most of all, thank you to my wife Rita who has enabled this PhD by making it possible for me to take the time to do it and by always being supportive through it all.

Chapter 1 Introduction

This PhD presents two distinct sets of musical works and an accompanying commentary. *Loop Work* is a set of open score instrumental compositions grounded in the technique of looping. *Accomplices* is a series of electronic fixed-media compositions made through a collaborative process with an improvising musician. Both projects are underpinned by an interest in loops and groove, and digital aesthetics. The commentary presents a critical examination of each set of works and contextualises them within experimental open-score and collaborative practices, and new music[1] more broadly.

All the works presented here engage with distributed creativity in some way. This manifests as: improvisation; performers deciding aspects of pieces before or during performance; game-like aims within pieces which performers have the agency to pursue; aleatoric or unpredictable elements; and, musicians working together in the composition of the work. In this introduction I begin with a broad discussion of collaborative music making to give an overarching context for the main topics of this PhD. I then briefly outline the two principal topic areas which are used to contextualise my work: (1) the interrelated concepts of loops and groove; and (2) digital engagement in musical works. Each section defines the key ideas, provides a brief literature review on the given topic and points towards relevant artworks to provide context. This is followed by sections on the two composition series, *Loop Work* and *Accomplices*, where the nature, rationale, and key concerns of each project are outlined, and connections with the two topic areas are drawn. The final part presents a section on my methodological approach, research questions, and an overview of the structure of the remainder of the commentary.

1.1 Distributed Creativity - Open Works and Collaboration

There are many examples of music-making in which participants other than the composer have meaningful agency in shaping the outcome of a piece through influencing the nature of the musical material, form, timbre, affect, etc. Within long standing traditions such as jazz, Carnatic music, and flamenco, agency is usually demonstrated through improvisation; extemporised melodies, harmonies, and textures, based on a historical repertoire, and an associated musical

[1] The term 'new music' is used throughout this PhD to refer broadly to music since around 2000 which is an extension of experimental and avant-garde classical music practices of the 20th century including Cageian experimentalism, minimalism, postmodernism, and so on. It often forms the cutting edge of compositional developments and is comfortable with the inclusion of non-classical practices.

vernacular. Musicians within these traditions inherit modes of collaboration which function to regularise musical form, and structure the contributions of individual performers.

Western classical music is not principally considered an improvisational tradition. As Derek Bailey notes in his television documentary *On The Edge*[2] "classical music provides an unlikely setting for improvisation. Enthralled to its historical geniuses and their timeless masterpieces, this music usually shuns the accidental and the unexpected", however, he goes on to point out that "improvisation played a vital part in the genesis of this music." Improvisation was important to Gregorian chant and early polyphony practices, and Bach was not unique in being an improviser in his time, he "was exceptionally good at something that pretty much everyone could do at a passable level. They could all do it because it was built into their musical thinking from the very beginning of their training".[3] According to Robin Moore, "performers of European art music in previous centuries exhibited considerable interest in improvisation, and continued to consider it an important musical skill until at least 1840".[4] Moore discusses reasons for the subsequent decline including "the disappearance of original social contexts for art music; the lack of exposure in daily life to classical music on the part of modern performers ... and reverence for art music".[5]

Since the middle of the 20th century, experimental practices have been engaging performer agency in numerous ways including through the use of open scores. Umberto Eco's seminal book *The Open Work*[6] identifies the principle feature of this kind of piece as "the considerable autonomy left to the individual performer in the way he chooses to play the work." He goes on:

> He is not merely free to interpret the composer's instructions following his own discretions (which in fact happens in traditional music), but he must impose his judgement on the form of the piece, as when he decides how long to hold a note or in what order to group sounds: all this amounts to an act of improvised creation.[7]

The degree to which the performer's judgement must be imposed varies greatly from relatively limited 'aleatory' to radically open invitations to improvise. The term 'aleatory' was coined by Werner Meyer-Eppler who used it to describe processes whose "course is determined in general

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[2] Bailey, *On The Edge*
[3] Mortensen, *The Pianist's Guide to Historic Improvisation*, 1-2.
[4] Moore, "The Decline of Improvisation in Western Art Music," 61.
[5] Moore, "The Decline of Improvisation in Western Art Music," 80.
[6] The term 'open work' is a broader description which includes any artwork which needs to be completed in some sense by a performer. An 'open score' is one way of achieving this in music.
[7] Eco, *The Open Work*, 1.

but depends on chance in detail."[8] An example of a piece in this category is Stockhausen's *Klavierstücke XI* which allows the performer no more agency than to choose the order in which a set of nineteen tightly composed fragments are played. Contrast this with John Zorn's *Cobra*[9] which specifies no musical material, style, genre, instrumentation, length or any other sonic qualities, but gives a group of players the rules to a 'game' in which they decide what sounds to make. Zorn says his work is designed to "deal with *form* not with *content*, with *relationships*, not with *sound*."[10]

The concept of the open score, and the open work more broadly, has been further defined or described by a number of its exponents:

> Composition which is indeterminate with respect to its performance. That composition is necessarily experimental. An experimental action is one the outcome of which is not foreseen ... A performance of a composition which is indeterminate with respect to its performance is necessarily unique. It cannot be repeated. When performed for a second time, the outcome is other than it was.
>
> John Cage[11]

> A practical and creatively ambiguous stimulus to performer involvement and sonic creativity.
>
> Earl Brown[12]

> Not so much a composition as a field of possibilities, an explicit invitation to exercise choice.
>
> Henri Pousseur on his piece *Scambi*[13]

Later in his book, Eco adds to his definition (above):

> [Open works] reject the definitive, concluded message and multiply the formal possibilities of the distribution of their elements. They appeal to the initiative of the individual performer, and hence they offer themselves, not as finite works which prescribe specific repetition along given structural coordinates, but as 'open' works,

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[8] Mayer-Eppler, "Statistical and Psychological Problems of Sound," 55.
[9] *Cobra* is an unpublished musical work. For details of its composition and legacy see Brackett, "Some Notes on John Zorn's Cobra."
[10] Zorn, "The Game Pieces," 199.
[11] Cage, *Silence*, 35.
[12] Brown, "Transformations and Developments of a Radical Aesthetic," 184.
[13] In Eco, *The Open Work*, 2.

> which are brought to their conclusion by the performer at the same time as he experiences them on an aesthetic plane.[14]

In this PhD and in my work more broadly I adopt the following definition of an open score:

> A musical score which does not provide comprehensive information for the realisation of a composer's vision, but is in some senses incomplete, inviting performers to complete it during rehearsal or performance. This will often involve a process or system of collaboration created by the composer as part of the piece.

The overarching concept encapsulating all these approaches to the dissemination of agency is 'distributed creativity'. The term derives from the broader notion of 'distributed cognition' most closely associated with the work of Edwin Hutchins who argued that cognition is distributed "across the individual and aspects of the material environment; across multiple individuals interacting and communicating in an organized way; and across time, in that products of earlier cognitive processes change the nature of later cognitive tasks."[15] If 'cognition/cognitive' is replaced with 'creativity/creative', this also provides a suitable general description of what is meant by distributed creativity. The term is used in this PhD to cover all the ways in which creative processes span the minds, bodies and actions of those who participate in them, and it provides the link between apparently distinct practices such as co-composition and open scores; stylistic improvisation and randomised aleatoric approaches. The following sections focus on three areas within the overarching concept of distributed creativity: when the collaboration occurs; the degree to which the distribution of creativity is important to a given work; and the contrast between fixed and open works.

1.1.1 Preparatory vs Performative Collaboration

Collaboration is an aspect of distributed creativity which can occur during the preparation of a musical work, or at the time of its performance; in some works, it will happen in both. A highly collaborative composition process which distributes creativity across many individuals, places, technologies and processes may result in a piece with a repeatable fixed outcome involving little in the way of creative autonomy in the moment of performance. For example, the Talking Heads album *Remain In Light* was recorded using numerous musicians and studio technicians involved in a series of open ended, improvisatory processes, but the finished work is a piece of fixed media (even if the songs in abstraction are taken to be the resulting work, these are

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[14] Eco, *The Open Work*, 3.
[15] Anderman and Anderman, eds. *Psychology of Classroom Learning*, 336. This is a summary of Hutchins' ideas, not his own words.

understood as largely fixed to the performances on the recording). In contrast, a work created by one person using a highly individualistic process can have a thoroughly collaborative performance outcome (e.g. Zorn's *Cobra*). The importance of this distinction is that collaboration which occurs in the preparatory stage of a work's development does not have an ongoing impact on the way the work is heard over time, whereas performative collaboration constantly reinvents the piece. As such, it can be helpful to consider the concept of collaboration as intersecting with, but not the same as, the notion of openness in the work (see below). John Cage made a related distinction by describing a piece as being indeterminate or determinate with respect to its composition and/or performance, however his focus was less on collaboration and more on chance procedures. For him, works which are 'indeterminate with respect to their composition' entail pieces written using material randomly or otherwise non-intentionally selected rather than a piece with input from more than one person.

1.1.2 Distributional Thickness

The concept of distributive creativity can be understood in relation to any musical work. Even a fixed media piece with a single composer such as Pierre Schaeffer's "Étude aux chemins de fer" has a technological, environmental and social context across which its creation can be said to be distributed. However, distributive creativity is more directly relevant to the understanding of some works than others. The ways in which creativity is distributed with regards a romantic symphony will be mostly the background circumstances to the composing process, and a degree of interpretation available to a performer, whereas, a piece such as Cornelius Cardew's *Treatise* (free improvisation with a graphic score) contains a critical aesthetic of the distribution of creativity at the heart of its conception; it is *about* distributive creativity.

Open and improvised works have long been at the heart of debates around the ontology of the musical work because they present as difficult cases with respect to the 'work-concept.'[16] Discussing the ontology of musical works, Stephen Davies uses the framework of 'concept thickness' stating that "the [ontologically] thicker the work, the more the properties of its sounded instances are essential to its character".[17] Distributed creativity is a related but broader concept which can be thought of in a similar way; to adapt Davies' phraseology: the thicker a work's distribution of creativity, the more collaboration and openness of outcome are essential to its character. This allows us to think of distributed creativity as a spectrum, however, as noted above, while both collaboration and openness are separately sufficient

[16] See Goehr, *The Imaginary Museum of Musical Works*.
[17] Davies, 'The Ontology of Musical Works,' 39.

conditions for creative distribution to occur, they can vary independently. Therefore, these notions are best thought of as different axes of the same continuously variable concept (see Figure 1.1).

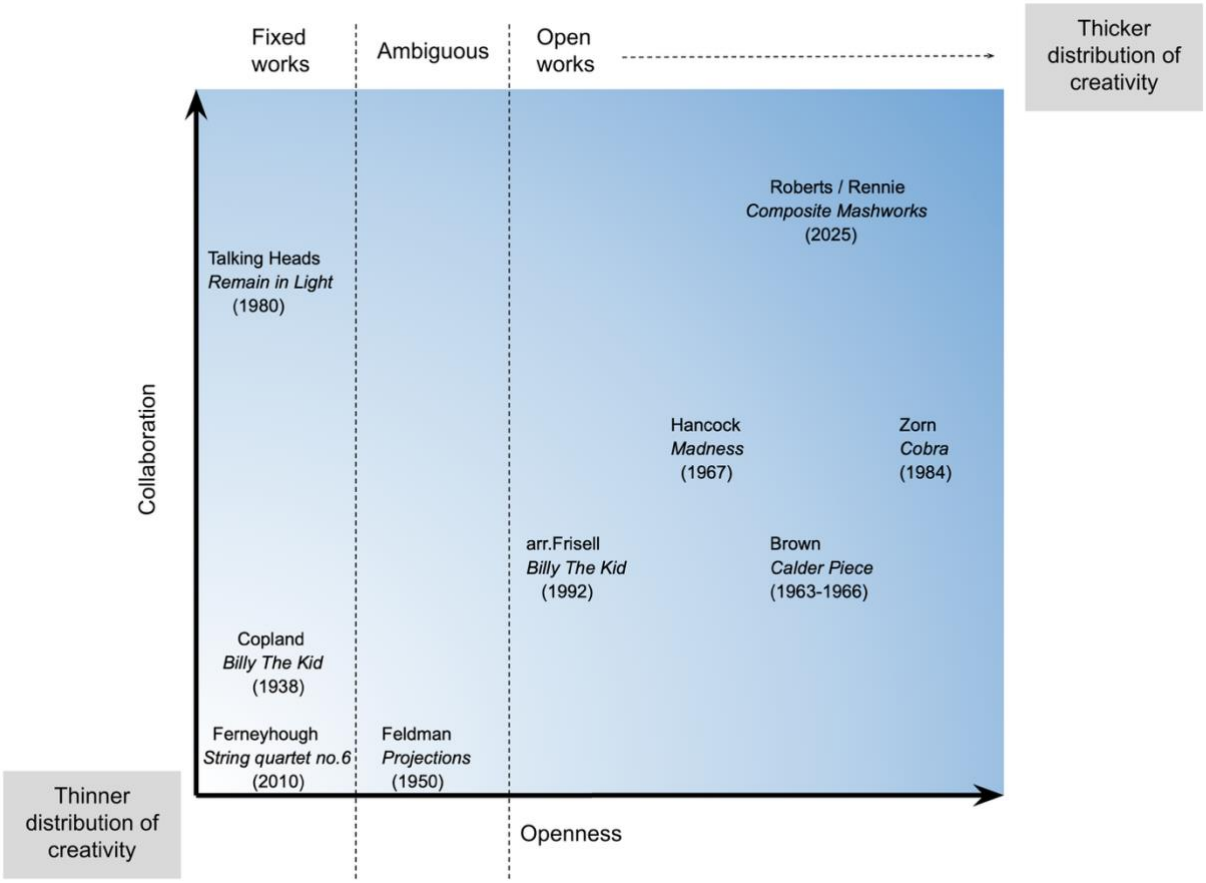

Figure 1.1: Distribution of creativity in musical works[18]

Ferneyhough's String Quartet no.6 is a work as close to having no collaboration and no openness as is possible. It is written by a single composer working in a highly idiomatic and individualistic style, and demands very exacting performance standards from players. Copland's *Billy The Kid* is in many ways similar, but is arguably a little more collaborative in a general sense due to its connection with the broader cultural environment, however, Bill Frisell's arrangement of the same piece[19] is considerably more collaborative and open, taking a jazz-based improvisational approach in some ways. Feldman's *Projections* have a similarly individual and inward looking character but allows the performers some aleatoric leeway making it more open, however, it is somewhat ambiguous how open a work it is. The performer is allowed to choose pitches within high, medium and low ranges and there is some control over

[18] Author's diagram
[19] From Frisell, *Have A Little Faith*.

timing, but these choices are deliberately abstract and expressionless.[20] The Talking Heads album *Remain In Light* is a work of fixed media, but the music was written by the band, along with additional musicians, jamming for extended periods before collaboratively editing the results. Also highly collaborative is the *Composite Mashworks* project of Cath Roberts and Tullis Rennie,[21] however this music is also a free improvisation in performance making it both very collaborative and very open. Another free improvised work on the diagram is Zorn's *Cobra*, however, collaboration in this piece is mitigated by the strict instructions given to performers, and the fact that Zorn not only created the piece alone, but continues to exercise control over performances of it.[22] Herbie Hancock's "Madness"[23] is a jazz piece with some important composed elements but the solos are considerably freer than a classic 'lead sheet' piece. The harmony is not followed in unison, or not at all, creating substantial tensions resulting in, from the view point of the listener, a largely free improvisation. *Calder Piece* by Earl Brown uses a graphic score and requires the performers to use the movements of a mobile sculpture to instigate musical events. The open score has an aleatory character like the Feldman but is substantially more developed with much more far reaching possibilities. The unpredictable movements of the sculpture combined with the multitude of ways this can be interpreted means that the work is very open, however, the score is in many ways quite prescriptive, limiting the performers' ability to be expressive or otherwise strongly collaborative as in the Hancock.

1.1.3 Intentional Openness

Although this framework implies a smooth continuum between works with a more open outcome and those with a more fixed outcome, there is a point at which one gives way to the other creating two broad categories. In fixed works the composer's intention is that every iteration of the piece should be in all important respects the same (there will be some disagreement about what these important aspects are, but in most cases this will include notes, rhythms, instrumentation, tempi, dynamics and any other feature typically prescribed by a composer in the style in question), and any variation should be limited to interpretive practices (the line between 'interpretative' and 'open' is a little hazy, but conventions have developed in

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[20] "I had never thought of the graph as an art of improvisation, but more as a totally abstract sonic adventure." Feldman discussing Projections. Quoted in Thomas, "Determining the Indeterminate," 131.

[21] Performance documentation: https://vimeo.com/1100002833

[22] "I have deliberately chosen not to publish (or even write down) the rules to these pieces, preferring to explain them myself in rehearsal as part of an oral tradition." Zorn discussing his 'game pieces' (which are very similar to *Cobra*) with Christoph Cox. In Cox and Warner, eds. *Audio Culture*, 196.

[23] From Davis, *Nefertiti*. For a detailed analysis of the way openness is used in this recording see Waters, *The Studio Recordings of the Miles Davis Quintet*.

most styles which serve to clarify the majority of instances) and environmental factors. Open works, on the other hand, are intended to contain a substantive element of unpredictability in the outcome. There are difficult cases which sit somewhere in the middle, for example, classic era big band jazz which is often very largely fixed with limited scope for improvisation such that repeat performances are in many respects very similar. While there might be some disagreement about these ambiguous works, most musicians would likely consider them to be in either the open or fixed category depending on the person's individual focus and interests. Works can also exist in multiple places on the spectrum simultaneously if the composer's intentions are not respected. For example, Copland's ballet *Billy The Kid* was written to be performed as per the score, but Frisell's version takes an improvisational approach to the material.

It is important to clarify that openness in performance is related but not identical to collaboration in performance. For example, Feldman's *Projections* have a degree of openness, but are not strongly collaborative because the score does not ask the musicians to play interactively with each other, and some are solo pieces. In contrast, Herbie Hancock's "Madness" is strongly interactive in performance with the musicians collaborating and negotiating with one another through quite open improvised sections.

If the discussion is limited to the openness axis of the spectrum, Davies' concept of ontological thickness (see above) becomes more directly analogous to distributed creativity. Following his description given above concerning the ontologically thicker work, that "the properties of its sounded instances are essential to its character",[24] he goes on to say, "Generally, the more a work's instances can differ while remaining equally and fully faithful to it, the thinner that work is."[25] This description is directly applicable to what I am calling thicker works with regards to openness in performance. Although the notion of the ontology of a piece of music is not identical to the degree to which performers have autonomy, in general there is an inversely proportional relationship between them such that in most cases: ontologically thinner = distributively thicker; distributively thinner = ontologically thicker.

Distributed creativity, in the senses described above, has been of growing interest to composers and musicians over the last seventy years. After enjoying a position of central importance in the Western classical tradition since its inception, by the 19th century improvisation was all but absent from music of this lineage (what Stephen Davies calls "a successful attempt by composers to control performance details despite their progressive alienation from

[24] Davies, 'The Ontology of Musical Works,' 39.
[25] Davies, 'The Ontology of Musical Works,' 39.

performances of their music"[26]). It was not until the middle of the 20th century with the graphic score experiments of composers such as Feldman and Cage that the agency of classical performers, albeit in less idiomatic ways than periods past, was once again foregrounded. Since this time these works and approaches have become a stable part of the canon and have spawned many varied strands within contemporary experimental composition which engage with these ideas.

These strands partly originate in an interest in perennially improvisational forms of music such as jazz, and folk musics, but they are also driven by a desire to create unique sonic experiences as well as different kinds of relationships and interactions between performers and composers. The wider distribution of creativity in music has the potential to facilitate and stimulate performer expression; performance experiences involving negotiation and collaboration; ways of decentering the role of taste and choice in the composition process; and ethical approaches which aim to create more democratic approaches to music making. This final point can be seen in opposition to the model of music creation still common in many parts of the Western classical tradition; Georgina Born describes it like this: "the composer-hero stands over the interpreter, conductor over instrumentalist, interpreter over listener, just as the work ideal authorizes and supervises the score, which supervises performance, which supervises reception."[27]

While distributed creativity is a key attribute of all the works presented in this PhD, it is not the central focus of the thesis. It forms an important part of the backdrop to the topics of loops and groove, and digitally engaged acoustic music, contextualising them in a specific and distinctive way. As such, this PhD's contribution on the macro level is to the fields of open score practice, improvisation and distributed artworks. More specifically, it focuses on how loops and groove, and digitally engaged acoustic music can be contextualised within it.

1.2 Loops and Groove

The foundation of loops and grooves in music is repetition. Repetition occurs in music at every level of scale from repeated notes of the shortest duration to the repetition of entire large scale works on different occasions. Scholarship on musical repetition has grown in recent years, and one key area has been the development of terminology for describing the different scales in which repetition operates. Beyond scale, academics such as Richard Middleton, Elizabeth

[26] Davies, 'The Ontology of Musical Works,' 40.
[27] Born, "On Musical Mediation: Ontology, Technology and Creativity," 26.

Margulis, and Rebecca Leydon[28] have elucidated new frameworks for discussing and understanding the particular ways repetition is utilised by composers and experienced by listeners. For example, Margulis's book explores repetition from a wide range of perspectives, from its role in aiding musical memorization to its function in shaping listener expectations.

Much recent scholarship on musical repetition has focused on minimalism, electronic dance music, pop and pre-20th century classical music. The fact that there has been less engagement with new music in this field might be explained by the studious avoidance of repetition found in most 20th century approaches to classical composition (for example: serialism, sound mass, New Complexity, collage).[29] The minimalists are a significant exception who dealt with a particular approach to repetition which focused principally on verbatim repeats of clearly perceptible musical cells, which were typically then submitted to processes in which those cells gradually and minimally transformed. Since the heyday of minimalism there has continued to be a strong vein of new music with repetition at its heart, while differing from minimalism in important ways. Some of this music has been labelled 'postminimalist',[30] such as the music of David Lang, Michael Gordon and Lois Vierk. New approaches to cellular repetition have emerged in recent decades, with composers, such as Bernhard Lang and Cassandra Miller engaging with repetition in ways that have a much weaker connection to minimalism. In this sense, the minimalist project has broadened out and its central elements, the use of repetition and focus on limited material, have become part of the wider musical landscape. Music after minimalism has often used repetition in non-obvious, and mitigated ways which fall somewhere on the ambiguous ground between repetition and variation.

The particular type of repetition known as a 'loop' has been ubiquitous in electronic dance music since the 1980s and is closely tied to the production of a "felt, kinaesthetic sense of the predictable elements of the temporal structure within a particular episode of music making"[31] usually referred to as 'groove'. Groove-based music more broadly including genres such as funk, jazz, and live drum and bass, utilise loops in live performance, and in recent decades, the diversity of groove types available to musicians has expanded considerably. This is particularly due to the influence of machine processing on groove production (explored in chapter 3) which

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[28] Middleton, "'Play It Again Sam'"; Margulis, *On Repeat: How Music Plays the Mind*; Leydon, "Towards a Typology of Minimalist Tropes."

[29] "In modernist high culture, repetitions can only be regarded as boring, soul destroying and regressive … At the beginning of the 20th century, modernism had acquired a hostile attitude towards repetition. It was not until the end of the 20th century that the modernist habitus changed into a far more positive attitude towards mechanical repetition, which began to foreground the loop as an aesthetic means." Baumgärtel, *Now and Forever*, 36.

[30] Gann, "A Technically Definable Stream of Postminimalism."

[31] Margulis, *On Repeat: How Music Plays the Mind*, 112.

has driven attention towards micro-rhythmic nuances, and a broadening acceptance of what 'a groove' might be.

The works presented in this PhD engage with both the popular music concept of the loop and its attendant relationship to groove; and the recent work of composers such as Lang and Miller. The music frequently loops and sometimes grooves, but these concepts are pushed to and beyond their limits in a search for new and compelling musical outcomes. The chapter on loops and groove in this commentary offers definitions and descriptions of the terms as well as relevant historical context. Theoretical frameworks are laid out to enable discussion of loops and groove in a new music context including examples from "Here and Now" by Joe Lovano, and "The Watchtower" by Bernhard Lang. A more thoroughgoing analysis is presented of "Melancholy Adorations" by Benjamin Oliver.

1.3 Digitally Engaged Music

Music can engage with the digital in a variety of ways. It can:

1. use digital technology directly
2. mimic the sound of digital technology
3. employ compositional techniques suggested by digital technology
4. refer to digital technology in an oblique way

The pieces which form the portfolio of this PhD engage with digital aesthetics in all these ways, but are mostly performed on acoustic[32] instruments; they are what I term 'digitally engaged acoustic music'.

In the digitally engaged music chapter I develop a framework for understanding, contextualising and discussing such work based on Ragnhild Brøvig's concept of the 'digital signature' - the unique contribution made to an artform by digital technology. The term originates in her PhD thesis "Music in Bits and Bits of Music: Signatures of Digital Mediation in Popular Music Recordings" and was developed further with Anne Danielsen in their book *Digital Signatures - The Impact of Digitization on Popular Music Sound*. They define digital signatures as "the sonically distinctive character of digital mediation. Put simply, digital signatures are the sonic fingerprints of digital technology".[33] Common examples are: the machine precision of a drum machine; digital glitching; the use of samples, and cut and paste as compositional tools; and, 'digital black' silence.

[32] See 3.2 for an explanation of my use of the word acoustic in this context.
[33] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 2.

The concept is built upon Brøvig's notion of transparency or opacity of technological mediation, that is the degree to which a musical sound draws our attention to the technology being used to create it. As such, these ideas are fundamentally about the perception of music rather than properties inherent in the music itself and are therefore subject to variation over time and between communities and individuals. Building on Brøvig and Danielsen's work, I extend this idea in chapter 3 to include mediation through acoustic technology which allows for 'acoustic signatures' to contrast with the digital. I also use Brøvig and Danielsen's term 'feature' to indicate that the sound has originated in the digital or acoustic realm, and introduce the expressions 'likeness' and 'signifier'. These are sister concepts to the 'signature', the first of which describes mimicry, while the second focuses on non-sonic elements of digital music creation.

In chapter 3, these ideas are brought together into a framework in which digital engagement in acoustic music can be understood both from comparative and descriptive standpoints. This framework is then employed to analyse and contextualise two case studies: the performance style of drummer Richard Spaven, and the Aphex Twin track "DISKPREPT4" both in its original form and in a live acoustic performance by GBSR duo. These ideas also lay the groundwork for in-depth examination of the compositions presented with this PhD in subsequent chapters.

1.4 Loop Work

Loop Work is a series of open-score pieces that allow performers to explore loops with varied types and degrees of agency. The pieces are underpinned by the following characteristics:

- The scores combine conventional musical notation with textual instructions that define the given creative task.
- Each piece allows for creative participation on the part of the performers. The works are open scores, in the sense that each performance will lead to different outcomes.
- Repeated sections are short enough to be identifiable as loops.
- Each piece has a bipartite structure. The first part sets up a given scenario, which is then transformed in Section B.

All the pieces from Loop Work presented with this PhD follow these principles, however one of them (*Fourth Record*) combines multiple loops into a longer piece. The loops used in *Loop Work* pieces reference 20th century music styles including post-minimalism, EDM, and funk, but I am attempting to extend my understanding of what might be considered a loop and explore the ways in which any loop can be said to groove.

In chapter 4 the pieces are analysed in this light using ideas and frameworks developed in chapters 2 and 3. The relationship between groove and movement discussed in chapter 2 referencing the work of Roholt, Hamilton and Iyer[34] is used to examine the piece "Loop Aware Exaggerate; Mute Silent Reduce" which is also contextualised within Walshe's concept of the New Discipline.[35] Danielsen's notion of the inner dynamic of a groove is employed in a discussion of the piece "Bye" and there is a demonstration of the way related ideas borrowed from the worlds of groove-directed[36] music feature in the structure of this and other pieces from the Loop Work project.

The various ways in which Loop Work pieces engage with digital technology and aesthetics are also examined using the frameworks presented in chapter 3. Comparisons are made with Mark Butler's idea of "playing with something that runs"[37] - looping, repetitive music continues 'under its own steam' while musicians make live, improvised interventions to the flow. His context is improvised EDM in which there is a machine which literally powers the music 'that runs', but the fully live context of my work opens up new ways of thinking about his ideas. The performers' interventions can be seen as 'music technologies' in the broader sense that Butler talks about transformational techniques.

A distinctive feature of the works presented is the ways in which they combine acoustic and digital aesthetics and this is brought out using the terminology of signatures, likenesses and signifiers elaborated on in chapter 3. The pieces "Patch Change", *Musician Reacts* and *Fourth Record* are analysed including discussion of ways that, compared to earlier compositions in the series, *Fourth Record* enables exploration into new areas by combining and overlapping loops.

This project connects strongly to my own past musical experience by reflecting the central importance of groove and improvisation to my understanding and appreciation of music. However, it also enables me to extend my practice by understanding alternative ways of approaching looping material and creating opportunities for performer autonomy. Loops assist audiences in understanding musical structure and material which, in turn, provides a clear

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[34] Roholt, *Groove: A Phenomenology of Rhythmic Nuance*; Hamilton, "Rhythm and Movement"; Iyer, "Embodied Mind, Situated Cognition."
[35] "The New Discipline," on Jennifer Walshe's official website, accessed July 25, 2025, https://milker.org/the-new-discipline.
[36] "music with a groove at its core, as both the means and the end of the artistic process. This in contrast to, for example, a rock song, which is groove-based but often directs our attention to other constitutive aspects, such as chords, melody or lyrics." Danielsen, Musical rhythm, 4 (footnote).
[37] Butler, *Playing with Something That Runs*.

backdrop for appreciating musical transformations of the looping material made by the performers.

1.5 Accomplices

Accomplices is a developing set of collaborative works created by passing work from one artist to another. The project has had two phases. I created each of the pieces made during the first phase with an improvising musician using an iterative process in which the musician recorded improvisations based on prompts that I provided. For example, I created some loops and asked them to improvise looping material over the top of it. I edited and manipulated these recordings to construct new musical material before sending this back to the musician for another phase of improvisation, which was again recorded.

In the second phase, I am collaborating with Norwegian composer Jørund Fluge Samuelsen. The second phase expands the approach used in the first such that each participant creates a piece which is passed onto another artist to use as material for the creation of their own work. The compositions are not passed back to the previous person but always on to someone new creating an indefinite chain of creators.

Distributed creativity is particularly important in this project. Coming from a background in group improvisation, I am aware that collaborative, improvised work can sometimes (but not always) be greater than the sum of its parts. Because of this, I often want to invite performers of my work, or collaborators to put themselves into the work in a strong sense, and I want to be surprised by others finding ways of using my material which I had not considered. The models of working used in *Accomplices*, where I accept the material given to me and pass my work on with no expectation of how it will be used, means my collaborators can potentially have an important stake in the work. Working in this way also allows me to develop my practice more broadly by thinking about ways in which I can distribute the creative process more broadly when instigating musical projects.

Although works in this project do not necessarily engage with loops, groove and digital aesthetics, the fact that the process involves sampling improvised performances tends to suggest these approaches. The *Accomplices* chapter describes the processes of some of the pieces in detail and examines them using the frameworks developed in chapters 2 and 3. In particular, the way in which digital signification is central to the work is discussed, and the use of loops and grooves in the project is described and assessed.

1.6 Methodology

The work presented in this PhD is the result of a cyclical interaction between practice and research - what Hazel Smith and Roger T. Dean describe as practice-led research and research-led practice.[38] Figure 1.2 shows the way I experienced reciprocal interactions between different stages of practice and research which enabled the work presented here.

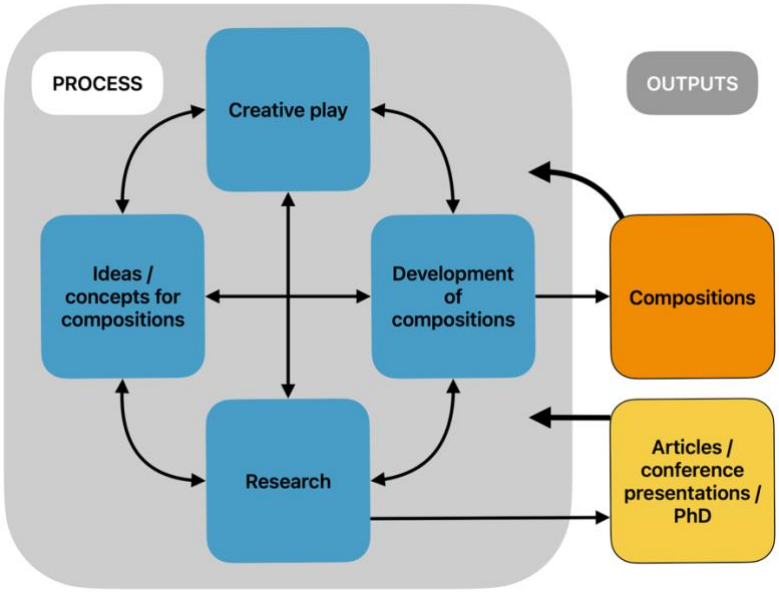

Figure 1.2: practice-led research and research-led practice[39]

To illustrate this with an example, selected steps in the development of the piece from the *Loop Work* series "Loop Aware Exaggerate; Mute Silent Reduce" were as follows:

1. a previous *Loop Work* piece led me to research the groove from "System" by Brotherly
2. research the groove which inspired it ("Here And Now" by Joe Lovano)
3. further research: transcribe the grooves
4. creative play with the materials
5. development work on the results
6. further back and forth between development and creative play
7. initial ideas about overall concepts
8. research into other pieces with similar overall concepts
9. development work on applying the material to the overall concept
10. draw on previous research into digital aesthetics to refine material
11. draw on previous research into open scores to refine performance directions
12. piece completed

[38] Smith and Dean, *Practice-Led Research, Research-Led Practice in the Creative Arts*.
[39] Author's diagram

13. research: workshop with Plus Minus Ensemble
14. final development based on workshop feedback
15. piece and elements of research undertaken for it used in conference presentation

This methodology promotes a reflective approach to my practice and a practical foundation to my research. In my work as a composer I attempt to extend my technique, my understanding of the contexts in which I am working and my approach to developing musical material beyond the current limits of my intuitions, and this is enabled by the application of research. As this research is being used in a creative setting where something new is being made, the process and outputs can potentially feed back with new data into the research or by expanding its scope. This provides a foundation for new scholarship which can lead to academic outputs supported by examples from creative practice.

1.7 Research Questions

The processes which resulted in the creative work presented with the PhD were developed in response to a particular set of research interests. Some of these questions instigated the projects and others arose while working on them:

> What methods can I employ to enable performers to perceive and inhabit a sense of groove in music which does not groove in a conventional or idiomatic way?
>
> How can I use the sounds and processes of electronic music making to develop a new integrated vocabulary of compositional techniques for use when writing for acoustic instrumental performers?
>
> What distinctive outcomes can be drawn out by applying digital aesthetics on acoustic instruments and groove-like structures to an open score or otherwise collaborative context?
>
> What frameworks can be used to understand how an aesthetic of the digital can exist outside digital technology?
>
> How can the results of research into existing groove-based music and music exhibiting digital engagement be employed in the production of engaging, idiosyncratic and experimental compositions?

1.8 Outline of Commentary

The commentary is in two parts: contexts and exegesis. In ‘Contexts’, I present theoretical frameworks for understanding loops, groove, and digitally engaged acoustic music, both to contextualise my practice and to provide a foundation for discussing it. Relevant historical, philosophical, musicological and psychological background is presented in both areas and existing frameworks which facilitate discussion and understanding of the works in the project are described. Where frameworks do not already exist or are not specific enough to the work in the PhD, new ones are developed and expanded upon. Examples are given from music other than my own to clarify concepts and to give wider context to my work, and case studies are used to demonstrate a more thoroughly worked application of the concepts expounded.

The exegesis describes the composition processes of the musical works contained in the PhD. The two projects - *Loop Work* and *Accomplices* - are examined separately through technical information about their construction, discussion of artistic aims, and ways in which research impacted the compositional outcomes. Selected works are singled out for more in-depth enquiry and the frameworks elucidated in the contexts section are used as lenses through which to critique aspects of the work. Finally, the conclusion brings together broad strands from across the thesis to discuss overarching themes and outcomes from the PhD.

Part I: Contexts

Chapter 2 Loops and Grooves

Being part of a groove from the inside, that is, working with a group of musicians to create an ongoing musical feel by looping, shaping, and reconfiguring a short passage of music, constitutes one of the most important formative experiences in my musical development. This has led me to want to explore the phenomena of loops and groove as a performer and composer, and push at the limits of these concepts to discover ways in which they can be creatively manipulated, extended and distorted without entirely losing sight of the elements which make them powerful musical experiences. The collective performance of groove has two ineliminable elements: continuous repetition of the musical material (looping), and the emergence of a shared state of 'being in the groove' involving players being locked together in a musical pattern, from which usually arises a desire to move our bodies.[40] The word groove is also used to refer to particular musical patterns which, in many cases, belong to a kind of library of genre specific or feel-based short rhythmic cells (or loops) used by musicians as a shorthand to create a familiar mood or effect. For example, it is common for drummers to be asked to produce a 'latin groove', 'Cold Sweat groove', 'broken groove' or 'Dilla groove' onto which other musicians can layer their parts. Some of the interest for me as a composer lies in designing loops which suggest unique kinds of groove or feel; the grooves mentioned above are commonly recognised by contemporary musicians and audiences but they were all revolutionary at one time or another. The late snare in James Brown's 'Cold Sweat' groove broke new ground in the 1960s,[41] and J Dilla's 'drunk' feel sounded wrong to many listeners in the 1990s,[42] both introducing musicians and audiences to new ways of experiencing groove, and suggesting new ways of dancing and moving the body. The examples given above fall broadly within the lineage of African American groove-directed music, but I am interested in exploring what more experimental approaches such as those found in contemporary new music might contribute to this approach.

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[40] The centrality of movement to groove is discussed in 2.2.2.

[41] "'Cold Sweat' deeply affected the musicians I knew," said Jerry Wexler, who was then producing Aretha Franklin and other soul stars for Atlantic Records. "It just freaked them out. For a time, no one could get a handle on what to do next." White and Weinger, Album liner notes for *Star Time*.

[42] See chapter 1 "Wrong" in Charnas, *Dilla Time*. The chapter records a number of contemporaneous reactions to Dilla's beats.

This chapter begins by discussing a working definition of 'loop' which emphasises the particular ways I am using it, followed by a brief survey of the practical means by which musical loops have been created and explored, for example via vinyl, tape, sampling, sequencing and live performance. A framework for understanding loops and repetition in live performance in contrast to mechanical or electronic production is proposed, and there is an examination of the experience of the performer when playing loops. The use of loops in popular and new music are compared, before definitions of groove are discussed. Theoretical frameworks relating to groove are laid out and these are applied to an understanding of how loops and grooves are explored in a new music context through an in-depth analysis of "Melancholy Adorations" from Benjamin Oliver's *Love Letters* song cycle. The focus of this chapter is on questions of experimental loop design and the pursuit of new ways of grooving, as such it does not attempt to present a comprehensive history or catalogue of everything relating to these concepts. Instead, a brief and broad background is provided, which concentrates on ideas that support the overarching arguments.

2.1 Loops

According to Tilman Baumgärtel, the word 'loop' "has established itself as a technical term for short sound and image sequences that can be repeated indefinitely, both in the world[s] of music and ... audio-visual media, whether analog or digitally recorded".[43] The final clause of this description assumes recording technology is involved in a loop, however, this chapter seeks to explore the ways in which 'looping' is also a distinctive practice that composers and live instrumentalists can use and enact.[44] Notwithstanding Baumgärtel's description, the word 'loop' is often used by musicians synonymously with 'repeat', 'vamp' and other terms of repetition. However, there is a meaningful distinction to be drawn between an instrumental performer 'looping', as opposed to performing an ostinato or other standard form of repetition. This distinction is based on the relationship of the repeated passage to technology. For example, the basso continuo part in Pachelbel's canon could be described as a loop - it consists of a two bar ground bass repeated throughout (see Figure 2.1).

[43] Baumgärtel, Tilman. *Now and Forever*, 8.
[44] I am not referring to the technique popularised by artists such as KT Tunstall or Ed Sheeran involving layering parts into a looper pedal to facilitate a full sounding performance by a solo musician - that is outside the scope of this PhD.

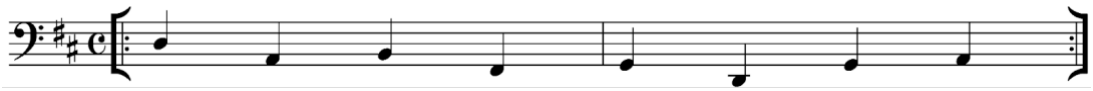

Figure 2.1: Ground bass from Johann Pachelbel's Canon and Gigue in D major[45]

The piece dates from hundreds of years before the concept of a loop of tape could even have been imagined, and, although a contemporary musician would understand the direction to 'play this loop throughout' or 'loop this', it is not clear that using the same language to refer to this music and a sample-based RZA beat helps in the understanding of their similarities and differences. The concept of a loop and the idea of multiple repetitions of short musical material by live performers share the fundamental characteristic of circularity - the end is also the beginning of the next iteration. However, as in Baumgärtel's description, the word loop carries connotations of machines. This distinction is brought out most clearly in digitally engaged acoustic music (see chapter 3), for example live bands performing hip hop beats. Here, the description 'loop' fits because the performance in some sense mimics the sound and feel, and the lack of variation, native to a looping sampler. Another approach is found in the work of composer Bernhard Lang which, while often composed for live instruments, is inspired by the effect, if not the exact sound, of technological looping. This connection between the repeated material and technology can be direct and obvious as in the live hip hop band example, but can also be more oblique such as in Lang's work. In order to bring out this difference clearly in the language used in this and other chapters of this PhD, I offer the following definition of 'loop' (in music) which endeavours to capture the central importance of machines to the concept while recognising the possibility of loops without machines:

> a short sound or sequence of sounds on a recording, or in a live performance, which can be repeated indefinitely, and which engages with the aesthetics of recording technology.

The focus in this PhD is largely on loops in live performance, however, in order to understand live performance which 'engages with the aesthetics of recording technology' it is necessary to explore technological loops and the unique aesthetic effects they create. This section continues with a brief historical outline of loops created by technological means - vinyl, tape, samples, sequencers - before discussing loops in live performance in some depth.

[45] Author's transcription.

2.1.1 Vinyl Loops

The earliest well known example of mechanical loops are Pierre Schaeffer's studio experiments in 1948[46] which saw him using a 'sillon fermé' ('closed groove' or 'locked groove') in the development of his 'musique concrète'.[47] These are "short patterns etched into records in a way that allows them to repeat continuously"[48] usually only found on the 'run-off groove' at the end of each side of a record which captures the needle in an infinite loop and stops it from sliding onto the label, but Schaeffer created his own records with locked grooves so that they would play a sound he recorded on to it indefinitely. Locked grooves would be taken up again by techno artists also using specially designed records in the 90s and 2000s,[49] but this is a relatively specialised and unusual way of working with loops in the modern day due to the time and expense required to produce a record, and the limited ways in which it can be used. These very limitations however, are part of the appeal to artists such as Stefan Goldmann whose *Ghost Hemiola* project involves creating locked grooves with a knife on black vinyl records,[50] and experimental DJs The Barebackshow who perform using only purpose made locked groove records,[51] Experimental turntablist Philip Jeck continued to exploit the affordances of vinyl loops until his death in 2022.

DJs in the 1970s also used vinyl to create loops in a different way. Artists such as DJ Kool Herc used two copies of the same record simultaneously on different decks, switching between them so that the same breakbeat loop could be played repeatedly.[52] Herc's approach is unlike the locked groove technique as it requires the constant intervention of the DJ to keep the loop going, and there is more scope for micro variations in the transitions between repeats.

2.1.2 Tape Loops

Once it became available to him, Schaeffer quickly realised that he could work with loops more easily and flexibly using tape.[53] This involved creating a literal loop of tape by connecting the ends together, and allowing it to circulate across a tape head producing an indefinite repetition

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[46] Baumgärtel claims Schaeffer is "the discoverer of the musical loop". Baumgärtel, Tilman. *Now and Forever*, 46.
[47] Kane, *Sound Unseen*, 17.
[48] Butler, *Unlocking the Groove*, 5.
[49] Butler, *Playing with Something That Runs*, 212.
[50] https://youtu.be/SCHxVMkEv5E?si=tstgU969JmFl6XTS
[51] They also release their locked groove records: https://www.normoton.de/albums/normoton_21.html
[52] Hebdige, "Rap and Hip-Hop: The New York Connection," 224.
[53] Kane, *Sound Unseen*, 17.

of what was recorded on it. This way of creating loops went on to feature prominently in the work of the minimalist composers such as Terry Riley, La Monte Young and Steve Reich, as well as in Éliane Radigue's feedback pieces in 1969-1970.[54] Baumgärtel describes the techniques of using tape loops as "a central compositional technique of post-war electronic music",[55] but these experimental composition techniques also came to the attention of a number of prominent rock and pop musicians. For example, inspired by Stockhausen's tape experiments, Paul MCartney used tape looping on The Beatles song "Tomorrow Never Knows."[56] While most pop and rock artists used these sounds as an additional layer behind a band performance, in the 1970s Brian Eno, formerly of Roxy Music, was among the musicians to bring the tape loop back to the centre of attention. His *Ambient 1: Music for Airports* album (1978) became a seminal influence on ambient music artists.[57] Since the 1980s, working with tapes in this way has become, as with vinyl, the preserve of a smaller number of specialised artists. Among these is Berliner Heinbach who draws attention to the physical properties of the tape itself through set-ups using long stretches of tape stretched across the stage.[58] As with artists choosing to work with vinyl, he and other artists centralise the limitations and affordances of working with the tape medium in their work.

2.1.3 Sample Loops

The emergence of digital sampling in the 1980s enabled hip hop beats to be created without the need for a DJ, and experimental composers could work without the time-consuming cutting and splicing of magnetic tape. This technology also allowed looped recordings to be manipulated and edited in more extreme ways leading to an exponential growth in the possibilities available to musicians. Although it is possible to edit magnetic tape through splicing, creating a modern heavily cut up track without the ease, precision and undo facility of the digital editing would "simply overwhelm any sort of physical cut-and-paste operation in the analogue medium".[59] Add to this the easy availability of a vast array of digital effects, and the particular sounds associated with the medium itself and the aesthetic possibilities opened up were almost limitless. In EDM this led to the development of styles based entirely on the far-reaching transformation of samples and the aesthetic consequences of digital technology such as drum

[54] Tape was used widely in experimental music in the mid-20th century but this chapter is focused specifically on its use for creating loops.
[55] Baumgärtel, Tilman. *Now and Forever*, 43.
[56] https://youtu.be/nyZtqHN4KR0?si=o2MSzcjGSncMSiS2. Paul McCartney speaking about tape loops on Revolver.
[57] Lysaker, *Brian Eno's Ambient*, 5.
[58] https://youtu.be/0Tpin8DL6Qw?si=JDhlHzPwED1xU5RG
[59] Brøvig and Danielsen. *Digital Signatures*, 81.

and bass, and glitch.[60] In new music, sampling, along with a democratisation of the technology due to lower costs, has led to wider integration of technology into the work of composers and performers. The field has moved well beyond the 'live performance with tape' model, or pieces using record players, radios, or synthesisers established by Cage, Stockhausen and others in the 1950s, and it has become commonplace at contemporary music performances since the 1990s to see performers interacting with laptops and using software such as Max/MSP to control various aspects of performance. This, along with an increased acceptance of repetitive approaches, has led to a turn in new music towards an embrace of looping, through both technology and live performance.[61]

2.1.4 Sequenced Loops

Alongside developments in sampling, the steep rise in the popularity of synthesisers, sequencers and drum machines in the 1980s, meant that loops were often created with digital or analogue synthesis rather than borrowed from pre-recorded material, and this remains a central feature of much popular dance music. Fundamentally vinyl, tape and sample loops are all performing the same function: *playing* a recorded sound over and over again. Sequencing demonstrates a significant distinction to other looping technologies because it involves *producing* the same sound over and over again. As a result, the listener may understand the result differently to the output of a looping sampler.[62] For example, when the TR-808 drum machine was released in 1980 its analogue synthesised sounds were new for musicians and listeners,[63] so the experience of hearing it loop a sequence had the character of a machine consistently *recreating* a pattern of sounds as opposed to a machine consistently *replaying* a recorded sound. Over time, however, the sound of a TR-808 has become so familiar from forty years of pop records that when we hear it now this distinction is lost or blurred; we arguably just hear it as an analogue drum machine, or a sample from another track.[64]

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[60] See chapter 3.
[61] Contemporary music journal *Tempo* dedicated its January 2025 edition to the way time is used in music including articles on looping in works by Éliane Radigue and Bryn Harrison, as well as an article on 'repetitive models in twenty-first-century music'.
[62] An exception here might be sample-based synthesis, but there is a considerable overlap between this and sampling.
[63] Similar drum machine sounds had become familiar but the TR-808 had a relatively unique sound and was fully programmable allowing for the creation of novel patterns.
[64] For a more detailed discussion on how listeners change the way they hear and understand technology over time, see 3.3.1.

2.1.5 Loops From Other technology

Loops have been created using other forms of technology as well. For example, Aphex Twin's *Computer Controlled Acoustic Instruments pt2* uses acoustic instruments played by computer controlled electronic devices. These include an adapted Disklavier piano, and drums played by solenoids.[65] Another artist working with a DIY approach to loops is Cameron Graham, whose Poet Mechanic audio sculpture installation pieces are created by assembling objects onto a turntable. These objects are arranged to create a series of sounds which loop with the rotation of the turntable. Graham Dunning's Mechanical Techno project[66] is a hybrid which uses turntables in a similar way to Poet Mechanic, however the spinning objects (which Dunning refers to as a 'ramshackle contraption') are mostly used to trigger analogue synths meaning the mechanical aspect affects rhythm, feel and predictability, but not timbre and final sounding effect. An interesting aspect of all these approaches is the relative lack of control the composers have over the outcome once the mechanism is set in motion. This is due to the inherent unpredictability of an acoustic sound source which is magnified when the forces used to make it sound are subject to the unstable aspects of an ad hoc mechanism.

2.1.6 Live Loops

Historically the cycling of short musical units can be found in folk musics such as African drumming, mbira music, Maqam rhythms, and Carnatic music, and in early groove-based[67] popular African American styles such as blues, jazz, rock'n'roll, and funk. Although these musics involve material which could be said to loop or cycle in some sense they do not use 'loops' as defined above ("a short sound or sequence of sounds on a recording, or in a live performance, which can be repeated indefinitely, and which engages with the aesthetics of recording technology"). The historical possibility of describing a live instrumental performance as a loop arose, under this definition, after the establishment of mechanical looping when composers and performers were able to create music which, intentionally or otherwise, mimics the output of looping machines. An early example of this is Terry Riley's *In C* (1964). Written after Riley had already experimented with tape loops, it involves instrumentalists looping short repeated phrases which have a 'cut' or 'edited' character.

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[65] https://soundcloud.com/richarddjames/diskhat-all-prepared1mixed-snr2mix. Richard James commented on his own SoundCloud page with some information about the method he used on this album.

[66] https://grahamdunning.com/2025/01/16/improvising-with-machines-case-study-mechanical-techno/

[67] Contrast with 'groove-directed' – see footnote 35.

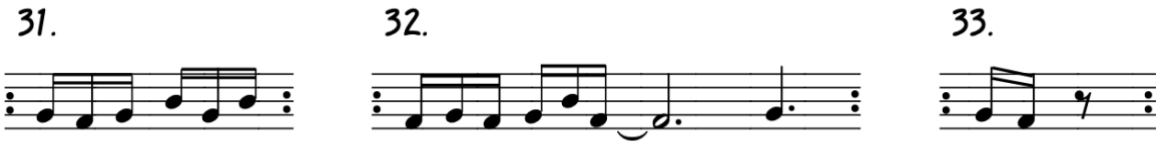

Figure 2.2: Except from the score of *In C* (1964) by Terry Riley[68]

As can be seen in fig. 2.2, the repeated phrases give the impression that they are sections removed from a longer whole: 31 sounds like the start of a rising sequence which abruptly restarts rather than continuing; the G at the end of 32 feels like the beginning of a consequent phrase which is never finished; the brevity of 33 creates a 'stuck record' sound. All of these are alien to traditional approaches to expressive musical phrasing, instead, they imitate the sharp, unyielding edges of a cut-up recording.

This approach not only emphasises a connection to technology, but brings out a way in which musical looping can indicate an embrace of Black culture. In his essay "On Repetition in Black Culture", James A Snead draws contrasts between the use of repetition in European culture and Black culture:

> In black culture, repetition means that the thing circulates … there is an equilibrium. In European culture, repetition must be seen to be not just circulation and flow, but accumulation and growth … If there is a goal (Zweck) in [Black Culture], it is always deferred; it continually 'cuts' back to the start, in the musical meaning of 'cut' as an abrupt, seemingly unmotivated break (an accidental da capo) with a series already in progress and a willed return to a prior series.[69]

Snead's description of a 'cut' and the way in which it "draws attention to its own repetitions"[70] describes very well the kind of approach to repetition in Riley's piece and the effects produced by looping more broadly. The fact that looping has become part of the vocabulary of Western composers since the middle of the 20th century is a facet of what Snead calls European culture's "ongoing reconciliation with black culture"[71] and this is even more significant when the loops used are connected to the concept of groove (see 2.2).

[68] The stave has a treble clef.
[69] Snead, "On Repetition in Black Culture," 149-150.
[70] Snead, "On Repetition in Black Culture," 151.
[71] Snead, "On Repetition in Black Culture," 152.

In the 1990s drummers began copying the sound and feel of the looped drum samples they were hearing in hip hop and EDM. An example of this is the drummer Ahmir 'Questlove' Thompson who, inspired by producer J. Dilla, began developing a playing style which copied Dilla's signature 'drunk' feel which exaggerates "timing discrepancies between rhythmic layers"[72] For drummers more widely this has developed to include adaptations to the traditional drum kit which mimic or suggest the sounds of drum machines and processed recordings.[73] Also, the playing techniques required to create this feel have become part of the modern drummer's vocabulary and include repetition with machine-like precision; an absence of improvisatory expression; and the micro-manipulation of the timing of individual events within a drum kit pattern.

2.1.6.1 Machine Loops / Performer Repetition

Although there is a useful distinction to be made between more traditional repetition which foregrounds performers' expressive variations, and repetition with a machine aesthetic, there is not always a clear delineation between the two. The sampled, or digitally created, loop and the live loop have become, to some extent, interchangeable in contemporary popular music where sample loops are often taken from recordings of live drummers, and music created in the studio using one method of looping might be performed live using the other. Many live performers have also absorbed the digital looping aesthetic into their instrumental practices to the point where the method of loop production is not always obvious to the listener. Drummer Richard Spaven says: "I do like it when I play something and people think it's programmed. I get a little kick out of that. After all, samplers were fed live drummers and then we were simply fed them back."[74]

The aesthetics of loops created by technology verses live performers could be seen as what Andy Hamilton calls 'interpenetrating opposites'.[75] Hamilton uses the term to understand the relationship between composition and improvisation, but a similar idea could help to frame the present discussion. Framing the two extremes as 'ideal types' - *machine loops* and *performer repetition* - it is possible to locate some examples on a continuum between them (see Figure 2.3). [76]

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[72] Brøvig and Danielsen. *Digital Signatures*, 105.
[73] Alex Stevenson has a forthcoming chapter focused on this subject.
[74] Spaven, "'The groove is everything'."
[75] Hamilton, "The art of improvisation and the aesthetics of imperfection", 171.
[76] It is important to emphasise that the contrast here is *as perceived by the listener* rather than based on the mode of production. However, it is very unlikely that extreme examples of machine aesthetics could be created without the aid of a machine, and AI is not yet at the point where it can convincingly mimic a highly nuanced and reactive human performance.

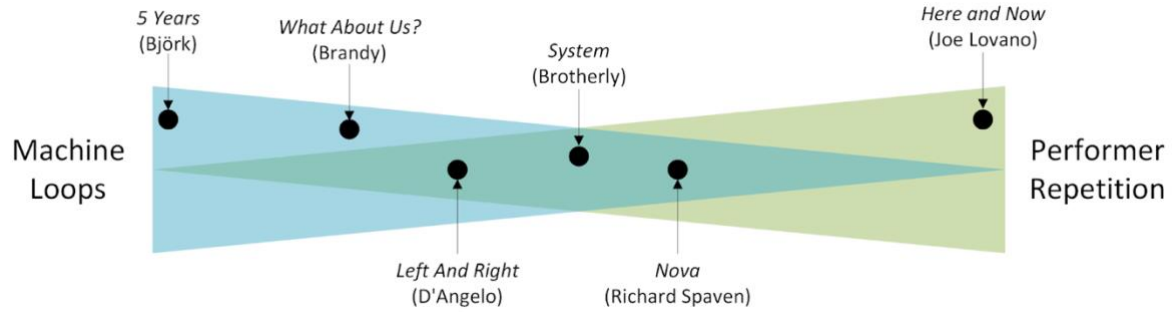

Figure 2.3: the interpenetrating opposites of Machine Loops and Performer Repetition[77]

At one end "5 Years" features an industrial noise loop with a sound and precision almost unimaginable from a human performer with an acoustic instrument. At the opposite end Lovano's "Here and Now" features a loose, improvised phrase performed live on an acoustic drum kit which changes significantly and unpredictably on each iteration. Despite their differences, both machine loops and performer repetition are often trying to achieve some of the same things; as Hamilton states: "A feature that seems definitive of one ideal type also turns out to be present, in some sense, in the other".[78] Hence, features native to machine loops such as exact repetition, interrupted flow, and glitching can be an important element in performer repetition, and machine loops can aspire to grooviness, organic qualities, and improvisational variation commonly associated with performer repetition. This framework helps to demonstrate that, while it is important to recognise a machine/non-machine aesthetic dichotomy, both approaches penetrate into the other and the distinction is not always obvious. Application of this framework to my own work in the Loop Work chapter helps to clarify the work's relationship to both approaches to looping.

2.1.6.2 Inside the Loop - the Performer's Experience

Danielsen uses Deleuze's distinction between 'static' (from the perspective of the observer) and 'dynamic' (from the perspective of the creator) repetition to illuminate the distinctive experience of performers when participating in looping music. While the experience of listeners is that 'the same thing is happening over and over', or 'the same sound is being replayed', the instrumentalist is constantly in a state of producing sound in a continual 'making' process. This is important because from this perspective, no two iterations of a looping part are the same - they are not literally playing 'the same sound again' - but rather, each is a new performance of the same musical material; "One makes up one part and answers with another in an eternal

[77] Author's diagram - examples refer to the drum beats only.
[78] Hamilton, "The art of improvisation and the aesthetics of imperfection", 171.

rhythmic dialogue. Every time, the answer is the same, but this may only be because it is the right answer."[79] The performer cannot step outside her *dynamic* experience of continuous production and adopt the perspective of the listener that there is *static* repetition of a single sound. As Timothy Hughes points out, this dichotomy is also reflected in the way looping music is notated: "A repeat causes the sight-reader to look back to the beginning of the music being repeated – a spatial leap in the opposite direction ... Music itself is always experienced in a sequential, or linear fashion. So when we hear music repeated we hear it *move forward to its own beginning.*"[80]

Dynamic repetition always entails some degree of variation as musicians cannot act with truely machine-like precision, and this variability is an important part of what characterises the experience of 'being in the groove' in many groove-based and groove-directed styles. Danielsen borrows the term 'changing same' from Amiri Baraka[81] to refer to this kind of groove, characterising the way that musicians approach it as being closer to a process of 'optimisation' rather than variation. This experience can be contrasted with what Butler calls "playing with something that runs" which represents the practice of performers such as DJs or EDM laptop performers using some form of technological playback. The performer sets something in motion which continues of its own accord while she is "continuously evaluating the configuration of sounds; determining if, when, and how it should change".[82] This makes the performer in part a listener or audience member as well as a real time creator of the music: "Playing a DJ set is a way of performing consumption".[83]

The performer's experience of enacting loops is an important aspect of my Loop Work pieces, and the frameworks described in this section are used in chapter 3 to understand what this experience might be.

2.1.7 Loops - New Music and Pop

Loops became increasingly important through the latter half of the twentieth century in both experimental classical music and pop music. Each side of this apparent divide developed its own unique approaches but they were crossing over and influencing each other from the

[79] Danielsen, "Time and Time Again", 42.
[80] Hughes, "Groove and Flow", 79-80. (italics in original).
[81] (Writing under the name LeRoi Jones at the time) Jones, LeRoi. "The Changing Same (R&B and New Black Music)," editor A. J. Gayle, *The Black Aesthetic*, Anchor Books, 1971.
[82] Butler, *Playing with Something That Runs*, 106.
[83] Butler, *Playing with Something That Runs*, 110.

earliest days. Alongside The Beatles Stockhausen-inspired tape experiments of 1966, the minimalist movement also provided a link between these musical worlds with The Who's Pete Townshend and other rock musicians citing Riley's *A Rainbow In Curved Air* as an influence, and La Monte Young collaborator John Cale being in the Velvet Underground. Alex Ross writes that "Reich and his colleagues borrowed from popular music ... and they affected pop music in turn."[84] This comfort with erasing boundaries between approaches to looping in the classical and pop worlds continued into the 1980s with groups such as Bang On A Can. The organisation, set up by postminimalist composers Julia Wolfe, David Lang and Michael Gordon, claims to be "building a world in which powerful new musical ideas flow freely across all genres and borders."[85] This tendency remains strong in the current new music scene in which the distinction between popular and classical styles and approaches is often blurred or simply not present. As will be discussed in more detail at the end of this chapter, both mechanical/digital loops and live loops are commonly to be found in the music of contemporary composers such as Benjamin Oliver, Wolfgang Mitterer, Seán Clancy, Louis V Vierk, Alex Paxton, Ben Nobotu and Cassandra Miller.

2.2 Groove

The word 'groove', as it relates to music, originated among swing-jazz musicians[86] and since that time it has retained its connection to this African American lineage through funk, soul, rhythm & blues and hip hop. However, in everyday conversation it has come to be used more broadly when referencing music which exhibits some characteristics of groove-based music, for example, even Thrash metal drummer Dave Lombardo published a tuition book called *Power Grooves*,[87] and the American String Teacher journal published an article entitled "To be in the "Groove": Minimalism and String Performance."[88]

However, generalising the concept far beyond its origins in this way is not without its difficulties. Widening its scope to include music with no connection to the African American musical lineage may have the effect of taking focus away from the importance of the specific racial, political, historical and social circumstances surrounding the emergence of the original

[84] Ross, The Rest is Noise, 517.
[85] https://bangonacan.org/about_us/
[86] Câmara and Danielsen, "Groove," 271.
[87] Lombardo, Dave. *Power Grooves*. Hal Leonard Corporation, 1999.
[88] Ho, Ang-Cheng Kris Ho, & Rodriguez, Victor J. "To be in the "Groove": Minimalism and String Performance. An Interview with Robert Davidson." American String Teacher, Volume 73, Issue 3 (2023): 35-40. https://doi.org/10.1177/00031313231178475.

concept, and render it too highly generalised.[89] In his essay "Black Music as an Art Form", Olly Wilson addresses a related issue within Black music itself as it developed in the context of North America. He draws a distinction between the "folk African-American musical tradition" and African American music after 1800 which he describes as encapsulating "the American ideal within black consciousness"[90]. Where the music in this PhD borrows from and uses groove as part of its material and structure we can consider this as 'the African American ideal within European consciousness'. Wilson says of the two traditions he describes that they both "share, in different ways, the basic African approaches to music making," but that "the criteria by which one judges their content as art varies"[91] and this provides a blueprint for the way in which we might understand the relationship between groove in the African American tradition and the use of groove and groove-like structures outside this lineage.

One way of clarifying this distinction is to reserve the term 'groove' for music of a Black origin, and to use an adjacent term such as 'groove-influenced' or 'groove-orientated' for work which does not form part of this historical lineage, while acknowledging that the dividing line here is far from clear-cut. However, it is still necessary to be able to refer to the general abstract concept, whatever the context, and for this it would seem unnecessarily convoluted to use any other word than 'groove'. This PhD refers to instances of both 'groove' and 'groove-influence' or 'groove-orientation' in its examples, and in the submitted work. In reference to individual works the distinction will be made, but when referring to the broad concept the term 'groove' will be retained as is the common practice in contemporary scholarship on the subject.

In common parlance 'groove' is used in a number of distinct but related ways:

1. to refer to a particular stylistic rhythmic pattern, or piece of looping musical vocabulary with a broadly understood feel ('that drummer is good at playing Dilla grooves');
2. to simply mean 'repeated accompaniment' ('after the chorus, the band goes back to the verse groove');
3. to indicate that a group of musicians are working well together and are producing tight rhythmic interconnections ('they are really in the groove');

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[89] "in addition to an ethically based motivation for describing the circumstances under which the grooves were made and their place within the context of black struggle and black self-consciousness, an understanding of the musical traditions and culture of black America is probably the best starting point for developing the analytical tools needed to grasp funk grooves as music." Danielsen, *Presence and Pleasure*, 14.
[90] Wilson, "Black Music as an Art Form," 9.
[91] Wilson, "Black Music as an Art Form," 10.

4. to suggest that a song, or a musician's performance, is creating a pleasurable desire to move one's body ('this tune is really groovy').

There have been a number of different approaches to the concept in academic writing which vary according to the context. A selection is given below:[92]

> Groove-based music ... features a steady, virtually isochronous pulse that is established collectively by an interlocking composite of rhythmic entities and is either intended for or derived from dance.[93]
>
> Vijay Iyer

> Groove: a felt, kinesthetic sense of the predictable elements of the temporal structure within a particular episode of music making.[94]
>
> Elizabeth Margulis

> Getting into the groove, describes how a socialized listener anticipates pattern in a style, and feelingfully participates by momentarily tracking and appreciating subtleties vis-a-vis overt regularities. It also describes how a seasoned performer structures and maintains a perceptible coherence.[95]
>
> Charles Keil and Steven Feld

> Groove ... the way in which the rhythmic essence of the music flows and unfolds.[96]
>
> Mark Butler

> A figure is not a groove unless it is *designed to be repeated*.[97]
>
> Timothy Hughes

Taken together, these descriptions appear to circle around a nucleus of concerns:

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[92] The authors presented here are not attempting to give full definitions of groove, but are describing it from a particular angle which facilitates the discussion in the passages from which these are taken.
[93] Iyer, "Embodied Mind, Situated Cognition", 397.
[94] Margulis, *On Repeat*, 112. (She is paraphrasing other scholars here).
[95] Keil and Feld, *Music grooves*, 111.
[96] Butler, *Unlocking the Groove*, 5.
[97] Hughes, "Groove and Flow", 14. (Italics in original).

1. an ensemble working closely in sync
2. a central role for repetition
3. specific layers of interlocking rhythmic patterns
4. the role of a non-cognitive sense of 'feel'
5. a connection with bodily movement
6. an expression of musical style

Which of these matters is foregrounded in a given definition of groove will depend on the aspect of the term being emphasised by a given author or speaker. Given the multilayered nature of the concept, any attempt to give a comprehensive, yet concise, definition is likely to either exclude some things we want to call grooves, or be too general to be useful. Instead, I think it is preferable to use a 'family resemblance' model wherein the "complicated network of similarities overlapping and criss-crossing"[98] in the concept of groove is communicated by describing the points above,[99] by pointing at instances of grooves, and ultimately by experiencing grooves as a listener and, if possible, as a musician.

In their entry for 'groove' in the *Oxford Handbook of Critical Concepts in Music Theory*, Danielsen and Guilherme Schmidt Câmara describe three ways of understanding it which they categorise as:

Pattern and Performance	An (ethno-)musicological and music theoretical approach to groove which analyses rhythm and pitch structures, and describes how these patterns are realised in performance; specific combinations of these elements can then be understood as characterising certain styles.
Pleasure and "Wanting to Move"	Primarily the domain of music psychology which seeks to understand people's responses when listening to grooves. A number of studies have been carried out with the broad conclusion being that (effective) grooves give pleasure and make listeners want to move.
State of Being	A more philosophical and phenomenological view which examines the nature of the experience of creating a groove. This includes an examination of how time is experienced when grooving, and the paradox that grooving

[98] Wittgenstein, *Philosophical Investigations,* no.66.
[99] And others - this is by no means an exhaustive list.

> music must be continually produced anew by performers, even though it appears 'static' and unchanging to listeners.

The next part of this chapter explores these three approaches in more detail; firstly, how grooves are constructed; secondly, the connection between groove and movement, and thirdly, a selective look at phenomenological effects of loops and grooves beyond the desire to move.

2.2.1 Pattern and Performance - The Inner Dynamics of the Groove

The internal structure of the loops themselves has played a central part in the development of styles and the types of feel available to groove-directed music. The way that a particular groove is put together is referred to by Danielsen as the 'inner dynamics of the groove'. She gives examples of classic funk grooves in which, for example, the looping material begins with polyrhythmic layers and ends strongly aligned to the beat producing a sense of tension and release within each repeated unit which "has a driving, dynamic effect and leads the process onward."[100] She suggests that this sense of forward motion derives from a 'productive dissymmetry' and quotes Deleuze who discusses an artist drawing a 'decorative motif'.

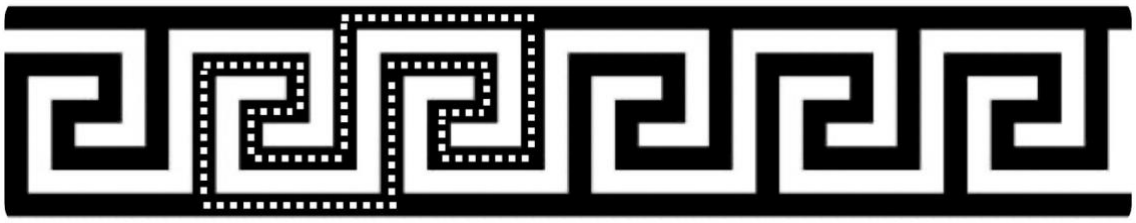

Figure 2.4: A Greek vase style pattern[101]

There are many ways to segment the pattern in Figure 2.4, but wherever we see the start and end points, we see the image as "juxtapose[d] instances of a figure,"[102] but this is not the experience of the artist drawing it freehand. If we consider drawing the shape indicated by the dotted line, we complete the previous iteration whilst, simultaneously, beginning the next. The shape is designed so its ending is also its beginning. If we stop the pattern we create a tension with no release (as shown at either end of the figure); the pattern has taught us what comes next but it is not there. This tension is present for the observer as well as the artist and also exists throughout

[100] Danielsen, "Time and Time Again", 44.
[101] Author's diagram.
[102] Deleuze, *Difference and Repetition*. Quoted in Danielsen, "Time and Time Again", 43.

the pattern. Our eye is drawn horizontally from one part to the next as we want to see each new iteration of the shape completing what would otherwise be left open by the previous. In this sense the imbalance inherent in the pattern (a 'dissymmetry') produces a drive in the observer to experience the pattern continuing.

Productive dissymmetry in grooves works in a similar way. For example, the groove found in Joe Lovano's 1991 track "Here and Now"[103] contains an inner dynamic which alternates between two beats with an 8th note density referent and four beats which bring out the 16th note subdivision (Figure 2.5).

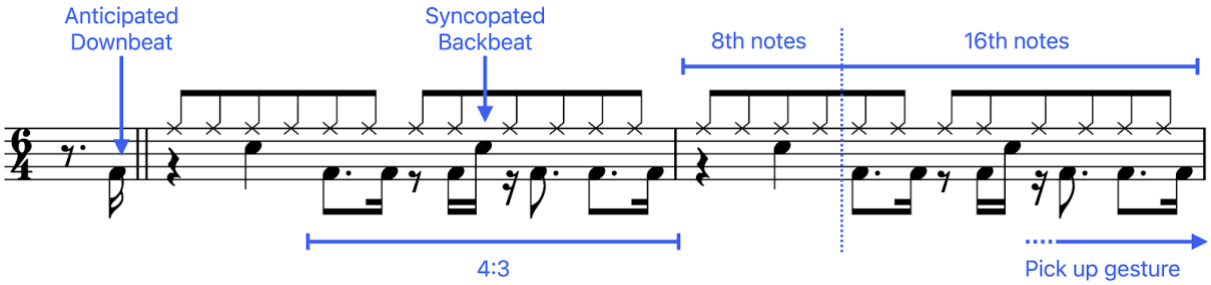

Figure 2.5: the main groove from "Here And Now" by Joe Lovano[104]

The second four beats of each bar is similar to what Danielsen describes as a "counter-rhythm with a tendency towards cross-rhythm,"[105] that is, the temporary suggestion of an alternative underlying pulse. The final strikes in the 4:3 bass drum pattern also acts as a pick up gesture into the next bar, and the last bass drum hit of this section doubles as an anticipated down beat of the following bar. This means that, as in the vase pattern, the end is also the beginning of the next iteration. Add to this the instability introduced to the pulse by the syncopated backbeat on the snare, and the overall effect is a pattern which oscillates between the relative security of the first two beats (8th note subdivision, solid backbeat) and the tension of the final four beats (polyrhythm, late snare, increased density referent, drive towards the next bar). The inner dynamic of the groove creates a productive dissymmetry which drives the sense of forward motion, and the particular way in which it is achieved characterises the particular stylistic feel of the song.

[103] A very similar groove is found in "System" by Brotherly, 2007.
[104] Author's transcription - two iterations shown.
[105] Danielsen, *Presence and Pleasure*, 62.

The Dilla revolution of the 1990s[106] opened up new ways of manipulating the inner dynamics of grooves by including more extreme microtiming events derived from the "exaggerated rhythmic expressivity of the machine".[107] In an analysis of Snoop Dogg's "Can I Get a Flicc Witchu", Brøvig and Danielsen highlight how the seemingly dislocated rhythmic layers nevertheless create a systematically asynchronous pattern. The authors argue that "the instability produced by such deviating patterns is very effective in enhancing the inner dynamics of the groove and keeping the listener engaged in understanding it."[108] These developments raise the question of how far the inner dynamics of a pattern can be distorted before it is no longer perceived as a groove. This question is returned to later in this chapter when grooves in new music are discussed, and also in chapter 4.

2.2.2 Pleasure and "Wanting to Move" - The Movement Criterion

Vijay Iyer suggests that movement when listening to a groove is more than simply a bodily reaction to what is heard, but is rather a way of understanding the music. This idea emerges from the concept of embodied cognition which "treats cognition as an activity that is structured by the body situated in its environment."[109] In his book *Groove: A Phenomenology of Rhythmic Nuance*, Tiger Roholt proposes that Iyer does not go far enough because, for Iyer, movement in this sense is equivalent to the neurological and mental processes *underlying* movement and does not require literal physical movement of the body in space. Iyer's conclusion, based on recent neuropsychological studies, is that "the act of listening to rhythmic music involves the same mental processes that generate bodily motion,"[110] but Roholt makes the case that "… our bodies do not merely serve to give us an orientation towards things, which constitutes a foundation for subsequent, full-blown, cognitive understanding; our bodily engagement with things is itself a kind of understanding,"[111] and that "we come to understand a groove through an activity of the body."[112] Andy Hamilton agrees, referring to this as 'the movement criterion', and puts it this way: "The question is not, 'Does the music literally move?' Rather, understanding the music involves literally moving oneself."[113]

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[106] Dilla used a flexible approach to microtiming across the layers in his beats resulting in what has been referred to as 'drunk', 'lazy' or 'seasick' grooves. This resonated widely through the worlds of hip hop, soul and R'n'B. A detailed account can be found in Charnas, *Dilla Time*.
[107] Danielsen, *Musical Rhythm in the Age of Digital Reproduction*, 1.
[108] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 14.
[109] Iyer, "Embodied Mind, Situated Cognition", 388-389.
[110] Iyer, "Embodied Mind, Situated Cognition", 392.
[111] Roholt, *Groove: A Phenomenology of Rhythmic Nuance*, 98-99.
[112] Roholt, *Groove: A Phenomenology of Rhythmic Nuance*, 106.
[113] Hamilton, "The art of improvisation and the aesthetics of imperfection", 170.

2.2.3 State of Being - Other Effects of Repetition

Loop-like repetition (including, but not limited to, grooves) is associated with a number of effects experienced by listeners. What follows is a very brief outline of some of these effects to provide some more context to the discussion of groove above. Danielsen discusses David Lidov's term 'textural repetition' meaning repetition which is at a frequency and duration that the listener stops hearing it *as* repetition and begins to take it for granted, allowing the attention to move to other aspects of the music.[114] Margulis develops this claim saying that "excessive repetition musicalizes qualities of a loop that may have initially seemed incidental, driving attention to otherwise perceptually inaccessible qualities of the sonic surface."[115] Using a different approach in her article "Towards a topology of minimalist tropes", Rebecca Leydon proposes a number of types of subjective experience which arise in music in which repetition plays a significant role. She refers to Naomi Cumming's suggestion that listeners 'become a musical subject' while listening to music, based on the elements of timbre, gesture and syntax. Leydon asks the question "What happens to 'the musical subject' when syntax is undermined by the obstinate repetition of a single motivic gesture? What domains of subjective experience can we map onto the 'absence of volition' that this musical situation implies?"[116] Her response is to describe a number of tropes which characterise these musical subjects under categories such as 'maternal', 'mantric', and 'totalitarian'.

These ideas inform and support an approach to the analysis of grooves and loops which conceives of them as worthwhile and consequential *because* they loop or repeat. This contrasts to some traditional approaches to musical analysis which criticised repetition as either a discursive absurdity when music is understood as having a dramatic or narrative telos,[117] or representing the "tyrannical, repressive and inhuman"[118] aspects of post industrial society.

2.3 Loops and grooves in new music

In the postminimalist ear of the 1980s approaches to looping broadened. For example, in Lois V. Vierk's *Red Shift* (1989) phrases are, in a sense, looped but this musical material is constantly transformed in what she calls "exponential structure ... in which rates of change of musical

[114] Danielsen, "Time and Time Again", 38.
[115] Margulis, *On Repeat*, 80.
[116] Leydon, "Towards a Typology of Minimalist Tropes," 5.
[117] Kivy, *The Fine Art of Repetition*, 330.
[118] Baumgärtel, *Now and Forever*, 26.

materials are governed by exponential mathematical equations."[119] The result is a strong sense of the repetition of limited material as is found in earlier minimalist work, but identical, or near identical, repetitions are not heard. This resonates with Kyle Gann's remarks about Janice Giteck's piece *Om Shanti* written a few years before *Red Shift*, it "creates an impression that it must be repeating or systematically permutative in some way, but in fact there is no repetition at all of any phrase longer than five notes."[120]

This expanded approach to loops and looping has developed further in recent decades with composers such as Aldo Clementi who has used a technique in which material is looped but consistently and gradually slows down. His repetition may be more obvious than in *Red Shift*, but due to the dense and richly complex nature of the material itself, the process of slowing down has the effect of revealing inner parts which were inaudible at a higher tempo. In his article on Clementi, Bryn Harrison describes this effect as an "unfolding, or perhaps unravelling"[121] which changes the listeners' experience of musical time. Cassandra Miller's *Bel Canto* also features an overt use of loops but, like the Clementi, they are manipulated to bring out different qualities of the material. In this case, the material is a very short fragment based on an opera recording but is performed at a wide variety of tempi and is layered such that different parts of the ensemble are looping at different rates.

2.3.1 Bernhard Lang

Austrian composer Bernhard Lang has based much of his work on loops, notably his *Differenz / Wiederholung* (DW) series which comprises around 40 pieces composed since 1998. Lang has borrowed approaches to looping and the manipulation of loops from the filmmaker Martin Arnold and, in an analysis of Arnold's work,[122] Lang delineates 'static' from 'modulated' loops to characterise the way they are used in his own music. 'Static' loops in this context involve identical repetitions, whereas 'manipulated' loops are transformed when repeated by being edited, reversed, slowed etc.

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[119] In interview with Harry Matthews. https://blog.soton.ac.uk/music/2019/01/24/when-harry-met-some-more-composers-part-3-lois-v-vierk/

[120] https://www.kylegann.com/AshgatePostminimalism.html

[121] Harrison, "The Tempo of Enclosed Spaces", 270.

[122] Lang, Bernhard. "Cuts'n Beats: a Lensmans View Notes on the Movies of Martin Arnold", 2015. http://members.chello.at/bernhard.lang/publikationen/CutsAndBeatsNotesonMartinArnold.pdf.

During an informal conversation with Lang I asked him about the importance of groove in his music to which he replied that it is at the centre of what he does. As Christine Dysers describes in her book on Lang, his music shares "links with not only free jazz and experimental composition but also turntablism, hip hop, DJ-culture, rock and electronic dance music (EDM)."[123] Another feature of Lang's groove-influenced work hinted at in Lang's discussion of Arnold, is the connection to sample culture. Much of Lang's output is music for live instrumentalists, often written in a manner which requires the players to simulate the aesthetic of samples cut from their original context. For example, "The Watchtower" from *DW16* features a quartet performing what appears to be a through-composed piece of music which, however, is not heard as a continuous flow, but instead is constantly interrupted by a 'stuck record' effect (see Figure 2.6).

This is achieved by looping sections of the musical material chosen deliberately such that they do not line up with the natural phrasing present in the original music. These loops have the quality of 'hard cut' samples similar to the stuttering retriggering used in sample-based electronic dance music styles, for example in J Dilla's "Bye". This effect is further supported by the performers replicating each iteration, or partial iteration, with machine-like precision, eschewing the expressive variation commonly brought to a repeated part by live instrumentalists.

[123] Dysers, *Bernhard Lang*, 14.

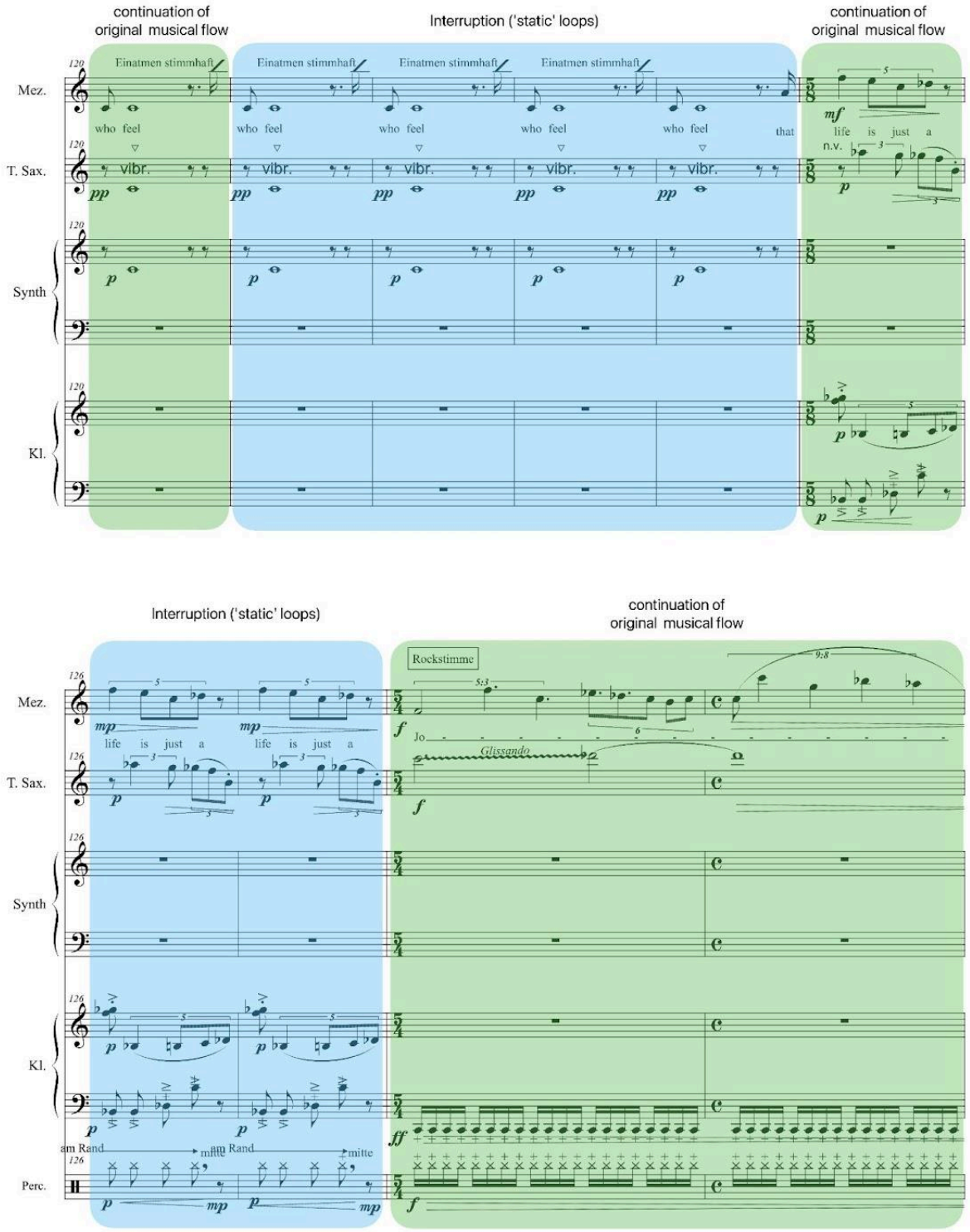

Figure 2.6: Extract from "The Watchtower" by Bernhard Lang[124]

[124] Extract from composer's score with annotations by the author. (Used with permission from the composer)

2.3.2 Loops and Groove in Current New Music

In the current new music landscape, traditional 'high' and 'low' art distinctions have dissolved to the extent that practitioners employ loops and grooves in the manner they are found in non-classical genres, as well as using the experimental tendencies and classical contexts described in the previous section. Alex Paxton's *Music For Bosch People* (2021) engages with the groove tradition in a direct way, featuring sections with looping feels which are fairly recognisable from groove-based styles, especially jazz. *Different Zones* (2019) by Don Li is a collaboration with Swiss jazz/breakbeat drummer Jojo Mayer, and features grooves in a cut-up but otherwise unambiguous way; references to sample culture, and verbatim repeats; as well as an aesthetic and systematised approach reminiscent of postminimalist music. Benjamin Oliver's song cycle *Love Letters* (2024), features a number of looping grooves which are reminiscent of broken beat and Dilla grooves but with an even more exaggerated manipulation of microtiming. In this sense, the music refers to a cultural scene while also deconstructing and reassembling it in an experimental way. What follows is a full analysis of the groove from the song "Melancholy Adorations" from *Love Letters* using Danielsen's framework to describe the inner dynamics of grooves, and a discussion of how this type of analysis can illuminate the understanding of music in the new music tradition.

2.4 Case Study: Melancholy Adorations

The piece is written for drum kit (including electronic percussion pads), xylosynth,[125] synth, piano and voice, and revolves around a four bar loop which is repeated verbatim except for the bringing in and pulling out of instruments, and a slight variation in the piano part. The vocalist sings the lyrics, improvising freely using a given modal pitch class set.

As can be seen in the score extract in Figure 2.7,[126] the four bars which make up the loop are of highly varying lengths, however, this does not represent how the music is heard. Instead, the "virtual reference structure"[127] is experienced as a slow, slippery bar of 4/4; a sort of hyper-stretched Dilla groove. Figure 2.8 shows the relative positions in time of the onset of sounds from each instrument, with the approximate perceived beat divisions along the bottom.

▶ Extract 2.1: "Melancholy Adorations"

[125] A synth played like a xylophone.
[126] This analysis is based on the composer's score and the original recording - thanks to Benjamin Oliver for providing these.
[127] Danielsen, *Musical rhythm in the age of digital reproduction*, 4.

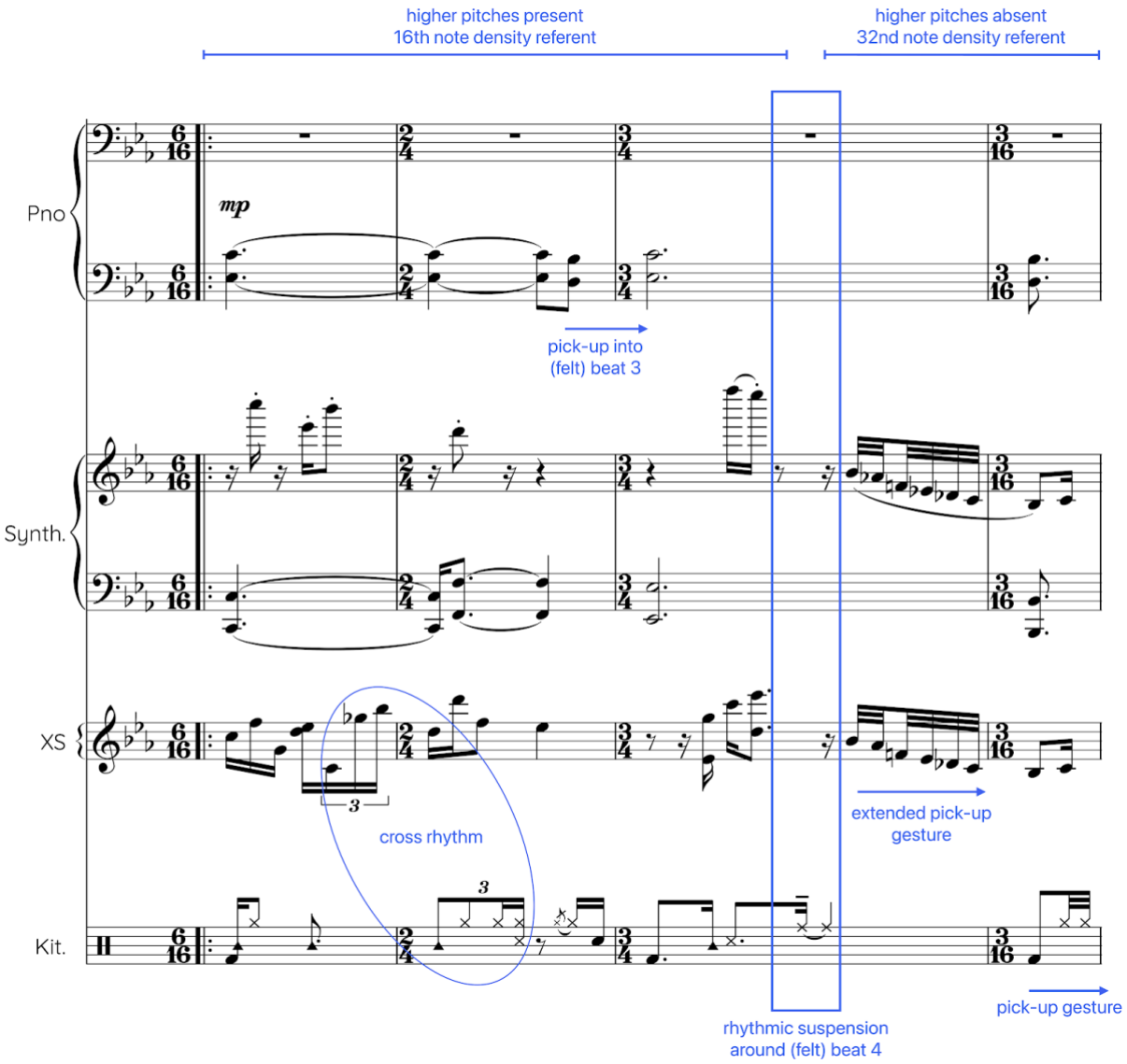

Figure 2.7: “Melancholy Adorations” - score extract with author’s annotations

(bars 5-8 inclusive)

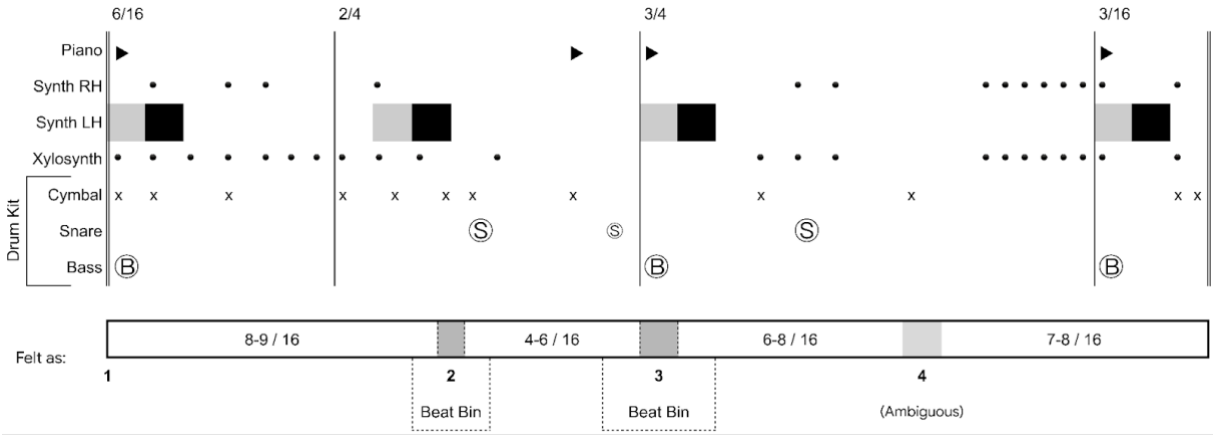

Figure 2.8: "Melancholy Adorations" - event onset and density, and perceived beat[128]

The felt beat positions arise due to a number of elements. Firstly, the first two bass drum hits are distributed to feel approximately like beats 1 and 3 in 4/4, with the final hit feeling like a pick-up to the next repeat, and the snare acts as a backbeat on beat 2, and an early backbeat before beat 4.[129] These beat positions are strengthened by the prominent bass notes in the left hand of the synth part which line up approximately with beats 1, 2 and 3, and with the pick-up bass drum at the end of the loop. Finally, when the piano enters it strengthens the bass line by playing in rhythmic unison with it on beats 1 and 3, and the final note; it also provides a pick-up into beat 3.

Another important function the piano performs is to clarify the rhythmic position of the synth bass notes. This happens because the synth sound has a slow attack making the precise moment when the beat is felt ambiguous (shown as grey to black blocks in Figure 2.8), but the clear attack of the piano sharpens the transient when it plays together with the synth. This rhythmic vagueness in the synth bass sound contributes to our hearing of the beats as what Danielsen calls 'beat bins', that is we no longer understand the beat as "a series of points in time, because each beat is thought to have both a shape and a duration".[130] In "Melancholy Adorations" the first beat is quite concrete and clear, but beats 2 and 3 are experienced as having a more ambiguous 'shape and duration', and beat 4 is implied rather than heard (see Figure 2.8). One can imagine that a series of people asked to clap on these beats would likely all locate beat 1 at the first piano/bass drum attack, however, their clap placement would probably vary much more within the beat bins of beats 2 and 3. This is because the precision of pulse

[128] Author's diagram
[129] Beat positions from this point onwards refer to the perceived 4/4 virtual reference structure unless specified as 'notated' beats
[130] Danielsen, *Musical rhythm in the age of digital reproduction*, 33.

positioning is temporally 'widened' by the lack of clear synchrony between sounds which otherwise all seem to belong to the same moment in the tactus. The first three beats being, broadly, evenly spaced and having a familiar *bass drum - snare backbeat - bass drum* pattern sets up a strong expectation of a fourth beat with another backbeat. The snare arrives too early to be heard in this way so comes across as an early shifted backbeat (e.g. as found in the verse groove of "Wake Up" by Rage Against the Machine[131]), and at the moment we roughly expect the beat to fall, the music reduces to a single ride hit. This produces a moment of rhythmic suspension which acts as the negative of a beat bin - a rhythmic hole approximately 1/3 of a second long into which the feeling of the beat falls.

The groove has a strongly shaped inner dynamic which drives the sense of forward movement. It begins with a 16th note density referent and moves into a series of triplets hocketed across the xylosynth and drums creating a brief cross-rhythm tension. The cross-rhythm resolves but the suspended beat 3 creates a different sort of tension resolved by a fast descending run on the synth and xylosynth. This run acts as a sort of extension to the pick-up gesture which is played across the ensemble and drives the loop 'forward to its own beginning' once again. This extended pick-up passage changes the density referent to 32nd notes, and takes away the high pitch information present in the synth and xylosynth in the first three beats. This sets up a strong imbalance, or dissymmetry, between beats 1-3, and beat 4 which can only be made sense of by hearing the loop again and again.

Although this analysis reveals the similarities between this music and grooves found in popular music styles, the real interest lies in how it is different. The groove from "Melancholy Adorations" is not danceable in a conventional sense, and, despite a clear connection to groove-directed music, it has many reference points in the field of new music. The feel and sound world produced in this piece do not fit into any simple stylistic understanding, but there are suggestions of Dilla and broken beat, and sounds associated with EDM, sitting alongside complex rhythmic ideas and unusual sound combinations normally found in experimental music. This creates a new way of grooving which might be understood, as suggested by Roholt (see 2.2.2 above), by moving. In creating this analysis I began by trying to find a way of moving my body to the music, this helped me find the perceived beat positions; understand which beats were beat bins and how they were shaped; and discern the patterns of dissymmetry which drive it forward.

[131] From 1:03.

Elements of popular music have long influenced composers of new music, but the use of loops and groove in "Melancholy Adorations" is an example of how new music might contribute to loop and groove culture.

> There is no reason for assuming that the virtual structures at play in rhythm always have the form of ticking clocks. All kinds of musical and bodily gestures are 'patternable' and thus available as structuring figures, to be transformed into the virtual schemes consciously and unconsciously at work in our experience of rhythmic events, whether while performing, dancing or listening.[132]

2.5 Loops and Grooves: Concluding Remarks

The presence of loops and grooves in this project reflects, first and foremost, my experience as a musician performing groove-based and groove-directed music. The deconstruction of this experience through historical understanding and more abstract theoretical work not only helps in understanding what is happening and why, but it also suggests artistic research questions:

- If funk grooves have an inner dynamic driven by a productive dissymmetry, in what ways can this inner dynamic be re-engineered to produce distinctive compositional outcomes while retaining something of the source material? How far can the dissymmetry be pushed before it stops operating as a productive force in the composition and performance?
- Each technology used to create loops has its own affordances which affect the looping output and the resulting aesthetic effect; how can these idiosyncrasies be employed as, or influence, compositional technique when working with live performers playing acoustic instruments?
- In the light of Jennifer Walshe's 'New Discipline' concept, how might the physical movement which forms the background to much groove performance become more of an aesthetic concern?
- Historically, grooves in music are associated with community-based gradual development; how can more experimentally engineered grooves contribute to these traditions?

[132] Danielsen, *Musical rhythm in the age of digital reproduction*, 33.

These and other artistic questions have been asked and answered by composers and musicians including a number discussed in this chapter. The music presented in this PhD represents some of my personal responses to this area of interest.

Chapter 3 Digitally Engaged Music

> I came across the mind-boggling rhythms of a new electronic song genre called jungle and drum 'n' bass ... Those beats were so radically different and new that I understood that they were no longer abstractions of a real drummer, but they came purely out of the syntax of drum machine programming ... the vocabulary of drum machine programming had surpassed the vocabulary of real drummers to articulate and express the digital age that had arrived.[133]
>
> Jojo Mayer

> The medium is no longer the message in glitch music: the tool has become the message.[134]
>
> Kim Cascone

The aesthetic language and sonic markers of digitally created music have long since become fully established in the sonic palettes of performers, composers and listeners, and this has, in turn, had an influence on the performance, composition and perception of music which is created using principally non-digital means. A common example would be acoustic drum kit players borrowing from machine-generated grooves, however, this digital engagement within acoustic[135] music can also be found outside groove-directed styles, including contemporary experimental composition. In addition to absorbing this influence, much digitally engaged acoustic music seeks to make a uniquely acoustic contribution to an established digital aesthetic. Much of the music in this PhD falls under this description featuring mostly non-electronic instruments yet displaying the strong influence of digital processes and/or aesthetics.

In this chapter I propose a general framework which builds upon pre-existing ideas for the purpose of interpreting and contrasting compositions in this PhD with other works of digitally engaged music - that is, music with a significant relationship to digital technology, either through direct use of such technology, or through aesthetic and structural references to it and

[133] Mayer, "Exploring the distance between 0 and 1".
[134] Cascone, "The Aesthetics of Failure."
[135] I use the term 'acoustic' in a specific way. See 3.2 below.

its results. A two-dimensional space is proposed which plots 'features' (or means of production, from fully digital to fully acoustic), against 'transparency' (the degree to which 'features' are salient to the listener, from fully transparent to opaque). Relative positions within the space reveal relationships between works, and the terms 'likeness', 'signature' and 'signifier' are introduced to describe music which can be located at different areas of the graph.

The framework builds on the work of Brøvig and Danielsen and can be seen as an expansion of their concept of the 'digital signature' and Brøvig's notion of 'opaque mediation' in order to encompass the kind of work produced for this PhD. I have adopted their terminology and introduced some of my own. This chapter begins with an outline of their ideas and then explains how I expand their scope in order to include acoustically made, yet digitally engaged work. My framework is then elucidated, followed by a discussion of the ways in which its conclusions are contingent on individual and environmental circumstances. The chapter concludes with two case studies which are practical applications of this structure: the drum kit performance style of Richard Spaven; and the piece "DISKPREPT4" by Aphex twin (original version and live version by GBSR duo).

3.1 Digital signatures

In her 2013 PhD thesis "Music in Bits and Bits of Music: Signatures of Digital Mediation in Popular Music Recordings*",* Ragnhild Brøvig coined the term 'digital signatures' to refer to the ways in which "the digitalization of technology has affected the audible result of the popular music production process."[136] In 2016 the thesis was developed into the book *Digital Signatures - The Impact of Digitization on Popular Music Sound,* with co-author Anne Danielsen in which they define a digital signature as "the sonically distinctive character of digital mediation. Put simply, digital signatures are the sonic fingerprints of digital technology."[137] There are two important qualifications to this concept. Firstly, digital technology that has no effect on listener experience does not instantiate a digital signature (for example, simply replacing a tape machine with a digital recorder); in other words, the digital signature is a fundamentally experiential concept. Secondly, digital signatures are those 'sonic fingerprints' which are exclusive to *digital* technology, as opposed to any other type of technology (for example, the kinds of tape editing practiced in the 1950s).

[136] Brøvig-Hanssen, "Music in Bits and Bits of Music", 3.
[137] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 2.

For example, the track "KJZ", recorded in 1996 by UK based drum and bass producer Rupert Parkes under the pseudonym Photek, displays several types of digital signature discussed by Brøvig and Danielsen:

1. *Digital Spatiality*. The piece comprises layers which imply contrasting acoustic environments. The double bass sample and the electronic bass drum are dry, suggesting a small, non-reflective acoustic space (so small as to be artificial). The drum kit sample has the close reverberation character of a studio or small club setting. The greatest contrast in spatial character is between the synth parts, which range from that of a large hall to that of a vast metal tank.

2. *Cut-Ups*. The drum kit sample is taken from a soloistic extract of the jazz drummer Buddy Rich which includes cymbal sounds of contrasting timbres and pitches. The sample is sliced into sections and rearranged to create an ever-changing groove. Due to the prevalence of cymbal playing in the sample, the slicing regularly cuts off the decay of one cymbal sound and juxtaposes it with another of a different pitch and timbre.

3. *Digital Silence*. At moments throughout the piece the drum kit sample is cut off abruptly, such that the full sound of the kit including any ambient elements is replaced by complete silence in the following moment. These 'drop-outs' form part of the rhythmic fabric of the music and, in contrast to a traditional rest in notated music, are experienced as a total absence of sound.

4. *Hyperaccuracy*. The composite drum groove created through the recombination of sample slices, when thought of as a hypothetical drum kit performance, represents a virtuosic extreme. It would seem to be technically impossible for a live drummer to reproduce this complexity on an acoustic drum kit. Aside from the complexity of sound and rhythm which can be produced through these sorts of processes, the character of machine accuracy is fundamentally different to that of even the most accomplished performer. This "exaggerated virtuosity of the machine"[138] results in the perfectly regular rhythmic placement of sounds, and the repetition of sounds is an identical replaying of a previous sound.

[138] Danielsen, *Musical rhythm in the age of digital reproduction*, 2.

It could be argued that most of the above examples could, in some sense, be created using analogue technology. This may be true in some cases, however, digital signatures do not only arise because of the theoretical possibilities inherent in digital technology, but because of the affordances presented by it. While we can theoretically imagine a rhythmic collage similar to the one heard in "KJZ" made in the 1970s using tape splicing, one factor that explains the rise of drum and bass in the early 1990s is the arrival of digital samplers in the 1980s which enabled, and was suggestive of, a way of working for musicians creating groove-directed music. The visual environment of sequencers and DAWs; the ability to try and undo unlimited edits; the breadth of possibilities offered by audio signal processing - these are examples of how the difference between analogue and digital technology is not only one of type, but of magnitude. This shift in the scale of what can be done to sound does more than make established operations quicker and easier (which it certainly does), it also reframes how we think about what the technology might be able to do. In Danielsen and Brøvig's words: "Digitally converted sounds can be treated very differently than analog sounds, and this, together with the unique sounds digital technology has introduced ... has affected how we make and think about music."[139]

In the following paragraphs, terminology relating to the digital signatures concept will be laid out, followed by an introduction to the notion of digitally engaged acoustic music which shows how these ideas might be expanded to include music with a non-digital method of production.

3.1.1 Transparent and Opaque Mediation

Brøvig presents the digital signature as an example of 'opaque mediation'. She frames the digital technology used in the production of music as a 'mediator' between the music and the listener. The mediation which takes place can be transparent or opaque to a greater or lesser extent:

Transparent mediation: "technology will be used in a manner that allows the listener to ignore it"

Opaque mediation: "technology will be used in a manner that forces the listener to reckon with it."[140]

Thus, the Photek example given above demonstrates opaque mediation in various ways because it wears its digital production on its sleeve. The listener cannot but hear that the music

[139] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 14.
[140] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 5.

has been created through digital means, and that this method of creation has had aesthetic and compositional impacts on the outcome. The exact nature and strength of this impression will differ between individuals due to the variety of experiences with digitally created musical sound and the style of music in question.[141]

3.1.2 Features and Signatures

Brøvig and Danielsen draw a distinction between a digital *signature* and a digital *feature*:

Digital feature	"indicates that the mediation involved in the music originates in processes that involve digital technology"
Digital signature	"points instead to a musical sound that is experienced as a footprint of the digital"[142]

In other words, a digital feature is simply the fact that digital technology is used regardless of whether it is understood as such by the listener. In this sense it is possible to have a digital feature which does not result in a digital signature, for example, a drum machine which fools you into thinking it is a live acoustic drummer. Put differently, digital signatures emerge when digital features are opaque, and digital signatures become less obvious as digital features become more transparent.

3.2 Digitally engaged acoustic music

While the digital signature is an excellent tool to understand the sonic results of digital technology, it can only relate to music created, at least in part, using digital technology itself. Much of the music presented in this PhD takes sonic, compositional, gestural and semantic influence from digitally created music, but is performed on non-digital, or 'acoustic' instruments. This is what I am referring to as 'digitally engaged acoustic music.'[143]

In the absence of an alternative clear and unfussy terminology, I am using 'acoustic' in this context to refer to instruments and sound making devices for which the production and quality of sound is directly related to actions of the human body. This includes voice, acoustic instruments (with or without amplification) and electric instruments which do not comprise an

[141] See 3.3.1.
[142] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 6.
[143] A forthcoming article by Brøvig and Stevenson – "Machine aesthetics in recorded and performed music: An analytical framework" - proposes an alternative way of conceptualising this idea. They use Barry Brummett's ideas of machine aesthetics as a musical analysis tool to deepen understanding of machine aesthetics in live music featuring traditional instruments.

interface and a separate sound creation device; for example, electric guitars are included, but not analogue synthesisers. As a guitarist, I conceive of the instrument as beginning with the guitar itself, and ending with the speaker, and that the sound produced from the speaker is originated, shaped and controlled by the movements, forms and nature of my body. In contrast, an analogue synthesiser is made up of an interface (for example, a keyboard) and a sound module (the synth itself). Unlike the electric guitar, the performer's body merely triggers the synth which, in turn, produces the sound. This is a kind of 'black box' process, wherein a key is pressed and the sound is heard, but the way the particular sound is created is not obviously apparent to either the player or the audience. Thor Magnussen says of this distinction that "the electronic or digital instrument *has* an interface, whereas the acoustic instrument *is* the interface".[144]

3.2.1 From Digital to Acoustic

Brøvig and Danielsen write:

> The new rhythmic feels produced by the DAW ... clearly demonstrate the ways in which new gestural expressions generated by digital music technology can be picked up by people and made a part of a human gestural vocabulary. This illustrates the two-way interaction between musicians and technology. The story of digital technology in the field of music is not simply about people trying to get the machine to mimic the human world. It is also about people wanting to play ... like the machine.[145]

What this suggests is that, beyond contributing the specific sounds and effects created directly by the technology itself, the use of digital technology in music has a broader influence on musical vocabulary, processes, and techniques which can persist when the technology itself is removed from the process; something akin to digital signatures seem to be present despite digital features being absent. This can be seen most clearly in the way that live acoustic drum kit players have been influenced by the sounds of looping and cut-up samples, and the programming of drum machines. Many digital aesthetic influences have become absorbed into a modern drummer's musical vocabulary, for example, phrasing a groove identically on each iteration as if it is looping electronically, a sudden drop out on beat one of a bar like pulling the fader down during a hip hop groove, and constructing a groove in the style of a breakbeat. Jojo Mayer calls this process "reverse engineering digital culture"[146] and describes how he has

[144] Magnusson, *Sonic Writing*, 35. (Italics in original).
[145] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 115.
[146] Mayer, "Exploring the distance between 0 and 1".

attempted to “acquire the idiosyncrasies of drum machine programming” in order to obtain sufficient “stylistic abstraction that I could create the illusion that I could play like a machine.”[147]

There are also many less obvious ways in which this influence manifests itself. This can be seen in different ways across many recent notated music compositions. For instance, Bernhard Lang’s *Differenz/Wiederholung* pieces owe many aspects of their construction to the sound of digital editing and ‘skipping’, looping, treating sections of material as discrete blocks in the manner of a sample, and the use of the glitch as musical material. However, many of the pieces are performed entirely on acoustic instruments. We experience the music as having a digital signature, but there are no digital features. In other works, the influence of digital signatures is less obvious but an argument can be made for describing them that way. For example, Matthew Shlomowitz’s *Letter Piece No. 5: Northern Cities* (2007) which uses compositional techniques resembling sampling, cut-and-paste, layering, and a focus on sound events (and actions) in the abstract. The experience of watching the piece does not necessarily evoke a sense of the digital, but this effect is foregrounded in some performances.[148] Jay Capperauld’s *Dehumanised Shock Absorbers* (2013) is for acoustic instruments, but the compositional language is derived from digital cup-ups and glitches.

3.2.2 Acoustic Features and Acoustic Signatures

My attempts to apply the concepts of digital signatures to digitally engaged acoustic music led to some research questions:

- Do acoustic instruments act as mediators in the way that digital technology does?
- If a digital signature must involve a digital feature, how can an apparent digital signature, created acoustically, be conceptualised?
- What is the relationship between ‘sonic footprints’ of digital technology, and non-sounding, structural influences from digitally created music?

Digital signatures are essentially relational in that they only arise due to the contrast with the perceived default of acoustic, and then analogue electronic, sound in music; the newly developed digital sound technology intruded upon the established technology resulting in novel

[147] Mayer, "Exploring the distance between 0 and 1".
[148] For example, Decoder ensemble’s version of Northern Cities features a movement style and choice of ‘samples’ which references a ‘digital cutting’ effect more so than Tom Pauwels and Mark Knoop’s version which includes more variation in movement and sound.

sonic experiences. Once digital sound has become widely experienced and expected it is then possible to imagine contexts (such as in EDM) where digital sound is the default and acoustic sound will act as the intruder. In such cases, works which do not include digital features are not 'featureless', they simply possess other kinds of features. Brøvig and Danielsen suggest that "opaque mediation encompasses all kinds of technologies used in the production process that are exposed, analog as well as digital";[149] acoustic instruments are a form of technology so they could, by this framing, mediate and 'be exposed' like digital technology. Rather than conceptualising an artwork as 'not having digital features', it can be thought of as positively possessing 'acoustic features'. These features can be more or less opaque to the listener so, just as a digital signature emerges from opaque mediation of digital technology, an 'acoustic signature' emerges from opaque mediation of acoustic technology.

Acoustic signatures, then, are (to borrow Brøvig and Danielsen's phrase) 'the sonically distinctive character of *acoustic* mediation … the sonic fingerprints of *acoustic* technology'. This might emerge as fine grained variation in sound and repetitions, expressive qualities across the phrase and piece as a whole, and the unaffected sound from an acoustic instrument. For example, Roni Size's drum and bass track "Brown Paper Bag" is opaquely constructed from samples and digital sound using the editing and transformation techniques of digital music production, however, live performances of the track in the 1990s often used live acoustic double bass and drum kit. A listener used to the original track hears these live performances as a fundamentally digital production with acoustic technology adding something new to the music. The obvious looping of a double bass sample[150] is replaced by subtly varying repeats and a fairly improvisatory playing style which exploits a range of glissandi, vibrato and phrasing. A performance captured in 1997 for Radio One[151] displays many features one would expect from a jazz ensemble: improvised sections from the vocalists; smooth dynamic development, fills and crash punctuation by the drummer, and a general sense of liveness.

3.2.3 Likenesses

Digital and acoustic technologies, then, can mediate music opaquely resulting in digital or acoustic signatures. The question then arises as to what can be created by transparent mediation through these technologies. In the digital signatures framework, transparent mediation is understood as digital technology "used in a manner that allows the listener to

[149] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 8.
[150] There are clicks on the strings which repeat in exactly the same pattern, and there is a gating effect which cuts off the release of the end of each phrase in an identical way each time.
[151] Original track: Brown Paper Bag - Live performance: Roni Size & Reprazent, Brown Paper Bag, live for Radio One 1997

ignore it" (see 3.1.1), examples include a lifelike drum machine that is not noticed because it is believed to be a live drummer, or digital editing of a recording done in a way which preserves a believable live performance.[152] If the same idea is applied to the notion of an 'acoustic signature' the result will be the opposite: a live acoustic drum kit played so that it fools the listener into believing it is a digital sample, or a compositional and performance technique which mimics the sheer and looping properties of digital editing. Both of these are, in effect, the creation of 'likenesses' out of a different material; the likeness of a digital signature made by acoustic technology, and the likeness of an acoustic signature made by digital technology. I offer these definitions:

Digital Likeness	Transparent mediation by acoustic technology which the listener hears as opaque mediation by digital technology
Acoustic Likeness	Transparent mediation by digital technology which the listener hears as opaque mediation by acoustic technology

3.2.4 Signifiers

Music which engages with digital technology and the outcomes of its use does not always have to involve signatures or likenesses, but can respond to the broader structural and extra-musical qualities of digital production. Brøvig and Danielsen suggest that "the different forms of digital mediation manifest the potential to generate completely new musical meanings … the digitization of technology has supplied a new musical language or compositional palette"[153] and this can be seen in the Lang and Shlomowitz examples given above. Performers in some styles have taken on the expressive qualities of digital production without necessarily sounding like a machine, and works may function as critiques of aspects of digital production whilst not embodying a digital aesthetic.[154] These aspects of digital engagement signify, without necessarily being or mimicking, digital mediation and the same is true of acoustic mediation. The Roni Size 1997 live example given above, while involving digital and acoustic signatures, also includes acoustic signification, for example, the way the performers are set up on the stage is strongly suggestive of a band mode of performance, and the physical presence of an acoustic double bass signifies jazz and a close relationship to acoustically created sound. This same

[152] Transparent mediation can also occur when the technology is simply not noticed or important to the listener, for example, we know it is a drum machine but have become so used to this sound that it ceases to be consequential in our appreciation of the music. (See 3.3.1.)
[153] Brøvig-Hanssen and Danielsen, *Digital Signatures,* 2.
[154] For example, Lang, "The Watchtower." See 2.3.1 for an analysis.

performance displays digital signification also, such as the conspicuous presence and use of computer screens, and the repetitive structure of the music which derives its meaning making from music created with samples.

3.3 Digital and Acoustic Mediation in Digitally Engaged Music

The ideas presented above form a framework for the understanding of technological mediation, both digital and acoustic, in digitally engaged music.[155] This framework can be conceived as a space within which works and practices can be located:

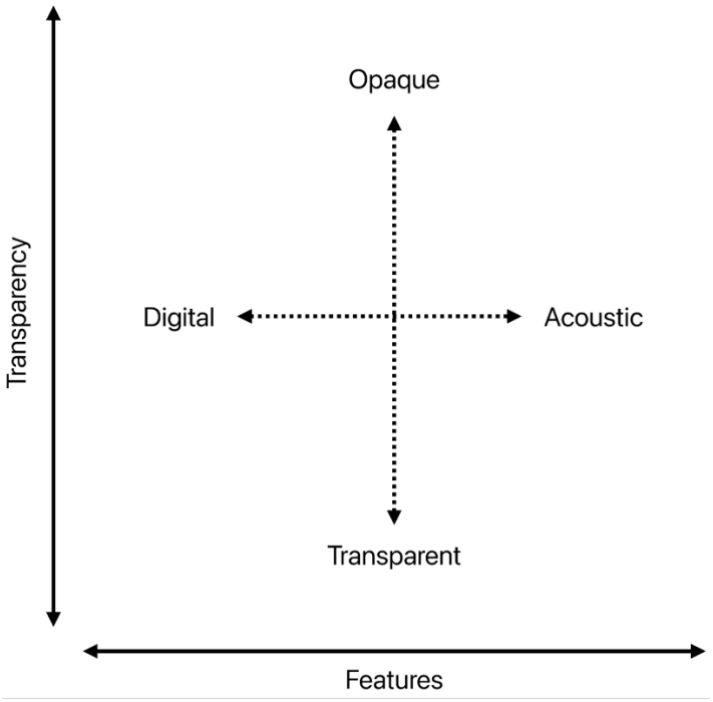

Figure 3.1: a space for understanding mediation in digitally engaged music[156]

Transparency and features being presented on a scale helps to emphasise the fact that they exist on a spectrum. Both the extent to which the technological source of a sound is apparent, and the proportion of the sound which is created digitally or acoustically, are not binary choices, but rather a matter of degree.

Signatures and likenesses occur in different parts of the space; both acoustic and digital signifiers can exist in any part of the space:

[155] This framework simply has nothing to say about music which does not engage in any way with the digital. For example, it would be nonsensical to ask whether or not a Mozart piano piece exhibits acoustic signatures because the concept of transparency in my framework relies on the contrast between digital and acoustic.
[156] Author's diagram.

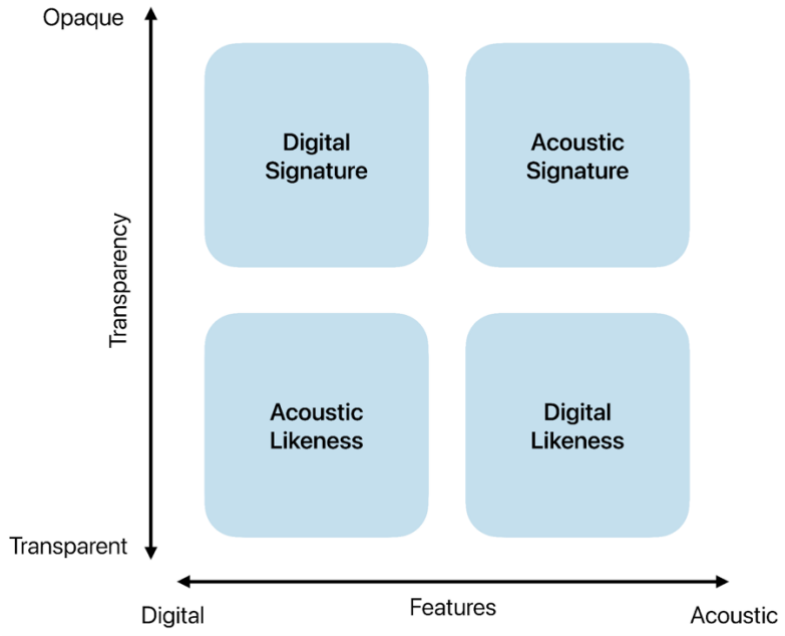

Figure 3.2: Likenesses and signatures in the mediation space[157]

Works of music as a whole cannot necessarily be simply placed in the space. This may be possible in some cases, but often different elements of a work, a particular performance or the way something is perceived by a specific audience may warrant separate analyses using these ideas.

This space can be further clarified through some examples:

	Transparency of technological mediation	Technology used	Example
Digital Signature	Opaque	Digital	A listener with experience of primarily acoustic jazz hears a jazz piece made with digital drums, bass and keyboards. The sounds used are obviously digitally created and manipulated by frequent sudden edits. She is struck by the digital nature of the sound both because of its inherent qualities, and because of the incongruity with her expectation of jazz.
Acoustic Signature	Opaque	Acoustic	A listener with a strong background in EDM hears a dubstep track made in a traditional way using obviously sampled and digitally created sound. Some way into the track an improvised violin solo begins. It is very expressive with highly varied timing and sound qualities, and some apparent mistakes have been left in. He is surprised at the obviously acoustic and improvised nature of the sound and the contrast with the rest of the track.

[157] Author's diagram.

Digital Likeness	Transparent	Acoustic	A listener with a background in Western classical music sees a performance of a solo violin piece which features phrases conspicuously cutting in unexpected places and returning to the beginning to form loops which sound identical to each other in every detail. She is amazed at how much the music sounds like it is created using samples.
Acoustic Likeness	Transparent	Digital	A listener with a background in Western classical music attends a concert of music for digital synthesiser. He is struck by the depth of expression, variation and 'human' qualities in the music and feels that this digital instrument has the expressive capabilities of an acoustic instrument.

3.3.1 Contextual Influences on Transparency

Opaque and transparent technological mediation is a fundamentally phenomenological concept. It deals with the way in which listeners perceive technological mediation and, as such, the outcomes will vary across different demographics, spatial contexts and modes of presentation. This section briefly outlines some of these contextual influences in relation to time, the visual, recording techniques and performance.

The degree to which a given listener or group of listeners perceive technological mediation as opaque can change over time. In the 1980s when digital technology was first introduced into mainstream music the resulting sounds had no precedent and were, therefore, likely to be experienced as highly opaque; the listener was unavoidably confronted by digital sound due to its novelty and contrast to what had preceded it. However, over time as listeners became used to this technology the sense of novelty reduced and started to normalise. This means that the listener is less 'struck' by the sound of digital technology and simply accepts it for what it is; at this point the mediation has become more transparent. The wide familiarity of digital sound made it possible for acoustic mediation to occur in music which is rooted in a digital sound world; it can be unexpected to hear live, improvisational acoustic drumming in a techno track for example, and this sense of surprise underpins the experience of an acoustic signature.

Our visual experience around music also affects the opacity of the mediation. Imagine hearing the sound of a TR-808 drum machine in the next room. You enter the room to discover a drummer playing an acoustic kit modified with cloth, tape, chains and other accoutrements[158] -

[158] For an example of this: How To Create Electronic Drum Sounds On An Acoustic Kit. Alex Stevenson has a forthcoming chapter on this subject.

no electricity is involved in the sound production. The sense of confusion and surprise you may feel at this discovery could be thought of as the experience of a sudden shift in opacity and understanding of features from a digital signature (or simply a familiar sound if you know the TR-808 well) to a digital likeness.

The way music is performed and recorded also exerts an influence on the way we perceive mediation. Drummer Richard Spaven (discussed in 3.4) has developed methods of performance which emphasise digital likenesses, and the way his drum kit is produced in recordings of his original material further reinforced this effect. This contrasts with The Brandt Brauer Frick Ensemble's largely acoustic ensemble performance captured in 2010[159] in which the music has strong digital signifiers such as sample-like construction, and digital likenesses including special uses of percussion instruments, but the overall performance and production ideal is much closer to a live classical performance.

3.4 Case study: Richard Spaven

Richard Spaven is a UK-based drummer, composer and producer whose principal musical influences are electronic genres including drum and bass, hip hop, broken beat and dubstep, however, he plays a fully acoustic drum kit. In addition to session work with artists including Flying Lotus and Alfa Mist, he performs and records original material with the Richard Spaven Trio featuring a bass guitarist and an electric guitarist. The trio's sound blends digital signifiers and likenesses with acoustic signifiers.

3.4.1 Digital Likenesses in Spaven's Playing

> Samplers were fed live drummers and then we were simply fed them back.[160]
>
> That's something that's really helped me as a player … thinking about the way that samples are used and manipulated, and putting that back into my playing.[161]
>
> Richard Spaven

Spaven's drum kit performance technique draws on a library of digital likenesses including:

[159] The Brandt Brauer Frick Ensemble
[160] Spaven, "'The groove is everything'".
[161] "Richard Spaven - Drum ´N ´Bass Drumming - Drumtrainer Online", https://youtu.be/VEOJ2ebDn2s?feature=shared.

Sound of the drum kit	Dry cymbals, muted drums, special effect cymbals, and multiple snare drums are used to mimic the drum sounds found in electronic music. The high tuning of drums in drum and bass; short, dead sounds with little or no decay such as those found on drum machines.
	Extract 3.1: Richard Spaven - digital likeness - sampled sounds.[162]
Machine-like qualities	Phrasing and individual sounds are extremely consistent in the manner of samples. Repetition has a 'looped' quality which suggests the sound and feel of a looping sample. Hyperaccuracy.
	Extract 3.2: Richard Spaven - digital likeness - machine qualities.[163]
Musical technologies[164]	Traditional features of jazz and funk drumming such as fills and solos are eschewed in favour of 'technologies' which reconfigure and transform the grooves. These include: mimicking a delay effect, digital silence, cut-and-paste style slicing of segments, microrhythmic variation.

[162] Spaven, Richard. "Meinl artist Richard Spaven performing "LAW" - filmed at the Meinl Cymbals Factory." MEINL Cymbals, July 8 2016. 5 min., 03 sec. https://youtu.be/2QnED9VMg08?feature=shared.

[163] Spaven, Richard. "Richard Spaven Trio Boiler Room London Live Performance." Boiler Room, July 12 2017. 45 min., 40 sec. https://youtu.be/B3EsHqhgHQU?feature=shared.

[164] 'Technologies' is used here in Butler's sense of "a notion of musical technologies that describes aspects of sonic organisation ... principles of design affording certain kinds of performative interaction ... By structuring musical temporality in distinctive ways, they allow musicians to effect these transformations within the dynamic environment of live performance." Butler, *Playing with Something That Runs*, 175.

Extract 3.3: Richard Spaven - digital likeness - musical technologies.[165]

These techniques allow him to imitate the digital signatures of drum sounds in electronic music when playing a tightly written part, but also, when playing in a more improvisational way, to exploiting them much in the way that a jazz or funk drummer will ad lib punctuations, section markers and pattern changes.

3.4.2 Transparency as a Performance Parameter

Although digital likenesses are prevalent in Spaven's playing, the degree of opacity in the acoustic mediation varies between this and acoustic signatures. He states that he respects "the mechanical way that machines play beats ... If you adopt that as a drummer and add to that as well as a human, that's when it gets really interesting for me."[166] This attitude resembles the approach of another drummer, Jojo Mayer who states, "I could create the illusion that I could play like a machine ... when I passed this threshold, something interesting happened; the human restriction – or the human element that was restricting me actually liberated me, and I could add the element of my emotionality and spontaneity to that genre."[167] This 'human element' appears in Spaven's playing when it adopts a more jazz-like approach in a fill, or soloistic section, or in moments when grooves are phrased in a funkier, more variable way. These elements weave in and out of Spaven's drumming as if he is using the opacity of the acoustic mediation as a variable performance parameter akin to dynamics.

Extract 3.4: Richard Spaven - Transparency as a performance parameter.[168]

Figure 3.3 shows how Spaven's playing fits within the mediation space. His performance mode is frequently defined by digital likeness, however, the arrows represent flexibility in the opacity parameter representing his openness to move between digital likeness and acoustic signatures.

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[165] Spaven, Richard. "Richard Spaven | 'Spin'." Vic Firth, October 19 2018. 4 min., 39 sec. https://youtu.be/mjK2r1sAktw?feature=shared.
[166] Spaven, "'The groove is everything'".
[167] Mayer, "Exploring the distance between 0 and 1".
[168] Spaven, Richard. "MEINL DRUM FESTIVAL 2015 – Richard Spaven – "Koln" by The Sure Co." MEINL Cymbals, September 10 2015. 4 min., 59 sec. https://youtu.be/pKI5sluuniY?feature=shared.

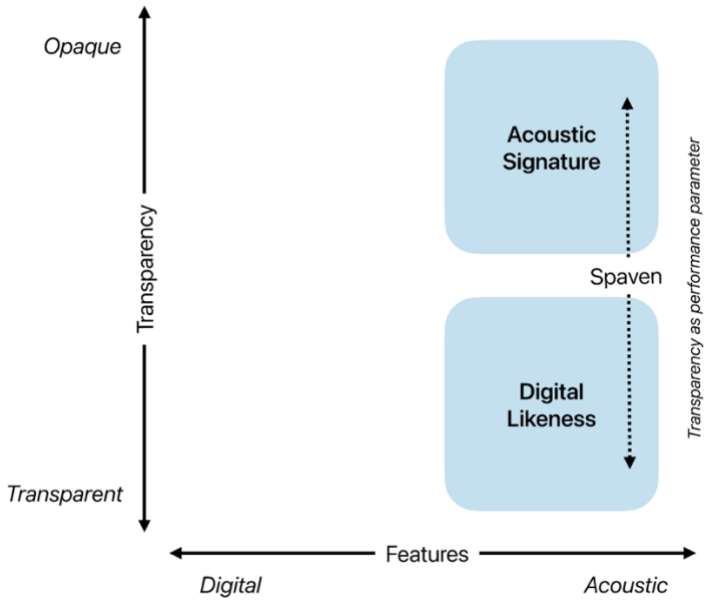

Figure 3.3: Acoustic mediation and transparency as a performance parameter[169]

This free approach to the opacity parameter seems to be what Spaven means when he says, "If you adopt that as a drummer and add to that as well as a human, that's when it gets really interesting for me,"[170] and what Mayer is talking about when he says "the human restriction – or the human element that was restricting me actually liberated me."[171]

3.4.3 Digital Likenesses and Signifiers in Spaven's Improvisational Vocabulary

In his book *Improvisation: Its Nature and Practice in Music*, Derek Bailey defines "idiomatic improvisation" as "mainly concerned with the expression of an idiom – such as jazz, flamenco or baroque – and takes its identity and motivation from that idiom."[172] The 'expression of an idiom' can be framed as the use of a language or vocabulary which may include particular phrases or licks, melodies with certain contours and articulations, ways of relating melodic elements to harmony, and approaches to developing material over time. These vocabularies are learnt through experiencing the music being performed live or on recordings, by being taught by more experienced players, and while performing.[173] Along with the development of musical idioms based on the use of digital technology such as drum and bass, broken beat, and hip hop, has come such a musical language and vocabulary. As such, these languages can be absorbed

[169] Author's diagram.
[170] Spaven, "'The groove is everything'".
[171] Mayer, "Exploring the distance between 0 and 1".
[172] Bailey, *Improvisation: Its Nature and Practice in Music*, xi.
[173] For an in-depth example of this kind of idiomatic vocabulary development, see *Thinking In Jazz*, "Chapter 4: Getting Your Vocabulary Straight."

by a performer and used in improvisation, and because these musical languages are formed by digital signatures, the improvisations of a player in the style will reflect this.

Spaven says of his work: “I don’t really know what I’m about to play ever … no fill, or whatever, is ever predetermined … in anything that I’ve ever done … having a preconceived chop or something that goes ‘there’ … I just never do it”.[174] This approach results in strong acoustic signifiers, however, his deep absorption of digitally derived styles means that the tools, phrasing, vocabulary, and relationships to timing and form used in his improvising also retain digital likeness and signification.

Extract 3.5: Digital Likenesses and signifiers in Spaven’s improvisational vocabulary.[175]

3.4.4 The Role of a Movement Profile in Spaven’s Performance of Digital Likeness

In interviews, Richard Spaven often discusses his immersion in the drum and bass club scene in London in the 1990s, and argues that this was a formative experience for him as a performer:

> You need to genuinely absorb it … you buy the records, and you go to clubs, and you move your ass to it … on the dance floor … you’d be part of that scene … that gives you, just, authority over, basically, what to play.[176]

> You just absorbed that and learnt that for yourself without ever being taught it and you did that through the enjoyment of listening to the music and it moved you … it didn't teach you - but it did.[177]

Following Roholt, Iyer and Hamilton’s ideas concerning the central importance of bodily movement to the understanding of groove,[178] if we are to come to understand a groove which includes a strong mark of the digital, then the correlated activity of the body will reflect these digital signatures in some sense. Danielsen argues that “entirely new gestures can be proposed by a piece of music, if we simply allow for them. Contemporary computer-generated grooves might in fact evoke completely new movement patterns, as we develop ways of internally or

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[174] Ruffini, *Drummer’s Resource*.
[175] Spaven, Richard. "MEINL DRUM FESTIVAL 2015 – Richard Spaven “Angel” by Jose James." MEINL Cymbals, August 7 2015. 4 min., 27 sec. https://youtu.be/9BSZ5O-WfTo?feature=shared.
[176] Brewer, *Meinl Radio*.
[177] Ruffini, *Drummer’s Resource*.
[178] See 2.2.2.

externally responding to these grooves." She concludes, "Put simply, mediation may cause new ways of moving."[179]

Iyer also situates improvisation within this understanding arguing that it involves "interaction with the structure suggested by the sonic, physical, and temporal environment; in other words, improvisation privileges embodied cognition".[180] If it is the case that digitally created music suggests specific movement profiles, then these movements will form part of the 'physical structure' and 'temporal environment' with which an improviser in this style must interact. This idea might also be framed in the language of affordances. A movement profile derived from music with digital signatures offers the improviser certain affordances within which to frame their improvisational language.

Spaven's description of his involvement in the drum and bass scene would suggest that he is likely to have developed a certain movement profile in the way Roholt is suggesting when he comments that "we see different kinds of movement, different styles of movement, in different cultural groups, as well as different groups of people immersed in one genre of music or another,"[181] and that this movement style would form part of the structure and environment in which he now operates. In this way, digital signatures have affected his movement style which in turn frames and affords the production of digital likeness in his performing. My observations of multiple performances both live and on video seem to confirm this with examples given below:

Machine-like movements	Highly regularised limb movements
Looped movements	Repetitive phrases performed using movements which visually loop in a similar way to the sounding result
Freezing	Movements which stop in mid flow along with a cut in the sound
Posed positions	The adoption of, and change between, a variety of stable positions to attack drums and cymbals at different angles. The positions are kept still

[179] Danielsen, *Musical rhythm in the age of digital reproduction*, 13.
[180] Iyer, "Embodied Mind, Situated Cognition", 408.
[181] Roholt, *Groove: A Phenomenology of Rhythmic Nuance*, 115.

and the changes between them are quick, making this reminiscent of robotic movements.

Extract 3.6: Richard Spaven - influence of movement style on the creation of digital likeness.[182]

Spaven's movement style appears to play a part not only in his understanding and production of grooves, but also in the creation of digital likenesses in his performances. This suggests approaches to digitally engaged acoustic music involving movement in composition and performance practices which enable exploration of digital aesthetics. These ideas are explored in some of the Loop Work pieces discussed in chapter 4.

3.5 Case Study: "DISKPREPT4"

"DISKPREPT4" is a track from Aphex Twin's 2015 EP *Computer Controlled Acoustic Instruments pt2* recorded using acoustic drums, percussion and prepared piano all controlled by computer. According to Richard James (Aphex Twin) this involved programming parts for "a modified Yamaha disklavier, 2nd gen and a couple of midi controlled solenoid based drum mechanisms."[183] In 2022, the percussion and piano group GBSR Duo with the addition of two other players performed a live recreation of the EP using no computer control devices, only live performance techniques.[184] Both the original work and this later live version display a unique engagement with the digital which can be illuminated through the framework presented in this chapter.

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[182] Spaven, Richard. "Richard Spaven performing "B-LINE" - filmed at the Meinl Cymbals Factory in Gutenstetten, Germany." MEINL Cymbals, May 27 2016. 3 min., 51 sec. https://youtu.be/I-CWP0NxsAE?feature=shared.

[183] https://soundcloud.com/richarddjames/diskhat-all-prepared1mixed-snr2mix. Richard James commented on his own SoundCloud page with some information about the method he used on this album.

[184] GBSR: George Barton, Siwan Rhys. Additional players: Sam Wilson, Joseph Havlat. https://dice.fm/event/d965o-stockhausen-aphex-twin-gbsr-duo-27th-aug-bold-tendencies-london-tickets. My sincere thanks to Siwan and George for providing the score and recording of their performance for my analysis.

3.5.1 Digital and Acoustic Features in "DISKPREPT4"

While the GBSR version comprises entirely acoustic features,[185] the original recording has a more complex relationship to its means of production. In one sense, the Aphex Twin recording involves only digital features in that the creation of every sound is computer controlled; there is no live instrumental performance and no human body is involved in sound creation. However, from another perspective the recording is created with entirely acoustic features as every instrument produces sound by being struck or otherwise played using physical force; no sound is digitally produced. Unlike a production involving a mix of acoustic and digital features, in this case the features are simultaneously acoustic and digital, with the acoustic sounding surface masking the digital operator beneath. The tension created by perceiving these apparently contradictory means of production within one object is one of the most engaging aspects of the piece. The GBSR version, while in one sense avoiding this issue, both serves to emphasise this quality when going back to the original, and uses it to create something bold and new.

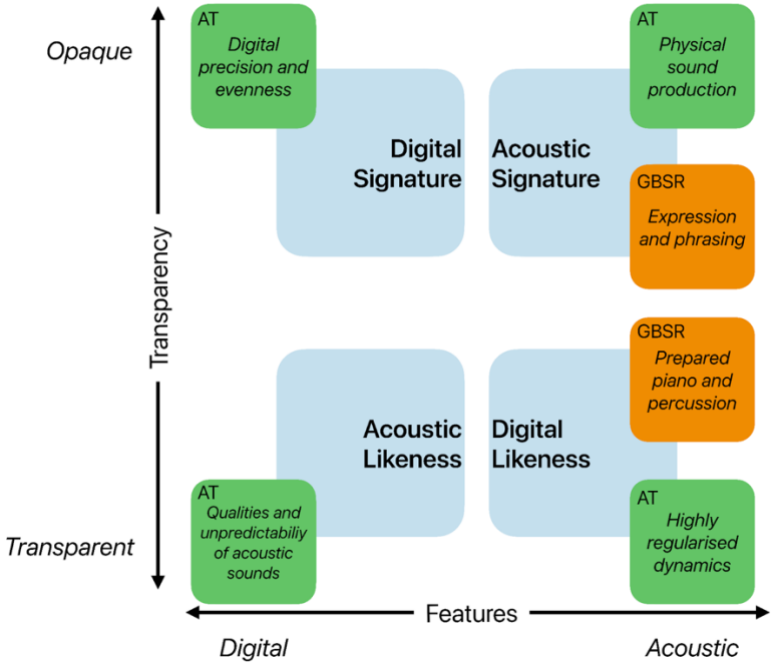

Figure 3.4: Digital and acoustic mediation in "DISKPREPT4"[186]

(Aphex Twin original in green, GBSR duo version in orange)

Extract 3.7: "DISKPRET4" – Aphex Twin

Extract 3.8: "DISKPRET4" – GBSR duo

[185] Using my definition of acoustic, see 3.2.1 - the performance included an electric bass guitar.
[186] Author's diagram.

3.5.2 Signatures and Likenesses in "DISKPREPT4"

The two versions of the piece might seem very similar on the surface, but an analysis of digital and acoustic mediation in both can assist in revealing and understanding the differences and similarities between them. The following is a selection of details which help to bring out these contrasts.

The piano note flurry heard at 0:54[187] is understood differently in the two versions. In the Aphex Twin version, it creates a digital signature as the computer control is revealed in the impossibly even and precise machine execution, but in the GBSR version an acoustic signature is heard here due to the expressive phrasing and variation. Acoustic signatures in the GBSR version mostly arise because human control is exercised over acoustic instruments in a musical context which is understood, in many respects, to represent machine control. This understanding can come from knowledge of the original, the association with Aphex Twin's catalogue, and the nature of the material. Acoustic signatures in the original, however, are understood differently. Here the instruments are controlled by machine, so the footprint of acoustic mediation is found only in the inherent nature of the sounds produced. A drum skin struck by a computer controlled device will not produce an entirely identical sound on each strike due to the nature of the material and resonances in the physical object, meaning the overall effect is not the same as if samples of these sounds had been used.

Prepared piano can also be perceived as a digital likeness, but this will depend in part on the listening biographies of the audience and the performance context.[188] Those listeners familiar with prepared piano in modern classical contexts will recognise the sounds of a piano played with items placed on or between the strings, but those coming to Aphex Twin's music from a largely pop/EDM listening background may not immediately connect these sounds to an acoustic source without a visual cue. For example, when listening to the original version the bass line beginning from 0:55 functions musically in a way familiar in EDM and might be heard as a manipulated double bass sample, and therefore a digital signature. The same moment heard while watching a performance by GBSR is likely to be understood as an acoustic signature, and possibly a digital likeness and signifier.

The GBSR performance of the inner dynamics of the groove from 0:18 displays an acoustic signature in its phrasing and dynamics. The bass line is shaped dynamically in a way which varies somewhat between iterations, and syncopations are felt more clearly as anticipations.

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[187] All time references are to the original Aphex Twin track https://aphextwin.bandcamp.com/track/diskprept4.
[188] See 3.3.1.

Overall, the feel is more subject to human variation in the manner of a funk groove performed by a band, when compared to the clockwork mechanism effect of the original. This is reminiscent of Mayer and Spaven's approaches which attempt to take something made by a machine and add a human, non-mechanistic element to it. The case of "DISKPREPT4" is unusual however, as the sound of the original version is already mediated through acoustic instruments. It is as if Aphex Twin is already adding something from the non-digital world to the aesthetic, which is the opposite of adapting drums to mimic electronic sounds. GBSR's performance takes this further by adding something not so much to the sound itself, but to the manner of its control. Unlike Spaven and Mayer this is not about improvisation, but rather issues of feel, expression and performance, especially when witnessed in a live setting.

3.6 Digitally Engaged Acoustic Music: Concluding Remarks

This chapter has centred around the ways in which music of any type, or manner of creation, can engage with the aesthetics of the digital. Based on the work of Brøvig and Danielsen, a framework for discussion of this engagement was expounded focusing on the ways in which both digital and acoustic technology can mediate music resulting in signatures, likenesses and signifiers, and the contingent, experiential natures of these ideas was clarified. Finally, this framework was used to investigate the drumming of Richard Spaven, and two versions of Aphex Twin's track "DISKPREPT4".

The concepts covered in this chapter help to contextualise and understand the music presented with this PhD. The terminology and ideas proposed here are used in subsequent chapters to develop an understanding of digital engagement in the portfolio, and how this body of work can be situated within the wider context of digital engagement in music.

Part II: Exegesis

Chapter 4 Loop Work

Loop Work is an ongoing composition series which currently comprises five works (some of these feature a set of short pieces) written between 2021 and 2024. The pieces are 'open scores', a term used to define scores that allow for a higher degree of performer agency than a typical score (see introduction 1.1). Within open score practice, my pieces are distinguished by their focus on musical loops. *Loop Work 1* comprises four pieces written for Plus Minus ensemble with an instrumentation of cello, piano, bass clarinet and electric guitar; *Loop Work 2* also has five pieces and was composed for student ensembles of open size and instrumentation; *Loop Work 3* was written for Laurent Estoppey on tenor sax and Antoine Françoise on keyboard and includes two pieces; *Loop Work 4* is a single work for percussionist Eugene Ughetti and electronics; and *Loop Work 5* is a longer single work written for Adam Betts (drum kit) and Vicky Wright (bass clarinet), also featuring piano, electric guitar, bass guitar, and an additional ensemble of open size and instrumentation. A revised version of one of the *Loop Work 1* pieces was also created for string quartet.

Loop Work 1-4 are cast in a bipartite form specific to these pieces; I will refer to the two sections as 'A' and 'B'. In the opening A section the performers play the loop as given; this may include some improvisational elements. The B section offers more extended possibilities for changing the nature, identity and course of the loop. For example, in "A Sandwich Short of a Picnic" the group begin by playing the notated loop as written, however the tempo and dynamics can be varied by the cellist who everyone else is instructed to follow. The B section gives the cellist more freedom in terms of breaking away from the group and instigating a chaotic section of music. *Loop Work 5* uses many of the same processes and techniques but applies them to a longer form which combines a number of short loops in succession, sometimes overlapping.

Apart from *Fourth Record*, the pieces are based on a single loop of no more than eight bars which is repeated throughout, and a set of instructions for the performers which include choices they can make to affect their own parts, or change the course of the piece. These include task-based decisions; soloistic improvisation; expressive choices; role taking; and game-like goal orientated decision making. This is the principle way in which the scores are 'open', but other aspects of the pieces are also left undecided in the notation, for example, *Loop Work 2* is for a flexible instrumentation that could feature any number and type of instruments. The music and instructions they follow are fixed so there is a broad predictability of

outcome, but the result can vary considerably depending on the makeup of the group.[189] Another example is the electronics found in *Loop Work 3, 4* and *5* which are designed to produce unpredictable, and in some cases random, outputs.

This chapter utilises concepts from frameworks laid out in chapters 2 and 3, to analyse and contextualise pieces from the Loop Work project. First, there is an examination of the ways in which loops and grooves are used in the project focusing on the importance of movement to groove, the ways that loops and grooves are structured, and the sense in which the unconventional grooves in the project relate to what is usually understood as a groove. This is followed by a discussion of digital engagement in Loop Work and finally, some concluding remarks draw together threads arising across the chapter.

The complete Loop Work current works list is shown in Table 4.1:

2021	*Loop Work 1*	1.1 “A Sandwich Short of a Picnic”	piano, cello, bass clarinet, electric guitar
		1.2 “Trickle Down Aesthetics”	
		1.3 “Loop Aware Exaggerate; Mute Silent Reduce”	
		1.4 “Blown Fuse”	
2021	*Loop Work 2*	2.1 “Divine Intervention”	open
		2.2 “Három Száz Harminc Három”	
		2.3 “Witness Statement”	
		2.4 “Realignment”	
		2.5 “Disruption”	
2022	*Loop Work 3*	3.1 “Patch Change”	tenor sax, keyboard, electronics

[189] Each time the pieces are performed they will be very different due to the open instructions, but certain parameters will remain the same. These vary between pieces but can include: the interactions between players, elements of musical material, the overall form, and performer physicality. These constant charateristics may allow each piece to retain more or less of a unique character despite the variations.

		3.2 “Bye”	
2022	*Loop Work 4*	*Musician Reacts To Computer - **FIRST TIME HEARING!!***	bass drum, gong, electronics
2024	*Loop Work 5*	*Fourth Record*	drum kit, bass clarinet, e. gtr, piano, e. bass gtr, electronics + open ensemble
2024	*Loop Work 1*	1.4 “Blown Fuse” *(revised)*	string quartet

Table 4.1: Complete list of works in the Loop Work project

4.1 Loops and Groove in Loop Work

Some pieces from across the collection are based on strongly groove-orientated loops while others feature looping material which is less rhythmically patterned and in turn avoid a groove-like feel. Even in the more groove-orientated loops the sense of pulse and groove is often disrupted both through the nature of the material, and by the players’ influence through open parameters; in particular the B sections of the pieces tend to move the sound in a more chaotic, less obviously pulse driven direction which is likely to go beyond what most listeners would conceive of as groovy. This was a deliberate aesthetic choice which, as well as providing an opportunity to engage with grooves - a facet of music to which I personally feel a deep connection - enabled the exploration of two of its aspects which could expand my understanding of what a groove can be. Firstly, I wanted to investigate Roholt’s notion that “we come to understand a groove through an activity of the body”,[190] and see to what extent this idea can apply to highly asymmetrical, non-isochronous looping structures. Secondly, I wanted to experiment with how far, and in what ways, I could stretch the sense of productive dissymmetry in the inner dynamics of grooves[191] before they lost all sense of being a groove at all. In this section I discuss examples from the Loop Work pieces which illustrate these two ideas, drawing on frameworks from chapter 3, and offer some reflections on the results of incorporating these concepts into my work.

4.1.1 Understanding Grooves Through Movement

There is a widely held belief that non-essential movement in groove is primarily reactive; this view is succinctly summarized by Roholt as follows: “it is often assumed that this is the only way

[190] Roholt, *Groove: A Phenomenology of Rhythmic Nuance*, 106.
[191] See 2.2.1.

in which the body and music are related … music is a *cause*; body movement is an *effect*."[192] As discussed in 2.2.2, this notion has been challenged by Roholt, Iyer and Hamilton who each make a claim along the lines that "understanding the music involves literally moving oneself."[193] In Roholt's discussion of the exaggerated Dilla-like groove of the contemporary R&B song "What About Us?" by Brandy, he writes, "if there is a way for a person faced with this seeming chaos to discover the underlying coherence of the groove, I want to suggest that it is through attempting different kinds of bodily movement while listening."[194]

Aside from this, Roholt describes three types of movement that musicians engage in which help them to perform:[195]

1. Necessary basic movements needed to play the instrument;
2. Apparently unnecessary movements with an underlying technical purpose, e.g. raising the arm higher than needed above a drum to produce an accent
3. Not strictly necessary movements which aid in feeling the pulse e.g. foot tapping

In the analysis below I detail a suggested fourth type: personal embodiment of musical gesture and flow.

Movement has also become a composed feature of works of new music since the early 2000s resulting in a growth in pieces "rooted in the physical, theatrical and visual, as well as musical"[196] which Jennifer Walshe has referred to as the 'New Discipline'. This 'performative turn'[197] in the work of new music composers has lead to a focus on "works in which the ear, the eye and the brain are expected to be active and engaged. Works in which we understand that there are people on the stage, and that these people are/have bodies … that the bodies playing the music are part of the music, that they're present, they're valid and they inform our listening whether subconsciously or consciously."[198] In practical terms, the pieces of this New Discipline include movement or theatrical elements composed into the piece alongside the sonic components. For example, the score to Walshe's *Everything* asks the performers to follow

[192] Roholt, *Groove: A Phenomenology of Rhythmic Nuance*, 84.
[193] Hamilton, "The art of improvisation and the aesthetics of imperfection", 170.
[194] Roholt, *Groove: A Phenomenology of Rhythmic Nuance*, 122.
[195] Roholt, *Groove: A Phenomenology of Rhythmic Nuance*, 85-86. This is my paraphrasing of his ideas.
[196] Walshe, "The New Discipline."
[197] Shlomowitz, "Profile: Matthew Shlomowitz."
[198] Walshe, "The New Discipline."

instructions to a stopwatch including movements, actions involving objects, and vocalising, alongside playing notated parts on an instrument.

"Loop Aware Exaggerate; Mute Silent Reduce" is a piece from *Loop Work 1* which draws on the idea that the understanding of groove-based loops is ineliminably connected to physical movement, and has movement composed into it in the manner of the New Discipline. It exploits the connection between the movement of the performers and the sound produced (or expected) in order to maintain a sense of musical movement despite the music itself falling silent.

I asked the musicians to find a repeating movement to accompany their playing despite the looping material being disjointed and angular without a clearly stated pulse (see Figure 4.1).

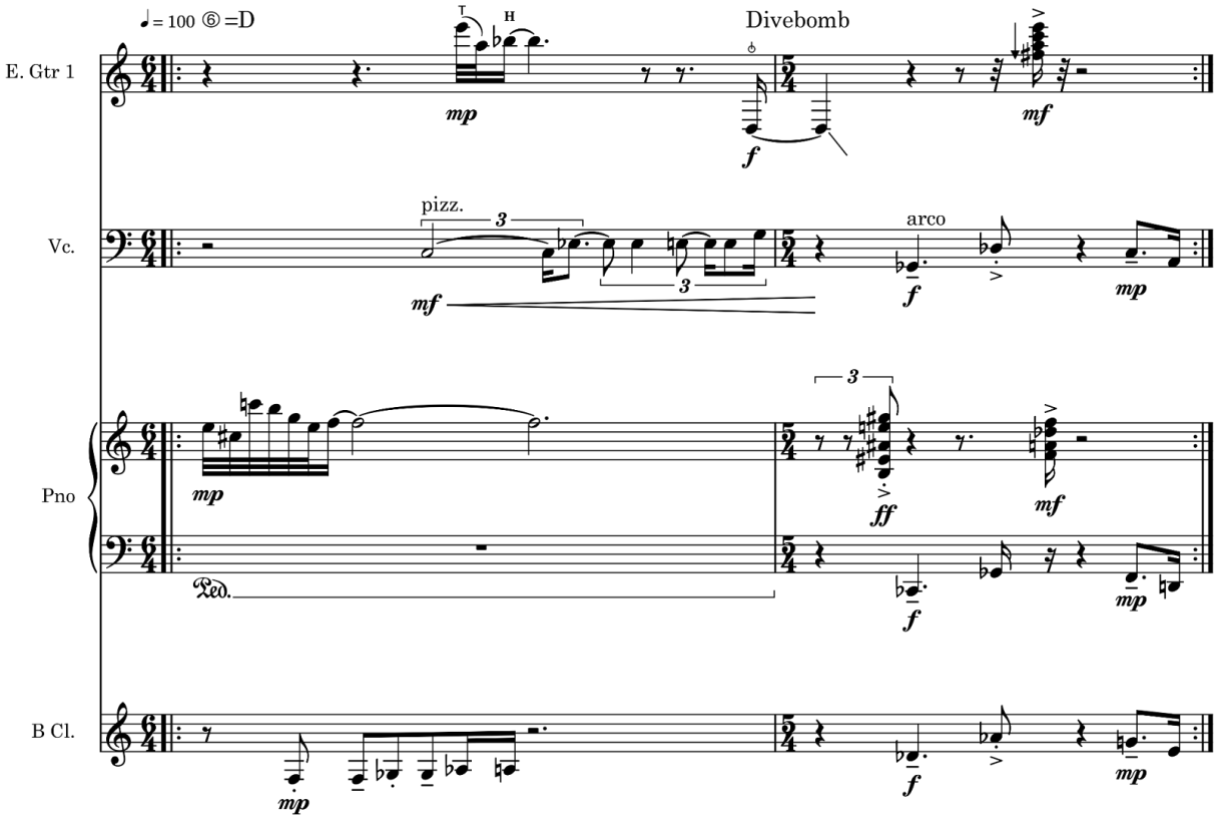

Figure 4.1: The loop from "Loop Aware Exaggerate; Mute Silent Reduce."

Extract 4.1: The loop from "Loop Aware Exaggerate; Mute Silent Reduce."

The initial version of the score asked the players to "Move: find a movement or pattern of movements which loop with the music" but it became clear whilst workshopping the piece[199] that the players were already doing this as a part of their usual practice, so, taking a suggestion from pianist Mark Knoop, I adapted the wording to "Aware: focus your awareness on how you are feeling the groove and, in particular, how you are moving to help you groove with the loop". This was supplemented with further background about why I was asking them to do this which the players felt was useful and relevant:

> Through a process of experimentation find a movement or pattern of movements which loop with the music.
>
> The idea is to find a movement which helps you (individually) to make sense of, and 'feel', the groove
>
> The movement is not a dance, or a response to the music, instead, it is an attempt (however imperfect) to connect more deeply with how you as an individual feel the music groove, and allow this connection to affect your performance
>
> Movement should be natural; not stylised

The score asks the players to exaggerate these movements before progressing to the B section where they gradually stop making sound whilst continuing these exaggerated movements. The intention here is to create a focus on our memory of the sound of the loop, and bring our attention onto the movements in themselves. In this moment, the hierarchy of movement and sound is disrupted as the remaining sense of groove is being created by the highly personalised movements of the musicians.[200] It has been made explicit that "the bodies playing the music are part of the music".[201] The silent groove in the piece demonstrates movement as a productive rather than a purely responsive practice; with our memory of the sound still in our ears, we see how the qualities of the performers' bodily movements, and the way they aggregate, contribute to the sonic characteristics of the loop and the way it grooves.

None of Roholt's categories of movement (see above) quite capture what the ensemble was doing when performing my piece. I suggest this is a fourth category of movement which sits somewhere between the second and third of Roholt's types. These are movements which are not part of the basic movements of instrumental performance, or a way to feel the pulse; neither

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[199] A workshop with Plus Minus ensemble took place on 09/06/2021 in which they played through the pieces from *Loop Work 1*.
[200] The documentation video demonstrates this 'silent groove' between around 1:30-1:50.
[201] Walshe, "The New Discipline."

are they used to facilitate technique such as accenting. Rather they are a highly personal embodiment of musical gesture and flow which may closely correspond to a particular rhythm or melodic shape, but sometimes have no obvious mapping to the music. This fourth category of movement is what I wanted the musicians to become *aware* of, and *exaggerate* in the piece.

"Bye" from *Loop Work 3* also has a groove-influenced loop, although the degree of rhythmic complexity is higher (see figure 3.3). In contrast to "Loop Aware Exaggerate", there is no mention of bodily movement in the score. However, the video shows a series of clearly patterned movements from both Laurent and Antoine which do not appear to be related to feeling the pulse, but rather seem closer to the 'embodiment of gesture and flow' movement type suggested above.[202] They noticeably loop their movements, giving something of the sense of watching a looped video. This suggests that in the performance of loops with a machine aesthetic, finding a movement which is itself indicative of, and influenced by, that same aesthetic might be an important step in grasping and understanding the groove, or groove-like feel. This is discussed further in the chapter on digitally engaged music (3.4.4).

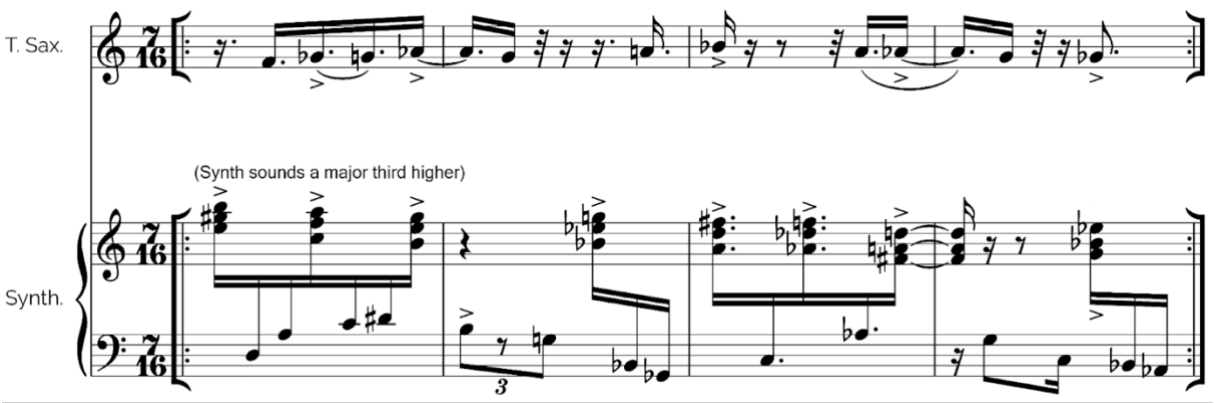

Figure 4.2: The opening loop from "Bye."[203]

Extract 4.2: The opening loop from "Bye."

[202] From around 0:18 in the documentation video.

[203] The score presented was performed by Antoine Françoise on the keyboard which was controlling a Granulator synth on Ableton Live. Through experimentation I found the best sound was obtained by transposing up a major third as the synth does not behave in a predictable or even way, and the pitch relationship between the instruments is not critical here. It may be possible to adjust settings on the Granulator such that I could fix this anomaly, but any performer of the piece would need my Ableton set anyway meaning they would be able to replicate the sound on the workshop recording.

Although not conventionally groovy itself, the loop in "Bye" has some structural characteristics in common with groove-directed music. These include productive dissymmetry in the loop design, and techniques to shape and manipulate grooves borrowed from popular music, both of which are discussed in the following sections. The "Bye" loop is analysed in the light of Danielsen's concept of the inner dynamic of a groove, and compared to J Dilla's metric modulation from his track "Hi". The influence on "Bye" from grooves based on odd-subdivisions is also discussed, and an example from *Fourth Record* is used to illustrate a feature of some sample based music in which incongruent layers are placed together to form complex rhythmic patterns.

4.1.2 Inner Dynamics of a Groove

Danielsen's analysis of funk groove design identifies several features that create what she calls 'productive dissymmetry'[204]—a deliberate lopsidedness within a loop that generates tension, resolved only through repetition. One such characteristic is a "tendency of cross-rhythm" wherein "a layer of potential cross-rhythm is used to create small stretches in time that fall between a dominant basic pulse and hint at its alternative".[205] The cross-rhythm sets up a desire for resolution to the main pulse, which, in turn, is drawn back to the cross-rhythm, and so on. The saxophone rhythm in the opening loop of "Bye" (see Figure 4.3) suggests a hearing of the beat as a dotted semiquaver (cross-rhythm [a]), also picked up later by the keyboard. The keyboard also briefly introduces 'cross-rhythm [b]' (a triplet), and the sax later brings in an extended dotted rhythm (cross rhythm [c]) as well, but the lack of continuity of these rhythmic gestures means they never reliably set up an alternative pulse to the overall aggregate pattern. Instead, the multiple cross-rhythms create a strong sense of instability and tension which is felt to require resolution by means of a return to rhythmic balance. This resolution is provided to some extent by a strong moment of conjunction between the instruments (marked as 'point of synchrony' on the score), and through the way we entrain to the overall loop through repeated listening. The repetition of the loop normalises its unconventional inner dynamic, and, despite how unusual and difficult it is to grasp; "The instability is stable and also aesthetically satisfying."[206]

[204] Based on ideas from Gilles Deleuze.
[205] Danielsen, *Presence and Pleasure*, 71. Also, see 2.2.1.
[206] Danielsen, "Time and Time Again", 43.

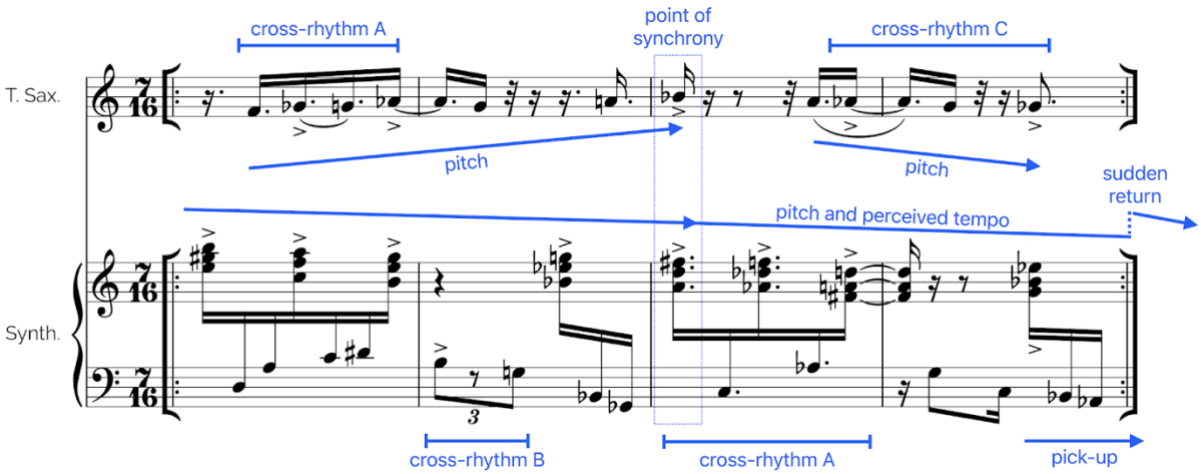

Figure 4.3: The opening loop from “Bye” with inner dynamics indicated

In contrast to the apparently chaotic rhythmic design, notes in the saxophone part rise and fall in a simple shape across the loop. As it reaches the highest, and most standout, pitch, the clearest point of synchrony between the instruments occurs. This is further emphasised by the preparation for this sax note using a familiar chromatic approach note lick. As such, this central point of rhythmic gravity might serve a related function to ‘the one’ in funk, that is, to be a strong focal site of weighting which reasserts the coincidence of the parts with every repetition. It is a brief moment in the relative chaos when we know where we are and we are reassured that we are listening to the same thing again. In the keyboard part the steadily descending pitch of the chords is entangled with a perceived ritardando created by the widening rhythmic distribution of notes in the left hand through the course of the loop, and the sudden return to the starting tempo and pitch on each iteration provides another moment of weight and recognition in the patterning. This impression is reinforced by the final three 16th notes which might be heard as a pick-up back to the beginning, helping to drive the loop forward towards its next iteration.

Extract 4.3: "Bye" - Initial Loop, keyboard part only.

4.1.3 Borrowed Approaches

Some pieces from the Loop Work series use and extend composition and production practices found in groove-directed music. Here I present three examples: J Dilla’s metric modulation, odd subdivision grooves, and temporally mismatched rhythmic layers.

4.1.3.1 Borrowed Approaches: Dilla's Metric Modulation

The J Dilla track "Hi" is based on samples from The Three Degrees' song "Maybe". The original song has a 6/8 feel at around 45 BPM (Figure 4.4a), and Dilla begins by playing an unedited extract from the original. He develops this by using truncated samples of each separate dotted eighth note beat (Figure 4.4b) resulting in the sound of a 90 BPM swung hip hop groove in 4/4 (Figure 4.4c).

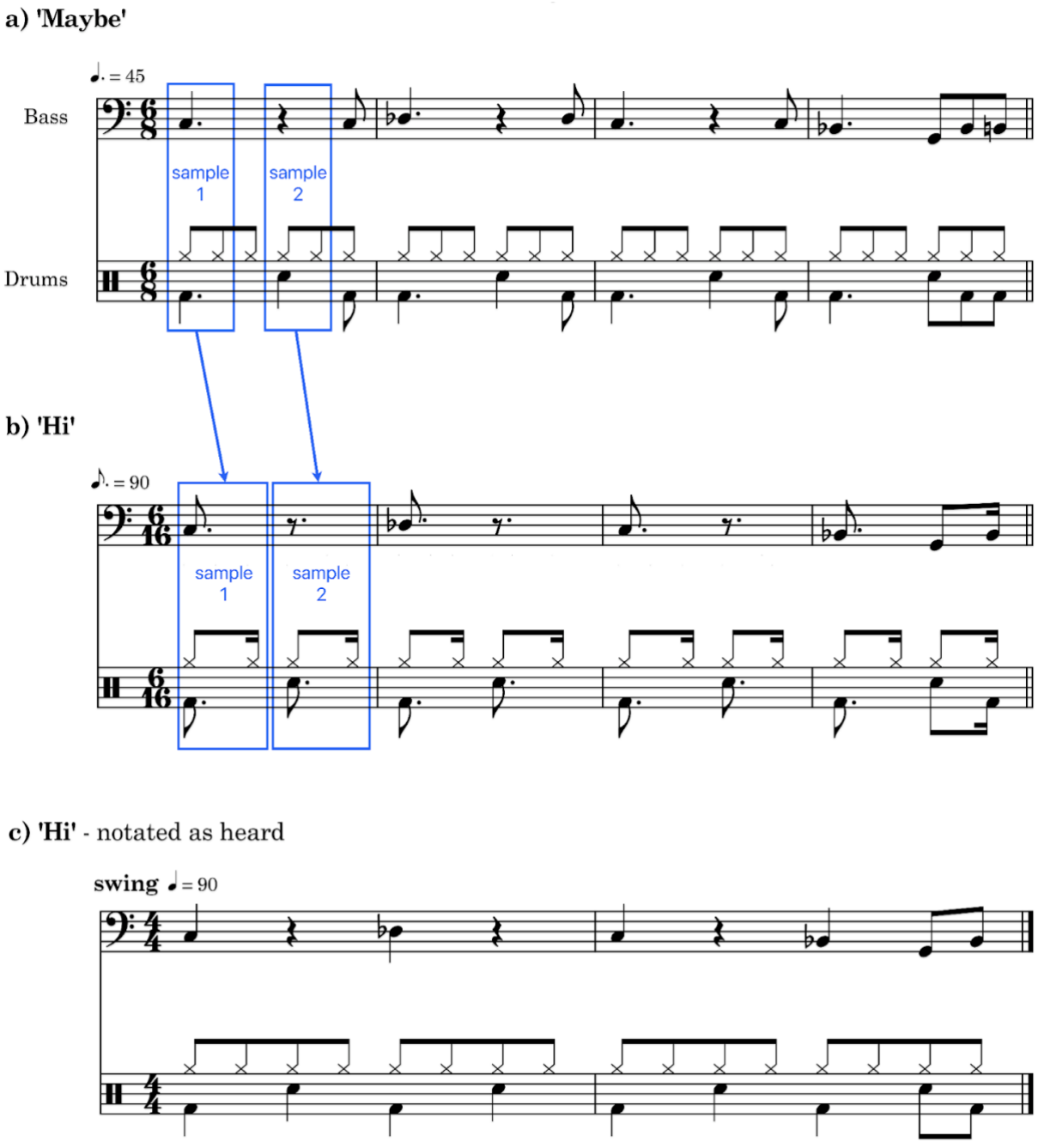

Figure 4.4: a-c bass and drums from "Maybe" and "Hi"[207]

[207] Author's transcriptions.

Extract 4.4: J Dilla, "Hi", *Donuts*, 2006.

This can be understood as editing the beat length. Nothing is added or altered in the material; it is simply a process of subtraction resulting in a new hearing of the same sounds. “Bye” takes this concept and explores it in a more abstract way not, as Dilla does, to make one unequivocal groove type into another, but instead, to find new feels and, potentially, new ways of grooving. Dilla’s approach here influences “Bye” in a conceptual manner only, inspiring a compositional technique rather than a particular sound or feel.

The initial loop in “Bye” is presented as two halves labelled ‘downbeat’ and ‘backbeat’ (see Figure 4.5 - the top line labelled ‘1’ and ‘1’).

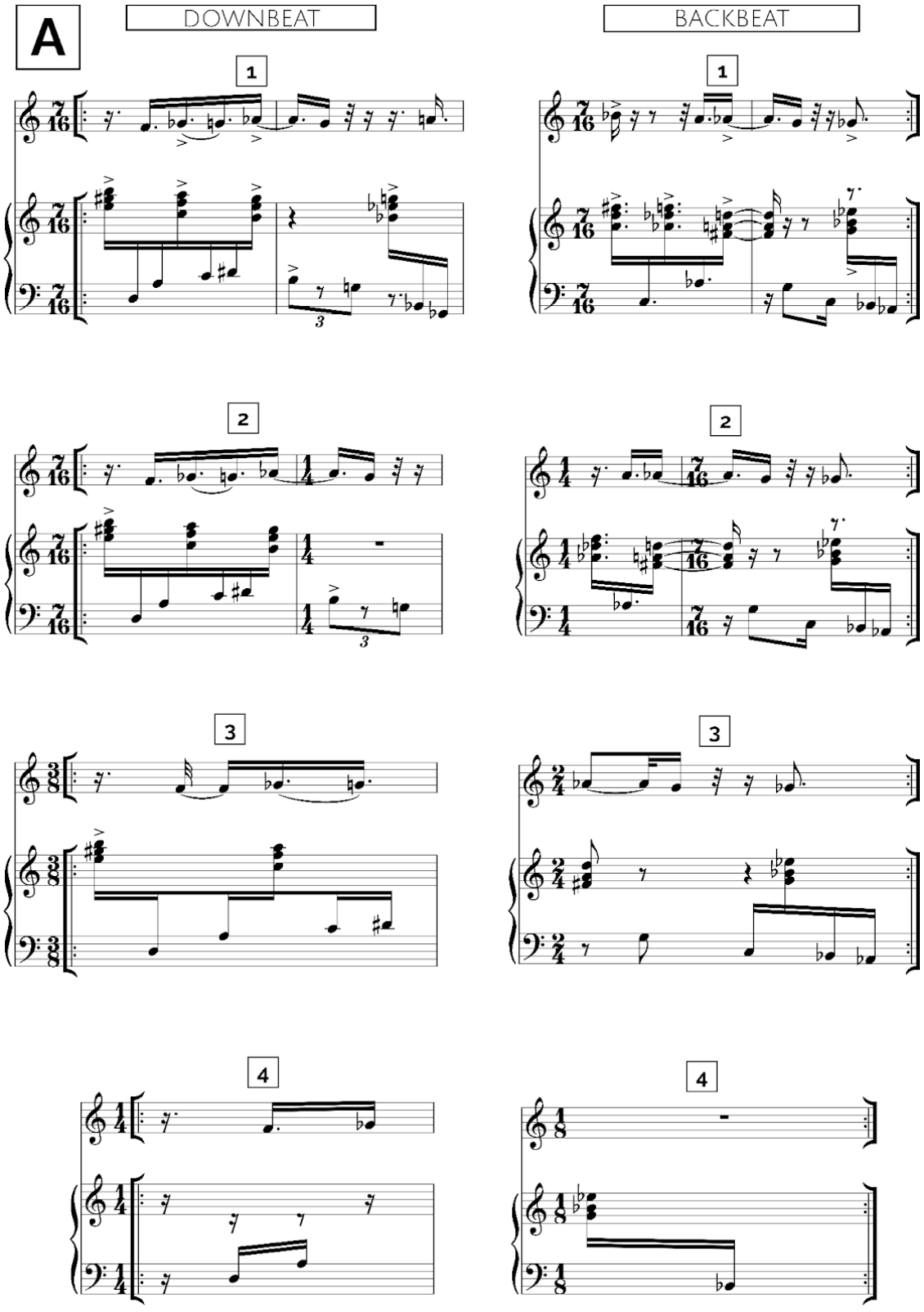

Figure 4.5: 'A' section from score of "Bye"

Conceptually, these are treated in the same way as dotted quarter note beats in "Maybe" - at first they are performed without editing (Downbeat 1 + Backbeat 1 - result shown in Figure 4.3 above), but then the performers may choose different versions of each half (marked 2,3 & 4 on the score). A fifth option is also explained in the score notes as an indefinite pause for both

instruments. Each version is a shortened version of the original (no. 1) in much the same way that Dilla cuts the beats of “Maybe” in half, however, in “Bye” the relationships are more varied and complex. Firstly, there are four variations of the originals (including no. 5 - silence) rather than one; secondly, the different variations can be matched in any combination between the two halves (1-3, 4-2, 3-3 etc); and thirdly, the modifications of the originals are not simply halves or quarters, but a range of different edited lengths. As such, there are twenty-five permutations available to the performers.

Given the rhythmic complexity of the “Bye” loop, and the multiple permutations of the two halves, the effect is not as striking and straightforward to grasp as in “Hi”. However, once the listener becomes acclimatised to the initial loop and starts to anticipate its length, the changes are clearly perceived as shortenings of the original part. In this way “Bye” reflects the concept used by Dilla in “Hi” but also extends it into new territory.

Extract 4.5: Examples of Downbeat + Backbeat combinations in “Bye” (note: ‘5’ is unmetered silence)

4.1.3.2 Borrowed Approaches: Odd Subdivision Grooves

Another concept used in “Bye” is derived from odd subdivision grooves. These are grooves which are felt as having a simple metre (commonly 4/4) but in which each beat is subdivided by an odd number. For example, in a bar of 4/4 each crotchet is divided into five (a quintuplet). This approach to groove composition and performance has become increasingly common since the early 2000s for example, in “The Tree Did Not Die” by Phronesis the beat is divided into fives; and “Taking Flight” by Vijay Iyer in which the subdivision is seven (see Figures 4.6 & 4.7).

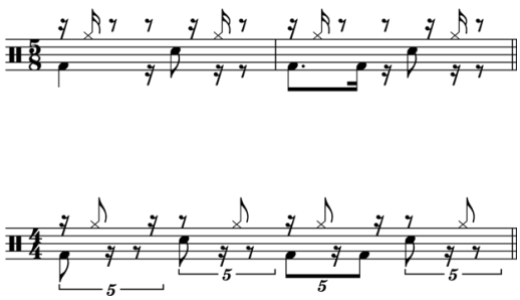

Figure 4.6: Sample drum groove from "The Tree Did Not Die" by Phronesis[208]

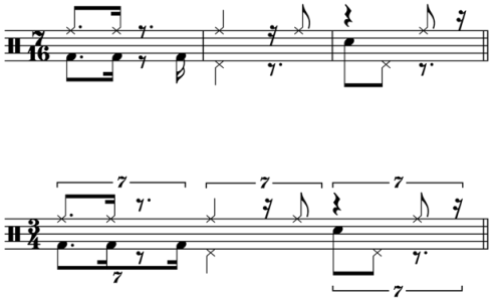

Figure 4.7: Sample drum groove from "Taking Flight" by Vijay Iyer[209]

(Both grooves are shown in two notations - the top version is how it is likely to be present to a player; the bottom version demonstrates how they work conceptually, and are heard, as subdivided 4/4 and 3/4 respectively)

This contrasts with the approach to odd metre and grouping often found in progressive rock such as the bands Tool and Dream Theatre, and in jazz fusion such as Mahavishnu Orchestra and Snarky Puppy,[210] where odd groupings are often apparent on the musical surface and felt by the listener.[211] In the 'simple meter/odd subdivision' approaches discussed in this section, the musical surface is generally focused on a strong and simple, often 4/4, feel with the odd numbered groupings residing at a higher metric level allowing the listener to easily grasp and move with a familiar and even beat.

The initial "Bye" loop (1+1) subdivides the beat into seven with the weighted point of synchrony (see Figure 4.3 above) positioned at the start of the second beat.[212] Given the complex and non-obvious rhythmic patterning of the music this provides a landmark for the listener to understand where the midpoint of the loop is, dividing the loop into two equal halves. "Bye" does not create a perceived groove with this subdivision in the sense that "Taking Flight" does; there is too much ambiguity. As such, the borrowing of this idea might be considered largely as a conceptual device for the composer, however, it does add further intricacy to the already obscure feel.

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[208] Author's transcription.
[209] Author's transcription.
[210] Although Snarky Puppy are a band who bridge both approaches.
[211] For example: https://youtu.be/80RtBeB61LE?si=wkceUVsuZR0LCC1u / https://youtu.be/KuaGOFXpPHU?si=ZFnQhxhk_useUMBW.
[212] As written, each 'beat' comprises two bars, but the speed at which the 16th notes occur means that I hear it more like one bar of 7/8.

There is scope for future pieces to explore the space between the ambiguity of "Bye" and the clarity of "Taking Flight". The question here would be: when does a grooving or looping pattern become so obscure that a simple meter/odd subdivision approach does not add anything distinctive? The interest to me as a composer would be found where the odd subdivision can be grasped sufficiently to complicate the feel in a distinctive way, but there remained enough ambiguity to allow for developing these approaches in a compelling manner. I do not think "Bye" fully succeeds in doing this as the subdivision is not strongly heard as such, but it was a useful device to aid structuring as a composer.

4.1.3.3 Borrowed Approaches: Temporal mismatch

The advent of sampling technology in the 1990s enabled simple and expedient ways to experiment with layering sounds from disparate sources. This resulted in producers such as Public Enemy's Bomb Squad and Wu-Tang Clan's RZA creating beats which involve a complex interplay between samples which use contrasting rhythmic feels, and samples with unmatched pulses or subdivisions. In most cases this technique produces a loose feel in which rhythmic relationships between most elements can be easily understood, but the onset of a specific element may be spread across a beat bin.[213] However, some examples are more extreme making the rhythmic relationships highly ambiguous "almost as though there were different layers in the accompanying tracks that did not belong to the same timing reference".[214] One such example, Snoop Dogg's "Can I Get A Flicc Witchu", is analysed in detail by Danielsen and Brøvig[215] who say the bass riff is "experienced as belonging to a rhythmic scheme that is completely different from the other rhythmic layers in the groove … and it does not align with any of the groove's other metrical reference points."[216]

This concept inspired a section of the Loop Work piece *Fourth Record*, which—unlike other Loop Work outputs—features multiple loops that are juxtaposed, overlapped, and combined with one another. The ability to overlap different loops in the piece gave me an opportunity to explore a complex texture in which "different layers … did not belong to the same timing reference."[217] One loop, "Stumbler" (16),[218] uses a polyrhythm to create a temporal mismatch in order to produce the kind of listening experience found in "Can I Get A Flicc Witchu". The preceding loop, "Loper" (14-15) (Figure 4.8), is in 9/8 at ♩. = 60 with a bass line which reinforces

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[213] See 2.4.
[214] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 105.
[215] Brøvig-Hanssen and Danielsen, *Digital Signatures*, chap. 6. Also discussed in 2.2.1.
[216] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 108.
[217] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 105.
[218] Each loop in the piece has a number, and the more significant ones also have a name.

the metre. When the piece moves to “Stumbler” (Figure 4.9) the time signature changes to 4/4 at ♩= 80 but the bass line continues at its previous tempo meaning it still repeats at the barline producing a 9:8 tuplet in each bar.

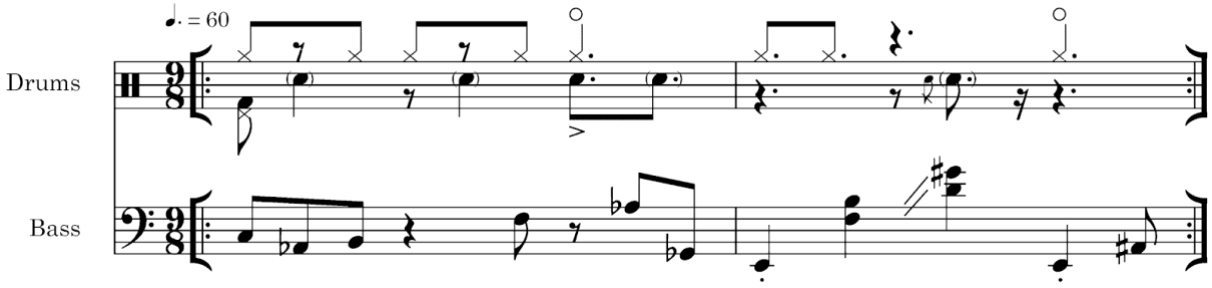

Figure 4.8: “Loper” loop from *Fourth Record*

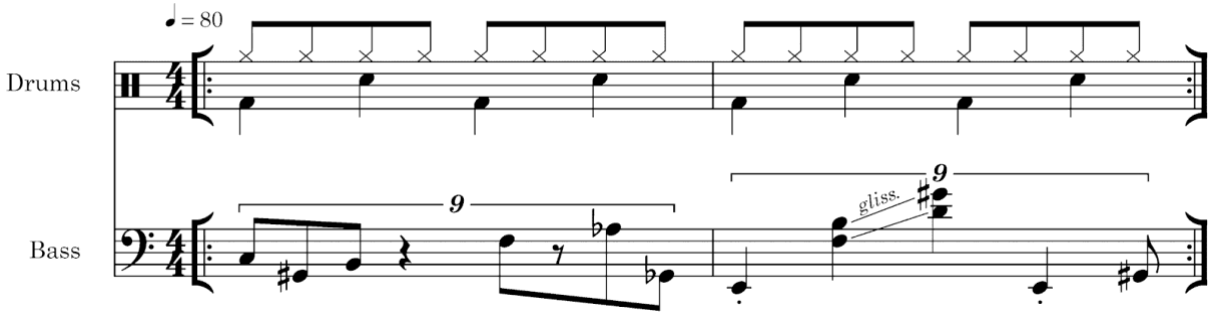

Figure 4.9: “Stumbler” loop from *Fourth Record*

Extract 4.6: *Fourth Record* - Moving from "Loper" to "Stumbler".

As Danielsen and Brøvig point out, “Such a free-floating rhythmic feel is very difficult to play live”[219]. As I was looking for precision and a true sense of independence between the parts (I feared the bass player might naturally fit in with the conventional metricity of the drums) I decided to use a polyrhythmic click track as shown in Figure 4.10.

[219] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 108.

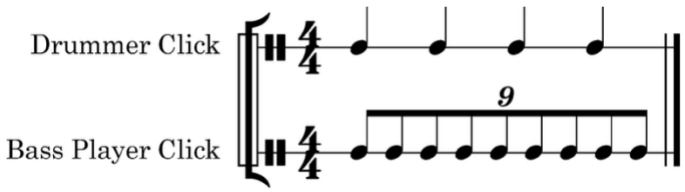

Figure 4.10: click track for “Stumbler” groove

As expected, there were challenges realising this in performance. It is an undeveloped skill set for almost all musicians to play a groove to a click which stands in such a complex relationship to an underlying 4/4 that can be heard simultaneously with the click.[220] One response to this might be for the bass player to use closed earphones to block out as much stage sound as possible, or even be in a booth, but this would work against the kind of performer relationships important to the overarching approach of distributed creativity.[221] It would be interesting to see to what extent a bass player and drummer working with this material over an extended period of time might begin to accurately feel it intuitively, and whether this could lead towards precise performance without the click.

4.1.4 Reflections on Grooves in Loop Work

The examples from my work suggest that insights from groove-based and groove-directed popular music can shed light on how an expanded notion of groove can be harnessed within new music. The question concerning groove-inspired experimental music is whether, once it pushes at the boundaries of what makes a groove work, can it usefully be considered a groove at all? Danielsen and Brøvig offer some considerations on this:

> For a groove to succeed as a groove, it has to be designed so that it engages listeners in a coproductive, bodily process. Rather than experiencing the groove from some arbitrary analytical distance, the listener should become engaged in the unfolding of the rhythm from within—that is, the rhythm is almost coproduced by the listener as he or she moves along with it, virtually (in the head) or actually (through dancing).[222]

I would like to expand the sense of engagement to the performer as well as the listener because, as Roholt points out, “In order for the sounds musicians make to become grooves, they must be

[220] The bass player in the performance, Genevieve, did an excellent job with limited rehearsal.
[221] See 1.1.
[222] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 112.

engaged with in a way that completes them."[223] It may be possible that performers are experiencing something as a groove when the audience are not because they have had the chance to spend time with the material and understand it through some form of bodily engagement. A piece such as "Loop Aware Exaggerate; Mute Silent Reduce" actively encourages the performers to understand the loop as a groove, but a listener may not grasp this on the first few hearings. Roholt claims that "Even a groove that has a disjointed feel repeats and, when it does, we grow accustomed to it"[224] but the extent to which we become accustomed, and the number of repeats required to achieve it may be dependent on the degree of disjointedness. The loop from "Bye" stretches the idea of what could be perceived as groovy to its limit, but as the looped movements of the musicians at the workshop show, there is still a sense of repeating bodily engagement implied by the music which could be considered to bear some resemblance to groove-directed music.

Danielsen and Brøvig argue that DAWs enabled the creation of "new rhythmic feels that could not have been achieved by musicians or any preceding technological tools."[225] I suggest the same might be true about musicians from the new music scene, particularly those with a highly developed level of rhythmic sophistication. Their ability to accurately perform extremely complex rhythms, such as tuplets with odd ratios, uniquely place them to be able to execute 'new rhythmic feels' which has the potential to extend groove performance practice. In this case the 'tools' are not technological, but comprise the language and techniques that have become part of the skill set for performers of challenging contemporary classical music who have played the serial compositions of composers such as Karlheinz Stockhausen and Jean Barraqué from the late 1940s and 1950s, let alone the new complexity works of composers like Brian Ferneyhough and Liza Lim. Several of the pieces in Loop Work exploit this ability to create new groove-like feels in a live setting, and *Fourth Record* deliberately places players from a groove-based tradition with those from the world of new music in an attempt to blend new rhythmic feels with established ones. Responses from performers as well as my own reflections suggest that I have been at least partially successful in this endeavour and the description of the music as having grooves has been mostly met with easy acceptance by players involved.

Understanding the skills of contemporary performers as a kind of technology and making comparisons between the affordances of such skills and those of digital technology provides an insight into one of the ways in which the music in Loop Work engages with the digital. In the

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[223] Roholt, *Groove: A Phenomenology of Rhythmic Nuance*, 131.
[224] Roholt, *Groove: A Phenomenology of Rhythmic Nuance*, 113.
[225] Brøvig-Hanssen and Danielsen, Digital Signatures, 111.

following sections, this and other forms of digital engagement in the work is explored in more depth.

4.2 Digital Engagement in Loop Work

The use of loops as a defining feature of the Loop Work pieces highlights the importance of digital engagement[226] in this music, though the degree of this engagement varies significantly across individual works. The compositions in *Loop Work 2*, for example, do not necessarily foreground digital influence, and other pieces explicitly signify non-digital idioms such as "Loop Work 1.1: A Sandwich Short of a Picnic" which engages with free jazz. However, engagement with the aesthetics of digital technology is clearly expressed in several ways. Digital technology is sometimes used directly, often in ways which encourage the emergence of digital signatures, and there are digital likenesses in sounds created by acoustic instruments. Composition techniques derived from digital tools such as DAWs and samplers are used in the construction of many of the pieces, and the phrasing of grooves and rhythms sometimes relates to the sounds and hyper accuracy of digital editing techniques. The digital world is signified in non-sounding ways as well, and the contrast between digital engagement, and acoustic sounds and approaches allows for the appearance of acoustic signatures and signifiers. The following sections explore these ideas within Loop Work through an analysis of three pieces: "Patch Change", *Musician Reacts* and *Fourth Record*.

4.2.1 Loop Work 3.1: "Patch Change"

The composition is based on the concept of patch changing particularly as it relates to swapping between sounds on a digital instrument. The most familiar example of this process is using a standalone keyboard-based synth to produce different sounds by pressing buttons, however, patch changing can occur in software such as Ableton live and can be automated. In this piece, the saxophonist effectively 'changes the patch' of the keyboard through a process of live sampling. The keyboard player uses the Granulator, an instrument developed for Ableton Live by electronic music artist Robert Henke, which can sample an audio input and create a sound based on it using granular synthesis in real time. The piece asks the keyboard player to press a footswitch on the first beat of every bar, operating the 'grab' feature of Granulator to capture a moment of sound from the saxophone's live performance (see Figure 4.11). Once the pedal is released, the keyboard sound will then immediately change to something based on the

[226] See Chapter 3: Digitally Engaged Music for an extended examination of this issue and the relevant terminology.

new sample. As such, the keyboard sound is changing every bar, based on the previous bar of saxophone playing.

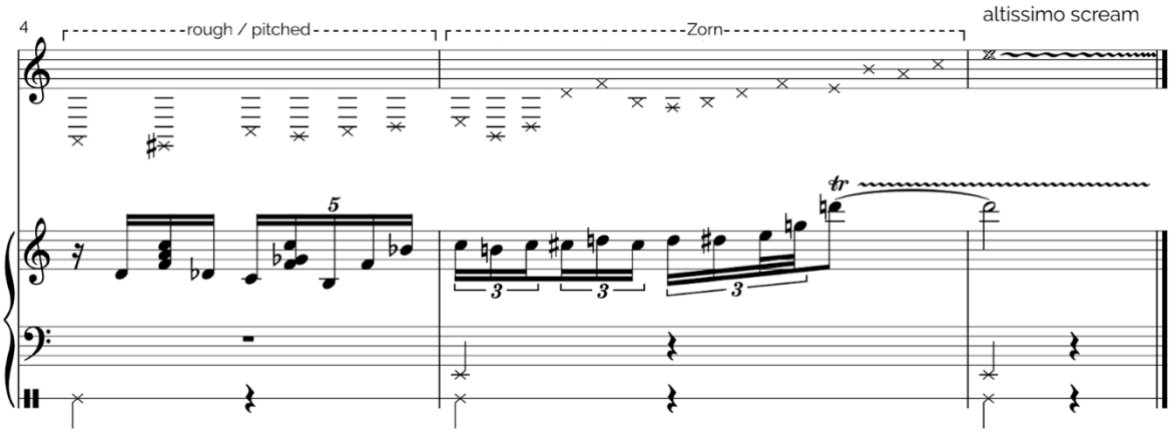

Figure 4.11: extract from “Patch Change” score.

The percussion stave below the keyboard part shows the timing of the pedal which operates the Granulator ‘grab’ function.

In the B section, the saxophonist no longer plays their notated part but instead simply ‘feeds’ sounds of their choosing to the keyboard player, thus exerting control over the keyboard sound.

This produces a relationship between the musicians where one is playing a notated part and following instructions, while the other is manipulating the sounding result of the first player. From the perspective of the sax player, this could be seen as a digital signifier recalling something like Butler’s ‘playing with something that runs’ which refers to the way that electronic music artists set something running (a loop or track), then ‘play with’ or manipulate it with effects or other processes. Unlike a live musician playing a looping groove, the electronic artist does not have to continuously act to produce the musical flow because it is being driven forward by a machine. Like this type of artist, the saxophone player in the B section of “Patch Change” is not only a performer, but a listener; a sort of active observer of the keyboard performance who is “continuously evaluating the configuration of sounds; determining if, when, and how it should change”.[227] In contrast, the keyboard player’s experience begins as that of a performer changing sound patches with a pedal[228] but, in the B section, develops into an experience more like playing with automated patch changes. He is still pressing a pedal but

[227] Butler, *Playing with Something That Runs*,106.
[228] As the sax part is reasonably predictable it is possible for the keyboard player to learn to expect which sounds will result at the start.

does not know what (if anything) will result from this. To the saxophonist the keyboard is a looping machine to be manipulated; to the keyboard player the saxophonist is machine automation of his output.

The way technology is implemented in "Patch Change" emphasises digital signatures from the audience's perspective. The sounds produced by the Granulator are manifestly digital in nature and often do not demonstrate an obvious connection with what the performer is doing. This lack of sonic-visual congruence occurs particularly when the saxophonist plays an unpitched sound such as a quiet breath sound which is then 'grabbed' by the Granulator and becomes the patch played by the keyboard. The result is the sight of the keyboard player continuing to perform the complex notated part while the sound heard is like intermittent white noise with no clear relationship to the actions of the player. Butler remarks when discussing audiences listening to recorded EDM, "The task of imagining or understanding *how* the sounds one hears were produced becomes even more difficult with synthesized sounds that cannot be traced to any single familiar instrument."[229] The absence of gestural legibility in a live performance of "Patch Change" creates a similarly difficult task for the imagination of the audience, placing further emphasis on the digital nature of what is being experienced. It is the opposite effect to what Sam Wilson, discussing Merleau-Ponty, calls the 'habitualisation' which occurs when we become familiar with the connection between performer action and the resultant sound of a musical instrument. He says this habitualisation "goes beyond the automatic, going so far as to make that piece of technology—momentarily at least—fade out of view."[230] In "Patch Change", the digital technology is deliberately brought into view, and the audience is forced to reckon with it.

Acoustic signatures and signifiers are also present due to the improvised saxophone part and in the nature of the interaction between the players which becomes progressively more obvious to the audience as the piece continues. This live collaboration in which the saxophonist is effectively deciding the sound of the keyboard focuses our attention on the fact that we are witnessing an active relationship taking place between the people on the stage. This strongly signifies live improvised music and, together with the powerful digital signifiers and signatures discussed above, the mixed digital/acoustic aesthetic intended in the piece is created.

[229] Butler, *Playing with Something That Runs*, 67.
[230] Wilson, "Building an Instrument, Building an Instrumentalist", 429.

4.2.2 Loop Work 4: Musician Reacts to Computer

As with "Patch Change", this piece highlights both strong digital and acoustic signifiers. The set up of a live performance of the piece involves the player placed between two speakers, each with a different output, to create the impression there are three sound sources to some extent performing as a group: speaker-musician-speaker. The acoustic percussion sound does not create any digital likeness and reflects acoustic signatures such as expressive variability, interactive over ringing and the sound of natural materials, however, the sounds from the speakers, both channels of which are delayed samples of the live percussion, is overtly digital due to being subject to obvious machine processing. The sound from the speakers is, at times, discernibly echoing the live percussion performance demonstrating the clear use of digital recording technology, but the instructions to the musician involve a level of improvised reaction to the digitally reproduced sound creating a two-way interactive process.

The combination of these elements foregrounds conspicuous acoustic and digital signifiers as well as signatures, and places human-machine interaction at the heart of the piece's aesthetic. The composition is designed to create digital 'voices' which interact with, and act alongside, the human performer's instrumental voice. These voices are at once dependent on the live percussion input for their source material, and independent from it through randomised processes which are outside the control of the performer - or the composer. The piece also features digital cut-ups in the form of voice samples which are randomly triggered at some points, and a short passage of digitally edited recorded drums which indicates the end of the performance.

Looking at this piece through the lens of the 'machine loop / performer repetition' framework[231] provides insights into the relationship between digital and non-digital (acoustic) aesthetics in the work. The framework aims to reveal ways in which features which seem native to clear examples of each type of looping can be present in the other. In *Musician Reacts to Computer*, the player loops the given material in a way which sits unambiguously at the 'performer repetition' end of the spectrum - the playing is rhythmically loose and improvisational; the sound is made on acoustic instruments with inherent variation. However, these features also appear in some sense in the literal machine loops in the piece. While the repetition of material through sampling and replay displays obvious machine aesthetics (e.g. digitally altered sound

[231] See 2.1.6.1.

qualities and glitchiness), the manipulations result in repetition that is not always clear and deliberate sounding, and there is a randomised character to the changes.

4.2.3 Loop Work 5: Fourth Record

As a longer and more complex piece, *Fourth Record* allowed me to build on aspects of earlier Loop Work compositions, while also exploring how transitions between loops could be used to advance my compositional aims such as the interplay between digital engagement and contrasting non-digital aesthetics. In common with *Loop Work 3* and *Loop Work 4*, *Fourth Record* includes digital technology in ways which draw attention to its digital qualities. This takes the form of a glitchy synth pedal[232] triggered by the bass clarinet and samples recorded and played back live during the performance. Alongside these clear digital signatures, the composition features a number of other ways in which digital aesthetics are signified and contrasted with acoustic aesthetics; some of these are detailed in the remainder of this section.

The title is a twist on the concept of the 'third record' which is the mixture between two songs which occurs when DJs beat-match[233] and overlap the sound of two records to facilitate a transition. Butler calls this a "chimeric entity" which does "not exist in material form"[234] as it can be considered a new track derived from two pre existing tracks only brought into existence in the mind of the DJ and then temporarily during performance. In *Fourth Record* the transitions between loops do not have this chimeric quality as they are composed into the piece, however, by approaching it in this way I was able to explore more broadly the notion of overlapping loops and the new loops which result from it. The composition can be conceived of as a DJ set in which the named loops are the records, and the transition sections are the 'third records'.

In a development of the live sampling technique discussed in regard to "Patch Change", during the first duet from *Fourth Record*, "Unearthing (9)", the guitar player samples sound from the synth triggered by the bass clarinet and the drummer samples the piano. The drummer and guitarist have complete freedom which parts of the sound to record, how long the extracts are, how many, and whether they are transformed by effects or editing processes. These samples then form the material for the second duet "Forging (18)", this time featuring the drummer and

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[232] The BOSS SYB-5 mimics analogue synth sounds but it is digital technology; a fact which becomes more obvious when the pedal glitches.
[233] The technique whereby a DJ adjusts the tempo of a song to that of the one currently playing in order to perform a smooth segue between them. This can involve a sudden switch or a period of overlap.
[234] Butler, *Playing with Something That Runs*, 41.

guitarist primarily using the samples gathered from “Unearthing”, but, as the duet progresses, also combining this with sound from their instruments. The only instruction is to “explore samples from “Unearthing” and find repeating patterns with guitar/drums”. Here, the sense in which the music loops is entirely at the discretion of the players, however, the broader environment of the piece, the instructions, and the likely short sampled nature of the material is likely to promote a looping aesthetic.

Similar to the way in which “Patch Change” transfers the technical process of patch changing into a compositional technique, the “Trigger Me (20)” loop from *Fourth Record* co-opts the concept of digital signal processing (DSP) as a structuring concept. In this loop, the drums hold down a consistent groove while an improvised bass line switches between the bass guitar and bass clarinet. The guitar improvises a solo melody on top of this texture. The mixed ensemble is divided into three groups, each given an instruction to follow either Jamie (guitar), Vicky (bass clarinet) or Genevieve (bass guitar):

Group 1	FOLLOW JAMIE [Jamie plays a guitar solo with phrases alternating with breaks] whenever he is playing, play a sound with these qualities: light; quiet; continuous; scratchy or pattering; and not clearly pitched do not synchronise with each other the result is a low, chattering cloud of noise whenever the guitar is playing
Group 2	FOLLOW VICKY [Vicky plays short phrases of staccato notes alternating with breaks] whenever she plays a note, play a note or chord synchronised with the rest of GROUP 2 as a group, repeat and quickly fade the note or chord the result is an echo effect after every bass clarinet note
Group 3	FOLLOW GENEVIEVE

	[Genevieve plays short phrases of staccato notes alternating with breaks] whenever she plays, perform an upwards gesture e.g. gliss or raking across muted strings from low to high there should be no clear pitches, and the sound should be short, quick, and start and end abruptly the aim is to blend the sound into the bass guitar sound, creating a tail to every note

Table 4.2: Ensemble instructions in "Trigger Me" from *Fourth Record*

Each group is acting like an effect processor because they are responding in real time to an input from a player and affecting the output that player produces in a fairly predictable way. Group 1 creates something akin to an ambience generator for the guitar player; group 2 acts as an echo or delay on the bass clarinet; group 3 adds a pitch bend to the bass guitar. The groups do not, however, attempt to mimic, and be indistinguishable from, digital effects, instead the digital signification, and to a limited extent digital likeness, is counterbalanced by clear examples of acoustic signatures and signification. These include the fact that, due to the physical spread of the ensemble, each group's sound will not correspond in physical space to the player they are following. This means the connection between the lead player's sound and the 'effect' sound will be somewhat diffuse and blended more into the overall sound. Also, the sound qualities and response times of the 'effects' will vary between instances bringing attention to the improvised nature of the effect group performance.

Fourth Record draws stark contrasts between acoustic and digital signification. This can be seen clearly by comparing the first loop "Invitation" with the second duet "Forging". "Invitation" is simply an expressive bass clarinet melody improvised from a set of pitches, and the rest of the group roughly following with a hum. This purely acoustic sound world evokes Gaelic psalmody, and the necessarily imprecise timing of the humming group (because the melody is improvised) focuses the audience's attention on the act of community taking place. Looping in *Fourth Record*, and Loop Work more broadly, can be roughly divided into two types: loops which involve the repeated restatement of the same musical material; and those which ask the musicians to repeatedly take a particular approach. This second type does not necessarily result in obviously repeated material and "Invitation" is an example of this. This approach tends

to de-emphasise, or even remove, the mechanical sense of looping and, as such, promotes acoustic signification. "Forging" is closer to the first type of looping because, although it is also improvised, the players are instructed to "find repeating patterns with drums (or guitar) / samples" and then "settle into a loop with drums (or guitar) / samples". This approach to looping tends to emphasise the mechanical and technological sense of looping, and alongside this "Forging" foregrounds a digital aesthetic through the use of samples. Seen from the perspective of the 'Machine Loops / Performer Repetition' framework[235], "Forging" demonstrates the opposite of the machine looping which takes place in *Musician Reacts To Computer*, namely that elements signifying machine loops (e.g. digital sound characteristics, rhythmic glitching, close repetition) are found in an example of performer repetition.[236] "Invitation" and "Forging" represent the extremes of digital and acoustic signification in *Fourth Record* while other sections balance these two compositional aims more evenly. They help to illustrate the ways in which digital engagement is made explicit in this and other Loop Work pieces, while existing in contrast to a similar engagement with acoustic, or non-digital, practices. They also help to show how the delineation of digital and acoustic looping aesthetics is not clear cut, but that, despite the contrasting approaches, what is found to be important in one is often also important in the other.

4.3 Loop Work: Concluding Remarks

Loop Work has provided a rich framework in which to perform compositional experiments using concepts arising from digital aesthetics and seeking engaging ways of combining them with overtly non-digital, or acoustic, aesthetic markers. The simplicity and limitations of the original format (A - Loop, B - extend performer intervention) has allowed me to focus on these qualities without the need for a particular concern with form, structure or intention, and the short, limited nature of the material of each piece encourages a focus on one or two ideas at a time. *Fourth Record* marks a development in terms of scale and working with transitions and this is something I would like to explore further in future pieces within the project.

Although open score practice has been commonplace in music since the middle of the twentieth century, and looping has become increasingly important in new music in recent decades, the particular ways in which these two approaches are used together in Loop Work are somewhat distinctive. The simplicity and clarity of structure enables a particular focus on the

[235] See 2.1.6.1.
[236] This loop does use digital samples, but they are triggered by a performer playing them as an instrument and the acoustic instrument sound is also heard.

compositional parameter at the centre of each piece and a fairly thorough exploration of a specific type of modification of the parameter through performer agency. There is significant scope for the borrowing and development of more approaches to loop engineering and manipulation from groove-directed music, and, as is shown particularly in “Loop Aware Exaggerate; Mute Silent Reduce”, the new discipline strategy of using non-sonic elements as compositional material can be effectively employed in Loop Work pieces.

Loop Work is a particularly effective forum in which to explore transparency as a performance and compositional parameter because of the capacity for the loops to operate as ‘something that runs’ or be an ‘optimising’ groove while the performers use their agency to affect limited elements of the flow. This also suggests that this set of compositions can bring groove practice and new music practice into a closer working relationship; something already attempted in the choice of performers for *Fourth Record*.

Chapter 5 Accomplices

Accomplices is an ongoing series of fixed-media pieces developed through a process of iterative collaboration. Improvisations or other material recorded by one musician are passed to another for use as the departure point for a new piece of work. Their output is subsequently passed on to another artist, and so on. In common with Loop Work, distributed creativity[237] is an overarching theme of Accomplices, however the former features open works that emphasise performative collaboration whereas Accomplices works are fixed and feature preparatory collaboration. The works in Accomplices are designed to be distributively thick[238] by making each piece dependant on the one which preceded it - every contributor is conspicuously building on the work of others. In all the work created so far, each stage of the compositional process has featured improvisation, and started without a strong sense of what the final product will sound like. However, future contributors might produce outputs without an improvisational approach, and may begin with a clear plan. Each response is predicated on the latest stimulus and each stimulus on the prior response. When something is passed to another artist they accept what they receive, allowing the previous artist to help define the parameters of their next moves.

The project has two distinct phases:

Phase 1 involved only two musicians - me and another. The work was created by developing and passing material back and forth between us. This phase produced three pieces, or outputs:

Collaborator	**Instrument**	**Pieces / Outputs**
Ausias Garrigos	Bass Clarinet	*Cómplices*
Claire Ellis	Violin & Keyboard	i. *Sigh* ii. *'n'*

Table 5.1: Accomplices - Phase 1 outputs

[237] For a more detailed discussion of the concepts surrounding distributed creativity see Introduction 1.1.
[238] "collaboration and openness of outcome are essential to their character." See 1.1.2.

Phase 2 is still active and creates chains of musicians, each one passing their work onto a new creator in an indefinite series. This phase began when I approached Norwegian performer, producer and composer Jørund Fluge Samuelsen to collaborate on a piece originally conceived to be similar to the approach with Ausias and Claire. After some discussion, we developed the idea of producing ongoing chains and Jørund has since become an equal collaborator on the project overall. This phase has so far produced one chain containing three pieces:

Jamie Howell	*Húg*
was used as material for:	
Jørund Fluge Samuelsen	*Widescreen Sonata*
was used as material for:	
Leah Kardos	*tapemash*

Table 5.2: Accomplices - Phase 2 outputs

Leah Kardos' piece has been passed to another artist where the next work in the chain is in progress. A second separate chain beginning with the same initial material is in planning.

Future plans for the project include involving artists from other mediums. Although we have yet to secure a collaborator of this nature we have had discussions with filmmakers, choreographers and a puppeteer. This PhD only focuses on musical outputs.

5.1 Phase 1: Cómplices

The working method developed for this project was precipitated by the Coronavirus pandemic UK lockdown in 2020. Pre-pandemic, my plan was to compose a piece for bass clarinettist Ausias Garrigos to workshop in person, but lockdown meant the piece needed to be remotely recorded and presented digitally. My hope was to create something that exploited features of the situation that would not have arisen had there been a live workshop, including the opportunity to have an extended dialogue with Ausias during the compositional process and the potential for recording material which could be manipulated, edited, and used for subsequent stages of the creation of the piece. Ultimately, the compositional method I arrived at as a solution to the challenges of making music under lockdown conditions became a methodology I wanted to pursue beyond the pandemic.

I entered into the first collaborative compositional process with Ausias with few preconceptions, however it was important that distributed creativity, digital engagement, loops and groove informed the aesthetic and method.

Improvisational practice was also to be integral to the development of the material, allowing the work to emerge from the process rather than working towards a preconceived outcome. Central to this approach was the aim to make the relationship between composer and performer as non-hierarchical as possible. Ausias and I arrived at a process which involved sending material between us, developing it as we went (see Figure 5.1). Although the process was to be collaborative, our roles were well defined: Ausias was the live instrument performer/original material generator; I was the curator of the material and arbiter of the finished product.

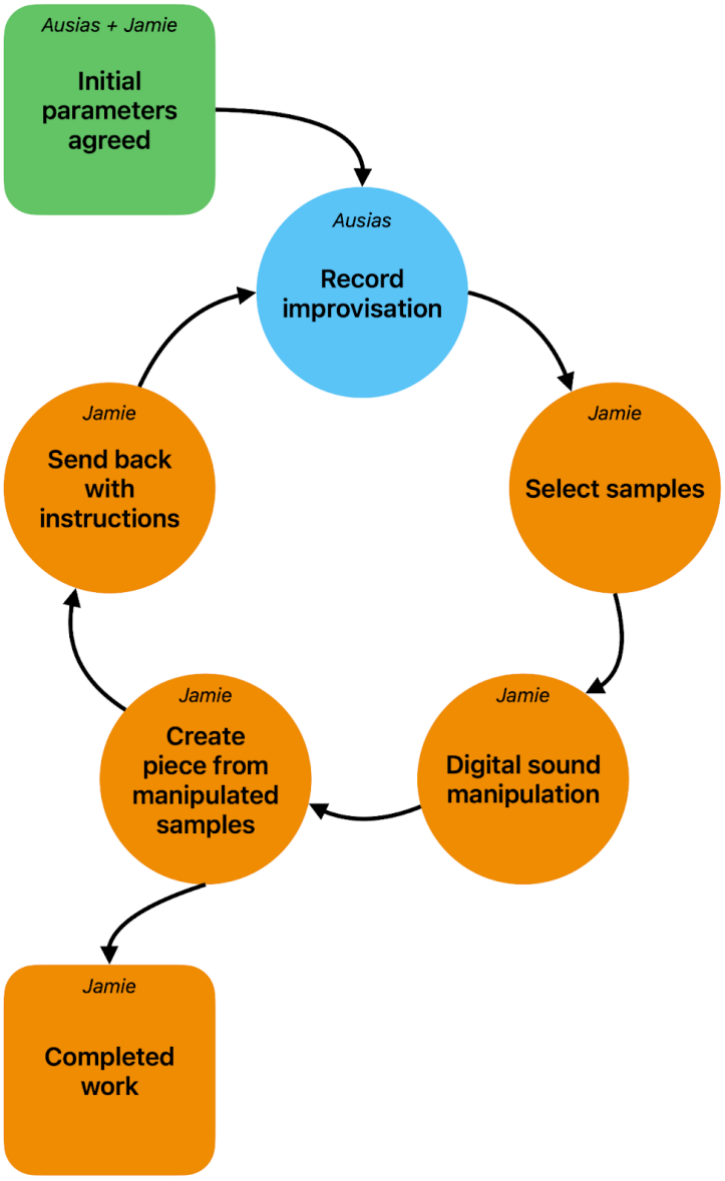

Figure 5.1: General process for *Cómplices* indicating roles

5.1.1 Digital and Acoustic Signatures and Signifiers[239] in Cómplices

As the process unfolded certain aesthetic and social concerns underpinned my curatorial judgements. i) Steering the piece towards an aesthetic of loops, grooves and digital engagement; ii) an 'aesthetic of imperfection'[240] to provide counterbalancing acoustic signatures and signifiers; iii) ensuring that Ausias' creative voice was present in the piece. The process of sampling Ausias' responses provided an opportunity to weave together acoustic and digital signatures. This was achieved by selecting moments which were, in some sense, unintended and 'imperfect', such as breaths, key sounds, accidental overblowing, and moments of shift between two notes or sounds. Foregrounding these sounds reveals the improvisatory 'acoustic'[241] origin of the playing, and isolates artefacts which are, in important ways, unrepeatable because once attention is drawn to them, and they are repeated, they acquire an intention and a form they previously lacked. The decision to loop these samples placed the footprint of the inherently repeatable on the inherently unrepeatable.

Further examples of finding a balance between digital and non-digital aesthetics as a compositional parameter can be found in the stimuli sent to Ausias to provoke a recorded response (see Figure 5.2). 'Stimulus 2' was created by using a MIDI pad controller to play the samples live. I recorded a number of improvised loops without the use of a click, and left them unquantized to allow unevenness and variation to lend contrast to the manifestly digital editing of the samples themselves.

[239] See Chapter 3.
[240] In broad terms, the embrace of the accidental and unintended. The term was coined by Ted Gioia in his book *The Imperfect Art* and further developed by Andy Hamilton in the article "The Art of Improvisation and the Aesthetics of Imperfection". In 2020, an anthology of essays on the subject edited by Hamilton and Lara Pearson was released: *The Aesthetics of Imperfection in Music and the Arts*.
[241] See 3.2 for a description of how I am using the term acoustic here.

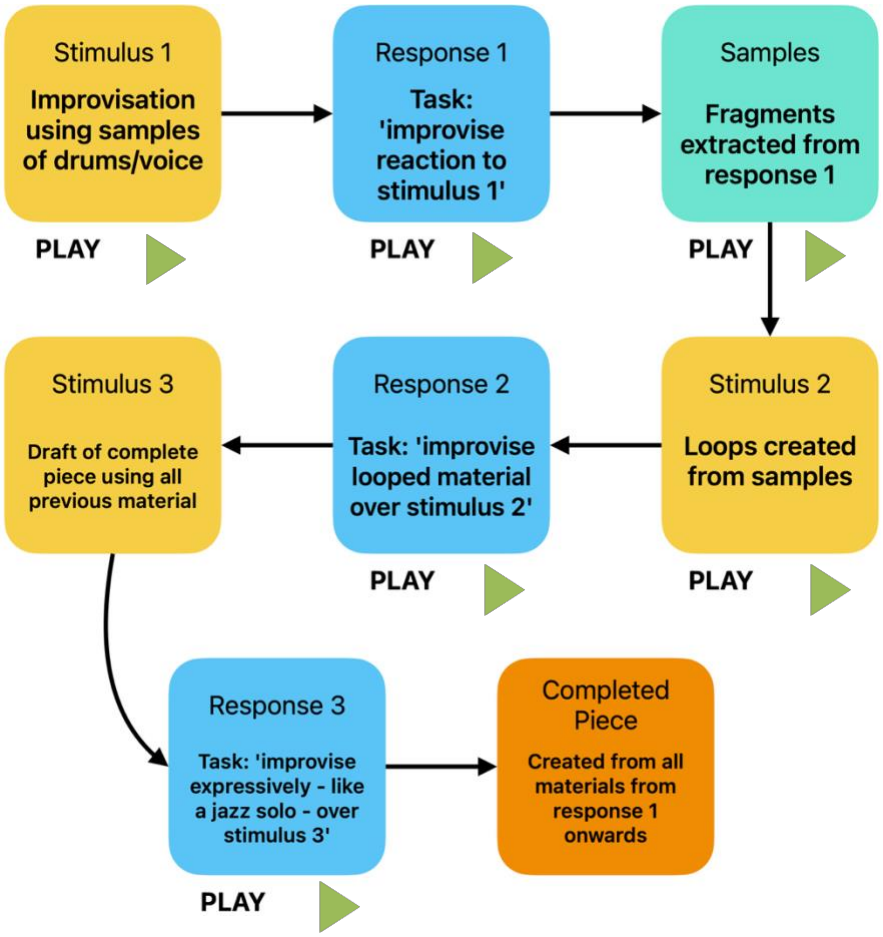

Figure 5.2: Process breakdown for *Cómplices*

'Stimulus 3' eliminated much of the live, unmanipulated sound. I sent the track back to Ausias and asked him to improvise once again. He produced two free improvisations from which I used extracts retaining their rhythmic positions allowing me to preserve some of Ausias's intent, whilst still exercising my own curatorial judgement. This version of the piece features striking disparities between the digital signatures of the samples-based track and the highly expressive acoustic signature of the untreated bass clarinet performance. However, the distinctive character of the piece comes from the manner in which the handling of the samples changes throughout the piece to allow a greater or lesser transparency of technological mediation.[242]

It was important that the three stimuli struck a balance between encouraging Ausias to use his own improvisatory voice, and guiding him towards a looping aesthetic and an engagement with the digital. It is true, of course, that regardless of what he recorded I was in a position to

[242] See 3.1.1.

manipulate it and fashion it. My commitment, however, to a collaborative mode of working meant that I wanted both of us to influence each other during the process itself. For my part, I left portions of Ausias' recordings without any sound manipulation and tasked myself with finding a way to use them 'as is'. My approach to influencing Ausias' playing was to provide stimuli which suggested loops, grooves and a digital aesthetic, and to provide light-touch instructions intended to narrow his focus while still allowing him to feel free to play. Table 5.3 shows the stimuli and responses in detail.

	Stimulus	**Task** (text taken directly from communication with Ausias)
1	The track was created by improvising with, and manipulating samples of Richard Spaven (an acoustic drum kit player influenced by electronic music[243]). I performed the improvisation using a loop pedal as a sample player; manipulations included slicing audio, reversing, slowing down, reducing the sample rate, and deleting audio. (No part of this stimulus was used in the final piece)	"the first thing I'd like you to do is 2 or 3 takes of an improvised reaction to [stimulus 1] please. Please don't work anything out, just play!"
2	A series of eight loops created using samples cut from the first response and digitally manipulated. Each loop was performed on a MIDI pad controller with each repeat played live, unedited and unquantized.	"I would like you to improvise some looped material over each of [the loops of stimulus 2] please. It could be: • A dubstep bass line • Percussion • A riff • Repeating 'samples' (played live) which sound like 'normal' clarinet playing which has been chopped up and edited down to snippets • Blocks of noise • Anything you can imagine that loops!"
3	Draft of complete track including a basic form. This was assembled in a DAW using all the responses and stimulus 2.	"improvise something very expressive [over stimulus 3] please. As if you are playing a jazz solo where you are in the spotlight. Play over as much or as little as you like."

[243] See 3.4 for a case study of his playing style.

Table 5.3: Stimuli and tasks during the creation of *Cómplices*

The stimuli were effective because Ausias is an accomplished and responsive musician, and because we had had a long talk where we had discussed the overall aims and ideas of the project. On reflection, the first stimulus could have been more carefully designed in a way to elicit more specific types of playing and sounds. The audio I created exhibited strong digital signatures which I hoped would influence Ausias' response, which it did to an extent, however, much of his playing here was what might be thought of as 'free improv' in a broad sense without specific connection to digital aesthetics. Stimulus two was more successful because it was much more specific, and it communicated something of the sound which the final piece would have. Despite the final stimulus being very open, it worked very well because it was exactly what I needed as a foil to what I had made. I knew this would be successful given Ausias' skills demonstrating the importance in a project like this of understanding the individual you are working with.

5.2 Phase 1: *Sigh*

Using the model developed for *Cómplices*, I approached violinist and pianist Claire Ellis to collaborate with me for the second piece in the Accomplices series. This gave me the opportunity to work with different instrumental sounds, and a player with a musical background and skillset different to Ausias. Given that I wanted both the process and outcome of these pieces to reflect the individual I was working with, these differences were viewed as affordances and offered possibilities for new directions in the work. I was also able to work with Claire in person which lent a different profile to the collaborative working method.

At the outset Claire indicated that she was not comfortable or experienced with free improvisation, which meant I had to find different approaches to the creation of stimuli. My response to this was to create a series of tasks designed to provoke Claire into providing interesting and varied responses on the violin. I adopted a task-based, open score methodology in contrast to the improvisational approach taken with Ausias. Building on my experience with *Cómplices*, the stimuli sought to foreground imperfection as well as expressive and conventional playing. I encouraged unintended sounds by the use of difficult tasks likely to result in unpredictable outcomes (see Figure 5.3), and ambiguous tasks which nevertheless have some clearer points of reference (see Figure 5.4). Playing to her strengths as an excellent reader and performer of Western classical music, I also gave her tasks which encouraged her to be more melodically and rhythmically expressive while still leaving some openness (see Figure 5.5).

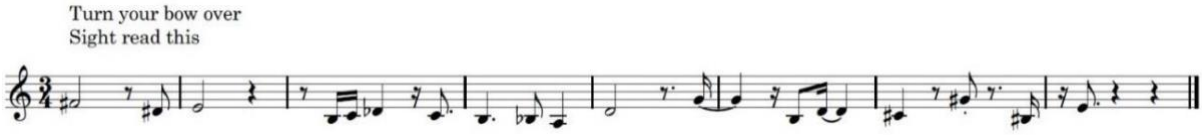

Figure 5.3: *Sigh* stimulus A

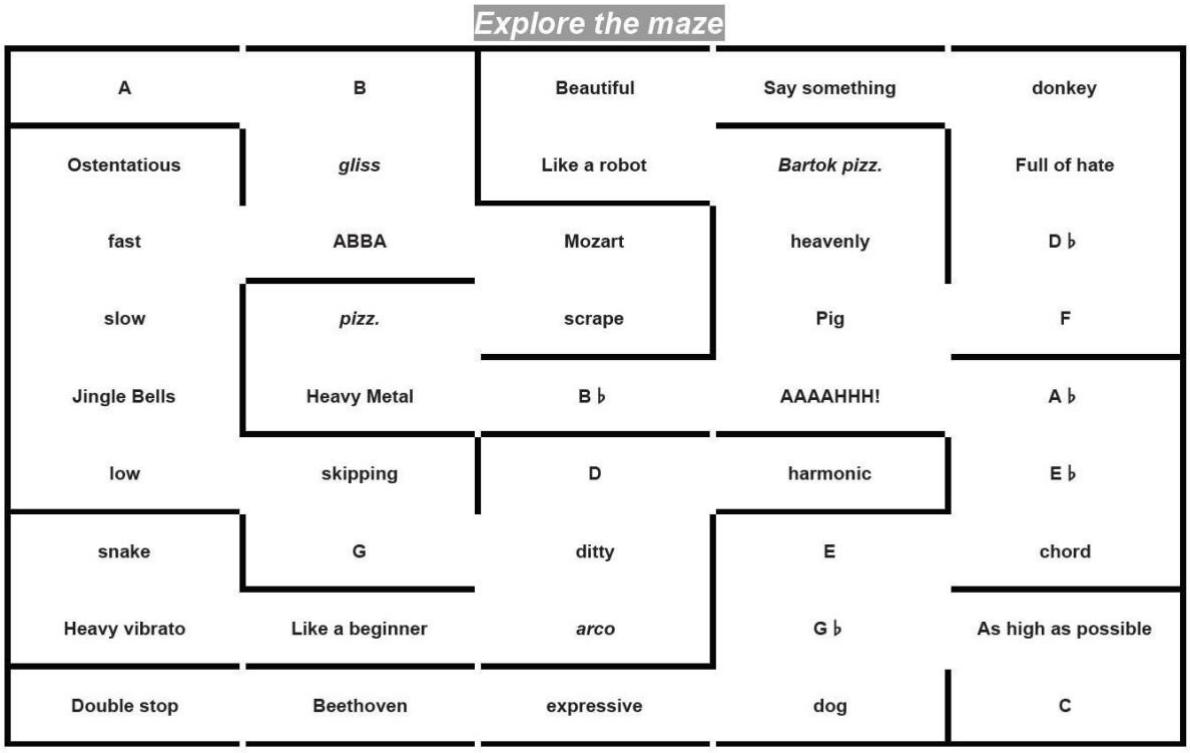

Figure 5.4: *Sigh* stimulus B

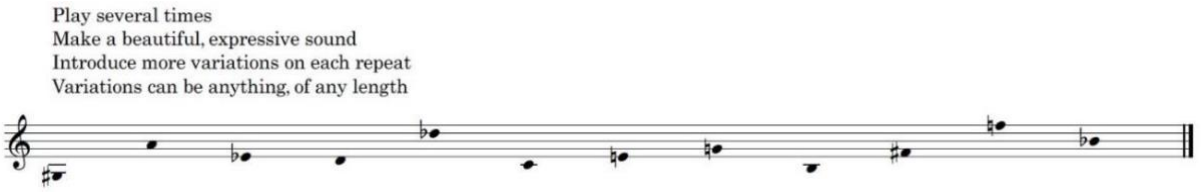

Figure 5.5: *Sigh* stimulus C

During the face-to-face recording sessions, I tried to avoid shaping Claire's view of what I wanted from her to retain as much of her individual choice in the formative material as possible. To give her a stronger influence on the direction the piece might take, my strategy was to be as absent from creative decisions as possible, simply presenting and explaining the tasks without prescribing how they were to be interpreted. I also recorded the results without comment. After these tasks were completed, the resulting recordings were used as a source for samples, which were used to create keyboard patches with which to exploit Claire's skill as a pianist. I wanted to see how Claire would respond to the sounds themselves, so I gave her open verbal tasks such as 'find a way to make this sound work' and 'play with this sound and find something you like'. Claire does not readily identify as an improvisor, which meant this strategy carried the risk of not

producing much significant material so I also asked her to 'play pieces you have memorised' which, given the ambiguous pitching and high noise content of the sounds, was unlikely to result in recognisable output. The unusual nature of the sounds (most of them lacked clear pitch definition, for example) meant she was intrigued and keen to playfully discover what they could do.

The final step in the development of basic material was a keyboard improvisation by me and an ambient recording made by Claire in her garden. The improvisation gave me a more overt role as a performer than in *Cómplices* and the environmental recording was used to avoid the 'digital black' silence which occurs when editing blank space into the timeline of a DAW.

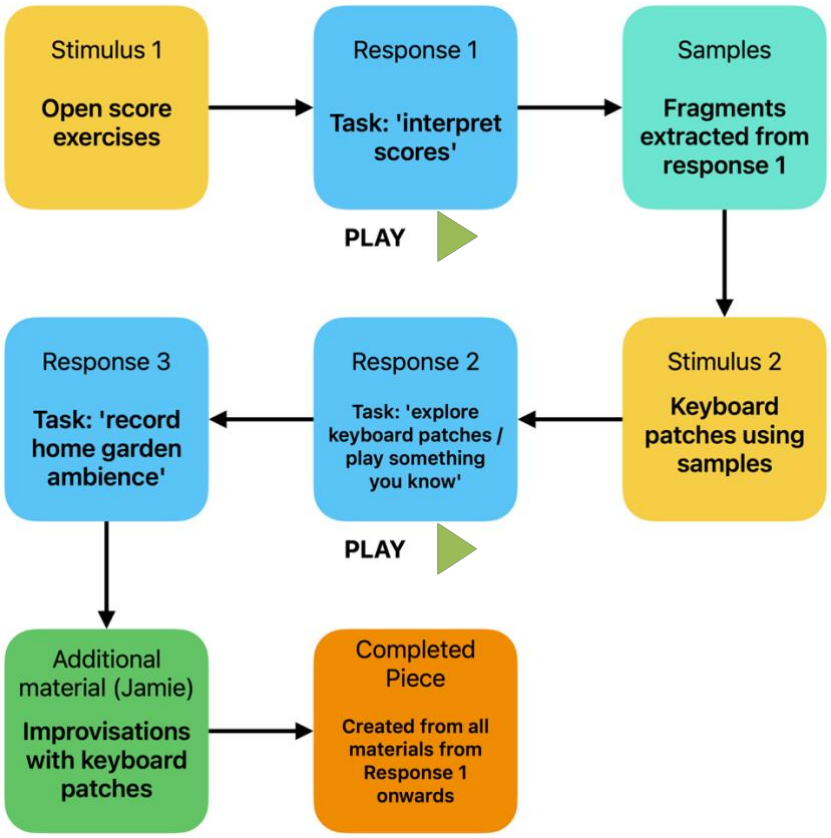

Figure 5.6: Detailed breakdown of the process used in *Sigh*

5.2.1 Digital and Acoustic Signatures and Signifiers in *Sigh*

In *Sigh*, I wanted to deepen the sense of contrast between signatures of the acoustic and the digital. My experience with *Cómplices* led me to believe that this could be achieved by focusing on bringing acoustic signatures and signifiers more to the fore. This is because digital signatures and signifiers were deeply embedded in the process and product and already very clearly

demonstrated, so further clarification of the acoustic aspects would more sharply differentiate the aesthetic ideas.

In order to achieve this demarcation I foregrounded more of the non-intentional aspects of the performance but also aimed to bring out the expressive and individualistic qualities of Claire's playing. These somewhat contradictory aims presented me with a puzzle to solve which was further complicated by the fact that the desire to focus on individual expression was also entangled with the goal of creating a collaborative piece in which both participants feel they have a sense of ownership and creative voice. My approach to this included using enough unedited playing to allow a sense of instrumental sound, phrasing or expression to develop, and carefully selecting samples which emphasised these qualities. Ultimately, I was unsuccessful in including Claire's musical voice in the piece because I had not clearly understood her relationship with the stimuli and the resulting sound. The first evidence of this emerged from informal conversations with Claire who said she did not feel she had a voice in the piece, and that she had no real stake in the work. I also gained a helpful perspective on this from a conversation with Konstantinos Koumpiadis whose research[244] focuses on collaboration in music production. He draws a distinction between musicians 'aligning individual goals to a perceived group goal' and 'aligning themselves to a perceived goal of another individual'. My intention with this project was to promote the former and, to an extent this was achieved with Ausias, but the experience with Claire fell more into the latter category. I think this was because the original stimuli did not foster a sense of ownership over what was played, but rather operated simply as a task with the purpose of producing material for my creative work. As such, Claire was encouraged to align herself to what she perceived as my goal rather than find her own goals which could be aligned with a shared aim.

Despite the failure of this aspect of the piece, attempts to balance acoustic and digital aesthetics by emphasising unintended sonic aspects were more successful. The use of a recognisable human voice (the sigh) which is subject to marked digital editing draws this contrast sharply, as does the use of ambient garden sounds which begins the piece. These sounds are heard unedited and without transformation drawing the listener into this environment before the sigh is heard in a recognisable form. The sense that a person's voice is sounding within the environment is credible to begin with, creating a strong acoustic signature in the sound qualities and acoustic signifier in the implied world beyond the sound. This

[244] Koumpiadis, Konstantinos. "An Actor Network Investigation of Heavy Metal Industrial models", PhD Thesis, University of West London, (under preparation).

credibility diminishes as repetitions of the sigh occur with increasing layers of additional sound and accumulating digital edits. Over this section of the piece (0:00-0:48), acoustic signatures and signifiers are strongly present from the start and digital signatures and signifiers are gradually brought in until they dominate the texture.

Throughout the piece aggregates are created by layering sounds which create digital and acoustic signatures, and the degree to which these layers are blended or remain distinct is treated as a compositional parameter. For example, the sound at 0:55 begins with the sigh and adds layers of digitally altered sound creating a bifurcated aggregate which gradually becomes more blended. The section from 1:10 takes a different approach where numerous acoustic and digital sounds are looped creating a complex texture. The sounds remain distinct due to their contrasting frequency content and spread across the stereo spectrum giving the impression of a collection of sonic events from digital and acoustic sources sounding through a wide, unreal space.

5.3 Phase 2: *Hùg*, *Widescreen Sonata* and *tapemash*

Authorship in phase 1 of Accomplices can be thought of as divided into 'work' and 'composition' where both artists contributed to the 'work', but only I was responsible for the 'composition'. Claire and Ausias contributed to the final pieces in a strong sense, but the relationship was not an equal collaboration because I made the curatorial decisions and was the sole creator of the final outcome. This changed in Phase 2 because once a piece was made and handed over to the next person, all control over what was created was handed over with it. As such, of the three pieces in Phase 2 so far I can only claim to be the composer of *Hùg*. I contributed work indirectly to *Wide Screen Sonata*, but I only have third hand involvement in Leah Kardos' *tapemash* - although the sound of my guitar is still recognisable in places.

5.3.1 Process

The process of the creation of these pieces was in many ways simpler than in Phase 1 because there was no need to develop a series of tasks. The only stimulus for each person was the previous piece and the task was simply to create another piece (see Figure 5.7).

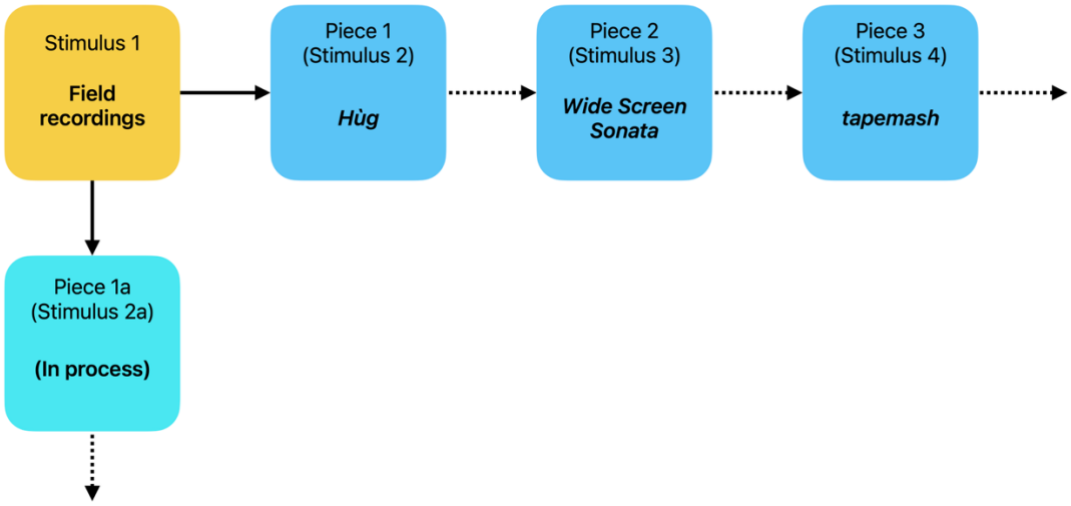

Figure 5.7: Accomplices phase 2 overall process

Jørund began by giving me an initial stimulus which was two short WAV files of field recordings from Norwegian folk culture: a 'springar' dance played on a fiddle with a non-standard tuning, and a herding call (Norwegian 'lokk') sung by Marit Jensen Lillebuen.

Extract 5.1: Lokk.

Extract 5.2: Springar.

Jørund did not give me any direction or instructions; we had both decided that I would simply use this material in whatever way I chose to make a piece. I extracted very short samples from the original WAVs and used a foot pedal to trigger them; I then recorded a single take improvisation piece with the samples and a guitar[245]. I passed this piece back to Jørund in the form of separate tracks (guitar and samples), again with no instructions other than to create a piece from this material. His piece was produced in the studio by playing back my tracks and performing a live mix which included adding effects and spatialisation, and varying levels of the individual tracks. Jørund rehearsed the performance several times before committing to a take so, to some extent, his piece was less improvised than mine. He then passed files of the separate tracks of his piece to Leah who also recorded a live mix. Her piece transformed the original material more radically by the addition of synths and conspicuous processes such as playing it through a reel-to-reel tape machine and affecting the tempo. As such, with each work

[245] I later edited this down into the piece presented with this PhD but Jørund was given the entire original recording.

new sound was added and the original material became increasingly more distant and obscured.

This way of working emerged from our desire to allow for the greatest degree of freedom for our collaborators and, in this, had a degree of success. Reflecting on this after all the pieces were complete, however, demonstrated that the lack of specific direction meant that the resulting works tended to stay within similar parameters and sound worlds, and, ultimately, lacked a clear sense of development from one to the next. As with *Sigh*, and *Loop Work 2*, phase 2 of Accomplices suffered from a lack of focus in the stimuli given to performers/creators. This is not an inherent property of the stimulus itself, but rather a relational problem where the particular stimulus does not provoke the individual musician to whom it is given into creating something highly creative, compelling and distinctive. This is not to say that the contributions by Jørund, Leah and myself are not good pieces in and of themselves, but rather that the overarching Accomplices project lacks focused direction and development leading to a sense of contrast which is not always compelling.

As of Autumn 2025, we are currently working on another piece based on the original stimulus (‘piece 1a’ in fig 4.x) in order to start a distinct chain of new pieces from the same initial material. Figure 5.7 is organised differently to previous process diagrams and uses dotted flow lines to indicate that this process, while having a curated progression, is much less clearly goal orientated overall. Each step beyond the first is an ending point as well as stepping stone to the next.

5.4 Digital Signification in Accomplices

The project is both made possible and artistically formed by technology, which allows for far reaching, immediate and effective collaboration, but is also a way of making the art. The outputs are not necessarily *about* technology, but technology permeates the project at every level. As such digital signatures often emerge in the surface of the music, but, as discussed in more depth below, the layers of digital signification beneath the surface reveal more about the project’s relationship to digital aesthetics.

Fundamental to the project is the use of digital recordings as musical material. Butler, in his discussion of improvised EDM and laptop performance, identifies how the use of prerecorded material creates and exploits relationships between these elements of the work and the work as a whole:

> Performances of Electronic Dance Music are consistently built on objects recorded prior to the event itself … the work of the performer is to radically transform these objects through the disassembly and reconfiguration of musical structure … The novel improvisations that they produce through these actions invoke and refract the creative music-making that takes place before the performance.[246]

Although Accomplices does not fit neatly into this stylistic or historical paradigm, this project can be helpfully illuminated through Butler's framework around the use of musical 'texts'[247] within EDM. In contrast to EDM the prerecorded material used in Accomplices originates within the project itself meaning that there is a closed loop of material. However, in his discussion of works developed over multiple performances Butler talks about "cumulative cycles of musical creation"[248] arising from processes where "composition forms the basis of improvisation, which in turn feeds back into composition"[249] and here the similarities become more obvious.

Accomplices also 'invokes and refracts' the music making which occurs before each piece is created. The use of samples in *Hùg* highlights rhythmic patterns in the field recordings through cutting and distortion, and juxtaposition with the guitar. These patterns include unintended ones (such as those found in the background noise of the lokk), and these elements are reframed and lent intentionality by musicalising them. As the chain of work grows, this invocation and refraction becomes more complex as each new piece forms relationships with the original material through the prism of the previous creators. A complex network of artists and works is created which allows those involved to get to know each other through their work, and through their take on each other's work.

Working with multiple prerecorded (musical) texts derived from multiple individuals, used to create multiple pieces in a complex network raises questions about authorship and ontology. In order to understand the idea of a 'work' in improvised EDM, Butler proposes a 'constellation' ontology drawing on ideas from Georgina Born.[250] He suggests that this type of work can be best understood as a constellation (Born's version of this is 'assemblage') of the objects and people in the network. The nature of this constellation is greatly impacted by the centrality of

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[246] Butler, *Playing with Something That Runs*, 25.
[247] "material instantiations of ontic entities" including vinyl, digital files etc. See Butler, *Playing with Something That Runs*, 31.
[248] Butler, *Playing with Something That Runs*, 63.
[249] Butler, *Playing with Something That Runs*, 48.
[250] Born, "On Musical Mediation".

technology in Accomplices because in order to truly understand the nature of each piece one needs to understand that the individuals creating it communicated (and in many cases came to know each other) online, and that the finished works are in the form of digital files which go on to become the material for the next piece. Add to this the fact that much of the creative work takes place within a DAW and using other forms of digital technology, and it can be seen that the ontological constellation which represents each work involves digital mediation at every level.

Whilst these ideas appear descriptive and theoretical they also impact on practice. Once I had identified this notion of a constellation in relation to the work taking place in Accomplices, I was able to better understand what was meant by 'work' in this project. By thinking of *Widescreen Sonata*, for example, as a constellation of ontological objects, I was better able to approach practical decisions about authorship. The assemblage includes field recordings of folk musicians and the people who made them, my improvisation and the equipment used to make it, Jørund's compositional decisions in the studio, the technological means used to communicate and distribute the music, and many other elements. This means that the piece is a collaboration and distribution of creativity across a number of people, objects, technologies, performers, cultural practices and environments, and this ought to be recognised when it is publicly presented.

5.4.1 Recorded Improvisations and Self-sampling

The use of improvisation captured in audio recording or transcription as material for subsequent composition has a long and varied history. Transcriptions of improvised solos are used in 'vocalese' jazz compositions such as Eddie Jefferson's version of Miles Davis' "So What" in which he puts words to Davis' solo; Bach's ricercar from his *Musical Offering* began as an improvisation;[251] improvised jazz has frequently been sampled in hip hop since the 1990s, by groups such as A Tribe Called Quest and Gang Starr. In the YouTube documentary "Harry Sparnaay, pioneer on the bass clarinet", the composer Roderik De Man is shown recording Sparnaay improvising on the bass clarinet in order to collect samples for the creation of the tape part of his piece *Yuxaposiciones*.[252]

The Sparnaay and Bach examples demonstrate that this process can occur within the work of a single artist or group that acts both as originator of the improvisation and the composer who

[251] Schulenberg, "Composition and Improvisation in the School of J. S. Bach."
[252] Minou de Leeuw, "Harry Sparnaay, pioneer on the bass clarinet (full movie)," directed by Andras Hamelberg and Minou de Leeuw, documentary, June, 2008, posted February 19, 2016, YouTube, https://youtu.be/O4s_nWszWvc?feature=shared. (from 06:58)

captures and reuses it. When this involves audio recording it takes the form of a kind of 'self-sampling' which describes the process occurring in Accomplices. This approach contrasts with the musical borrowing which takes place in hip hop, for example, in the circularity of the process of development, manipulation and application of material. Recognisable recorded improvisation is "music of the moment made timeless, the one-of-a-kind reproducible, the spontaneous turned inevitable"[253] and its use as samples in other music allows for a musical critique and a relationship between works to develop, however, in self sampling this does not occur as the music is having a conversation with itself. On the other hand an 'originate and recycle' approach allows for the initial material to be designed with specific aesthetic notions in mind, and the possibility of exploring material more deeply through multiple iterations of the process. Whilst processes might also be repeated when using borrowed samples, there is a limit to the degree of development possible before the original sample is rendered so unrecognisable that it no longer holds any particular meaning for the piece and the relationship is lost. When the original sample is not known to anyone other than the composer and/or performer, this tension does not exist.

5.5 Loops and Groove in Accomplices

My role in phase 1 of Accomplices gave me final control over how material was used, and meant that I was able to base the compositional work on loops which I attempted to infuse with a sense of groove. These loops and grooves emerged from the nature of the material I was given by Ausias and Claire, the 'DAW with MIDI controller' environment in which they were made, and my own proclivity for emphasising the unintended sounds and highlighting a digital aesthetic. The improvised material I received was also influenced by the tasks I set which included attempts to elicit looping and grooving from the players. For example, task 2 of *Cómplices* asked Ausias to 'improvise some looped material' whilst listening to loops I had created from the previous improvisations. The final task asked him to improvise 'something very expressive … As if you are playing a jazz solo' over the mostly completed track. The track at this point contained much groove-based material which would allow him to develop a sense of feel associated with improvising over a groove - something I knew he was experienced at doing.

My approach to creating loops from the improvised material was to use finger drumming on a sampler. I cut the recordings into samples and manipulated them, then I mapped them onto the pads of a MIDI controller allowing me to play them in real time. I then developed grooving loops

[253] Katz, *Capturing Sound*, 79.

by improvising on the sample instrument I had created. *'n'*, the second piece which used Claire's contributions, was entirely improvised in a single pass using this method.


Extract 5.3: Loops used in *'n'*.

The character of the loops and grooves was strongly influenced by the way I had selected and treated the samples. Some had similar characteristics to traditional drum samples, for example, a snare or bass drum-like sound, but many were long or had a slow attack and others contained rhythmic material. This meant the way I was feeling the sense of groove as I performed was strongly shaped by the affordances of these sounds, and the loops and grooves that emerged often had the unusual, lopsided attributes I was seeking. I also often performed loops over multiple instances rather than using copy and paste, and never quantised or used a click in order to draw out the aesthetic of imperfection I was looking for.

In phase 2 my piece *Hùg* was improvised using a set up involving a guitar and a foot pedal to play samples. In this case I also had the ability to affect the sample by reversing them and slowing them down giving me greater scope to experiment than the finger drumming approach. The addition of the guitar allowed me to develop the kinds of loops and grooves I was creating and gave me the opportunity to make fine differences between iterations of loops despite the samples playing back in an identical manner on each occasion. The process of slowing the samples deteriorates them creating rhythms which suggest rhythms and feels, and I attempted to understand these groove-like patterns by physically moving with them as suggested by Roholt.[254]

The particular uses of technology in the project influence the feel and sound of its loops and grooves. The loops and groove-like structures were created through recorded live performance; the editing of those performances in a DAW; the creation of samples from these recordings which were used to perform grooves with a sample player; and the use of these samples to assemble loops on the timeline of a DAW. Danielsen and Brøvig discuss the influence of the DAW on groove creation:

[254] See 4.1.1.

> The DAW presented new opportunities for optimizing and experimenting with the microrhythmic design of grooves … warped into new rhythmic feels that could not have been achieved by musicians or any preceding technological tools.[255]

In this project there has been a balance between this kind of technology-driven feel and human performer-led approaches. This means there is a variety of groove types which can be used as a compositional parameter, but also that these approaches can be combined to create distinctive tech-led and human-led hybrid forms.

Once my piece was passed on in this phase I no longer had control over the way the compositions were conceived or what the aesthetic concerns would be. That said, the fact that Jørund used my piece as the initial material for his own meant that he was beginning with something loop and groove infused, and this may have had an effect on his approach. This influence will, of course, fade with each new piece and become an increasingly distant part of the constellation which comprises future works.

5.6 Accomplices: Concluding Remarks

The primary concern of the Accomplices project is distributed creativity. It is based on values which my collaborator Jørund and I have formulated as follows:

- We actively seek for our work to be put into the hands of others to make art beyond our control
- We are curious about other artists and want to know them through their work - and their take on our work
- We want to expand our circle of collaborators to include as diverse a group of creators as possible
- We embrace the use of technology as a means to collaborate and make art
- We want to challenge and develop our processes and craft

The embrace of technology mentioned here makes a connection between the project as a whole and one of the themes of this PhD, however, the main aesthetic concerns of looping, groove and digital engagement are present in these pieces insofar as I am the composer of them. Once they are passed on, the works take on the aesthetic interests of other people.

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[255] Brøvig-Hanssen and Danielsen, *Digital Signatures*, 111.

This project contributes to approaches to collaborative working practices. My findings with respect to the use of stimuli as provocations for performers can inform further work in this field with particular reference to the difference between 'aligning individual goals to a perceived group goal' and 'aligning themselves to a perceived goal of another individual'. There is also contribution to work involving loops, grooves and digital engagement within a collaborative space, including ways in which passing material on to others can help to evolve idiosyncratic feels which would not arise if an individual was working alone. Overall, the project demonstrates a model of collaborative working which can be used and developed by others whose practice overlaps with this mode of distributed creativity.

Chapter 6 Conclusions

This commentary has focused on a cluster of areas which were central to the development of the creative work presented in this PhD: digitally engaged acoustic music; loops and groove; and distributed creativity. The final chapter lays out how the research questions are addressed by the creative work and commentary, and points to potential directions for future developments.

The research questions stated in the introduction can be categorised into three broad overlapping areas: musical results, ways of working and theoretical understanding.

Musical results

> What distinctive outcomes can be drawn out by applying digital aesthetics on acoustic instruments and groove-like structures to an open score or otherwise collaborative context?

Way of working

> How can I use the sounds and processes of electronic music making to develop a new vocabulary of compositional techniques for use when writing for acoustic instrumental performers?
>
> How can the results of theoretical research into existing groove-based music and music exhibiting digital engagement be employed in the production of engaging, idiosyncratic and experimental compositions?
>
> What methods can I employ to enable performers to perceive and inhabit a sense of groove in music which does not groove in a conventional or idiomatic way?

Theoretical understanding

> What frameworks can be used to understand how an aesthetic of the digital can exist outside digital technology?

6.1 Musical Results

Taken individually, the ideas used in the compositions in this PhD are not new. Groove-like loops have been employed by new music composers for some time; strong forms of distributed creativity have been common in experimental music since the 1960s; and digital aesthetics have exerted an influence on acoustically produced music for at least the last thirty years.

However, the portfolio presented here contains a distinctive mixture of these elements based around my individual interests and points of focus which results in music of a unique character.

Open scores (See 1.1) have the potential to afford sounds and structures with a very singular character due to their inherent unpredictability. When grooves and open scores are used together, the possibility arises to create looping feels which are beyond the imagination of the composer working alone. As such, the resulting feel, or groove, is a direct product of the presence of collaboration in the work. A clear example of this occurs in *Cómplices* where I created groove-influenced loops using samples of Ausias's playing. Leaving untouched much of the original shape and emphasis in his performances meant that the loops I produced were limited by the affordances of his contribution. The imposition of my own taste and approach within these affordances resulted in feels which neither of us would - or could - have made alone and therefore bear the distinctive mark of a collaborative approach.

The ways in which open score practice and looping are used together in Loop Work are particular: the simplicity and clarity of structure enables a focus on a single compositional parameter and a thorough exploration of a specific type of modification of the parameter through performer agency. For example, "A Sandwich Short of a Picnic" from *Loop Work 1* takes a familiar walking bass jazz groove and allows players to twist the sense of pulse in ways which will be unique to each performance. Added to this the fact that only one performer controls this change of pulse with the others trying to keep up produces its own distinctive characteristic feel featuring both a leader/follower dynamic and an aesthetic of failure.

The length and structure of the piece *Fourth Record* allowed me to explore several ways in which the mixture of digital aesthetics, distributed creativity and groove-like loops can work together to produce unique results and the combination of this particular set of approaches in one long work is distinctive. The piece's structure as a set of loops of open length played one after another enabled me to use the concept of a DJ set as a structuring device. The main loops take the place of the DJs records while transition loops act as the 'third records' (see 4.2.3). As discussed in detail in 4.3, other ways of combining loops include the loop "Unearthing" being sampled to create another loop ("Forging") later in the work; a return to the first loop "Invitation" in a modified form at the end having the effect of recontextualising; and, the change from "Loper" to "Stumbler" which puts the same bass line into a new context which references a 'lazy' hip hop feel. These varied approaches, combined with a number of ways of distributing creativity and the signification of digitally created music, led to an end result which was distinctive and contributes a unique voice to contemporary new music practice.

6.2 Ways of Working

The creative portfolio in this PhD shows how the vocabulary of electronic and groove-based music production can be borrowed from and extended in a more experimental direction. For example, “Bye” borrows a sample-based structuring concept from Dilla and the concept of simple meter/odd subdivision grooves but pushes these ideas far beyond that which would work in a groove-directed context (see 4.1.3). That said, one can imagine some of the extended approaches in “Bye” being used in a more moderated form such that a continuous, danceable groove could be maintained. The concept in *Fourth Record* of using a group of live instruments as signal processing with an improviser (see 4.2.3) is an approach based more on the way technology is used rather than its sounding effects. This idea also has the potential to feed back into groove-directed music and implies that any kind of digital process could be used in this way, opening up more avenues for exploration.

Compositional vocabulary was also developed with a relationship to the musical material of digitally created music. For example, the loop from “Loop Aware Exaggerate; Mute Silent Reduce” is a distortion of two grooves overlaid on one another, one from an acoustic jazz context (“Here and Now” by Joe Lovano), and the other from a semi-electronic source (“System” by Brotherly - itself based on “Here and Now”). The resulting aggregate represents a more experimental way of exploiting material which derives from digital and groove-based aesthetics.

Alongside the compositional vocabulary, the musical works required the development of approaches to performance and rehearsal which would enable performers, and audiences, to find the groove experience within a sometimes quite densely experimental sound world. “Loop Aware Exaggerate; Mute Silent Reduce” takes a direct approach by including movement within the piece itself to encourage the players to feel a somewhat awkward loop as a groove and communicate this feeling to an audience. While broadly reflective of the focus on the performative aspects of music making that has captured so much interest in the new music scene over the past two decades, I have argued that my work is distinguished by its focus on the physicality of performing grooves in particular, and, in this piece, the use of movement both as an aid to feeling the musical groove, and as a distinctive part of the performance.

The process of workshopping this piece was valuable for me in developing my approach to working with musicians and evaluating works. Becoming more conscious of the way one is using movement to help produce a sense of groove in a loop was successful in this piece and has since become an important tool when I work with musicians in this field. Noticing how players did this without prompting (such as in “Bye”, see 4.1.1) was an important step in developing

these ideas further, and researching the case study of Richard Spaven (see 3.4.4) allowed me to broaden these ideas to include digital engagement. Future work will include this approach to movement embedded in the pieces themselves or as a rehearsal strategy.

Research and creative practice are thoroughly intertwined throughout this PhD. At every stage in the creation of the musical works, scholarship informed decisions and shaped the environment in which creative exploration occurred. Likewise, the direction of academic research was determined by the nature of the creative works produced, both in terms of what scholarship was studied and how new theoretical ideas were arrived at. This concept of 'practice-led research and research-led practice' (illustrated in fig. i.2 of the introduction) allowed me to develop idiosyncratic compositional techniques and distinctive musical outcomes.

Significant for me as a composer was the recognition that certain elements identified by research could become compositional parameters. This meant I was able to take specific elements arising from research and ask myself local compositional research questions such as: what will happen if I change this parameter while keeping other aspects the same? And how can I allow a player to alter this element of the music to produce exciting results for audiences?

Compositional decisions in *Sigh* (see 4.2) were informed by research into digital signatures and the effect of digital technology on rhythm. This allowed me to identify and emphasise digital signatures through, for instance, carving rhythms from a continuous sound through deletion, and by using spatial properties to create an unreal sonic environment. But this also drew my attention to ways of working against a digital aesthetic by avoiding these elements. This helped me to make decisions to fill 'digital black' gaps with untreated ambient sound and combine conspicuously digital with clearly non digital sound.

6.3 Theoretical Understanding

In the initial stages of this PhD, both the creative and critical work was inspired by preexisting theoretical frameworks in the fields of repetition, groove, digital aesthetics and popular music. These theories and ideas remained essential throughout the work, however, they were unable to fully describe what was happening in the creative outputs. This was largely due to most of the preexisting scholarship regarding groove and digital aesthetics being based on studies of popular music leaving it unable to fully accommodate more experimental new music approaches.

Danielsen and Butler's work on groove-based musics powerfully describes and explains how grooves work in music which forms part of, or is based on, the African American tradition and sheds light on the experience of creating and hearing them. However, when looking at music,

such as the work in this PhD, which resides much further from this tradition while still owing a debt to it, concepts such as inner dynamics, productive dissymmetry and beat bins need to be viewed more broadly and stretched beyond their original uses. The analysis of "Melancholy Adorations" and of the pieces accompanying this commentary demonstrate that, when adapted in this way, this terminology can be helpful in understanding what this more obliquely grooving music is doing and explaining its effect on performers and listeners.

Existing research into digital aesthetics examined for this thesis largely focuses on ways in which the landscape of popular music has changed due to the introduction of digital technology and how these changes are perceived by listeners. Until very recently[256] there was relatively little written about how these effects feed back into music produced in non-digital ways, however, this was essential for an understanding of the music created for this PhD. To that end, Brøvig's 'digital signatures / opaque mediation' models were expanded and adapted to encompass these effects and this has provided a useful way of understanding music which exploits the relationship between digital and non-digital aesthetics (see chapter 3). This relationship can create complex interference patterns of musical meaning which can be usefully described and systematically understood using concepts and language devised for the Digitally Engaged Acoustic Music framework.

6.4 Future Developments

At the time of writing (January 2026) I am involved in new projects which extend the idea of live sampling used in "Patch Change", *Musician Reacts* and *Fourth Record*. The aim here is to deepen a sense of collaboration between musicians while exploring new ways for technology to contribute to improvised performance; all with the larger purpose of creating more distinctive creative outputs.

The Accomplices project has the potential to grow and develop in an interdisciplinary way which includes film, dance and other art forms. Along with my colleague Jørund, I am attempting to navigate the challenges of involving other people in a chain of works which, whilst having great potential, also creates difficulties around managing work with others. Ideally, the project could develop such that it takes on something of a life of its own, spreading between multiple collaborators in many directions.

The development of the early short pieces in the Loop Work project into the extended work *Fourth Record* suggests further ways in which these ideas might be extended and further

[256] See footnote 138 in 3.2 regarding Brøvig and Stevenson's recent paper on this subject

explored. The use of the short loop as a compositional unit means that a wide variety of approaches can be taken to instrumentation and ensemble design; methods of combining, transitioning and overlapping loops; and manipulation of loops and the overall piece through the distribution of creativity.

6.5 Final Thoughts

This PhD makes contributions to composition practice and scholarship. A practice-led research / research-led practice methodology was used in the creation of musical works which engage with distributed creativity, groove-like loops and the influence of digital aesthetics through non-digital means. This methodology contributes to artistic research in these fields, particularly in areas where they intersect. In pursuing this artistic practice I have surveyed and contributed to the wider scholarship on these topics, bringing a creative practitioner's perspective to fields largely populated by theorists. This helps to broaden and move forward discussions on loops, groove and digitally engaged acoustic music, and bring theory and creative practice closer together in these areas.

First and foremost, it is my hope that the creative outputs in this PhD stand on their own merits as musical works, but also that they can serve as examples of research-led practice for future practitioners. Alongside this, the theoretical ideas developed in the commentary have the potential to assist other researchers working in related areas of practice and musicology through new specific and specialised concepts and an associated vocabulary.

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