Textural and Timbral Ambiguities

Creating and Composing with Sound Groups
in a Portfolio of Compositions

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Declaration

The compositions and accompanying commentary comprised in this submission are entirely my own work. Where I have consulted the work of others, this is always clearly stated.

Signed: Ehud Freedman

Date: 14.3.2023

Acknowledgements

I would like to thank my supervisor, Professor Mark Bowden for his great dedication, support and encouragement and for his invaluable guidance. I would also like to thank Royal Holloway University London for their support as well as members of its music department's academic and administrative staff. I am grateful to the musicians and all collaborators who have taken part in the works I comment on in this thesis. Finally, I want to thank my family, most of all my parents, for their unwavering support, in this project and much more.

Abstract

This practice-based research in music composition consists of a portfolio of original compositions and written commentary on the submitted works: two pieces for acoustic instruments and pre-recorded audio, two pieces for string duo, two pieces for sextet, a studio piece for toy accordion and a score for a contemporary dance performance.

Through the practice of original composition, the research examines the creation of ambiguous textures using timbral ambiguity. Timbral ambiguity is achieved in the research through the integration of timbres. For example: the combining of solo clarinet and vibraphone sounds into an integrated sound. In the resulting integrated timbre, it is difficult to distinguish the clarinet and vibraphone. In ambiguous textures in the research, timbres of textural layers as foreground and background are difficult to distinguish from one another. These ambiguities emphasise sound groups over individual sounds.

The research investigates the roles of timbral contrast, an antagonist of timbral ambiguity, in timbral and textural ambiguities. It suggests a timbral contrast spectrum, which can be consulted when composing with timbral and textural ambiguities. Further, it finds added value in these ambiguities, as increased interest and the enhancement of musical parameters as melody, harmony and rhythm. The music in the portfolio is influenced by minimalism in aesthetics and style and so, it is examined in this context.

The research examines the mimicking of a music sequencing electronic/digital tool, the arpeggiator, in acoustic composition. It demonstrates the practice's contributions to consistency, efficiency, novelty, and timbral and textural ambiguities.

Context for the research stems from academic thought on ambiguity in language, literature, music and from musical works featuring timbral and textural ambiguities. Works by György Ligeti, Kaija Saariaho, Thomas Adès, John Adams and Michael Gordon are among those which informed the research, as did musicological work by composer Jonathan Harvey, Leonard Meyer and others.

The subject of ambiguity has been widely discussed in academic literature, especially in the fields of language and the arts. Musical timbre has also received considerable attention as has texture, in practice and in academia. Timbral ambiguity as a term, tool and concept, has, however, been the subject of little focused academic research. Textural ambiguity has rarely been directly explored in academia. This thesis and accompanying portfolio aim to add to knowledge in these seldom discussed subjects.

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INTRODUCTION

I. Timbral and textural ambiguities

Jonathan Harvey, in an article about several pieces in which he manipulated, edited and combined acoustic and synthesised sounds, wrote:

> *'We have all experienced beautiful moments when the play of colour in sound is paramount. We are enchanted and can call it nothing other than a timbral experience. Boulez's orchestration, Stockhausen's electroacoustic manipulations, Ligeti's "cloud" music, Grisey's or Murail's spectral music - at their best they create a kind of magic we may describe as timbral, though there are many supporting structural parameters as well. They have something else in common too: they are all playing with the identity given to objects by virtue of their having a timbre, in order to create ambiguity. The 'timbral experience' is fundamentally one of shifting identities. It occurs when we mistake, however momentarily, one thing for another.'* (1986: 178-9)

Harvey's 'timbral experience', as described above, is central to this project. He is quoted here at the beginning, as *'shifting identities'* and '*mistaking… one thing for another*' are fundamental in the research's portfolio.

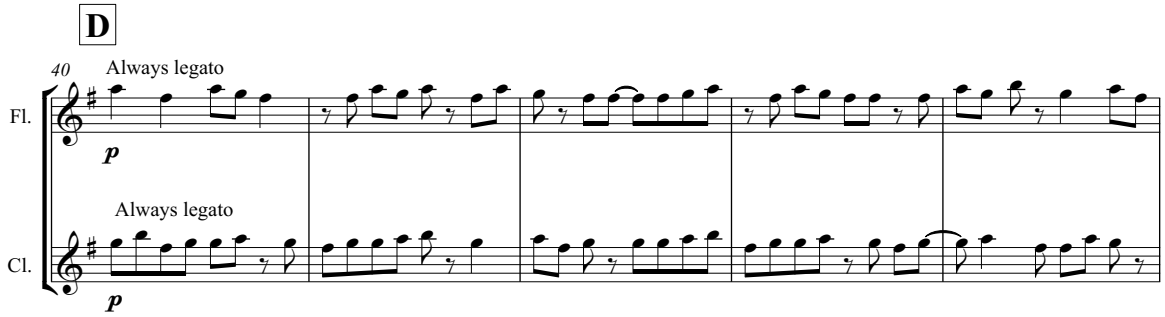
Harvey's words remind me of an experience I had when I was fourteen years old and saw an amateur painting at a record shop. At first glance, it looked like nothing more than a collection of blots and short brush strokes in shades of mostly yellow and red, the colours of fire. Lingering on it a moment, I made out an object at the centre of the fiery texture, which was Jimi Hendrix playing the guitar. Both background and object were painted with shades of yellow and red and similar looking short brush strokes. Hence, little contrast existed between them to help perceive them as separate. Still, Hendrix's familiar image could be distinguished, and as if emerging from the fiery background. Hendrix is associated with fire, as it is the title of one of his songs and as he would occasionally set fire to his guitars onstage.

I remember the experience of looking at the painting more vividly than I do the painting itself. While at the time I mainly thought it looked cool, I believe my impression partially derived from having engaged with the work. Perceiving Hendrix's image despite minimal

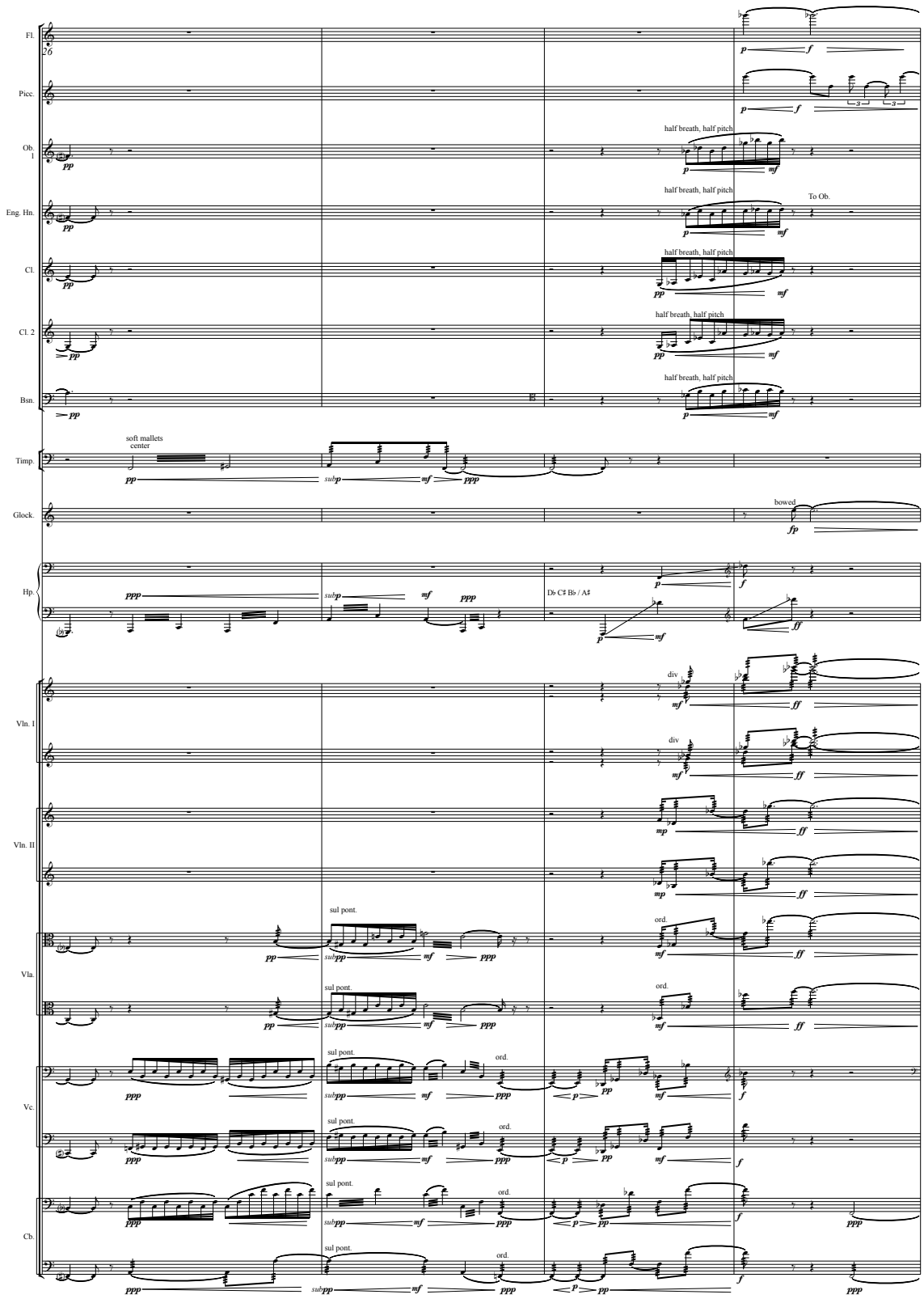
contrast with its background brought added value to my experience. Further, the ambiguity between object and background symbolised Hendrix's emerging from and being ‘fire’. Thus, textural ambiguity facilitated and embodied the painter’s deeper message. My composition style is not consciously influenced by visual art, yet experiencing ambiguity in the painting’s texture has remained with me since.

When texture in Western music is discussed in academic literature or taught to young musicians, it is often done in four categories: polyphony, heterophony, homophony and monophony. Jonathan Dunsby argues these categories are not distinct and actually represent, to some extent, historical evolution (1989: 49). As such, they are irrelevant to my research. Thus, texture will be discussed in the thesis with regard to *layers*: foreground, middle-ground and background.

I had already experimented with timbral ambiguity and shifting identities in my work prior to beginning this research. In my piece *Wooden Horse: Opening* (2011), I combined string and woodwind sounds (ex. 1.2) to create new and ambiguous sounds. In *Quietly Deliberately* (2013), I combined a flute and a clarinet by exploiting their timbral similarities (ex. 1.1). Moving forward, I envisioned challenging the perceived distinctions between textural layers, between soloists and accompanists and between individual instruments.



Ex. 1.1. Quietly, Deliberately, bb. 45-48. A flute and a clarinet are combined/integrated into a single, larger entity – a sound group – by exploiting their timbral similarities.



Ex. 1.2. Wooden Horse no.1, bb. 26-29. String, woodwind and percussion instruments are integrated into sound groups using the density of tremolos and trills and timbral similarities.

Interest in integrated sounds and textural layers was one of the motivations for my new musical direction. Another was a desire to draw attention to what was being played, not to whom or what was playing it. For this purpose, I sought to emphasise *sound groups* over individual sounds. The first technique to turn to for this was timbral ambiguity, with which I already had some experience and had observed it in past works (as discussed in the next chapter).

The Oxford Advanced Learner's Dictionary defines ambiguity as '*the state of having more than one possible meaning'*. This research focuses on and utilises timbral and textural ambiguities, as in the perception of multiple possible timbral identities and textural layers (respectively), in new music composition. Timbral ambiguity is achieved in the portfolio through the integration of timbres. For example: the combining of solo clarinet and vibraphone sounds into new and ambiguous sounds. In this example, each instrument's timbre embodies a single, unambiguous meaning. In the resulting integrated timbre, it is difficult to distinguish the clarinet and vibraphone, thus this new sound appears timbrally ambiguous. In ambiguous textures in the portfolio, timbres of textural layers as foreground and background are made difficult to distinguish from one another. Thus, the resulting textures are ambiguous. The two ambiguities promote the perception of sound groups over that of individual sounds.

As discussed in the first half of the next chapter, the use of ambiguity – any ambiguity – can bring added value to art. One way it achieves this is through *defamiliarisation*, the act of making the familiar or ordinary seem strange in artistic works. A simple example of this artistic device is how metre or rhyming can differentiate between poetry or song lyrics and everyday spoken or written language. Metre and rhyming are defamiliarisation – they turn the ordinary or practical into art.

Ambiguity can act as a form of defamiliarisation, a term coined by Russian literary scholar, Viktor Shklovsky, in 1917. Understanding ambiguity as defamiliarisation in composition helped shape my musical choices in the portfolio. Its meaning, origin, value and relevance to this research will be detailed and explained at the beginning of the next chapter.[1]

[1] See Context, I. pg. 16.

Additionally, timbral and textural ambiguities were potential means to greater efficiency: by composing instrumental parts to simultaneously function as multiple textural layers,[2] I was hoping to reduce ensemble sizes in my music. My hope was to require less instruments as a by-product of their assuming more textural functions. Efficiency and economy are regarded as attributes which add to an object's beauty. Da Silva, et al have asserted, based on their research, traditional convention and modern academic thought, objects are deemed beautiful based on their sensory properties, but also on how efficient the relationship between an artefact and its function is. They observed the reason a thing is deemed beautiful is sometimes to do with *how* it had been made (2016: 50).[3]

II. Research questions

The questions below guide the research:

1. What roles does timbral ambiguity play in the creation of textural ambiguity in my music?

2. What roles does timbral contrast play in the designing of ambiguous integrated timbres and ambiguous textures?

3. What new interest and benefits does abstracting the behaviour and uses of arpeggiators to acoustic music provide?

***

Having introduced what instigated this research, its main areas of interest, and its guiding questions, I will now put it in context by surveying and discussing: the concept, value and functions of ambiguity in art and specifically in music; the states of timbral and textural ambiguities in music; the significance of timbral contrast or timbral distinction in ambiguity;

[2] For example, functioning as foreground and middle-ground or foreground and background.
[3] Da Silva, et al. wrote about the aesthetics of efficiency and the principle of 'maximum effect for minimal means'. This principle *'explains the aesthetic judgment of an artifact as the judgment of a means-effect relationship - a relationship that can be aesthetically appreciated for being efficient'.* They determined the beauty of objects is sometimes attributed to *'the way something is done'*.

additive and integrative ambiguities and their relevancy to the research; and the influences of minimalism and music technology upon my musical language.

CONTEXT

I. Timbral ambiguity and defamiliarisation: making sound more poetic

The concept of ambiguity has been widely discussed in academic literature, especially in the fields of language and the arts. Abraham Kaplan and Ernst Kris asserted ambiguity functions in poetry '*as the instrument by which a content is made poetic through the process of re-creation'* (1948: 430). Re-creation, according to Kaplan and Kris, is an intellectual or emotional reaction to ambiguity by an audience. They placed great importance on ambiguity's ability to stimulate the imagination – to re-create. Without re-creation, an artwork would not be, as they wrote, effective nor would it be *poetic.*

Marking ambiguation an act of turning content poetic is reminiscent of influential early 20th century theorist Viktor Shklovsky's means of distinguishing *'between the laws of practical language and the laws of poetic language'* (1917/1965: 10). So-called practical language is such that is free of artistic techniques as metre or rhythm, which are common in poetry. In his landmark article, *Art as Technique* (also known as *Art as Device*), Shklovsky claimed the act of *defamiliarisation*, a term he coined, distinguished between the practical and the poetic. He defined defamiliarisation as the making of practical language strange or extraordinary by applying artistic technique to it.

For example, one technique which distinguishes film (poetry) from reality (practical language) is the act of editing (a kind of defamiliarisation); one cannot observe an event from two perspectives or be at multiple locations simultaneously in reality, but one can when watching a film, thanks to editing. Theatre differs from real life due to techniques including lighting or scripted dialogue. Even the placing of action and dialogue on a stage in front of an audience is an act of defamiliarisation. These acts make the practical poetic or artistic. Shklovsky wrote:

> *'The purpose of art is to impart the sensation of things as they are perceived and not as they are known. The technique of art is to make objects "unfamiliar", to make forms difficult, to increase the difficulty and length of perception because the*

process of perception is an aesthetic end in itself and must be prolonged. (...) Art removes objects from the automatism of perception…' (1917/1965: 12)

Applying Shklovsky's theory to music can be met with difficulty. Music differs from such arts as film, theatre and poetry as it is stranger to begin with. Compared to language and image, music is unfamiliar. We do not use music to exchange information or understand our surroundings, as we do through language (used in poetry and prose) or sight (visual arts). Music is essentially defamiliarised sound. It is sound (practical) that has had technique (defamiliarisation), as composition or performance, applied to it. This application turns sound poetic, into art – into music.

Ian Cross argued music is a result of human evolution in that humankind needed a more ambiguous means of expression than language (2005: 35). Pure practical language has no ambiguity to it: words for objects, like 'door' or 'hand', conjure the images of the objects. However, music may raise different associations for each listener, especially when it comes to emotion.

Leonard Meyer wrote:

'Music may be meaningful because it refers to things outside itself, evoking associations and connotations to the world of ideas, sentiments, and physical objects. Such designative meanings are often less precise and specific than those arising in linguistic communication. However, this does not make them less forceful or significant. Or music may be meaningful in the sense that within the context of a particular musical tone or group of tones indicates - leads the practiced listener to expect - another tone or group of tones will be forthcoming at some more or less specified point in the musical continuum.' (1957: 413)

Meyer points out how music may lend itself to ambiguity, when evoking any thought related to what lies outside of music, such as emotions or objects. In this context, music can suggest multiple possible meanings more easily than language. However, when analysed as a system of hierarchies and probable outcomes, some music may be regarded as practical or ordinary compared to other music.

For example, in the tonal system, a sequence such as I^6_4–V–I is predictable and unambiguous in relation to others. The purpose of the cadence V–I is to dispense with imbalance and uncertainty; it is 'perfect', as in 'finished' or 'complete'. A different sequence, such as I–iii–IV is more ambiguous, since it is unresolved, more unpredictable and less familiar within the tonal system.

Meyer asserted: as musical certainty increases, meaning decreases, but composers can introduce '*designed uncertainty*' to avoid a '*tedium of maximum certainty'* (1957: 419). He placed value on this designed uncertainty – an intentional ambiguity devised by composers to subvert expectations or create interest. Meyer distinguished between designed and *'undesirable'* uncertainties in which there is no meaning or multiple meanings to be perceived (1957: 420). According to Meyer, undesirable uncertainty is a negative and a result of error or accident.

Timbral ambiguity, as any ambiguity, can serve to increase meaning, as Meyer put it, and therefore increase interest. It can also make content poetic, as per Shklovsky, through defamiliarisation.

A dynamic dichotomy can now be drawn out:

Familiar	Strange
Certain	Uncertain
Practical language	Poetry
Single meaning	Ambiguity
Ordinary/mundane	Extraordinary

Table 1.1. A dynamic dichotomy: defamiliarisation turns familiar content strange or more poetic. As a result, or in the process, it generates more interest. Such is the case with ambiguity.

It is important to note the right column does not stand for 'good' and the left does not stand for 'bad'. The column on the right exists thanks to the one on the left. For example, ambiguity is interesting because it challenges the ordinary, certain and familiar. Without the

items on the left, there could be no ambiguity; for the act of defamiliarisation to have meaning, it must be applied to familiar content.

For example, take timbral ambiguity: when we combine familiar flute and clarinet sounds to create unfamiliar, integrated sounds, we defamiliarise the flute and clarinet timbres. The result is ambiguity, which also provides added interest: the new combined sound is stranger than its two components on their own and it is a relatively nuanced sound. There are other ways to defamiliarise individual timbres. For example, using a novel playing technique or manipulation with music technology. However, in this research, I create timbral ambiguity by combining sounds or in other words, integrating two or more timbres.

Jonathan Harvey experimented with and wrote about combining timbres to create new integrated sounds, which he intermittently referred to as 'hybridisation' of timbres (Harvey 1986; Vandenheede & Harvey 1985). An early example of Harvey focusing on sound hybridisation in his practical work is *Mortuos Plango, Vivos Voco* (1980/2013), where he electronically combined choir boys' voices and church bells into new integrated timbres. A late and more complex piece of his is *Speakings* for orchestra and electronics (2008). In *Speakings*, combined orchestral instruments and the voices of 11 soloists, with help from real-time effects, making it difficult to distinguish between the groups. The integrations yielded less familiar, timbrally ambiguous sounds.

All initially unfamiliar artistic devices, such as the above, stand to become less strange the more audiences are exposed to them. As such innovative devices' (ambiguity included) novelty stands to diminish over time, a question arises: can ambiguity add value, beyond short-lived novelty, to music?

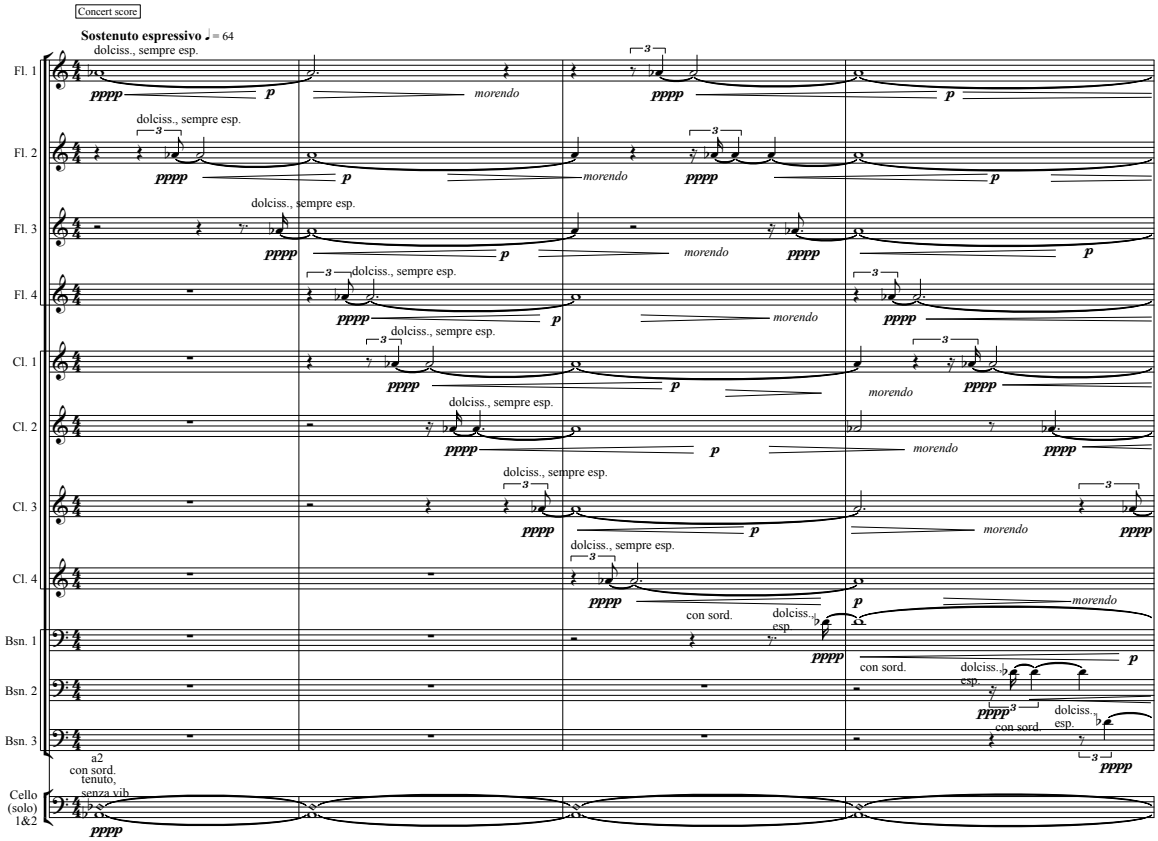
Ligeti's *Lontano* (1967/1969), a piece praised by Harvey for the 'timbral experience' it delivers, is an example of such added value. Richard Steinitz wrote about the piece: '*Lontano is a study in opalescence, in slowly evolving timbral and harmonic transformation (…) Within these textures, timbres and harmonies ebb and flow*.' (2003: 152-153). Julian Anderson labelled it '*…an exploration of timbre in orchestral contexts through density and slowly transforming textures*' (2000: 8). The focus in *Lontano* is said to be on timbre, harmony and density. Yet, the 'ebb and flow', a dynamic quality in the texture, is as dominant a feature in *Lontano*'s 'timbral experience'. The experience of listening to *Lontano*

appears to be textural as it is timbral. Thus, the piece is an example of using timbral ambiguity to design a textural experience.

Timbral ambiguity by combining sounds occurs right at the beginning of *Lontano* (ex. 2.I.1). Flutes and cellos, playing harmonics, double one another with an identical pitch (A flat) and are joined un-noticeably by clarinets. The clarinets subtly change the overall sound as they become louder; an integrated timbre, a sound group, is created on the expense of its participating individual timbres. It then becomes difficult to distinguish these timbres. Ligeti, as a means of musical development, then adds more winds, brass and a new pitch, which all bring more contrast. More tension is introduced and heightened as a means of subtle development. From there to measure 41, the music develops towards timbral diversity. However, it briefly returns to an emphasis on similarity at measure 41, where the orchestra halts on high Cs.

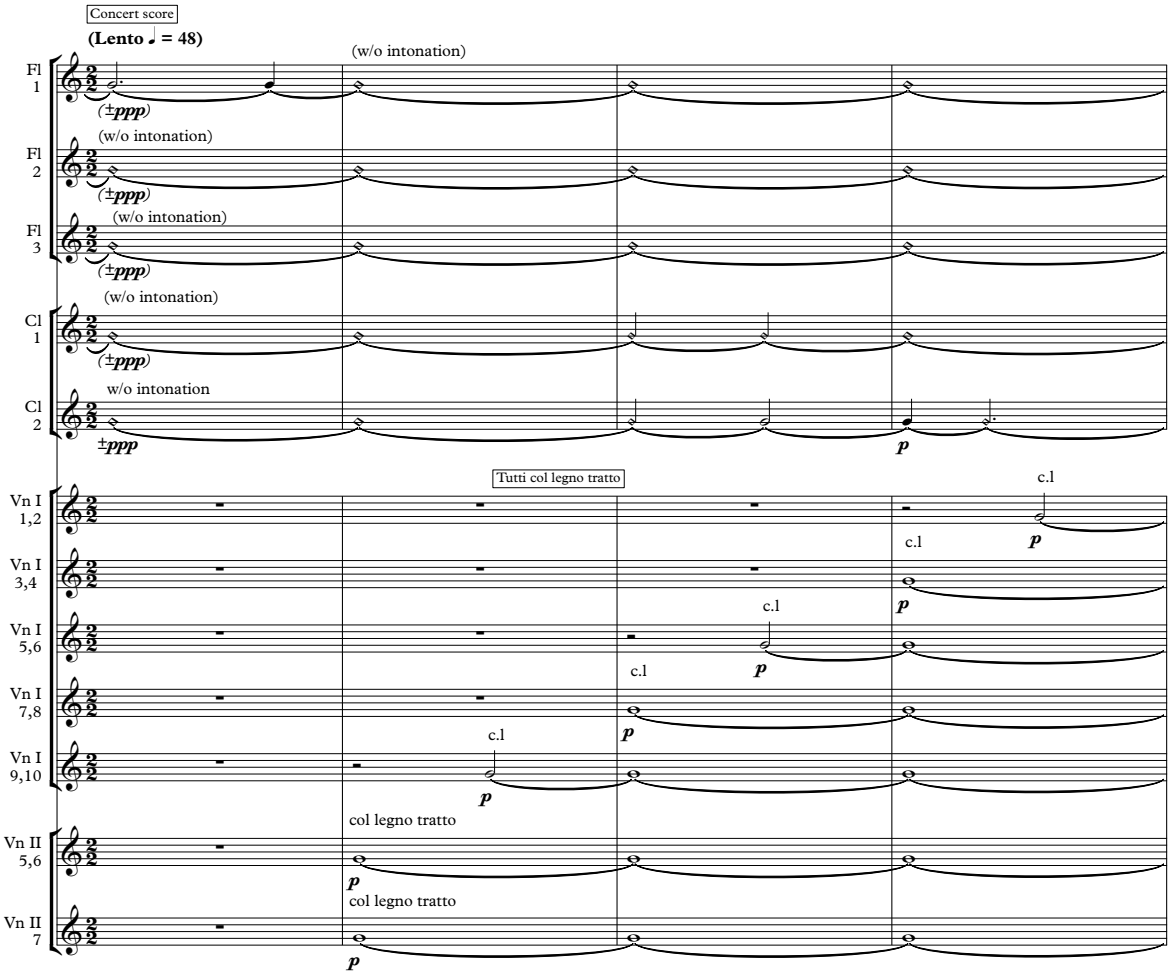
In summary, the identical (flutes), related (flutes and clarinets) and integrated develop into contrasting and diverse. This is manifested in how combined flute and clarinet timbres are gradually joined by a full orchestra, featuring diverse and contrasting, rather than integrated, sounds. Thus, timbral and textural *ambiguities* decrease towards timbral and textural *distinctions*. This renders the *levels* of timbral and textural ambiguities *developing parameters*, hence of value in addition to these ambiguities' serving as instruments of novelty.

Per Nørgård's *Symphony no. 2* (1970) opens on a flute playing a sustained G above middle C (ex. 2.I.2). It is gradually joined by other instruments of increasing timbral dissimilarity. Both the use of just one pitch and timbral similarity create tension and anticipation for timbre and pitch to become more diverse. As contrasting timbres are added, so do various other pitches. In summary, timbre and timbral ambiguity levels function here as both independent developing parameters and supporters of other developing parameters as pitch.



Ex. 2.I.1. György Ligeti, Lontano, bb. 1-4. Identical or related timbres integrate into an ambiguous sound, in which their individual timbres are difficult to discern. As the piece progresses, timbral contrast increases and individual timbres become more distinct. This will happen in conjunction with and, in some cases, result from more variety in articulation, pitch, harmony and dynamics to dramatic effect.

Kaija Saariaho uses timbral ambiguity in similar ways to Ligeti's in *Lichtbogen* (1986). The piece opens on an alto flute, instructed to play without vibrato, finger an F sharp while producing a 'breath tone' and fade the tone out in favour of a pitched tone (ex. 2.I.3). This initially produces a nuanced sound of mostly breath, with a hint of the fingered pitch. As the breath sound gives way to the pitched tone, the sound becomes a familiar alto flute's f sharp. Unperceived, string instruments join playing the same pitch, also without vibrato and bowing over the fingerboard to better match the flute sound, while the alto flute fades away un-noticeably in bar 3. The strings are instructed to gradually move their bow away from the fingerboard to their default bowing position, in between the bridge and the fingerboard and to gradually add vibrato.

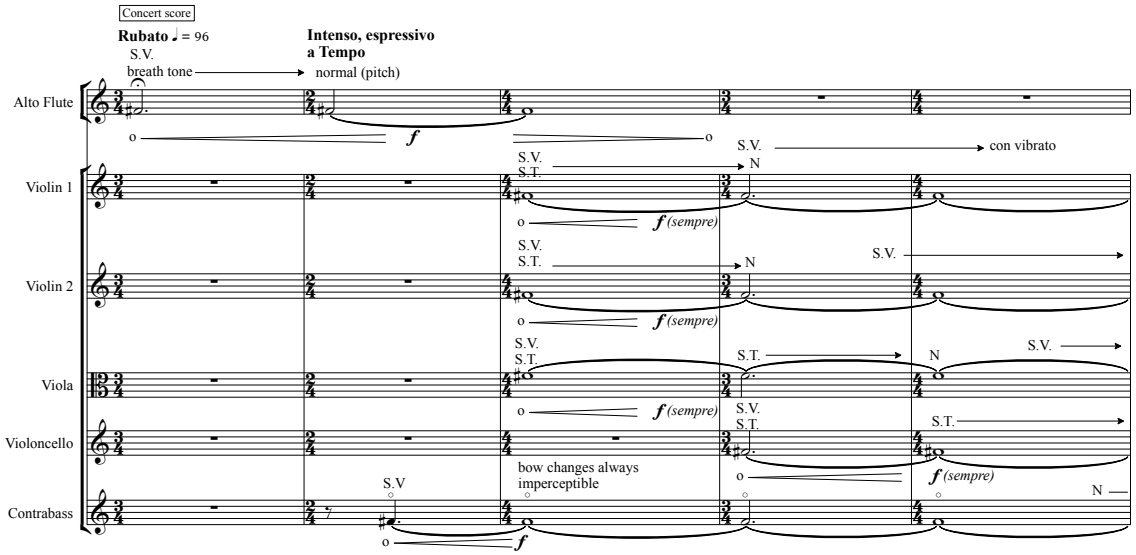


Ex. 2.I.2., Per Nørgård, Symphony No. 2, bb. 6-9. A gradual process of growing timbral contrast. Flutes are joined by clarinets and later violins, playing nuanced sounds, designed to be almost unnoticed, but enrich the ensemble's overall sound. The diamond shaped note-heads demand 'no intonation' – less pitch and more breath. Col legno tratto on the strings is indicated to create 'an almost in audible "whispering" scrape…', as annotated by the composer in the score. The result: an ambiguous blend of unfamiliar sounds, growing apart and more discernible as the piece progresses.

One function of these gradual changes is adding subtle individual timbral distinctions to a timbrally ambiguous combination of sounds. The changes are staggered to increase the distinction effect. Another function of these changes is the adding of interest through subtle variation and contrast. The music then progresses gradually to timbrally diverse textures with varied articulations in the strings and as other instruments join in, playing different pitches. The trend of gradual or sudden changes from relative similarity to great contrast continues throughout piece.

The essence of *Lichtbogen* cannot be characterised without the aspect of timbre and its development in the piece (Anderson and Saariaho 1992: 617). In addition, the level of timbral

ambiguity, functions as a standalone developing parameter. It also helps emphasise other parameters as density, harmony and rhythm.



Ex. 2.I.3. Kaija Saariaho, Lichtbogen, bb. 1-5. Saariaho blends an alto flute with string instruments, creating a nuanced, ambiguous integrated timbre with gradual and almost imperceptible changes through the use of dynamics (instruments are instructed to begin playing as quietly as possible).

Part of the context Harvey used in his article *Mirror of Ambiguity*,[6] was works by composers such as György Ligeti and Gérard Grisey. Both extensively explored timbre in works featuring complex and dense textures.[7] Grisey and Tristan Murail are considered founding members of the spectralist movement and Ligeti an influential predecessor/contemporary. Joshua Fineberg claimed spectralist composers foreground timbre in their practice (2000: 2-3).[8] This thesis and portfolio do not draw direct influence from spectralism's scientific side, nor do they consistently foreground timbre. They do explore its aesthetic value, defamiliarising function, effects on other parameters and aesthetics and, most crucially, its role in musical textures.

[6] See Introduction, pg. 10.

[7] Ligeti's *Lontano* and Grisey's *Vortex Temporum* (1995) have directly and indirectly influenced the portfolio. As the only direct influence of the two, *Lontano* is investigated in this chapter while the latter is not.

[8] Fineberg wrote: '*they consider music to ultimately be sound and see composition as the sculpting in time of those sounds that a listener will hear. All other shared attributes might change with time, but this attitude towards music and musical perception is the true hallmark of a spectral composer'.*

In summary, timbral ambiguity can add interest to music. Initially, as a tool of innovation and subversion of expectation through sound, but also to evoke wonderment, mystery and surprise. In addition, timbral ambiguity can function as both a standalone developing parameter and a supporting element of other featured parameters as melody or harmony.

In the next sub-chapter, I will contextualise this research's main area of interest: the relationship between timbral and textural ambiguities.

II. Textural ambiguity: distinction vs integration – individuals vs groups

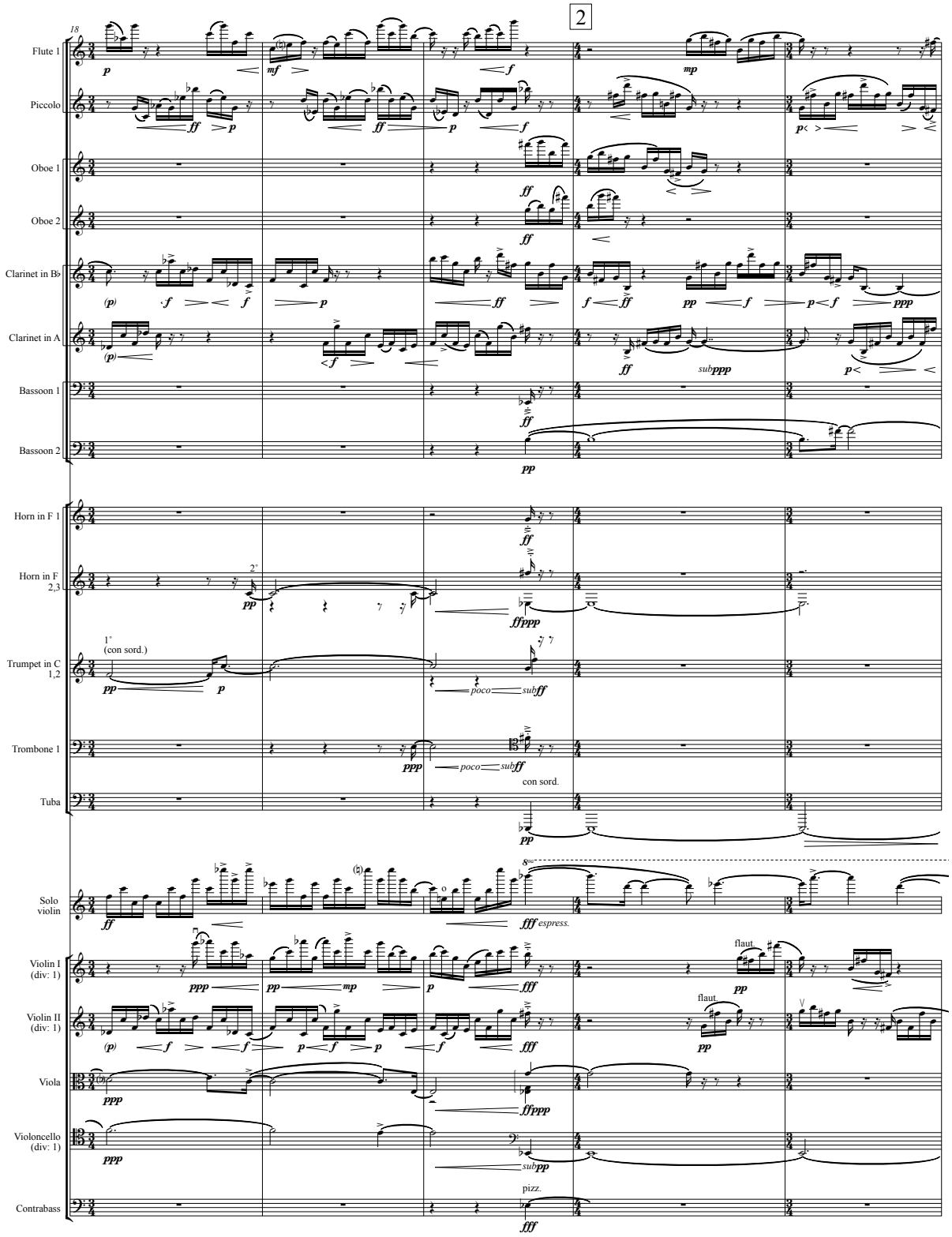
As I wrote earlier, I connect the memory of looking at the texturally ambiguous Hendrix painting to what Jonathan Harvey wrote about the magic of the 'timbral experience'. As such, it is also related to Richard Steinitz's 'ebb and flow' in Ligeti's textures. These textures are not only subjectively beautiful, but also stimulated re-creation (the mental participation in the artwork) due to their ambiguity. That kind of experience, whether looking at record shop amateur art or listening to influential twentieth century pieces, has brought me to compose texturally ambiguous music. Following examples from the works mentioned before and others to follow in this chapter, I turned to timbral ambiguity to explore textures in my own music.

Thomas Adès challenged traditional textural relationships in the first movement of his violin concerto, *Concentric Paths* (2005), by using timbral ambiguity. Adès obscured the distinction between soloist and ensemble in the piece as an integral part of the musical development. The ambiguous relationship between the two entities serves as a developing and structure defining parameter. The composer intersects phrases played by instruments in the orchestra, exploiting their timbral similarities to seem to appear and disappear from within each other. Significantly, the solo violin itself blends at times with the orchestra, mid phrase. It moves at a fast pace between background and foreground, as orchestra members do the same (ex. 2.II.1).

Adès's writing exploits perceived timbral likeness to multiple ends. Soloist and instruments or sections in the orchestra appear at times to emerge one from the other and vice versa, which can be heard as a cause-and-effect relationship. Thus, it provides the music with an appearance of having logic, a rationale. It aids a natural-seeming flow, as phrases and textural

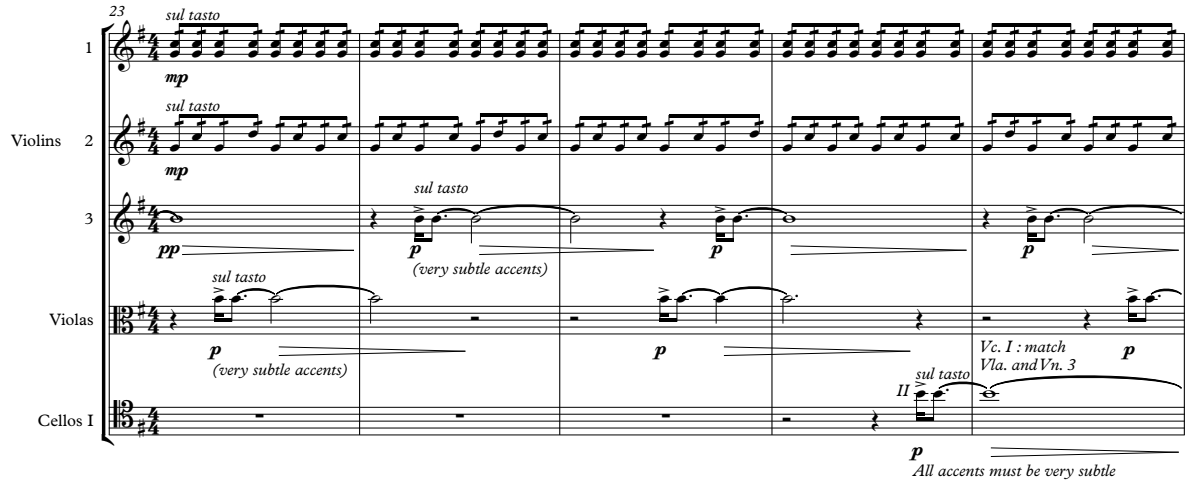
layers are weaved together seamlessly.[9] Neither orchestra nor soloist can be seen as initiators of the cyclical cause-and-effect sequence, from as early as the first beat. This strengthens an illusion of reason in the piece: no sound appears without another having triggered it. This characteristic of the movement is made possible with textural and timbral ambiguities.

[9] Distinctive examples of exploiting timbral similarities for integration in Adès's orchestral music can be also found in the opening sections of *Tevot* (2007) and *In Seven Days* (2008).



Ex. 2.II.1. Thomas Adès, 'Concentric Paths: I. Rings', bb 18-22 (score in C). Swift, but carefully timed, rises and falls in dynamics and a constant overlapping of phrases in subtly differing timbres (i.e., flute and clarinet), challenge the roles of soloist and accompanist in the high woodwinds, high strings and the solo violin. The resulting timbral ambiguity facilitates textural ambiguity as it reduces the distinction between the soloist and the orchestra.

In the first movement of John Adams's *Shaker Loops* (1982), written for string orchestra (originally for septet), timbral similarity is used to eliminate individuality as to create larger entities. Adams makes it intentionally too difficult, and thus unimportant, to discern which instrument/s occupy the background or foreground. The aesthetic is of integration. This is apparent not only in the arrangement and composition of sounds, but in the verbal indications in the score as well (ex. 2.II.2)



Ex. 2.II.2., John Adams, 'Shaker Loops', bb 23-27. Measured tremolo in the 1st violins and 2nd violins serve as background to the material in the 3rd violins, violas and cellos. However, these textural layers are ambiguated due to timbral similarity: all instruments play sul tasto, all accents are instructed to be 'very subtle' and literal instructions are given to match other instruments. The apparent objective is obscuring individuality for an appearance of the music emanating from a larger entity, an integrated new whole.

It is important for the discussion on larger entities, integration and ensemble sounds to review certain terminology in critical thought on ambiguity. In response to William Epson's influential book, *Seven Types of Ambiguity* (1930), Kris and Kaplan named five types of ambiguities. Two of these ambiguities are relevant to this thesis as follows:

1. Additive: '*In additive ambiguity the separate meanings, though still alternative, are no longer fully exclusive but are to some extent included one in the other'* (1948: 418).

2. Integrative: *'We call an ambiguity integrative when its manifold meanings evoke and support one another. (...) They interact to produce a complex and shifting pattern; though multiple, the meaning is unified'* (1948: 420).

One can argue the *Lichtbogen*, Nørgård's *Symphony No. 2* and *Lontano* examples can be perceived as employing *additive* ambiguity. This claim holds water, as some listeners may discern distinctive individual instrumental timbres within the examples' timbral combinations, even if momentarily. In that sense, the individual sounds *add up* to a new sound with their individuality still perceptible. However, it may also be claimed the overall timbres in the examples are of *integrative* ambiguity: they demonstrate complex new wholes in which individual timbres are mostly imperceivable, or their individuality is perceivable, but negligibly so.

Jonathan Harvey strongly stressed his desire to integrate sounds but on the condition of their individuality remaining perceptible:

> *'So one is forced to consider that all these exotic individuals (…) are indissolubly themselves and yet they belong to a larger entity. The aesthetic urge towards integration without losing individuality is my motive.'* (1986: 186)

Harvey appears to have acted to create *integrative* ambiguity, his 'larger entity'. However, his ultimate intended objective seems to be *additive* ambiguity – maintaining perceivable timbral contrast within the larger entity. He wanted a flute-clarinet combination to yield a new sound without losing the perception of the instruments' individual timbres.

That it is difficult to say which ambiguity is in effect in the musical examples shown earlier or in Harvey's approach to timbral combinations is important and perhaps inherent to this research. After all, the term 'ambiguity' itself can be ambiguous, as it may at times have multiple possible meanings (Foerst 2017: 653). Within this multiplicity, I have formed my own objective researching combining sounds in my music. It is different to Harvey's: I aspire to integrate sounds by *reducing* individuality. For me, using individuality or, rather, *contrast*, is merely a means to an end. I aspired toward integrative ambiguity: creating complex and more unified new sounds. How integrative, as in what level of contrast I would use and in what ways, remained to be found in the practical component of the research.

And so, timbral ambiguity's function in this research is primarily the ambiguation of texture. To that end, I seek to obscure the individuality of instruments and electronic sounds in favour of an ensemble sound, an integrative sound. That same integrative textural ambiguity is how I

remember experiencing Hendrix's image and its background: both magically made of the same colours and brush strokes, both symbolically made of fire.

III. Stylistic and aesthetic influences: minimalism and music technology

One of the main features of my portfolio is repetition. In music, it is commonly associated with minimalism, but is also common in pop and most electronic music genres. My fondness of repetition is partially related to my interest in efficiency. Minimalism is in itself a striving for efficiency: it aims to be effective by using as little material as possible.[10]

In search of repetition techniques, I have been borrowing from the minimalist style and the research also examines how timbral and textural ambiguities affect repetition. As part of that, I use repetition generating music technology in my electronic and electroacoustic works. Further, I mimic their common uses in some of my acoustic works.

The following elaborates on minimalism and music technology in this project:

i. Minimalism

Timothy Johnson listed principal minimalist techniques (1996: 751). Included in those, were an even rhythmic texture, simple harmonies and an absence of extended melodic lines. He asserted *'the minimalist technique often produces long, harmonically static passages characterized by consonance and built from repeated patterns and pulses'.*

The above is evident, features and aesthetically defines my portfolio to a notable degree. This necessitates adding minimalism to the research's context. Aesthetics of the style, techniques commonly used in it and my subjective enjoyment of it have served as either guiding principles (aesthetics and techniques) or intuitive re-enforcement (subjective enjoyment) in composing the portfolio.

[10] Merriam-Webster dictionary defines 'efficient' as: 'capable of producing desired results with little or no waste (as of time or materials)'.

Examples of minimalist features listed by Johnson are prominent in so-called classic minimalism as well as minimalist works from the 21st century. 'Classic' refers to 1960s music by the likes of Terry Riley, Steve Reich and Philip Glass. More recent minimalists who have influenced me include David Lang and Michael Gordon, also known as founding members of the American Bang-on-a-Can collective.

ii. Music technology

A sub-genre of classic minimalism is process music. In his process piece, *Come Out* (1966), Steve Reich had two reels of tape play the same short, recorded bit of speech at different speeds in a loop. The result was a slow process of change in how the speech sounded, the counterpoint between the tapes, the level of the phasing effect and the listener's decreasing level of ability to perceive words being said. It was a composition derived from a rigid technological process.

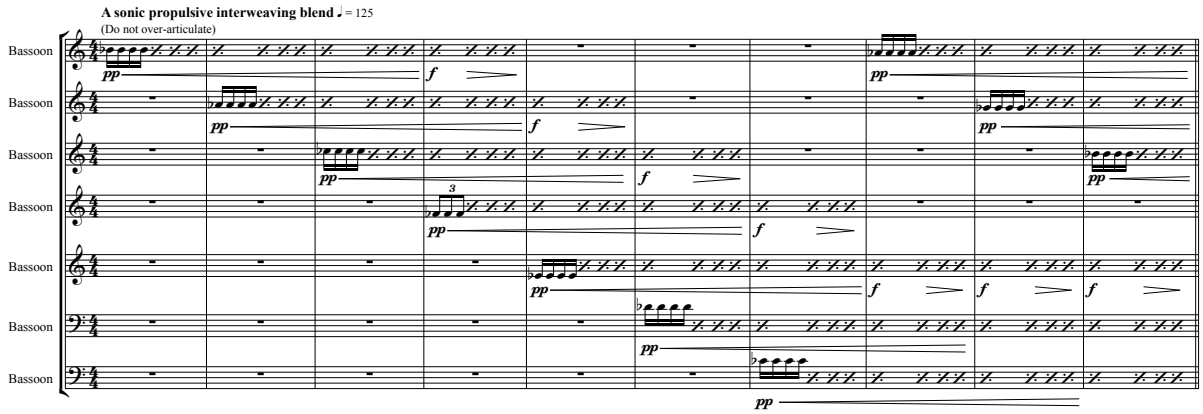
The piece is not made of melodies or harmonies and its process of composition was minimal as well. In the composing of such a piece, a mechanical process dictates the result with little composer involvement. Composition is an artificial act of putting sounds together, but *Come Out* demonstrates how use of machines can make musical development appear natural.

In nature, we appreciate the beauty such things as waves crashing on the shore, free of human superimposition. As Reich himself once wrote, *'Though I may have the pleasure of discovering musical processes and composing the musical material to run through them, once the process is set up and loaded it runs by itself'* (1968/2004: 34). 'It runs by itself', as a natural process would. In contrast to natural processes, music is a human made process, contriving the appearance of reasoning behind one sound's following of another. In process music, the imposition of human will is restricted to minor decision making. Most of the composition is then left to a mechanical process. The credibility of programmed behaviour is thus reminiscent of natural processes. Like waves crashing on the shore: random and unpredictable to human eyes, but as forces of nature, inherently logical and reasoned, part of a larger *system*.

Steve Reich moved on to mimic the composition process of his tape pieces in works for acoustic instruments. In Piano Phase (1967), he applied the mechanical behaviour of two tape

reels running the same audio at different speeds in a piece for two pianos. Reich replaced the looped recorded speech with a short piano phrase, with one piano starting a beat later every four repetitions. The result was acoustic phasing and continuous contrapuntal and harmonic variation. By *abstracting* the behaviour and use of music technology from one medium to another, Reich *defamiliarised* both the original technique and the practice of acoustic composition. Phasing was thus used as a concept, an aesthetic and a supporting developing parameter for his repetitive piece. Embodying the minimalist concept, it was efficient to great effect.

Michael Gordon mimicked the behaviour of a delay effect in *Rushes* (2012), while demonstrating a relationship between timbral ambiguity and texture. In the piece, seven bassoons play repeated single note phrases of changing rhythms and lengths (ex. 2.III.1). By changing dynamics gradually in each phrase, Gordon creates an illusion of delay effects in the bassoons. The pseudo delays, combined with a various single-note phrases, compose intricate, ambiguous textures. In these textures, instrumental individualities become nearly indistinguishable and thus unimportant. Rushes is an example of integrative ambiguity and of how mimicking music technology helps create timbral ambiguity and serves a textur*al* purpose.



Ex. 2.III.1., Michael Gordon, 'Rushes', bb 1-10: mimicking a delay effect in an acoustic bassoon ensemble results in an ambiguous texture in which perceivable individuality is reduced to a minimum in favour of an integrated and complex larger entity.

In some of the acoustic works in my portfolio, I abstract the behaviour and the use of the *arpeggiator*, a sequencing synthesis device, commonly used in pop music. The arpeggiator generates repetition of single notes and/or broken or block chords. I first started mimicking

the arpeggiator in acoustic music after composing electronic music with it. Doing this helped strengthen my acoustic music's consistency, as in process music.[12]

In addition to mimicking music technology, I make use of it in the electronic and electroacoustic works in the portfolio. The most relevant technology to this research has to do with repetition and ambiguity. This includes looping, delays and the reuse of live material in electroacoustic works, a practice I have named 'audio recycling'.[13]

IV. Summary

1. Timbral ambiguity has served composers in various ways, to include: as an independent developing parameter; support for other parameters such as melody, harmony and rhythm; a tool of defamiliarisation; a facilitator of textural ambiguity; a means of innovation.

2. Integrating timbres can lead to the formation of groups of two or more sounds in which individual timbres are difficult to perceive. The emphasising of sound groups over individual sounds through integration is prominent in the portfolio and the main aesthetic objective behind the research.

3. Timbral ambiguity can play a central role in composing complex and/or ambiguous textures. However, timbral contrast/individuality – an antagonist of timbral ambiguity – is also found in ambiguous textures. This research examines the use of timbral contrast in ambiguous timbres and textures.

4. Minimalism is a dominant influence on the portfolio. Its characteristics of repetition, absence of extended melodic lines and simple harmonies feature in the original works presented here. In noting that, important context is provided for their analysis.

5. Music technology is directly and indirectly used in the portfolio. I use it in electronic and electroacoustic works, while in others it serves as an aesthetic and technical guide. Specifically, the arpeggiator, a sequencing synthesis tool, is mimicked and used as a guide in

[12] For more on the arpeggiator see Works, II, pg. 47.
[13] I explain 'audio-recycling' on pg. 36 and expand on the use of effects, looping and editing in Works, subchapters I, III, V and VI.

some of the portfolio's acoustic works. My approach draws influence from composers as Steve Reich and Michael Gordon, whose work features repetition and the mimicking of music technology in acoustic music.

***

In the next chapter, I will describe and analyse the portfolio works and address the challenges posed by the research's objectives and questions.

WORKS

I. *Glimmers*

Glimmers is an electroacoustic piece for Bb clarinet, vibraphone and pre-recorded stereo audio. It was performed at the Sonorities Belfast festival in 2018 by Rob Plane and Simon Limberick and in 2019 at St. David's Hall in Cardiff by New Art Sound (NAS) Duo.

In this chapter, I will explain the objectives and concepts behind the music, describe the composition process, analyse the piece and reflect on the research's primary interests.

Concepts: timbral relationships and integrated sound

After a preliminary discussion about the piece's desired approximate duration and the available instrumentation, I proceeded to envision and conceptualise the music. At that stage, I hoped to achieve the following:

1. The integration of the instruments' timbres as to create a single entity[14]. This should lead to a new sound in which the instruments' individual timbres are difficult to distinguish.
2. The creation of integratively ambiguous textures. I imagined these textures could result from integrations of the acoustic instruments, but more so from their integration with the pre-recorded sound.
3. The discovery of any new sounds emerging from timbral integrations.
4. A better understanding of using timbral integration and ambiguity in the context of a piece.

Asked to choose between percussion instruments for the piece, I selected the vibraphone. Its inherent timbre and technical variety, as in mallet changes, bow use and the sustain pedal

[14] See Context, subchapter II, pg. 27-28 for integrative ambiguity and 'complex new wholes' or 'larger entities'.

promised timbral flexibility and possibly some timbral similarities to the woodwind instrument's timbre. This will be demonstrated later in the chapter.

Aspiring to achieve all four objectives elegantly, I hoped they would all inform and/or trigger one another. And so, I aimed for textural ambiguity (objective #2), the creation and discovery of new sound combinations (#1 and #3) and for integration which added value to the musical development and did not cancel any sounds in the process (#4). The guiding principle was therefore integrating the instruments in favour of a new whole and a new timbral identity. In this new whole, the clarinet and vibraphone identities would become obscure.

Process

Glimmers was conceived after receiving an opportunity to write for NAS Duo (clarinettist, Ausiàs Garigos Moràn̂t, and percussionist, David Merseguer Royo). The piece was written in two phases: the acoustic and the electro-acoustic. The acoustic phase involved composing on paper and notation software, workshops with the musicians and a recorded performance. In the electroacoustic stage, I edited and manipulated material from that recording to use as an added sound source to the live music.

i. Phase I: a score for an acoustic performance

With the rationale described in the previous sub-chapter in mind, I considered different clarinet and vibraphone sound options to integrate in the context of a piece. I then wrote a motif to serve as a vehicle for all four objectives and provide harmonic and melodic development. After this, I sketched passages using the motif and integrated sounds and met with the musicians to workshop the sketches.

Our workshops were crucial to composing the piece. To confidently compose with the imagined integrated sounds, we needed to examine such matters as how notes were struck or blown or the effects of dynamic balances and shifts. Experimenting with sound combinations through trial and error resembled the devising of a recipe. We worked with ingredients, quantities, methods and execution and remained open to unexpected discoveries.

In the process of discovering sounds and techniques to include and develop in the piece, the workshops also revealed a significant pitfall to avoid: *auditory masking* (henceforth: 'masking').

Masking is a state in which one or more sounds cancel another sound/s, making the cancelled sound/s unnoticeable, as opposed to difficult to distinguish. During the workshops, we noticed the clarinet would often timbrally dominate its partner to the point of masking it. This happened mostly due to a volume balance while playing the same pitches, but sometimes due to intricacies in the clarinettist's intonation. The result was a perception of clarinet timbre only, rather than a new and unfamiliar larger timbral entity – an ambiguous integrated timbre, neither clarinet nor vibraphone. And so, we found ourselves searching for sound combinations perceived to be in between states of timbral distinction and that of masking, combinations from which timbral ambiguity could emerge.

After our last workshop, I wrote the final acoustic version of the piece. The duo recorded it and later performed it live.

ii. Phase II: electro-acoustic

After the first phase, I thought there was still something to be desired in terms of dynamics and the depth and heights in pitch. There was a lack of textural density as well, which I saw as a deficit to be made up for. I decided on re-composing the live recording from phase I and add it to the piece. The addition would help make it more dynamic and dissonant and expand the register spectrum. Moreover, it would help me explore timbral and textural ambiguities further.

To this end, I abstracted and edited long and short sequences from the live recording and composed them with the following additional principles as guidance:

1. 'Audio-recycling': I wanted the pre-recorded material to be perceived as originating from the live music. To achieve that, I set a rule: the pre-recorded content can only be made of material that had already been played live. For example, the downbeat of bar 52 could only be used in the pre-recorded track *after* the live musicians had played past the downbeat of bar 52.

I needed to do this as the pre-recorded track use was compromising my reduced individuality principle: the pre-recorded content introduced more timbral contrast in the form of new textural layers as short loops and a beat. The potential variety of this new material brought on too many musical possibilities. The prospect of more timbral contrast and variety, could lead to aesthetic vagueness. An ‘audio recycling’ principle helped me set limitations to try and avoid such an outcome. It dictated every new pre-recorded sound in the piece was to be part of the same line of musical development I had been building upon. Specifically, I was aspiring to maintain a consistency of the motivic, harmonic, timbral and textural developments of phase I, while enhancing them.

‘Audio recycling’, my practical term for nonidentical reuse of audio material, is common practice in many genres, especially in popular music. The most straightforward technique for such reuse is looping. My approach is different as it allows for changes in the repetitions of the original. In addition, audio recycling in my music puts an emphasis on increasing ambiguity through sound integration.

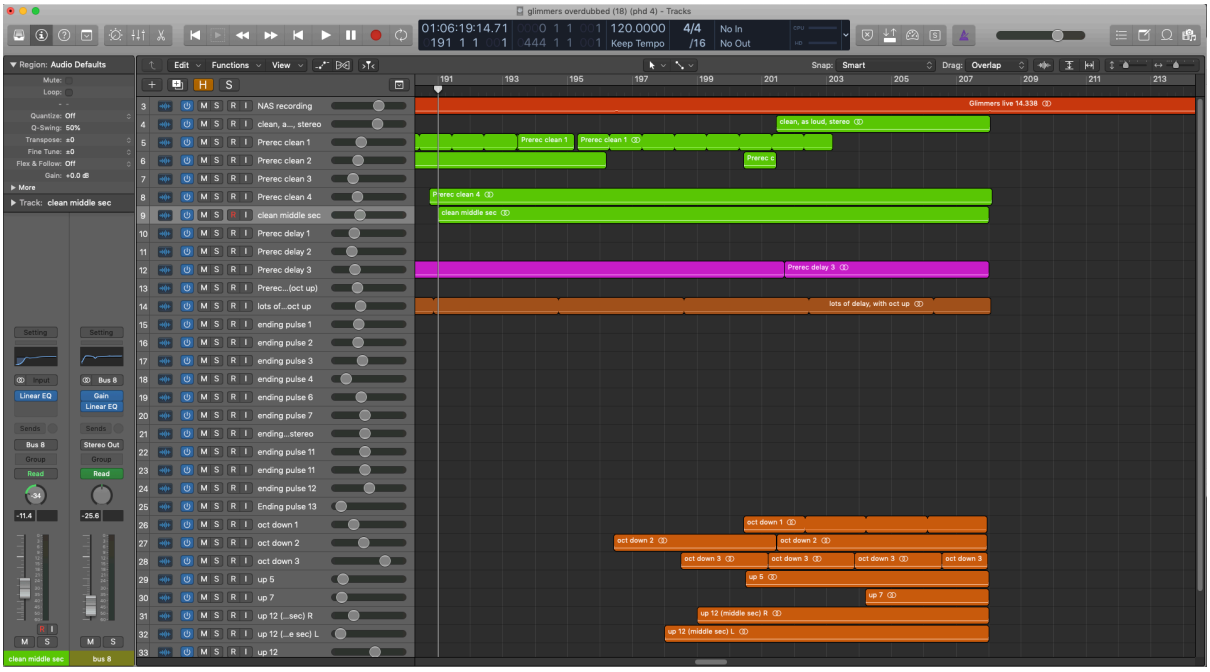


Fig 3.I.1. ‘Glimmers’, a screenshot of the Logic Pro session file. The red track is the live recording, which is muted during live performances. The other tracks are a mixture of clean (dry, without effects, with the exception of light reverb on some) and wet (with effects) edits of the live component.

2. Ambiguity between the live and recorded sources: in addition to the relationship between the clarinet and the vibraphone, varying degrees of integration of the live and recorded elements would add interest and a welcome complexity to the sound.

The final stage of the second composition phase was editing and mixing, after which the piece was ready for performance.

Analysis

The piece is composed in binary form. Section 1 (bars 1-248) is mainly characterised by strict time and a motif of combined crotchets and long notes (ex. 3.I.1). It is performed to a metronome click to synchronise the live component with the pre-recorded audio. The audio consists of manipulated and un-manipulated edited extractions from the acoustic version of *Glimmers*.

Section 2 (249-end) is characterised by rubato, long sustaining chords and a pulsating, more noticeably manipulated pre-recorded part. The live performance is synchronised with the pre-recorded track by approximation.

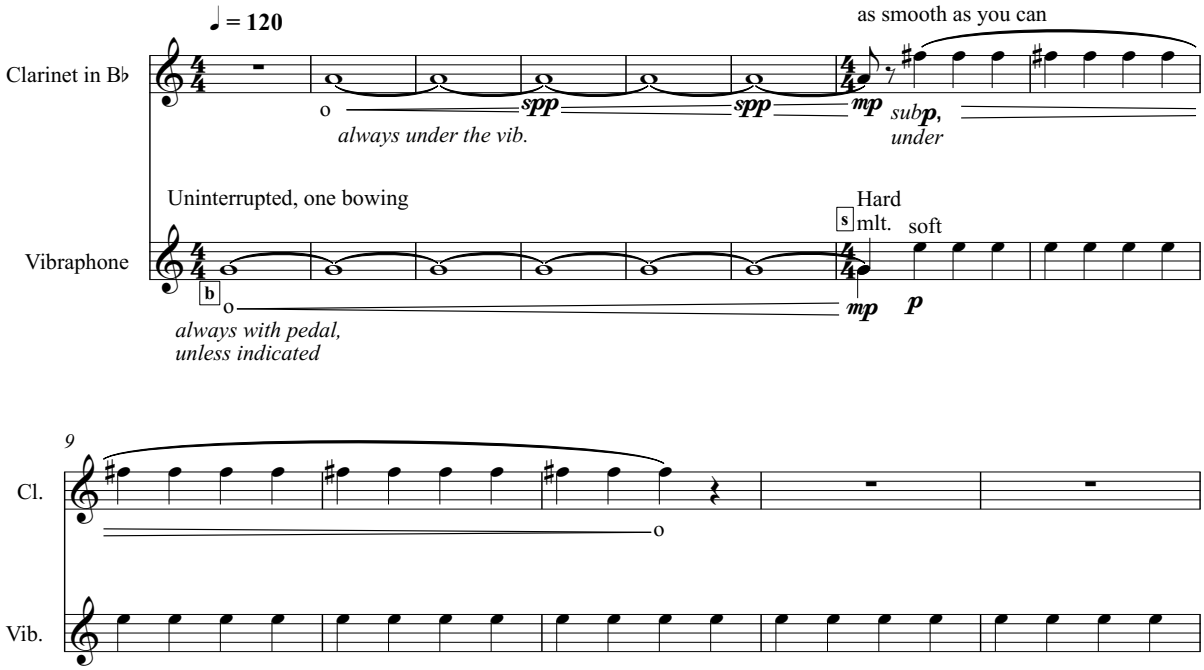
ii. Section 1 (bb 1-248)

The music opens on the motif (described above and seen in ex. 3.I.1), which serves as a traditional vehicle for developing parameters like melody, harmony and dynamics, as well as timbre and especially timbral ambiguity. Dissonance or tonality are not yet introduced in the early stages, with solely the pitches G and E used, but later serve as prominent developing parameters or, rather, musical tensions (fig. 3.I.2).

Consonance	←→	Dissonance
Unisons and two-note harmonies	←→	Complex/ambiguous harmonies & clusters
Implied major key	←→	Implied minor
Clear tonality	←→	Ambiguous tonality
Narrow scope of pitch range	←→	Enhanced registral depth and height
On the vibraphone: struck notes	←→	Bowed
Short notes	←→	Long
Quiet	←→	Loud
Thin textures	←→	Dense
Soft mallets	←→	Hard

Fig 3.I.2., Featured tensions/developing parameters in the 1st section (bb 1-248).

Timbral ambiguity here is aesthetic-defining as well as a parameter supporting melodic development and the featured tensions. As seen in example 3.I.1 and throughout the piece, the timbral integration is dynamic – subject to frequent variation. Changes in dynamics, articulation, pitch and the intervals between the two parts, all affect the integrated sound. This dynamic, a constant shifting within the integrated sound's texture, provides another layer of interest. It works alongside the tensions listed above, enhancing their effects.

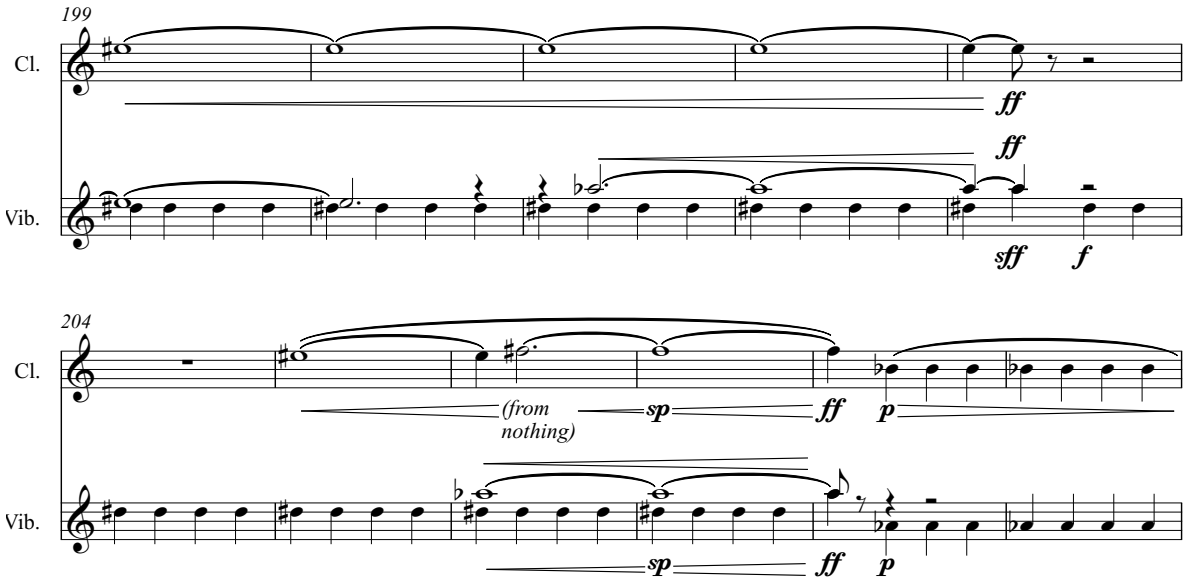


Ex.3.I.1., Part 1's motif. A mix of long and short notes with varying loudness and mallet changes to keep the timbre from stagnating and avoid masking. The unstable and everchanging character of the integrated sounds enhances the featured

components of the piece (rhythm, harmony and the tensions listed in the previous page) by providing more interest without stealing focus from them.

The motif repeats three times in slight variation in dynamics, length of sustained notes and quasi-fadeouts of crotchet notes as well as the alternating of long and short notes between the instruments and the sound combinations. What remains the same is the pitch material until bar 43. At that point, a third pitch is added and a new developing parameter, dissonance, is introduced. The amount of dissonance intensifies as part 1 progresses, along with the other developing parameter.

The pre-recorded sound enters in bar 83, replaying the first few bars of the piece. The track's G against the live Ab brings in more dissonance. Later, that track will also provide more density, scope of register and spatial and timbral effects. It will also take part in timbral integration and in adding to the counterpoint and harmony until it is cut off where the music reaches a climax at bar 208 (fig. 3.I.1 and ex. 3.I.1).



Ex.3.I.2., 'Glimmers' bb. 199-209 (at 6'35'' in the recording and represented in the Logic Pro screenshot as well – fig. 3.1). This figure shows the high point at bar 208 following a build-up. The music gets denser, more dissonant and more dynamic, with soft sounds rising to ff. It finally reaches a critical moment, at which the recorded track is cut off, leaving us with the fundamental timbres we started with.

After the climax, the intensity is gradually relaxed until the end of the section in bar 248. Featured tensions (such as dissonance level and textural density) go back to a state

resembling that of the opening (fig. 3.I.2). In addition, the pre-recorded track is cut off and sustained notes and moments without a pulse are introduced. Such pauses are a defining characteristic of the 2nd section. Here, they help facilitate a transition between the sections.

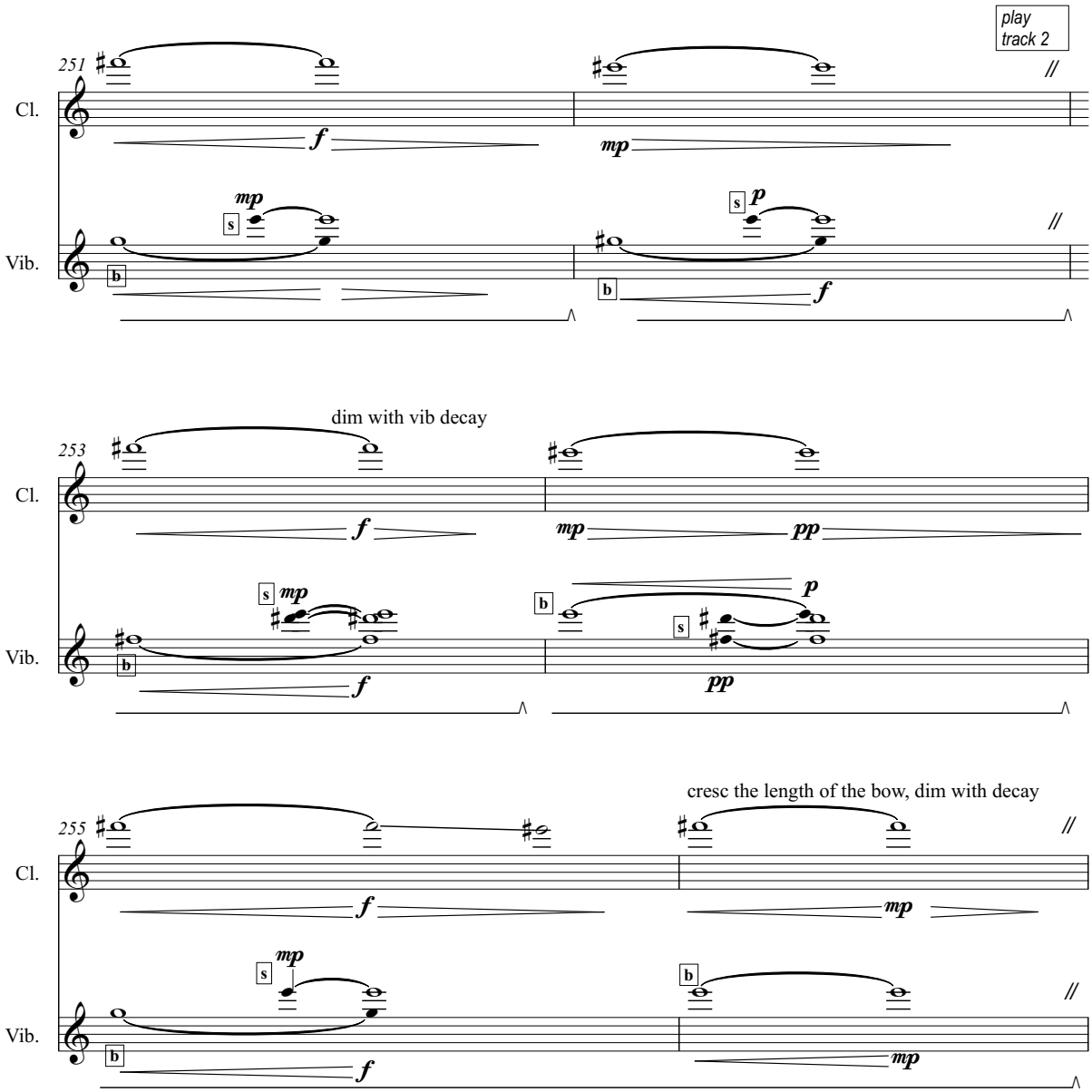
ii. Section 2 (bb. 249 – ending)

The 2nd section opens on a harmony-focused motif, accounting for all live-played material until the end of the piece (ex. 3.I.2). The first harmony is that of the ending of the previous section. Following harmonies revisit earlier moments in that section. A pattern is set: most bars start with anticipation, embodied by a long and crescendoing note, either in the clarinet or bowed on the vibraphone and a diminuendo starts when a note is struck on the vibraphone. The pattern goes through subtle variations such as changes to the harmony and/or the voicings, changes to playing techniques like mallet changes and glissandi, omissions of the struck note and note additions to the clarinet part. Other significant parameters are the dynamics and the level of dissonance. Both of which play critical roles in building tension in the live music and in pre-recorded and live integrations.

The pre-recorded track is more prominent in this section and provides pulse, density, depth and height of tone, dissonance, timbral variety and more ambiguity. The track is first heard at bar 253, replaying the contents of bar 252 against 253 (ex. 3.I.3). This clashes a D-sharp against an E, causing dissonance, which the recording will continue to do with more variety as the section progresses.

Unlike in the 1st section, where live parts were charged with providing a pulse, the recording takes that role in the 2nd section. It introduces a pulse in bars 254-255, by replaying material from the first section. Later, looping and delays help create a pulsating texture, aided by a digital pitch shifting plug-in effect. This effect is used to increase pitch variety. Most importantly, it is used to digitally create bass parts and high-pitched sounds from the recording of acoustic instruments which do not reach as low or high.

Some of the loops have abrupt endings. The purpose is to emphasise their being loops: identical and mechanical, tape-like repetitions. As the live performers are fading into the background in the final stages of the piece, they eventually leave the floor to the recorded sound. The emphasised looping is an antithesis to the acoustic sounds that opened the piece.



Ex.3.I.3., 'Glimmers', bb. 251-256. Richer harmonies and dissonances are introduced as the section progresses, for example the pre-recorded audio replays bar 252 against 253-254, adding a dissonant D-sharp. The ambiguous timbre of clarinet and bowed vibraphone and changes in their dynamics create a cohesive, yet undulating integration. It is an integration where any subtle shift impacts the overall texture (bb. 253-256).

Reflections on timbre, texture and 'audio-recycling'

Every compositional choice in *Glimmers* was made with sound-integration in mind. In my workshops with the musicians, I learned the key to ambiguous timbral integration was finding integration sweet-spots: states of timbral ambiguity in which no masking occurred and no distinct individual timbres were perceived. The workshops led to the discovery of new

ambiguous and unstable timbral identities. Unstable, as slight changes in performance would alter the timbre or even dissolve the integration.

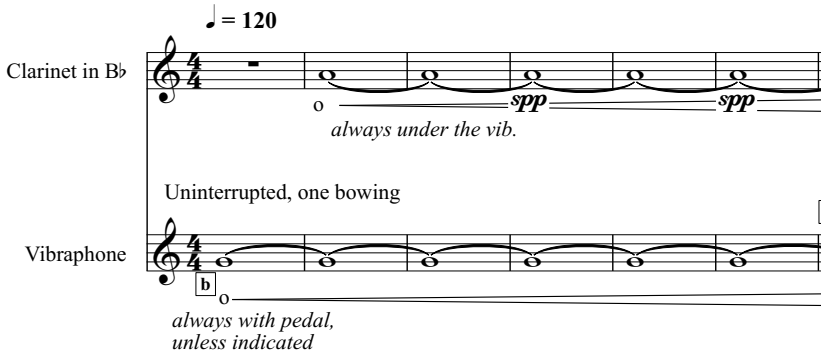
For example, the dynamic chords which populate the 2nd section (as described in '*Analysis: ii. Section 2'*) required trial and error and verbal discussions during workshops to find balances which would maintain the integration of the instruments in these chords, rather than having individual timbres stand out. Varying changes in loudness the different techniques called for within one chord were meant to create timbral instability as source of musical interest. However, in the first workshop readings, that instability led to timbral distinction. And so, the musicians and I worked to reach the right balances for timbral integrations using my feedback and guidance on one hand and their insight on the other.

My work on *Glimmers* helped me observe how masking on one hand and strong timbral distinction on the other can nullify timbral ambiguities and require my being aware of their potential adverse effects on my music. As described in detail earlier[15], when masking occurred in the workshops, only one instrument's timbre could be perceived while the other's became imperceivable and ineffectual. Thus, masking reduced the amount of interest added by timbral ambiguity without adding any of its own. I observe masking to be akin to Leonard Meyer's *'undesirable uncertainty'*[16]: an occurrence, which could result from error or oversight, accident and/or a composer's lack of understanding of the musical system within they are attempting to work.

The possibility of masking presented a challenge to be addressed from the first bars of the piece, as I discovered in my first workshop with the musicians. Masking would reduce integrated sounds' nuance and tension, thus reducing interest. That is why, for example, the clarinet has subtle accents in the first few bars of the piece (ex. 3.I.1). The accents create *timbral shifts*: fleeting moments of timbral contrast. These are fleeting enough to not disturb timbral integration and timbral ambiguity. This practice is reminiscent of the openings in Nørgård's *Symphony no. 2* and Saariaho's *Lichtbogen*.[17]

[15] See pg. 36.
[16] See Context, subchapter I., pg. 18.
[17] See Context, subchapter I, pg. 22 & 23.

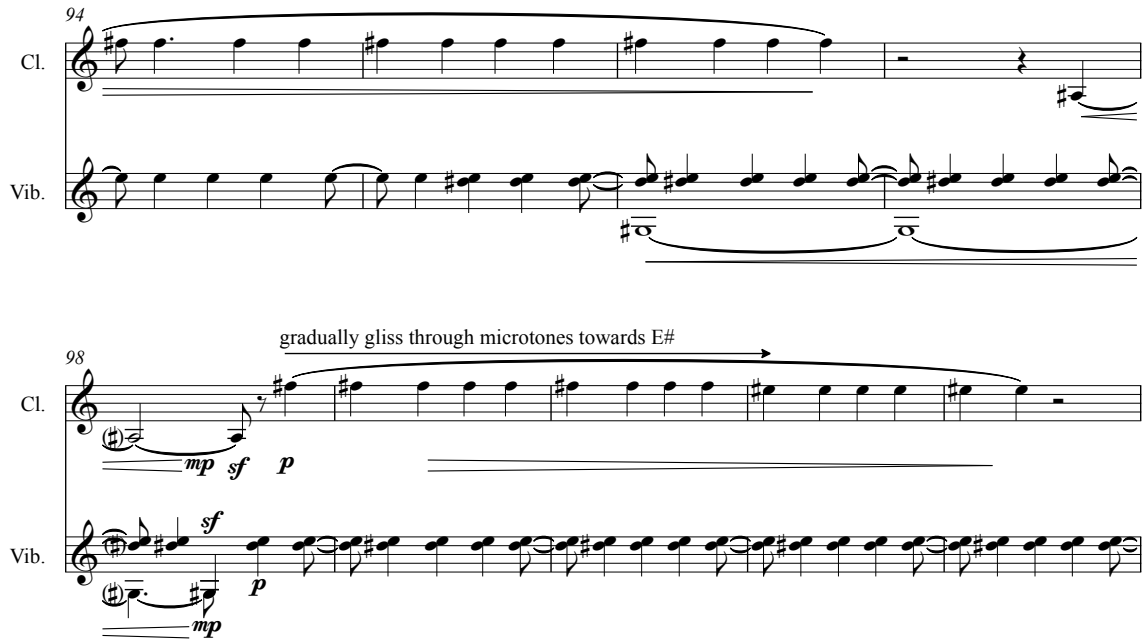
At low levels or for short periods of time, some timbral distinction/individuality/contrast proved necessary. Thinking of integration methods as recipes of sorts, timbral contrast is used in *Glimmers* like salt in chocolate cake. It is used sparingly and meant to often go unnoticed and yet enhance all other flavours. Throughout this research, finding timbral contrast sweet-spots remained key in my compositional process.



Ex. 3.I.4., 'Glimmers', bb. 1-6. *The first bars of the piece: an ambiguous sound with inner-movement. The subtle accents are timbral shifts, which provide some definition and a sense of motion within the musical fabric. Thus, they add a dynamic quality to texture, but not draw attention to the clarinet timbre. This is made possible with help from the instruction, 'always under the vib.', and the accents' short durations – they remain but momentary timbral shifts.*

Dissonance, another form of contrast, is used to enhance the effects of ambiguity by momentarily emphasising *individual* sounds. It is another method of creating momentary timbral shifts. The changing intervals, some being more dissonant than others, alter timbres of the combined sounds. As an example, using unisons and minor seconds successively was highly effective for these purposes (ex. 3.I.4)

Another way to keep timbral combinations from monotony or the masking effect in *Glimmers* is syncopation. To momentarily clash individual timbres, using dissonance and syncopation added interest in the form of timbral variation without causing sustained timbral distinction. The syncopations, as the use of dissonance, facilitate momentary timbral shifts. It is important to note that rhythmic variety and dissonance, as tools of creating contrast were used sparingly (as momentary shifts), as their purpose was to support and enhance, not take centre stage (ex. 3.I.4).



Ex. 3.I.5., 'Glimmers', bb. 98-102. Narrow intervals, the gradual change in pitch in the clarinet and the syncopation draw attention, as generators of contrast, to the subtle differences in timbre, but not enough to break the integration of sounds. Contrast – emphasis on individuality – is momentary: it manifests as momentary shifts in sound. The shifts do not dissolve the timbral and textural ambiguities, but embolden them and add movement and interest to the music.

Audio recycling helps avoid the pitfalls of the limitless possibilities of pre-recorded audio. Made of used material, recycled audio use enforces consistency and is an economical tool. It curbs excess variety yet is a content and variation generator. Further, it adds new interest in the form of timbral and textural ambiguities.

Summary

Combining sounds in *Glimmers* was a continuous and everchanging act of integration. It resulted in ambiguities at times more integrative and at others more additive.[19] Additive ambiguity served in *Glimmers* to embolden the impact of integration. In other words, I found raising the level of timbral contrast to create additive ambiguity provided clearer context for integration, without resorting to strong timbral distinction – an unambiguous state, foreign to the piece.

Masking, the cancellation of sounds by other sounds, would occur in composer-musician workshops during the composition stage. The phenomenon would nullify ambiguity in favour

[19] For additive and integrative ambiguities, see Context, subchapter II, pg 27-28.

of the perception of timbral distinction. For example, the clarinet timbre would often dominate and cancel the vibraphone's, and the latter's presence and contribution to the texture would be lost. Thus, masking was to be avoided in the piece in favour of a balance between integration and individuality, as discussed above. This balance is manifested in states of timbral additive and integrative ambiguities and the avoidance prolonged states of distinction on one hand and masking on the other. It was achieved in practice through discussions in the workshops and the use of notated instructions: musical and verbal (ex. 3.I.1).

Momentary timbral shifts are used in the piece to move between additive and integrative states. The result is an added dynamic quality, a sense of motion, within the musical texture or within integrated sounds. The shifts are facilitated by timbral manipulations created by notated volume changes, syncopation and dissonance, by music technology (in the audio track) and by unforeseen subtle nuances in the performers' execution, which are outside the composer's control.

An important finding arising from *Glimmers* is the crucial role of composer-musician workshops in the writing period of pieces foregrounding novel timbral integration. Insight into the effects of masking, contrast levels and timbral shifts or observing balance issues and discovering new sound combinations were made possible thanks to these collaborative workshops. Had we not held the workshops, I would have lacked the necessary experience and knowledge in integrating the instruments to write the piece.

Finally, 'Audio-recycling'[20] is used in *Glimmers* as an economical tool for consistency and variation. Further, it adds new interest in the form of timbral and textural ambiguities.

[20] For a full explanation of 'audio-recycling', see pg.36.

II. Two Pieces for Sextet (2017-2018)

Circuits (2017) and *Dots and* Rays (2018) are short pieces for flute/piccolo, oboe/cor Anglais, Bb clarinet, viola, cello and double bass. They were recorded by Riot Ensemble in 2019.

In this chapter I will explain the concepts and relevant areas of interests behind the pieces, mainly the creating of melodic and dynamic textures and the direct influences of music technology, electronic music, and minimalism.

Please note: all music examples in this chapter are in C.

Circuits

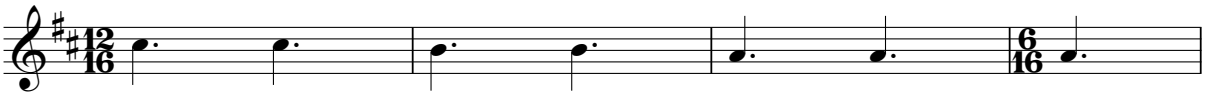
i. Background and influences – from Bach to 80s synth music

Both pieces originate from my interest in arpeggiators. An arpeggiator is a sequencing synthesis tool. Its main function is automating precise rhythmic repetitions – sequences – of single or groups of sounds in pre-set patterns. The origin of automated music is difficult to pinpoint, but obvious early examples are music boxes and player pianos. Inspired by these mechanical inventions and following composer Raymond Scott's 1940s 30-foot 'Wall of Sound', an electro-mechanical sequencer, Herbert Belar and Harry Olson created the RCA Mark II Sound Synthesiser, the first analogue sequencer. In 1968, Robert Moog built the Moog 960, the first synthesiser-sequencer to be released for commercial use (Arrar & Kapur 2013: 384). From then on, as electronic sounds grew in popularity, synthesisers became more accessible and playable and so did sequencing devices/features built into them, as arpeggiators.

One of the arpeggiator's most common uses is the breaking of block chords ('arpeggiating' – creating arpeggios), but rhythmic repetition of single notes is also common. Similar sequencing practice can be heard on countless songs, starting in the mid-late 1970s and especially in the 1980s. Some well-known examples are the bassline in New Order's *Blue*

Monday (1983), the synth riff from *A little Respect* by Erasure (1988) or the arpeggiated opening chords in *Here Comes the Rain Again* by Eurythmics (1984).

The composition process of *Circuits* started with a basic, 3-pitch melody (ex. 3.II.1). To develop it, I harmonised it and played it through an arpeggiator. After experimenting with different patterns, I created a six-note loop as a motif (ex. 3.II.3). I then went on to compose an electronic track for multiple arpeggiated synthesisers. I never finished this track, but an opportunity to workshop acoustic new music at Royal Holloway University prompted me to adapt it for an acoustic ensemble.



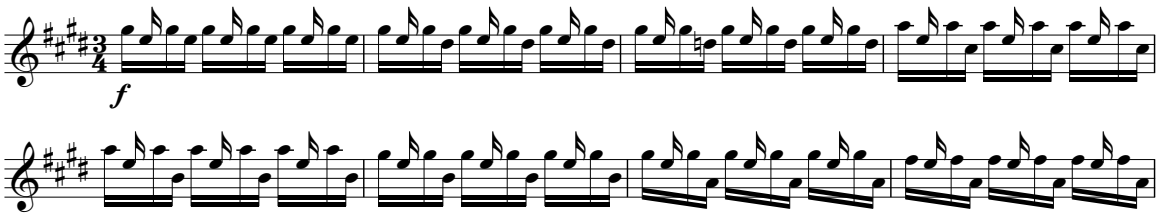
Ex.3.II.1., The melodic cell for 'Circuits'.

My vision for the acoustic piece was of broken chord patterns played by several instruments simultaneously, forming dynamic-melodic textures. I hoped to use repetition patterns and variations of the patterns to form ambiguous textures in which instruments moved seamlessly between background, middle-ground and foreground. This would often mean shifting between playing melody and accompaniment. To achieve this, my arpeggiator-like motif would function as a building block for the multi-voiced, dynamic textures.

Playing chords on an arpeggiator reminds me of Bach's solo music for the violin, like his Violin Partita no.3 in E major (1720) (ex. 3.II.2). The piece is monophonic, yet melodic, rhythmic and chordal at the same time. In setting forth on my own work, I wondered how Bach's solo violin works' 'implied polyphony' (Davis, 2006: 423–46) could be adapted for more than one instrument.[22] Thus, in *Circuits* I set on orchestrating monophonic arpeggiator material for sextet. In doing this, I wanted to 'translate' implied polyphony to dynamic-melodic ambiguous textures. In these textures, monophonic arpeggiator patterns would swiftly shift between textural layers and from playing melody notes to providing accompaniment, which is what the solo violin is doing in the partita.[23]

[22] Davis called textures in Bach's monophonic solo violin music 'implied polyphony' for the melodic independence of the suggested voices within them.

[23] This rethinking of 'implied polyphony', is similar and different to what Ligeti called 'micropolyphony' (1983: 14-15). An influence on the work in my portfolio, Ligeti's micropolyphony involved composing detailed independent parts. He wrote '*melodic lines… governed by rules as strict as Palestrina's…'* to form '*a kind of impenetrable texture'*, in which they were indiscernible. I take note from Ligeti in that textural writing, whether or not as dense as in *Lontano*, *Lux Aeterna* (1966/1968) or *Atomsphères* (1961/1971), stands to



Ex.3.II.2., J.S Bach, Violin Partita no.3 in E major, Prelude, bb. 19-26. Implied polyphony in monophonic music – an influence on my texturally ambiguous ensemble writing. The highest notes in the semi-quaver four-note groups serve as melodic notes, while the fourth notes serve as a second voice and melody. Both can be perceived as independent melodies. The second note in the groups is a pedal tone. Multiple melodic lines are drawn here, while harmonies are outlined and a texture is formed.

What challenged me most composing the unfinished electronic version of *Circuits,* was the limitations the use of arpeggiators imposed. An arpeggiator can run one rhythmic pattern and one pattern for how the chords you feed it are broken (meaning the order of appearance of notes in a chord's arpeggio). This is unlike composing by hand or on software, where composers can flexibly apply variations to repeating musical figures.

However, I saw this lack of flexibility as an advantage when it came to adapting it to acoustic music. The rigidity of the patterns could be used as a welcome artistic guide: a potential tool for systematic writing. Mimicking an arpeggiator in acoustic music would be like transcribing a process, as Steve Reich did in his phasing pieces following his tape phasing works.[24] As such, it contributes to consistency and the appearance of an underlying system in place, since the arpeggiator, a machine, never deviates from its programmed logic – its pattern. At the same time, the acoustic medium allows for flexibility and changes to patterns, as the arpeggiator here is only a guide, not an instrument used in the performance.

There is added value in using arpeggiator patterns in acoustic music, even if when they are altered for the sake of variation. Such variation poses a risk of reducing the music's consistency. Its potential gains are musical development and also defamiliarisation, from the merging musical styles and composition methods. *Circuits* is hence a balancing of the arpeggiator's mechanical strictness and the freedom and inaccuracies of human performance.

benefit from detailed and systematic part-writing. I differ in that I aim to obscure timbres, not melodic lines; I emphasise cohesive sound groups and use them to convey melodic content.

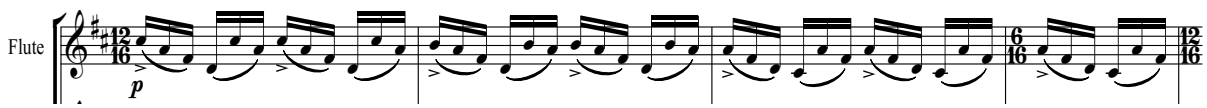
[24] See Context, subchapter III, pg. 30-31.

ii. Analysis and outcomes

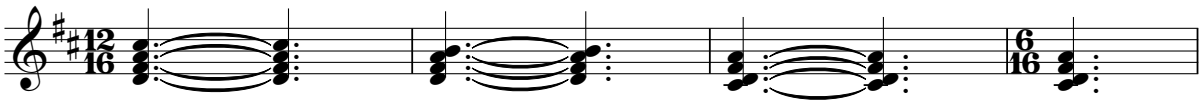
The piece's structure is a version of the theme and variations form. It consists of a 16-bar theme (bars 1-16), five 16-bar variations (letters A-E) and an 8-bar coda (letter F). The variations, played without pause between them, include development in harmony, density, scope of register, orchestration, dynamics, timbral and textural relationships and melody. Rhythm is the least developed aspect in the piece as is common in minimalist and minimalist-influenced music.

The piece opens on a triplet-based motif, the vehicle for all developing parameters from beginning to end. The prominent melodic notes are located in most phrases on the downbeat of beats 1 and 3. In the first four bars, the harmony is D-major7, D6 and F-sharp minor7/C-sharp. The implied key is F-sharp minor, but towards the end of the opening (approaching letter A), the tonal ambiguity is resolved in favour of the key of D-major upon the use of an E-minor7 chord. The 12/16 time signature of four beats subdivided by three plays host to an ostinato, which cell is a six-note arpeggio (ex. 3.II.3).

The motif (first bar, ex. 3.II.3, below) is a transcription of generated material from a D-major7 chord (ex. 3.II.4) fed onto an arpeggiator, programmed to a pattern setting of six notes with a subtle accent on the downbeat of 1 and a descending arpeggio direction (fig. 3.II.1). The chords contain only four notes, not six as in the pattern. When played through an arpeggiator, the six-note setting automatically adds an extra two notes from the top of the chord to the end of the pattern. The result is below:



Ex. 3.II.3., 'Circuits', bb. 1-4. A six-note arpeggio serves as a motif and drives the entire piece. The downbeats of beats 1 & 3 serve as a skeleton melody in most bars throughout (ex. 3.II.1). The lowest notes in the group function as a counter melody as in the Bach violin partita (ex.3.II.2).



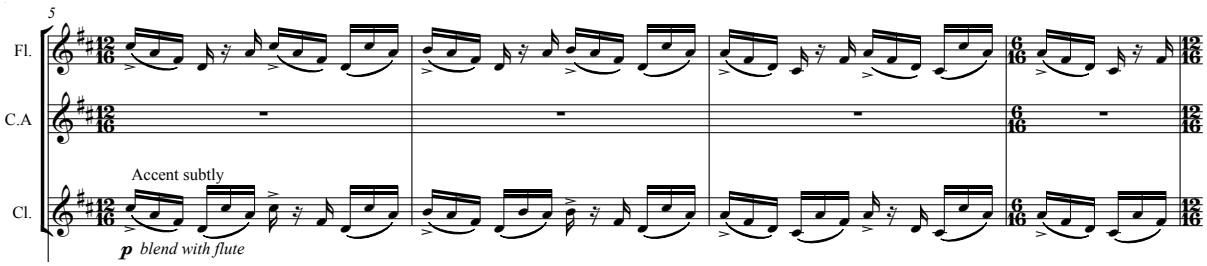
Ex. 3.II.4. 'Circuits', the chords that yielded the material in ex. 3.II.3 when played through the arpeggiator setting in fig. 3.II.1 (next page).

Fig 3.II.1. 'Circuits', the arpeggiator setting for the motif in its original digital format: six semi-quaver notes (1/16, above the dial), a descending order of arpeggiation (the selected down-pointing arrow) and an accent on the first note. When playing the music in ex. 3.II.4 with this setting, the result is the first four bars of the piece (ex. 3.II.3).

After the first four bars, a first variation in the core arpeggiator pattern was needed to suit human performers. Writing for woodwinds necessitated rests for breathing. However, for the music to pause, for any reason, meant to impose something alien to it: its core pattern was a continuous note sequence, repeating non-stop. Adding rests could have potentially sounded as an artificial imposition.

The first instance of hocketing and timbral ambiguity comes into play in bar 5. The clarinet enters, playing the same material as the flute, but then carrying on while the flute has a rest for breath and soon after has a rest in its own part (ex. 3.II.5). This fleeting moment is the first time in the piece where timbre modulates and is ambiguous due to integration. Another

consequence of adding rests was their becoming a part of the playing pattern and integral to piece's musical fabric. Throughout the piece, rests create space in textures. They make them more elegant and allow more musical information through,[25] despite the textures' trend toward higher density.



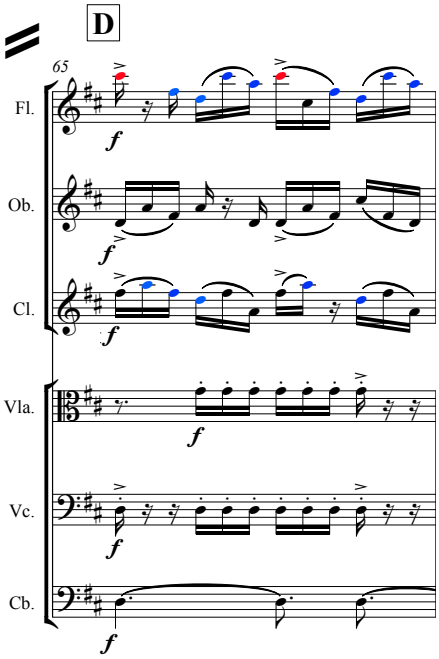
Ex. 3.II.5. 'Circuits', bb 5-8. Hocketing, timbral and textural ambiguities as the flute and clarinet blend and hint at the textural writing to come. Rests are introduced first as a necessity, to allow time to breathe, but become a characteristic of the texture themselves, providing it with 'air' and the repetition pattern with a naturally occurring, thus authentic, diversity.

In bars 9-12, I introduce a rhythmic variation in the theme with three-note arpeggios, as opposed to six. New contrast between the two instruments manifests in the form of minor differences in pitch material between them. This aims to enrich the texture and sound through slight emphases on the individual presences of the flute and clarinet, without breaking their single-entity, integrated sound. Similarly to my other pieces, like *Glimmers*,[26] to make the most of timbral ambiguity, it was important to avoid masking and to use contrast, although sparingly, to embolden the integrated sound.

From letter A, the piece becomes a duet between the strings and the woodwinds. The strings play the role of accompanists to the winds' lead most of the time. The accompaniment material in the strings is arpeggiator-derived, based on a seven-step, single-note pattern. The woodwinds in letters A-E create a dynamic-melodic texture using hocketing and the motif. One of many examples of dynamic-melodic textural writing is bar 65 (ex. 3.II.6), where the flute and clarinet take turns playing fragments of the foreground material while the other has a rest or occupies the middle-ground with the oboe. The strings occupy the background.

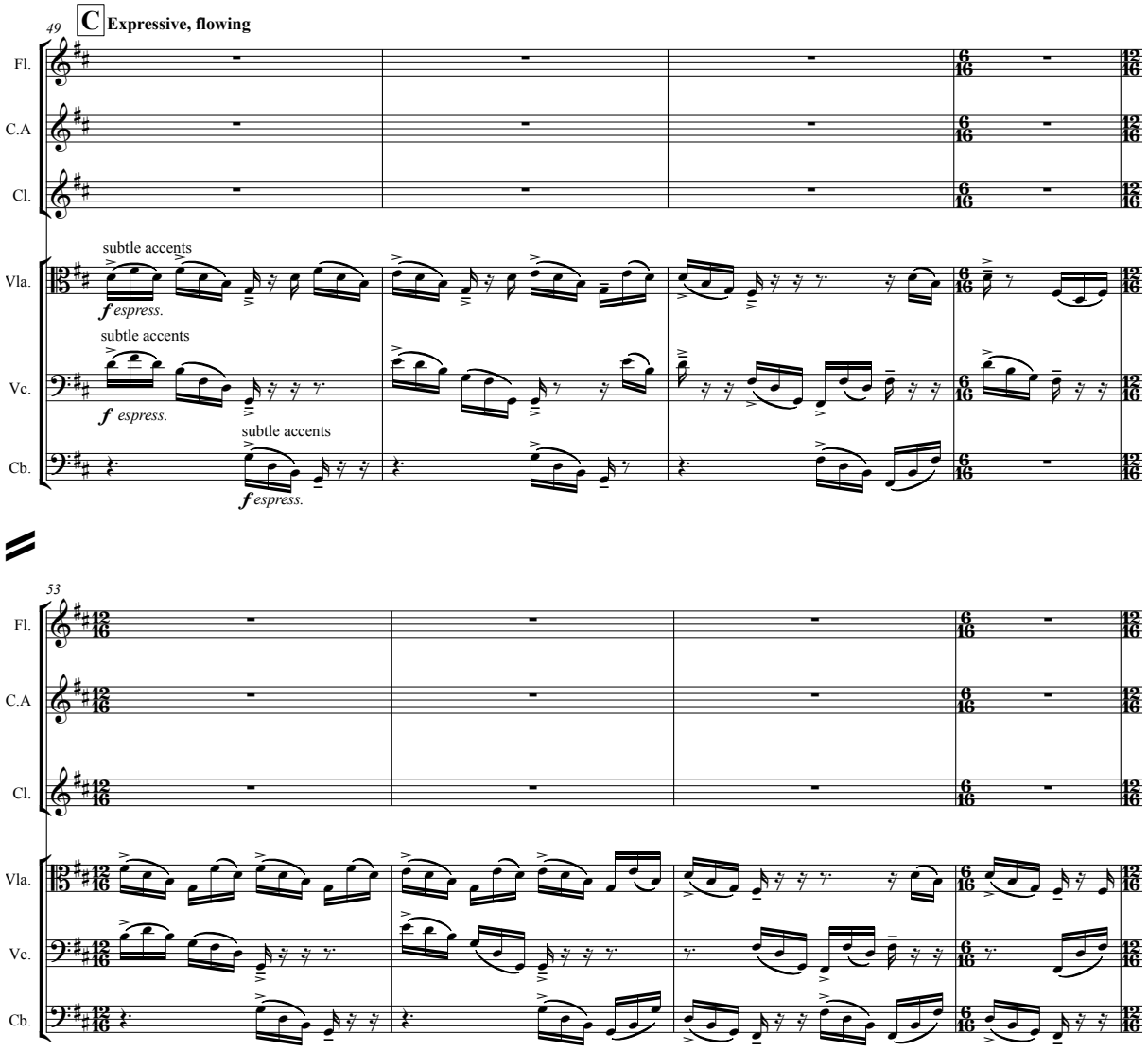
[25] According to the APA Dictionary of Psychology, an elegant solution *'… achieves the maximally satisfactory effect with minimal effort, materials, or steps'. Reducing pitch in favour of rests reduces the amount of material in the texture leads to a more elegant outcome.*

[26] See *Glimmers,* Works, subchapter I.



Ex. 3.II.6., 'Circuits', bar 65. Foreground notes are in colour with red marking melody notes. The woodwinds occupy the foreground and middle-ground with a pulsating melodic texture, while the strings occupy the background. In effect, the woodwinds' texture plays the role of soloist and the strings' accompanist. The cello and viola parts were transcribed from arpeggiator patterns I had experimented with prior to notating.

In bars 49-56 the woodwinds rest while the strings occupy all textural layers (ex. 3.II.7). I had to adapt to the strings' limitations in playing certain voicings of arpeggios. My mission and challenges here were to write the strings as an integrated single entity, not as individuals and to keep the music free of pauses. To achieve my goals, I altered the motif's patterns, transposed it to access more open strings, used more rests in each part and changed the direction of the ostinato to reach the cello and bass's low registers.



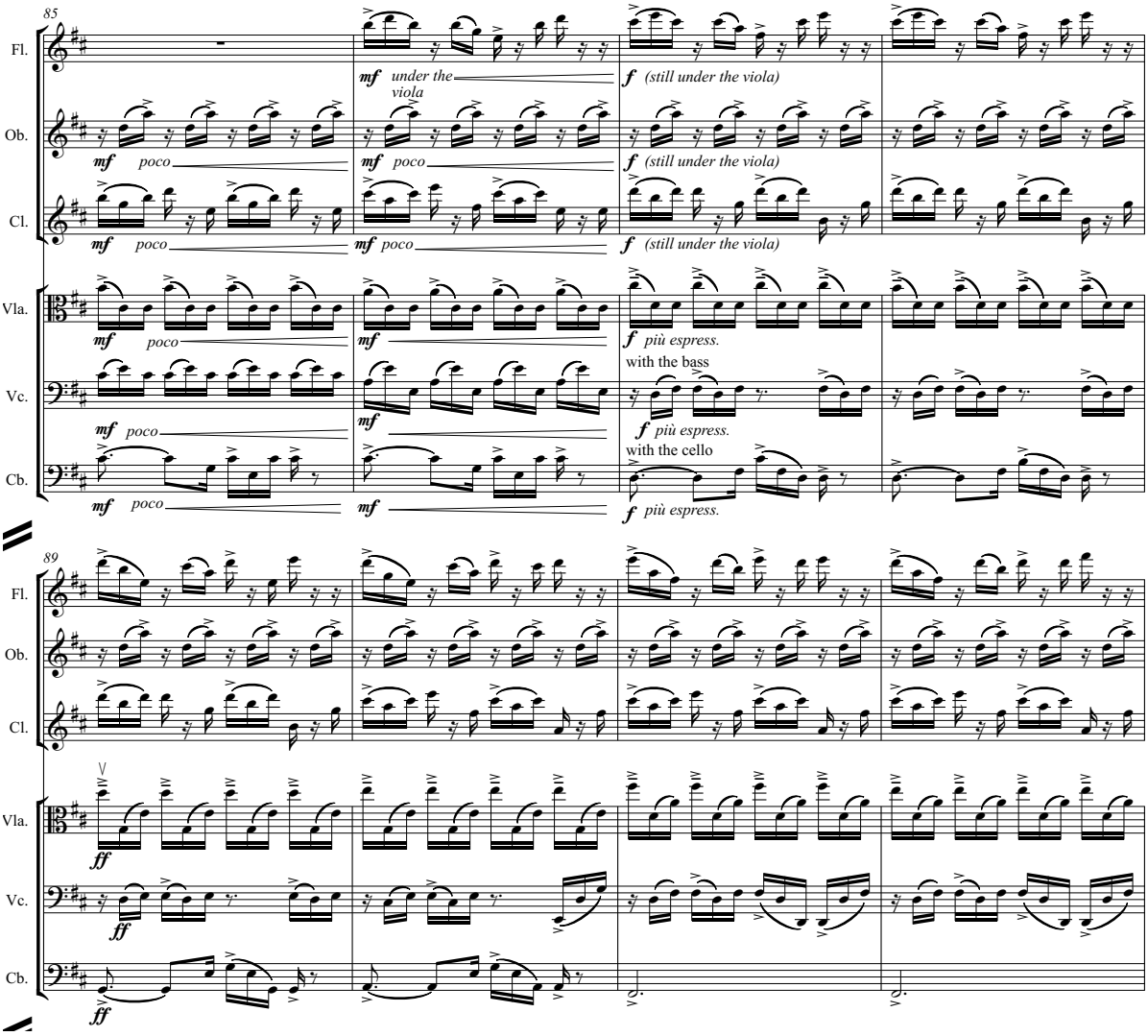
Ex. 3.II.7. 'Circuits', bb 49-56. The strings temporarily assume the role of the woodwinds. To adapt to their limitations in playing the arpeggio motif fluidly and avoid pauses in the ostinato, variations in the melody, rhythm, harmony and direction of the ostinato were needed to facilitate the hocketing.

The ambiguous dynamic texture writing reaches its peak in letter E, especially in bars 86-90 (ex. 3.II.8). All instruments frequently shift between textural layers and most of the time can be interpreted as occupying two layers at once. In letter E, both the woodwinds and strings comprise musically independent sectional textures within the general texture.[27]

For example, in bars 81-86 the viola plays in the foreground, but its 2nd note of every beat is in the middle-ground. The cello fills this foreground gap momentarily, but still continues to occupy the middle ground. This results in the viola and cello playing both supporting and leading roles (ex. 3.II.8).

[27] 'Independent' as in viable as standalone entities, as voices in baroque polyphony aim to be.

In 87-90, the cello and bass share the middle-ground, hocketing on the viola's countermelody, while the bass occupies both the middle and background. The woodwinds, as a group, occupy the middle-ground and background, creating an ebbing, dynamic and ambiguous texture in the upper range and adding a shimmering quality.



Ex. 3.II.8., 'Circuits', bb 86-90. All instruments simultaneously play more than one role in the texture and/or within their sections.

Dots and Rays

i. Background

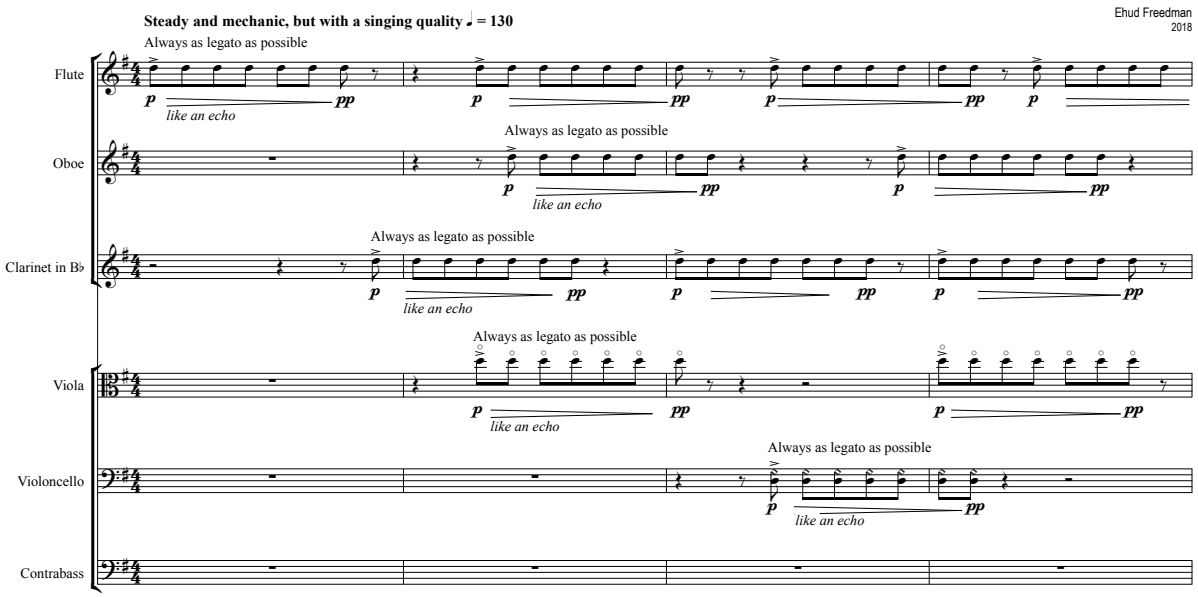
The piece follows up on textural and technical ideas from the dance cue *Completion* I composed for the show *Upload/Unplug*.[28] In this cue, I use multiple single-note repetitions to create textures and rhythmic emphases by using the arpeggiator effect in Logic Pro. Wishing to write a companion piece for *Circuits*, I set on adapting ideas from the electronic *Completion* for an identical acoustic instrumentation.

ii. Analysis and outcomes

The piece's structure is ABABa, although it can also be seen as binary – ABa. Analysing it as ABABa, the A's (bars 1-53 and 83-117) function as build-ups to the B's. These build-ups begin with the first pitches of their succeeding B sections (D in A1/B1 and G in A2/B2). Pitches in A sections are added in their order of their appearance in subsequent B sections. A sections are harmonically ambiguous and diverse in density and dynamics. Pitches introduced in A sections become fully fledged melodies and harmonic sequences in B sections, which also have denser textures.

The pattern of the arpeggiator-like motif is strictly maintained throughout the piece. All individual phrases in every instrument are a dynamically fading seven-note sequence. Sequences are cut short only if interrupted by a new sequence in the same instrument. This writing mimics real arpeggiators receiving new input before completing a pattern. The seven-note motif is the single building block of the piece, as everything in it is made from the motif. The only parameter subject to change in the motif is the dynamic: how loud the first note is and how much quieter the sequence becomes (ex. 3.II.9-10 and fig. 3.II.2).

[28] See Works, subchapter VI, ii, pg. 92.



Ex. 3.II.9. 'Dots and Rays', bb 1-4. A dynamically fading seven-note pattern functions as the motif and sole building-block of the piece.

Fig.3.II.2. 'Dots and Rays', the arpeggiator setting on which the seven-note motif is based: seven steps, an accented first note and six diminishing notes. I allowed myself to choose when to slightly deviate from the pattern in terms of the angle of the diminuendo's curve to better control and vary the ensemble's overall dynamics.

The piece begins with a D, played quietly by a solo flute, soon joined by other instruments.[29] Other pitches are added by order of their appearances in section B1 (bars 54-82). By the end of the first A section (bar 53), all pitches in the G major scale have been added. Other

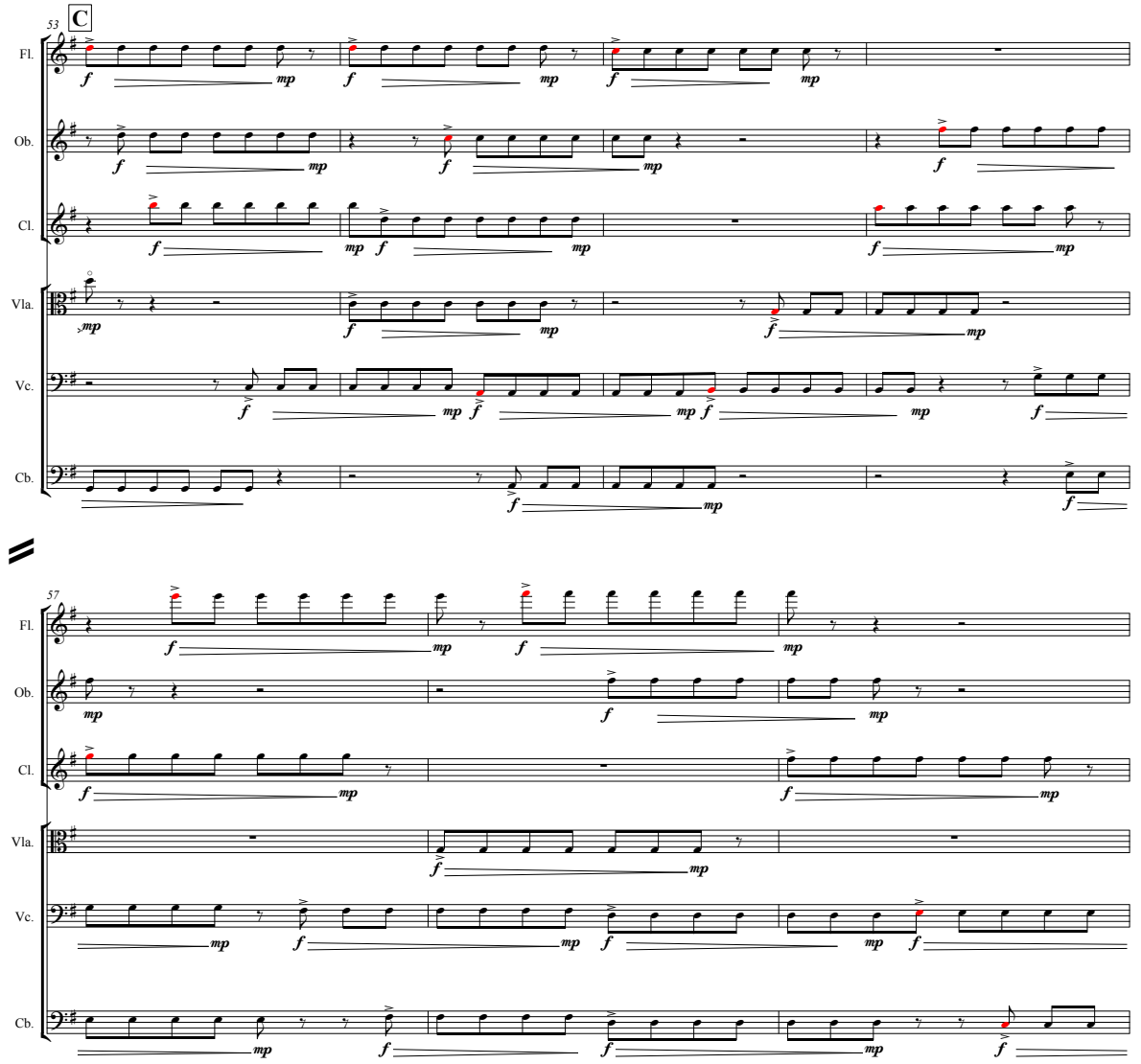
[29] Played by various instruments, this single pitch opening and the diversity in pitch that follows is influenced by that of Saariaho and Ligeti's in *Lichtbogen* and *Lontano* (see Context, pg. 21-23).

parameters develop as well until they reach their manner of manifestation in the B sections: louder volume, wider scope of register and greater timbral contrast between the strings and the woodwinds. Timbral contrast grows as a result of the strings not playing harmonics or mimicking the woodwinds in other ways (such as the *flautando* technique*)*. Still, a level of ambiguity is maintained through pitch-doubling and the texture's density.

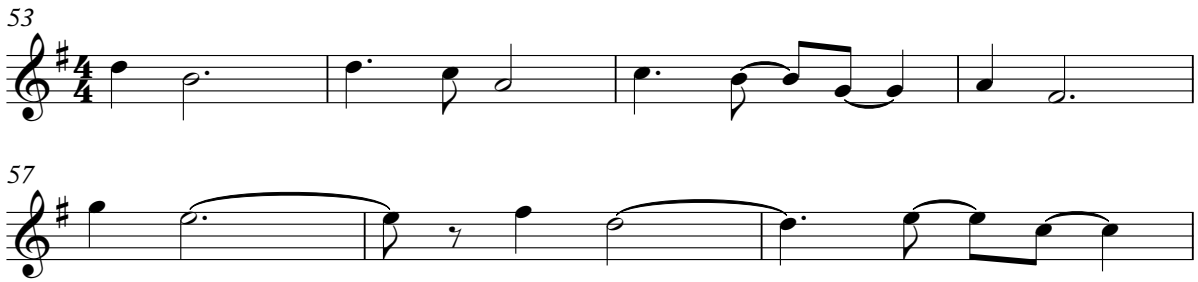
Dots and Rays employs melodic-dynamic textures. The first note of each seven-note pattern frequently functions as a melodic fragment. At times it serves as a counter melody fragment or an echo/ghost note when played immediately after another instrument's first note. All first notes play a rhythmic role in the texture. The other six notes are meant to populate the middle-ground or the background. They also facilitate harmony and density (ex. 3.II.10). The six have a greater effect on the overall volume at any given moment than first notes. When they are louder or quieter, so is the perceived overall loudness.

Dots and Rays puts a greater emphasis on integration than *Circuits.* The latter employs more contrast between strings and woodwinds and soloist-accompanist relationships. In addition to employing timbral similarities for integration purposes, *Dots* goes further than *Circuits* by integrating the viola and cello with the woodwinds. In most parts the bass is integrated as well, although it is distinctive at times. The most obvious examples are when the strings play harmonics, a sound which blends well with the woodwinds (ex 3.II.9).

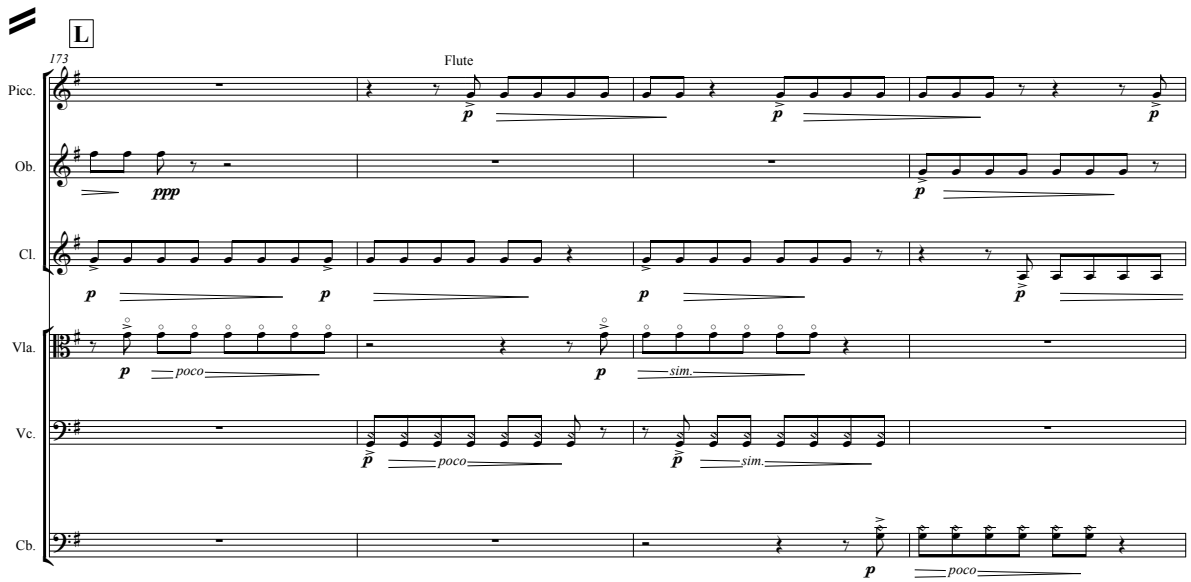
A musical tension exists between similarities and subtle contrasts in timbre across the ensemble. It makes it sound unified on one hand and heterogenic on the other. This pre-meditated tension or, rather balance, is the sweet-spot I mention in subchapter 3.I. *Glimmers*. It is a degree of timbral ambiguity a composer judges as adding value to music. Here, I based my judgment on my subjective appreciation of the sounds and how well I deemed they succeeded in facilitating integrated dynamic-melodic textures.



Ex. 3.II.10. 'Dots and Rays', bb 53-59. In red are melodic notes that occupy the foreground due to either loudness/relative height/the absence of other accented notes (i.e. viola and cello in bar 55). On occasion, first notes in a pattern function as 'ghost notes' or 'echoes', when appearing immediately after identical pitches in another instrument, as the first D's in the oboe in bar 53 and the clarinet in 54.



Ex.3.II.11. 'Dots and Rays', the skeleton melody in bars 53-59, highlighted in red in the previous example (shown here without the octave displacement).



Ex. 3.II.12., 'Dots and Rays', bb 173-177. With the strings playing harmonics, timbral and textural ambiguities are increased. The objective in using timbral ambiguity here is the creation of a single dynamic-melodic entity out of six individuals. Controlling the tension between timbral similarity and contrast plays a role in the design of every ambiguous texture in the piece.

Summary and chapter conclusions

Circuits and *Dots and Rays* combine my areas of research and artistic interests more comprehensively than all other pieces in the portfolio. These pieces led to new findings related to all three research questions.

1. Timbral ambiguity's role in adding interest/value to repetitive music

Repetition of minimal core material, a salient feature in the portfolio, is subject to continuous and nuanced timbral change in both pieces. This is due to ongoing individual timbres' integration with other individual or integrated timbres – resulting in continuous change in states of timbral ambiguity. Instances of ambiguous integrated timbres in the pieces are unstable and differ from one another, even when made from the same ingredients. I find such continuous timbral and textural changes to add significant interest and value to the pieces.

2. The role of timbral contrast in ambiguous melodic-dynamic textures

In both *Circuits* and *Dots and Rays*, instruments shift rapidly between textural layers and between playing melodic foregrounded notes to occupying the background. This is due to my

exploiting of timbral similarities or my obscuring of timbral contrast with performance techniques (i.e. harmonics in the strings), leading to dynamic and ambiguous textures. I found controlling timbral contrast levels within the integrated timbres crucial to designing of these ambiguous textures.

3. Benefits from abstracting the behaviour and uses of arpeggiators to acoustic composition

i. Defamiliarising acoustic music

Both pieces originated from experimenting with the arpeggiator effect in Logic Pro. My early experiments with it and its common practices and aesthetics informed my writing for acoustic instruments in the pieces. I found the abstraction of arpeggiator patterns to acoustic music defamiliarised (and as such adding value) to the acoustic medium. This is due to my incorporating of techniques and aesthetics not associated with the medium.[30]

ii. Providing a foundation for systematic and consistent development

The mimicking of the Logic Pro arpeggiator plug-in effect provided me with rigid patterns to follow. As in process music, adopting a machine's behaviour, in this case its pattern generation, provides a framework for composition: a system for consistent musical development over time.

4. Further findings: timbral and textural ambiguities' roles in achieving greater efficiency

In this research, it is undesirable to enlist instruments to designated roles as soloist/accompanist or, for example, to exclusively occupy the higher or lower registers. Using instruments in multiple textural roles in my pieces, I find less of them seem to be needed. Thus, textural ambiguity, the seamless shifting of individual sounds or groups of sounds between textural layers (foreground middle-ground and background), increases efficiency/economy in the pieces. Without textural ambiguity, I believe more instruments would have had to be used to deliver the same melodic content, scope of register and textural density.[31]

[30] The practice of mimicking music technology in acoustic music follows in the footsteps of Steve Reich, as observed in his phase pieces (see Context, III, ii, pg. 30-31).

[31] While a departure point for these pieces was solo violin works by Bach – more efficient music by the rationale suggested here – his music was only a model and an influence for more efficient *ensemble* writing. As

III. *Pianos*

Pianos (2021) is an electroacoustic piece for upright piano and pre-recorded stereo audio. I recorded its live components using my own upright piano and created a studio electroacoustic version (submitted with this portfolio) out of these recordings.

Concept and objectives

The piece continues work I did in *Glimmers* in 2018, where I used two live source instruments to examine timbral and textural ambiguities between acoustic and recorded sound.[32] *Pianos* examines similar interests using only one live source instrument.

The vision I had for the piece was of an acoustic piano part blending and clashing with pre-recorded and manipulated edits of this same part. This interaction would produce timbral, spatial, rhythmic and harmonic effects. Such results are commonly achieved by applying digital/analogue effects to acoustic or electric instruments. In Kaija Saariaho's *Petals* (1988), ambiguity is created between a cello and its own acoustic signal, manipulated by analogue effects in real-time. Despite the dramatic spontaneity real-time manipulation offers, I chose a more controlled method, using pre-recorded material, to explore this specific method and reach different findings.

And so, at the initial stage of imagining the piece, I hoped to:

- Find new sonorities as I did in *Glimmers,* but with a single acoustic sound source this time.
- Manipulate piano sounds and blend them with acoustic, unmanipulated sounds, live or recorded, to create timbral and textural ambiguities. Such ambiguities are meant to add interest and are of independent value (see subchapter 2.I).

the pieces in this chapter offer an ensemble approach, they need not be compared to solo works in terms of orchestration efficiency.

[32] See *Works* subchapter I. *Glimmers*.

Process

The composition method and process of *Pianos* were a function of the objectives. I had to determine what fundamental sounds could help accomplish my goals as well as be used to construct a long piece. I planned for the playing techniques/sounds to define the piece's structure. For example, the 1st part is dedicated to trills and the 2nd to chords and clusters (table 3.III.1).

To this end, I used the following composition process:

1. I notated various short phrases and techniques like trills, clusters, chords and melodies.
2. I recorded the notated material at various dynamics and registers.
3. I manipulated, edited and combined them in Logic Pro. This and the previous stage functioned as composer-musician workshops, similar to the *Glimmers* workshops, except here I was both composer and musician.
4. After workshopping the material, I re-envisioned the piece and drew out a structure (table 3.III.1).
5. I discarded phrases and techniques I deemed irrelevant to either the concept or my envisioned aesthetic and replaced them with new ideas. The discarded material was mostly melodic. Its development, rhythm and harmony drew too much attention to themselves at the expense of timbral and textural interests.
6. I recorded a second batch of piano sounds.
7. Satisfied with the material, I edited and manipulated it on Logic Pro, based on my structural plan.
8. I transcribed the work I did on Logic Pro to a score for a studio/live performing pianist and finalised the editing of the pre-recorded component.

Analysis

The piece is in four sections. As they have no precise start and end points, except at the piece's beginning and end, the following list's sectional boundaries are approximate. The sections are defined by featured sounds or techniques experimented with. For example, trills in section A:

Section	Bars	Timing in the Recording	Salient Feature
A	1 – 186	0:00 – 7:58	Trills
B	187 – 285	7:58 – 12:12	Chords and clusters
C	286 – 357	12:12 – 15:58	Arpeggios and percussive muted-string notes
D	358 - ending	15:58 – 18:05	Decays

Table 3.III.1. 'Pianos', structure and features.

Most of the piano techniques/sounds I chose are purposefully common, like trills and arpeggios. Their familiarity gives context to the defamiliarising function of timbral ambiguity. In addition, trills can offer long and dynamic sounds. They are also as close to long sustaining notes as the piano can offer. Their inner, though unmeasured, rhythms enrich textures, especially when multiple trills are in play. The low block clusters offer contrast to the trills, add variation to the mood and provide rhythmic punctuation. The block and rolled chords offer more variety still. As all other foregrounded sounds, they demand different integration methods. Using different integration methods leads, in this piece, to welcome musical development. I expand on the above below:

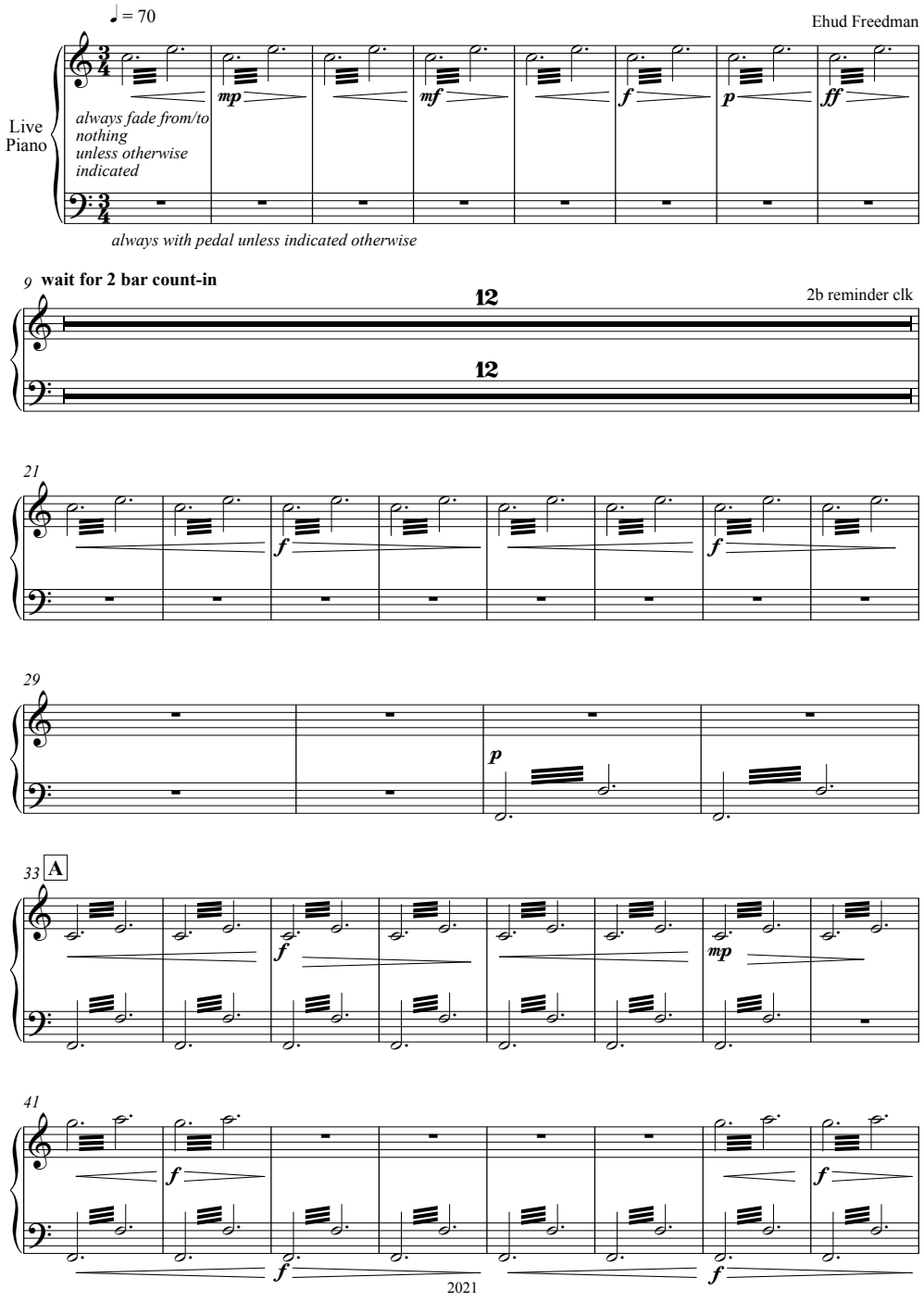
Section A: Trills

(bars 1-186, 0:00-7:58)

The piece opens on trills of C and E in the live piano,[33] rising and falling in loudness (ex. 3.III.1). The starting texture is thin as to allow room for development toward density. Thus, a relationship between live and recorded sounds is established early, as do timbral and textural reference points. The clean sounding trills are then integrated with pre-recorded copies of themselves. Much of their high and low frequencies are cut out by an EQ effect and several copies of their natural decay, manipulated with effects. After the live material arrives at a tacet (bar 9, 0:20), a manipulated copy of it repeats. This is aimed to establish the pre-recorded track's role: interact with the live part and create timbral ambiguity.

[33] From here on, the part of the studio/live pianist will be referred to as 'live'. In the Logic session file, this part is divided between three tracks: 'Player 1', 'Player 2' and 'Player 3'.

In the next eight minutes, while several parameters including harmony, pitch, register, dynamics and density develop, various sound and technique combinations are introduced and live-recorded timbres interact with altered pre-recorded material. For example, in bars 21-28, the live C-E trills are combined with an octave E-E trill, which high and low frequencies had been cut out. Soon after, the left hand adds some low frequency with F-F octave trills over lower C-E trills (ex. 3.III.1).



Ex. 3.III.1., 'Pianos', bb. 1-48.

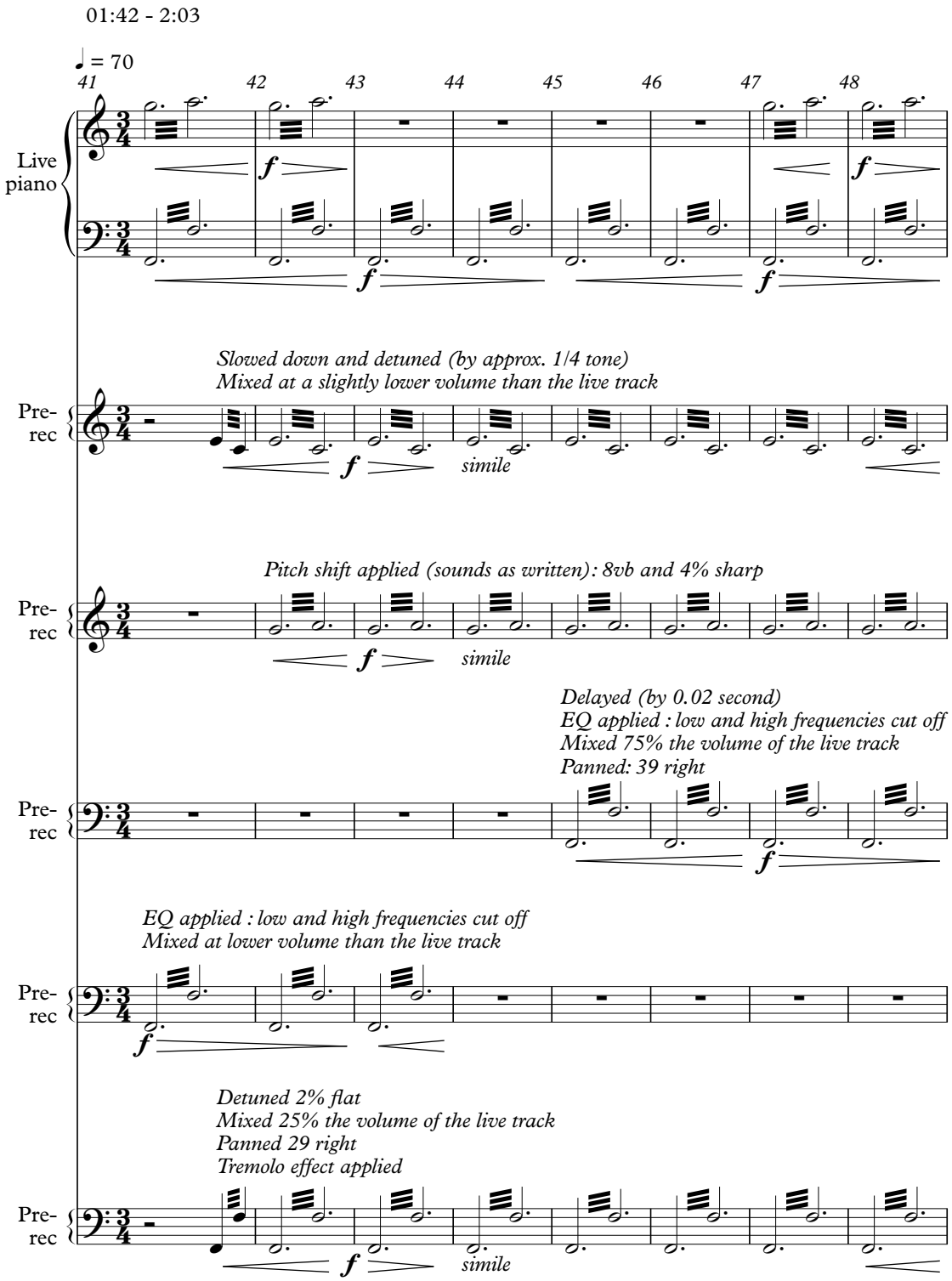
In bars 41-48 (at 01:42 – 2:03), the live part has a G-A trill, while the pre-record adds the C-E trills from earlier, a detuned copy of the F-F octave trills and then an EQ'd copy of them (ex. 3.III.1 and 3.III.2). Detuning can add pitch material and can also change the timbre of the detuned sound clip. When I wanted to create a slight timbral variation, one of the techniques I used was subtle detuning by 2-10 cents, sharp or flat (ex. 3.III.2). This slightly alters the perceived timbre of the live part by blending with it, while the detuned recording's existence may go unnoticed. Detuning more drastically however, for example by an octave or more, results in a new and perceivable sound.

Through trial and error, I found it was important, at early stages of sections, not to completely obscure the live piano with pre-recorded sounds for lengthy periods of time. The live piano sound's presence and character had to be established first, as it was the piece's timbral point of reference and origin. If I were to let it become indistinct for long, in the first few minutes of the piece, the manipulated sounds would lose their context. Hence their purpose, to interact with the live sound, would become vague. It would render the act of sound integration arbitrary and meaningless.

As the piece evolves, the relationship between live and recorded becomes more established. This is due to the piece being an experiment in *mistaken identities*, as Jonathan Harvey put it.[34] Here, these identities are live versus recorded piano sounds and clean versus manipulated. After tensions are established, timbral ambiguity – the obscuring of timbres/identities – can exist for longer periods without the risk of vagueness.

Thus, integration methods had to comply with the piece's experimental purpose. One of the methods was to play two sounds together and then separately, for context/reference. Another was creating noticeable counterpoint or delay between sound sources. This would then allow for all sounds to be heard, but still timbrally affect one another as they merged into larger entities. In these additively ambiguous states, timbres shift between foreground and background (bars 41-48, fig. 3.III.2), resulting in *dynamic textures*.

[34] See Introduction, I, pg. 10.

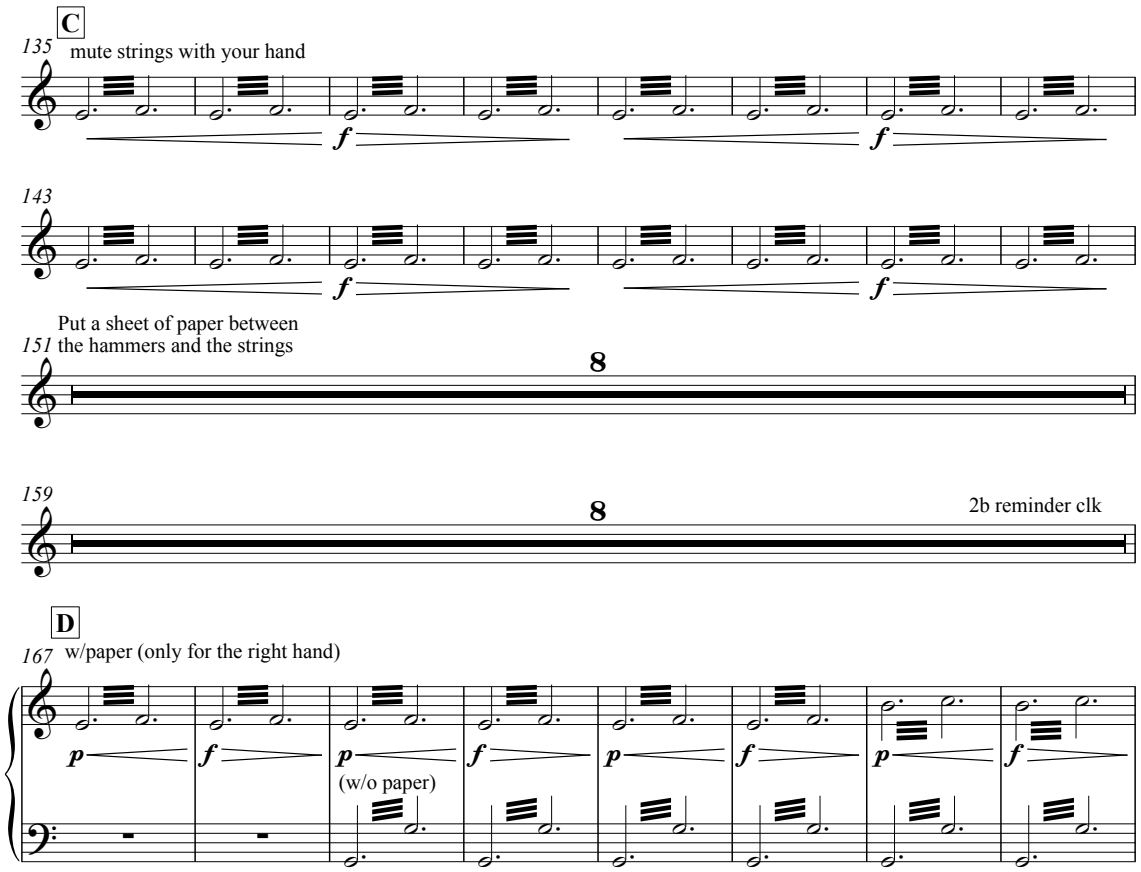


Ex. 3.III.2., 'Pianos', bb. 41-48, including a transcription of the pre-recorded material (does not appear in the performance score): timbral manipulations applied to parts of varying degrees of similarity to the live piano part.

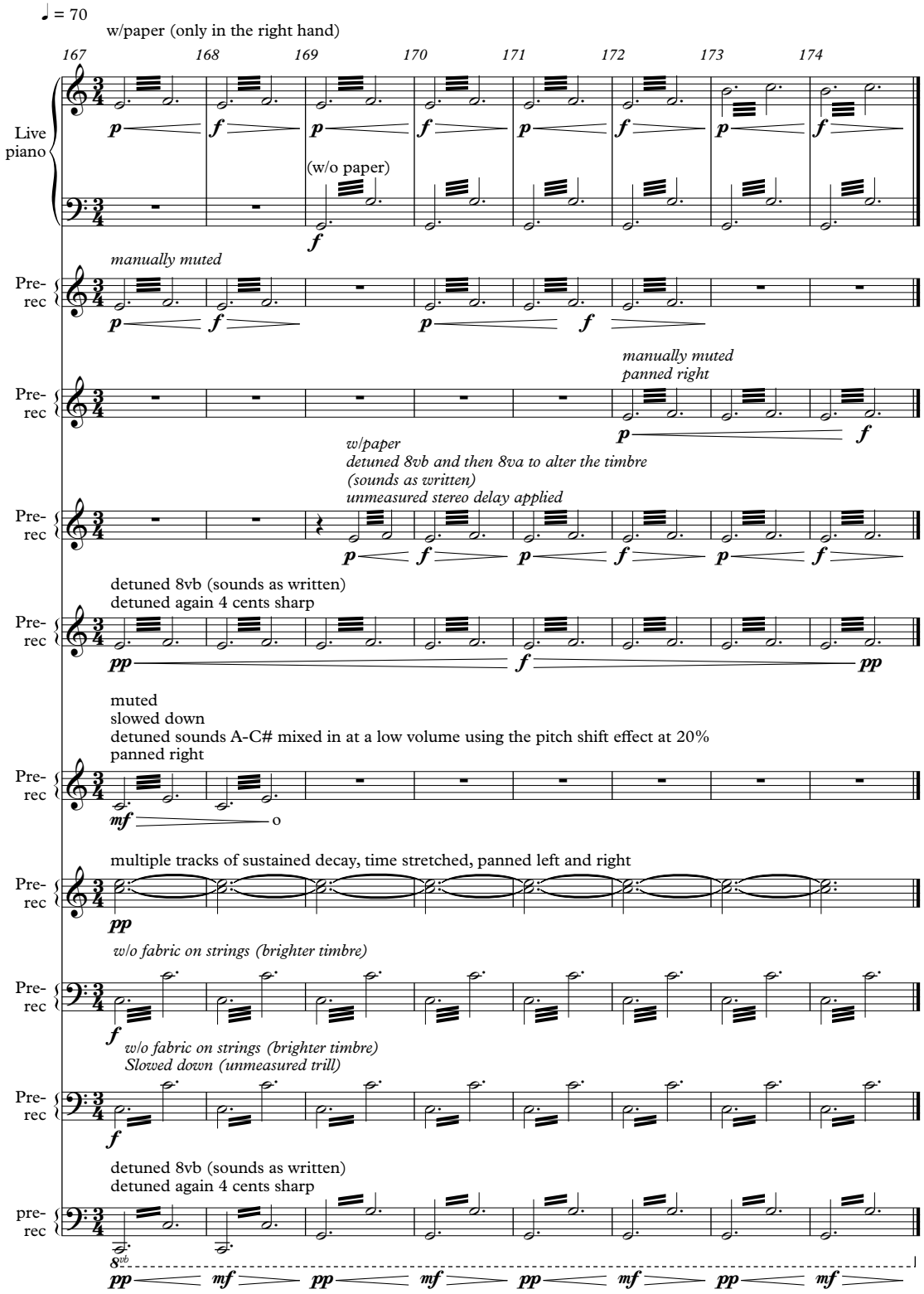
Digitally manipulating the clean piano sound was not the only one way I created material for integration. Another method was altering the piano's timbre *at the source* – prepared piano – and then re-recording selected live passages. For example, the live part was recorded on an

upright piano with a thin fabric placed between the hammers and the strings to darken its very bright sound. To access an alternate sound for use in integration, I removed the fabric and re-recorded some of the music, as if on a brighter piano.

Other methods included placing a thin book and a sheet of paper between the hammers and the strings (bar 135) or muting strings with my fingers (bar 167, examples 3.III.3-4). These timbral variations first occur in the live piano and then appear in the pre-recorded sound. Following their appearance, they are re-used to integrate with live and other pre-recorded sounds.



Ex. 3.III.3., 'Pianos' bb. 135-174 (05:44 – 07:27), muting and placing objects next to the strings yields timbral variation. The function of this variation is twofold: (a) It constitutes development in the piece's core material. (b) It later appears in the pre-recorded track and interacts with the live piano after it had moved on to producing different sounds (see the full transcription of bars 167-174, ex. 3.III.4).



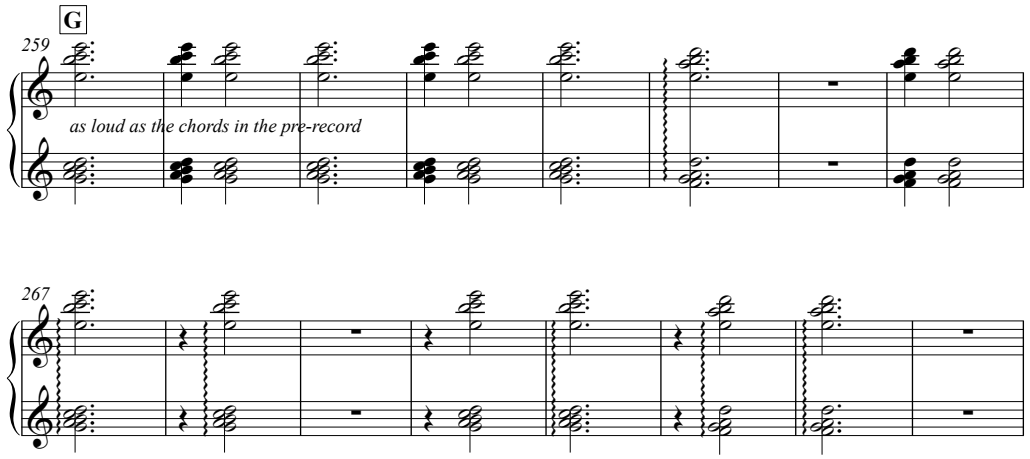
Ex. 3.III.4., 'Pianos', bb. 167-174 (07:06 – 07:27), the live piano part and a transcription of the pre-recorded material: the live piano interacts with a differently prepared piano. Preparations include removing the dampening fabric from the strings to make the timbre brighter, muting the strings and placing a sheet of paper between the strings and the hammers. Other tracks were altered after the fact, by the applying of effects and/or time stretching. The goal of preparation and effect manipulation is the same: timbral variations similar and different enough to the live part to cause timbral and textural ambiguities.

Section B: chords and clusters

(bars 187-285, 7:58-12:12)

Low register block clusters replace trills as the musical subject at bar 187 (7:58). Block chords are added from bar 211 (9:00). Whereas trills' lengths, textures and their dynamic performances easily blended with pre-recorded trills over time, the short attack of the chords and clusters required a different approach to creating timbral and textural ambiguities. Simply put, playing live and recorded chords/clusters at the same time, from the start of the section, yielded meaningless results. Trying this method out, it sounded as if the live piano had a plugin or real-time effect applied to it. The pre-recorded sound had no perceivable impact and so I sought other approaches.

As in section A, first instances of featured techniques are clean and non-integrated to establish them as reference points. After this, in this section, they are integrated with detuned, transposed and EQ'd chords and/or clusters. Counterpoint is created between the live and recorded chords. Proximity and timbral resemblance between live/clean and recorded/altered chords obscure their timbral identities. Ambiguity, as in mistaken identities and timbral shifts, occurs. It becomes difficult and unimportant to discern what is live and what is not (ex 3.III.5).

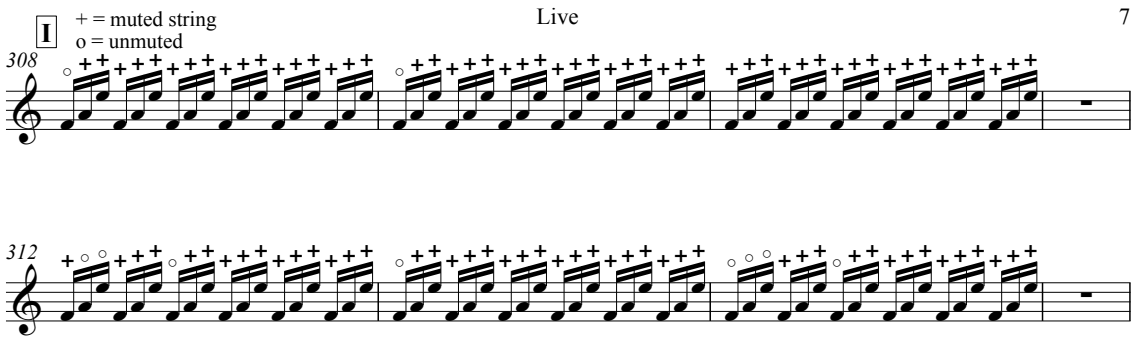


Ex. 3.III.5., 'Pianos', bb. 259 - 273 (10:58 – 11:39), the live piano serves as part of a denser and ambiguous texture, consisting of multiple rhythmic displacements of the same chords in the timbrally altered pre-recorded track. The purpose of the displacements was obscuring the live part's timbral identity and textural ambiguity.

Section C: non-pitched percussive sounds and arpeggios
(bars 287-358, 12:12-15:18)

A non-pitched percussive ostinato is played by the live pianist from 287-298. After the ostinato's first appearance, I integrated it with a transposed version of itself, but its main interaction happens later, with three-note arpeggios (F-A-E), introduced live at bar 308 (ex. 3.III.6).

The arpeggios consist of muted and unmuted notes. This adds timbral variety and rhythmic punctuation to the ambiguous texture the arpeggios create. Also, the texture consists of other materials that had been performed by the live pianist. They include non-pitched percussive sounds and octave trills. Manipulations to these materials are editing, EQ, tremolo effects, detuning and digital transposition.



Ex. 3.III.6., 'Pianos' bb. 308 – 315 (13:09 – 13:30). Arpeggios of muted and unmuted notes prominently occupy the foreground of the texture and interact with timbrally altered versions of themselves in the pre-recorded track.

Section D: block clusters, chords and decay
(bars 358-ending, 15:18-18:05)

Blocks of low clusters return to the fore from bar 358, as other elements from earlier in the piece re-appear in passing over the next two minutes. As the live and recorded clusters move to the background and then gradually disappear, their live and pre-recorded decays move to the fore.

As before, decays' identities needed establishing as reference points before going through any integration. Methods of manipulating the decays included time stretching, transposing

and distorting. While the methods affected timbre, the characters of the decayed sounds remained whether of a decaying low cluster or a decaying high trill or chord. I note this, because it was key to preserve connections between manipulated materials to their clean origins. Without doing so, the altered sounds would have no context and their reason for being, to comment on or interact with the live piano, would become vague.

Reflections on timbral and textural ambiguity

The piece is a textural exploration of timbral relationships between piano sounds. Timbral ambiguity, a state in which timbral identities become obscure, brings its own independent value to *Pianos* by facilitating the experience of mistaking one timbral identity for another. It also helps create textural ambiguity and new sonorities. So, it serves as both a means to an end and an end in itself.

In composing the piece, I have made the following observations:

- Timbral individuality, which I try to obscure most of the time, was needed to be established prior being obscured. Without the context of clean, untouched sounds, the ambiguous combinations would have a lesser or no effect. The exploring of timbral relationships between clean and manipulated or prepared piano timbres could not be done in the absence of this context. There would also be loss of musical tension and potential for development.

- Integration of sounds helped create new sonorities, especially when using continuous and dense material as trills, arpeggios and decays.

- Integration was instrumental in textural ambiguity, the seamless shifting of sounds between foreground and background within textures.

- As for elements with a short and single attack, as block chords, placing them over live chords in the Logic Pro timeline yielded an irrelevant effect. Irrelevant, as placing them on top of one another yielded an identical result to the application of digital/analogue effects to sound. It is a common timbre-altering method with known

outcomes, which are not relevant to this research. Instead, I staggered the pre-recorded and the live piano short-attack sounds chords and clusters. The desired difficulty to distinguish between sound sources – the ambiguity – happened gradually, rendering all sources and the texture ambiguous. Emphasis was thus put on what was being played by *groups of sounds*, rather than *individual sounds*.

- Timbral ambiguity creation in the piece functions as a developing musical parameter. It outlines the piece's four-section structure: every section introduces its own unique integration methods.

- Workshops during the composition process are crucial to pieces involving novel sound combinations and/or unfamiliar timbres. Workshops can affect compositional decisions and lead to unexpected discoveries.

IV. Two Pieces for Violin and Cello

In this chapter I will discuss the pieces *Gravel* and *Reminders*, both composed in 2018-2019 and recorded in London in 2019 by Miriam Wakeling (cello) and Rowena Kennally (violin). They were composed as companion pieces, sharing in instrumentation as well as approaches to tonality, rhythm, timbre and texture.

Aesthetics and instrumental relationships

In addition to melody and harmony, at the heart of both pieces is the tension between individuality and integration. When I began work on both, I aspired to no timbral individuality all through the pieces. However, the musical ideas which came to me as I was composing necessitated compromise in this area. For example, at places I wished the instruments would play at wide intervals apart, the distance would emphasise their timbral individualities. However, I felt keeping them always close together was too limiting. The low cello notes added depth and a richness of sound I did not want to leave out. And so, I aimed to use timbral contrast to explore tensions between integration and individuality and use it to embolden the pieces' featured parameters: melody and harmony.

To achieve more unity between the violin and cello, they are rhythmically locked, rarely playing a counterpoint other than 1:1. As it is in other pieces in the portfolio, I mostly de-emphasise soloist roles in these two pieces in favour of an integrated ensemble sound and work toward dynamic-melodic ambiguous textures.

Analysis

i. *Gravel* (2019)

The piece is in a structure of ABAB, resembling song form: verse, chorus, verse, chorus. A1 is at bars 1-24. B1 is at 25-39, A2 at 40-54 and B2 at 55-71. Both A's and B's have inner divisions of a+b.

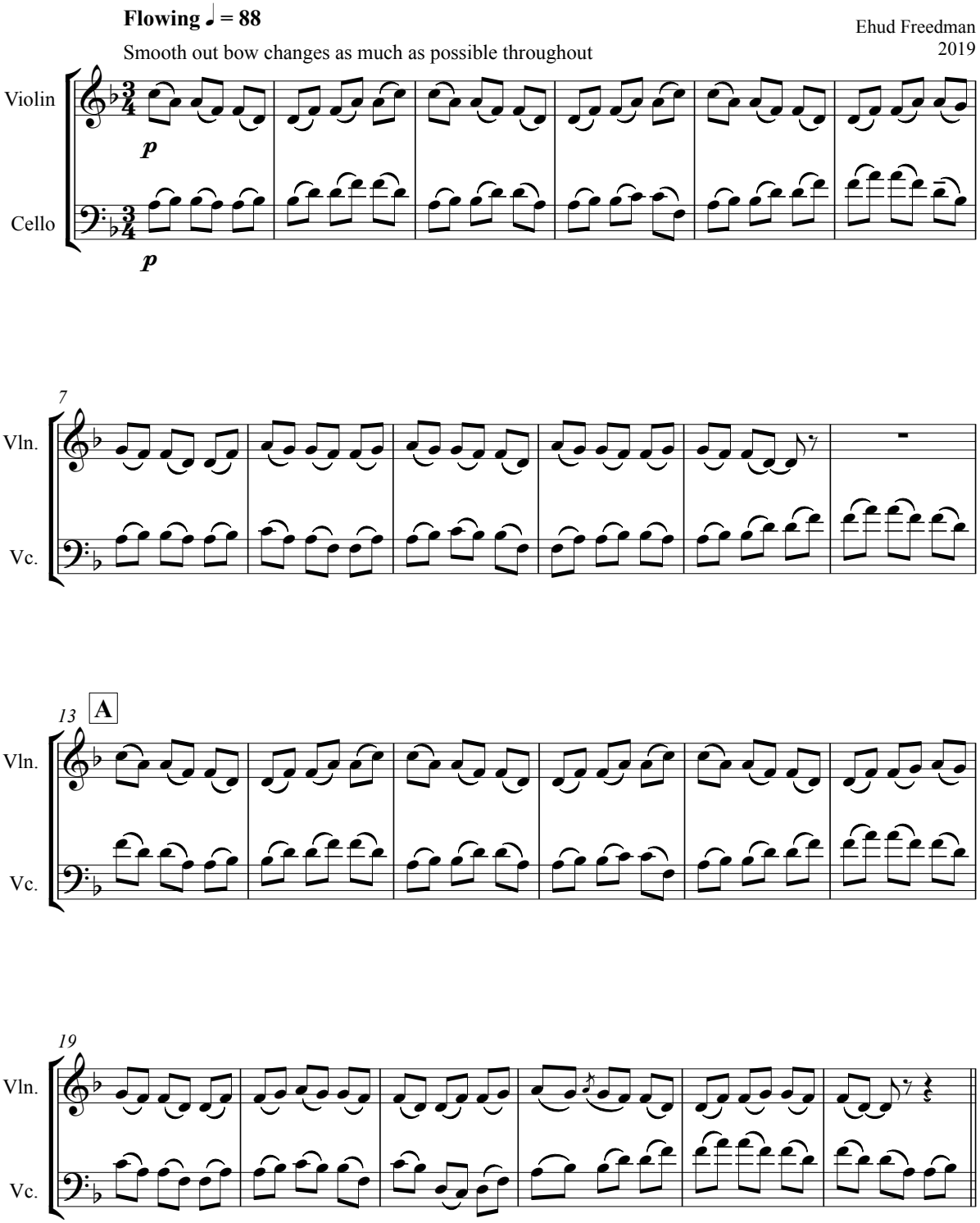
The A sections' featured characteristic is a theme built around a D-minor7 chord and is constructed of two six-bar parts, both in two parts: a call and a response (ex. 3.IV.1). The theme is played by the violin, but the cello plays a variation of it in a pattern which shape develops as it recurs. To create unity between the instruments in the A sections, I wrote them relatively close, within a tenth of each other, and often within the octave. This strengthened the single entity aesthetic I was aiming for. Occasional exceptions, like intervals bigger than a tenth, as well as leaps greater than a third following stepwise motions and voice crossings, emphasised the instruments' individuality to a degree I deemed beneficial.[35]

The B sections' (see fig. 3.IV.2) main feature is a second theme, which is based on the themes in the violin and its variations in the cello in section A. Though certain harmonies do emerge occasionally, as in the A sections, the B sections' harmonies are ambiguous almost throughout and can be interpreted in more than one way.

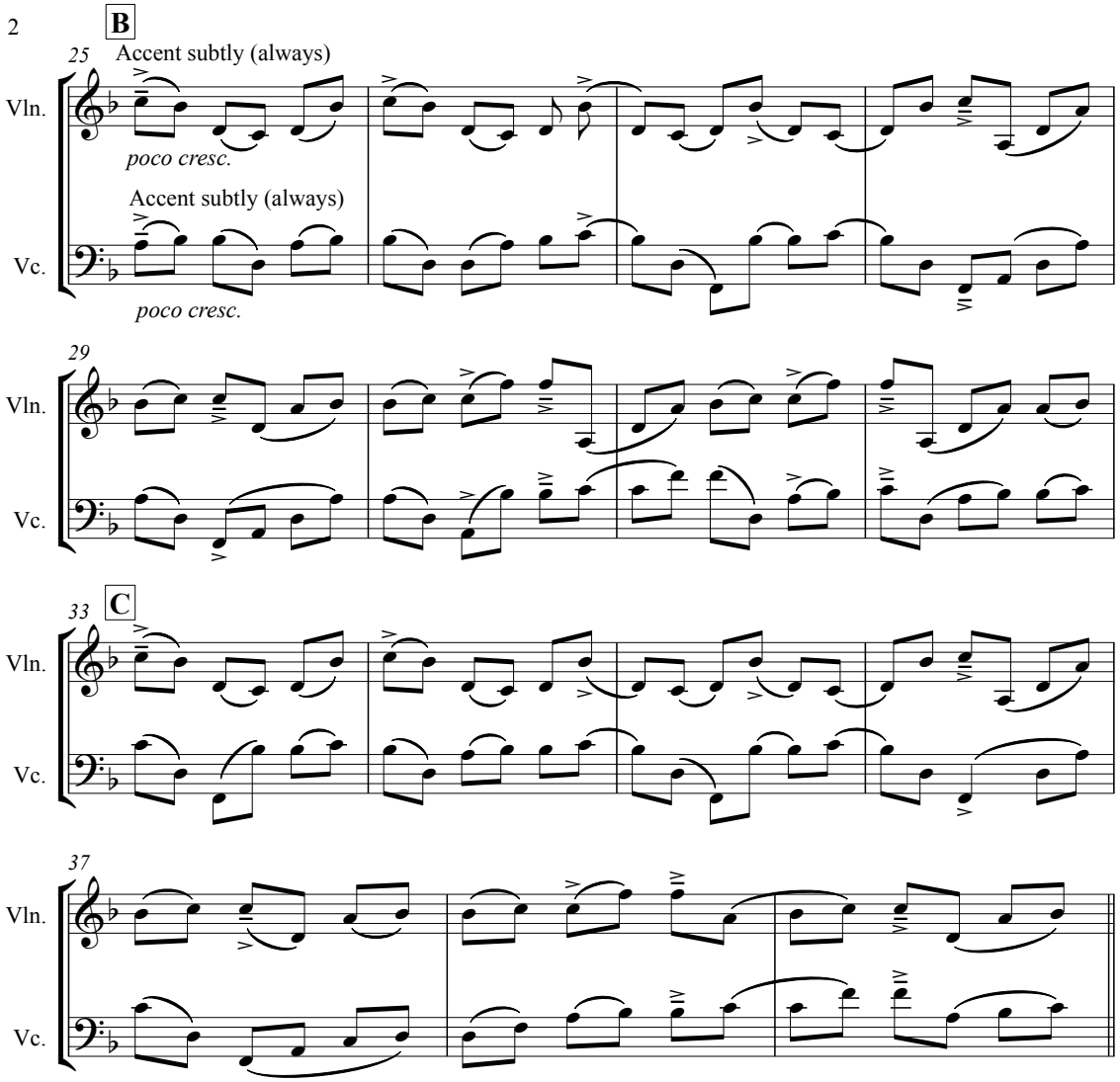
The tendency to move in steps in A is exchanged in B for frequent leaping, both instruments reach higher and lower than they have and play at greater intervals apart. The relationship between the instruments in the B sections is characterised by more contrast and individuality. Sequences in B have a clear soloist (the violin) and accompanist, brought on by wider intervals between the parts and leaps in both. Close intervals, a staple of the A sections, occur only in passing in the B sections and promote an ensemble sound. A tension of individuality versus unity, distinction versus integration, is used here to add musical interest. Staying rhythmically locked together, a level of unity is preserved.

[35] These exceptions constitute momentary timbral shifts, on which I expand in the final part of this chapter.

Gravel



Ex. 3.IV.1. 'Gravel', bb 1-24. The piece begins with a theme based on D minor7 and a counter-theme in the cello. The instruments are almost 'locked' in a quaver for quaver, 1:1 counterpoint, at a relatively close proximity interval-wise to promote a unified sound and reduce their individuality. Exceptions (as in bars 4, 16 and 21), especially those including leaps, bring out individual timbres.



Ex. 3.IV.2., 'Gravel: bb 25-39'. Unity vs individuality: playing further apart, the instruments' individual timbres are brought out. Voice crossings and smaller intervals function as facilitators of timbral similarity/ambiguity/integration.

ii. *Reminders* (2019)

Reminders' structure is ABa. It features a motif and theme and going through minimal melodic and harmonic development. The piece explores the timbral relationship between the instruments and its effects on texture.

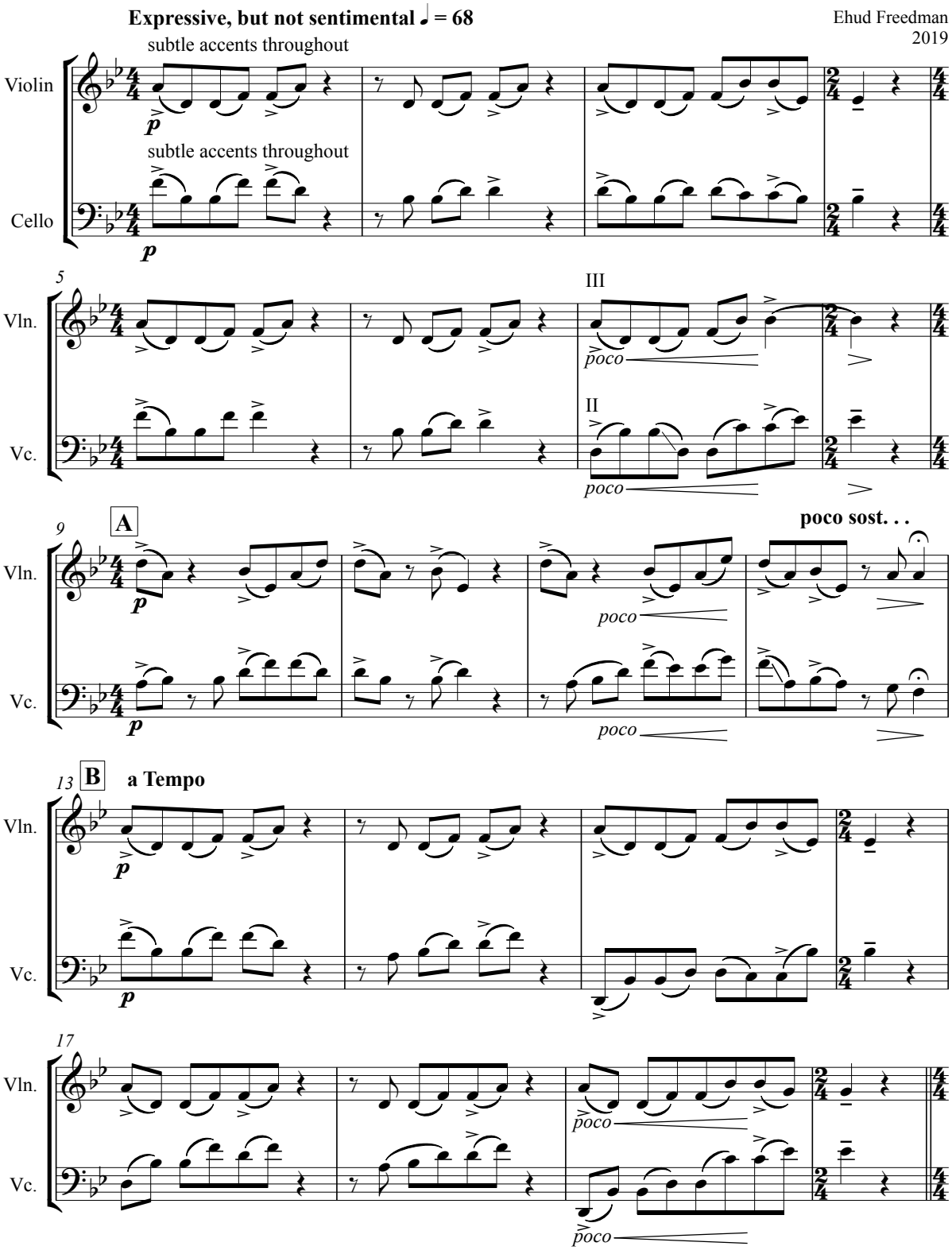
The A section is between bars 1-20. Its most prominent characteristic, as is the entire piece's, is the motif, which appears in the first bar. The motif is the sole building-block of the work and as such it is a vehicle for all developing parameters in it. Bars 1-9 constitute the piece's theme. The B section (bars 21-51) features limited melodic development, an ascending melodic direction and greater depths and heights in register and dynamics. The final A (or

‘a’) is a slight variation on bars 5-9 and a coda, a reduction of the first bar, which winds the piece down to its ending.

Much like *Gravel*, this piece has the instruments rhythmically locked, at a 1:1 counterpoint, playing quavers together throughout with rare exceptions. In the A section they play at relatively narrow intervals apart. This writing, as in *Gravel*, promotes timbral integration, a single, larger entity sound, rather than of individuals playing a duet. Instances of them playing far apart, especially when the cello plays well below the violin’s range (the first instance is bar 7), emphasise individuality. For a passing moment they change the relationship between them: from components in an integrated sound to distinctive foreground and background instruments. Another way I use to subtly disrupt an ambiguous texture is portamento in the cello (in bars 7 and 12 as well as later in the piece), which draws attention to the instrument’s individuality through contrast (ex. 3.IV.3).

The cello’s individuality becomes more noticeable from bar 15 as it starts reaching down more often (ex. 3.IV.3). This is in preparation for section B, whose prominent feature is four-bar sequences of ascending arpeggios which use the cello’s low range.

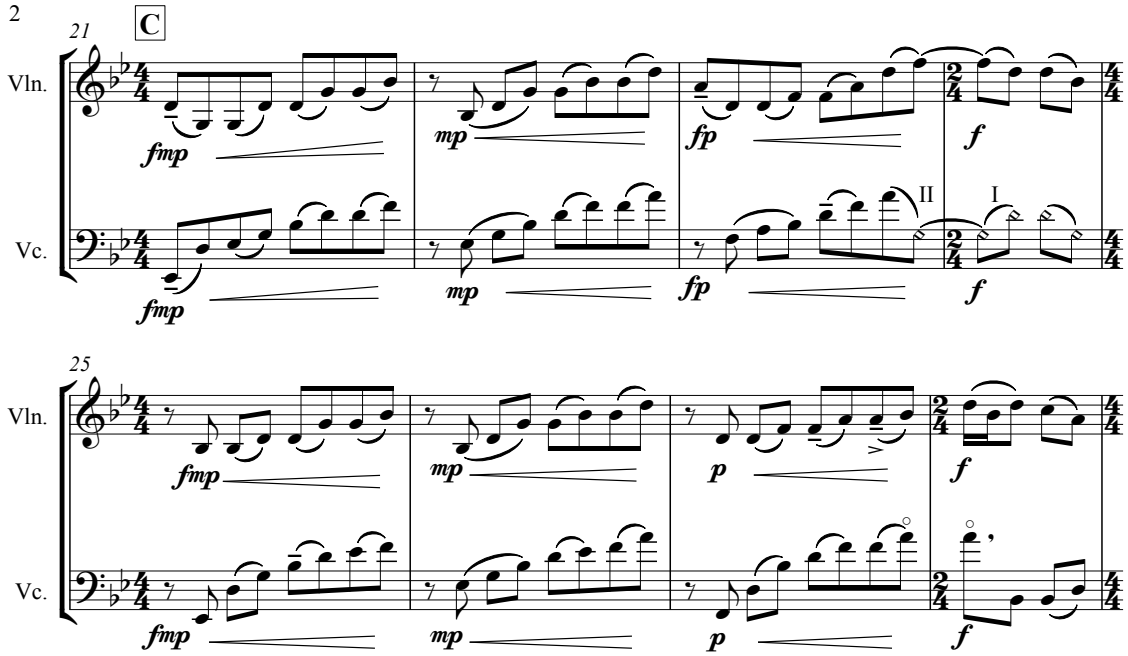
Reminders



Ex. 3.IV.3. 'Reminders', bb 1-20: an integrated sound is created through identical, locked together, rhythms and articulations and by playing at intervals which are relatively close together. However, as the music progresses, the cello reaches lower more often (first in bar 7 and then from 15) and the texture and sound shift from conveying unity to individuality. The cello part's shape between 17-20 prepares the arpeggios of section B.

Section B is made of a recurring four-bar sequence built around three chords: E-flat, F7 and B-flat. These are the same chords which populate the A section, but appear there in different orders. An ascending pattern is repeated in variation, delineating the harmonies. It rises from bar to bar until it resets at the beginning of the next four bars. As in the A section, the parts are rarely not rhythmically locked and are mostly narrow intervals apart, so they can better form a single entity.

Keeping the parts together at close intervals dictated certain choices. For example, note repetitions or choice of notes and beats to start arpeggios were made with integration in mind. I was concerned about the violin dominating the cello as the latter occupied the lower end. Having them play close together helps avoid this. As the arpeggios ascend to the cello's highest register and beyond it, it plays harmonics to reach higher. The harmonics preserve timbral integration with the violin and add interest through variation (ex. 3.IV.4).

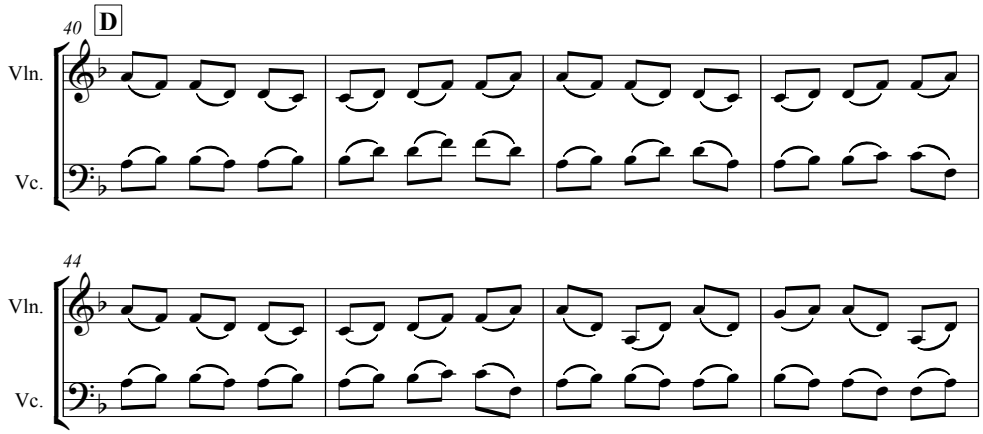


Ex. 3.IV.4. 'Reminders' bb 21-28. In a variation on the piece's motif, the duo builds upwards together as one. When reaching its highest register and beyond it, the cello switches to harmonics to continue to blend with the violin and preserve their relative unity. In bar 28, the cello's warmth at the bottom, emphasising its individuality, its 'cello-ness' against the violin, stands in dramatic contrast against the preceding integration in the middle and high registers.

Reflections on texture and timbral ambiguity

Gravel and *Reminders* explore integrative textural and timbral ambiguities by striving for them. Among integrated sounds, instances of individuality stand out when they do appear, even in passing. There is a tension between integrative or additive ambiguities and the absence of ambiguity due to distinction – prominent individuality – in the pieces. On a spectrum of timbral contrast levels, integrative ambiguity has low levels of contrast and distinction high levels. Additive ambiguity is located somewhere in between. Masking is an unambiguous state which has no or negligible timbral contrast and has been found to add negative value in this research.[36] On a spectrum of timbral contrast, it would occupy the opposite side to timbral distinction with ambiguous states in between them.[37]

Momentary shifts between integration and contrast (for example: bars 7, 18, 27-28) are a characteristic of the pieces. In *Gravel*, during the second A section, the instruments play at close and wide intervals and in unison. This results in momentary timbral contrast – timbral shifts. In the context of integration, shifts add subtle variety, interest and motion to texture. Further, integration *levels* provide tension and interest and diversity to the piece. Contrary to some pieces in the portfolio, constant integration is not an objective in this piece. Rather, the level of integration is a means to an end, which is added interest through the shifting from timbral clarity (no or low integration) to ambiguity (high integration level).



Ex. 3.IV.5., 'Gravel' bb 40-48. Playing at close and wide intervals apart and in unison makes for shifts in the otherwise integrated sound of the violin and cello. This is aimed to add subtle timbral and textural variety and a sense of motion within the texture.

[36] For an elaboration on auditory masking, see pg. 36.
[37] See *Conclusions*, figure 4.1, pg. 101.

V. *Accordion Loops*

Accordion Loops (2017) is a two-part studio piece consisting of edited and manipulated loops, recorded with a toy accordion.

Background, objectives and process

While working on a dance project, I recorded a demo for one of the cues with a toy accordion (fig. 3.V.1). As part of the process for the demo I recorded myself improvising to get a sense of the instrument and its sound. The accordion was limited technically, in slightly poor mechanical shape and I was neither an accordionist nor familiar with the workings of that particular toy instrument, so I was limited to performing technically easy material. What I ended up submitting for a demo was turned down, but I thought the raw recordings could still be put to use, which prompted composing *Accordion Loops*.

The title is a reference to *Shaker Loops* by John Adams (discussed in chapter 2.III.). *Shaker Loops* refers to the loop styled repetition in that piece and to its instrumentation, a string orchestra. Adams used the string ensemble in a way which made it sound like a unified, larger instrument – an integrated complex new whole. Working with a worn out and mechanically limited toy instrument I was not proficient on, creating integrative textures and sounds using loops and audio editing seemed an interesting premise for an experiment.

Another reason for the title is to relate it to ambiguous sounds in the musical texture, which characterise the piece. I wanted to affect the listening experience by communicating even though not everything in these tracks may sound like an accordion, those are indeed accordion loops you are hearing.[38]

[38] One exception to the otherwise purist, all-accordion approach, is a bass pulse in part II, for which I used a synthesiser, though I believe it is negligible in the perceived unified aesthetic of the all-accordion sound. Other bass parts were made by digitally transposing and manipulating the toy accordion recording.

Fig. 3.V.1. The toy accordion used in 'Accordion Loops': a two octave keyboard (from A below middle C at the bottom of the range) and a set of triadic chord buttons (unused in the piece).

After listening again to the raw recordings I had made and some of the loops I had created, I proceeded to experiment with the materials. I singled out and edited possible motifs and made loops out of them. Playing back some of the loops alone and together yielded results of musical value. Still, the loops were timbrally identical and thus undesirably perceived as overdubbing: multiple performances by one instrument. Without timbral ambiguity, there was no added value to using the loops as they were. From that point on, my goal was to compose for a fake ensemble of toy accordions and their descendant sounds – sounds I would create from my old recordings. Like *Shaker Loops*, I imagined my fake ensemble consisting of dissimilar timbres, coming together as a unified and integrated ensemble.

Rather than perform repetitions, as the strings do in *Shaker Loops*, I would turn to using digital loops. These loops are about 1-3 seconds long edited soundbites from my old improvisation recordings. This practice is common in electronic music as well as pop and hip-hop, where a short piece of audio is sampled and played in a loop. The resulting aesthetic is machine-like, as identical copies of a recording repeat over and over, as opposed to humans performing the repetitions. In the case of the latter, each repetition would sound different,

even if marginally so. Today, looping of everything from percussion to vocals is prevalent in popular genres, electronic dance music, sound-art and other styles. What I borrow from this practice in this piece is the looping itself, the looped cells' brevity and, to a degree, the use of percussive beats.

I composed *Accordion Loops* using Logic Pro. The process began with choosing musical cells for looping and assessing their development potential as motifs. I experimented with different digital variation methods of loop cells. Those include: EQ, digital transposition and time stretching. All methods alter the timbre of the original sounds. Through automation of the EQ or the Pitch Shift effect,[39] I was able to create timed changes in timbre as well as in pitch. Having this kind of control over timbre and pitch resembled composing and orchestrating acoustic music by hand or notation software. More relevant to this research, however, is discovering how altering timbre helped create semi-heterogenic textures from one toy accordion. This is thanks, in part, to timbral ambiguity, on which I elaborate toward the end of this chapter.

Analysis

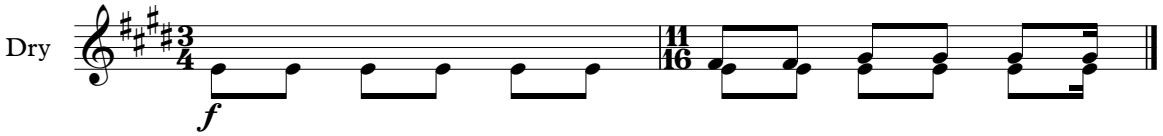
The piece consists of two movements, which I will refer to as part I and II. Both were made by editing and manipulating parts of roughly ten seconds of raw material extracted from longer recordings of improvisations on the toy accordion. The two differ in tempo, tonality and featured loops. They share some rhythmic features and have similar, though not identical, endings.

Part I

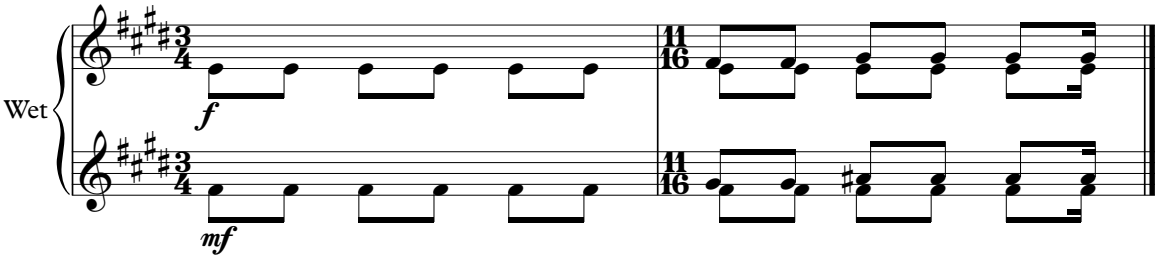
Part I opens on its main motif (ex. 3.V.1). The dry recording of the motif includes the notes E, F-sharp and G-sharp only, but a Pitch Shifter effect with a setting of 33% amount of wet signal and a pitch shift of two semitones sharp adds F-sharp and A-sharp at a lower volume (ex. 3.V.3). An EQ effect trims low and high frequencies and a stereo delay effect helps

[39] Automation is the programming of changes in parameters like volume or resonance, to occur at specific points in time.

create more density and motion in the texture with a counter melody/echo it adds (ex. 3.V.2 and fig. 3.V.2).



Ex. 3.V.1. 'Accordion Loops': the motif and primary source for all loops in both part I & II as it sounds dry, with no effects applied (as it exists in my effect-free improvisation recordings). The second bar can be alternatively interpreted as a 3/4 with its last beat cut short, or 2/4 + 3/16.



Ex. 3.V.2., 'Accordion Loops', an approximation of the motif as it sounds with the Pitch Shifter effect applied.

Using these manipulations, I created many timbral variations from little original source material. About two thirds of the music in Part I, is made out of the opening loop's cell (the motif as shown in ex. 3.V.1).

Fig. 3.V.2. 'Accordion Loops', the Pitch Shifter setting applied to the main motif's track, which yielded the result in the transcription.

Using automation of EQ parameters, I widened and narrowed the filtering of the high frequencies on the main track to accentuate its first beat and give the motif a more dynamic shape (0:00 – 2:01). This turned the texture gradually more complex, with other instances of the accordion interacting with the motif.

Towards 2:00, the automation of the EQ stops on a bright timbral setting. Soon after (2:01) the motif, in its original form, is cut and other variations of it assume the foreground (2:01 – ending).

Part II

As in part I, part II opens with a looping of a short cell. The 5/4 cell is this part's main motivic material between 0:00 – 2:44. A version of the main cell from part I functions as a secondary motif and occupies the middle-ground and background between 0:00 – 2:44. It then occupies the foreground until part II's opening motif takes over at 3:58. Repetitions of integrated and manipulated copies of the secondary motif now occupy textural layers. Their manipulation is meant to cause slight timbral differentiations between them. Hence, when they are combined, the texture is ambiguous: not devoid nor high in timbral contrast.

The primary methods of developing timbres and pitch material in the loops in part II are EQ filters and pitch shifting. As noted in other chapters about works with electronic components, pitch shifting not only changes pitch, but also timbre (the more drastic the shift, the greater the timbral alteration). It is an efficient tool for facilitating the development of more than one parameter.

Reflections on texture and ambiguity

In discussing texture and ambiguity, it is important to stress *Accordion Loops* was made to explore these areas while creating a piece out of little material and under strict limitations, dictated by the choice of instrument:

- Roughly ten seconds of source material in total is used in the piece. It was edited and manipulated to create variety, avoid monotony and experiment with ambiguity. It is

futile to experiment in timbral ambiguity with identical sounds as *some contrast and individuality must exist* even if they are difficult to perceive.

- With the exception of a synth bass track in part II, the piece was made using one instrument.

- The instrument itself, an old and worn out toy, was mechanically limited. It was impossible to play continuous melodies on its keyboard, some of its buttons did not work and the maximum duration of note sustain achievable was about two-three seconds.

Economy was dictated by the instrument and thus became a guiding principle in composing the piece: one instrument, minimal and simple core material and minimal development. Timbral ambiguity was another guiding principle. As a measure of efficiency, I used one to facilitate the other. Subtle alterations were made to instruments in my fake accordion ensemble. The pursuit of these alterations was a pursuit of ambiguity; ambiguity in new individual sounds and the textures they formed. In addition, it was an attempt to defamiliarise an accordion and integrate its new timbres to form layered textures.

Thus, efficient use of minimal material, a result of inherent technical, mechanical and imposed aesthetic limitations, informed the ambiguation of accordion timbres and the creation of ambiguous textures.

VI. *Upload/Unplug*

Introduction

i. Background

Upload/Unplug (2018) is an interactive solo dance performance by choreographer, Rebecca Evans, and her company, Pell Ensemble. It has been performed in venues in the UK including London's Southbank Centre and Rich Mix. In addition to recordings of the complete score, for selected cues, video files from a 2018 performance at Stockton Arts Centre (ARC), are included in the research portfolio and referred to in this chapter.

The score I composed for the show comprises of multiple separate cues. Most cues consist purely of synthesised sounds and involve practices common to electronic music as looping and the use of arpeggiators.[40] Others vary in style and instrumentation. These include a piano waltz, a sound-art vocal collage and cues combining sampled acoustic piano and synthesisers. The gradual transformation of the score from electronic to acoustic symbolises the show's narrative arc, as will be discussed in this chapter. The score was composed and recorded directly onto Logic Pro.

ii. Benefits and Challenges Inherent to Collaborative Processes[41]

Most of my professional work has involved collaboration, especially in dance, theatre and film. In these mediums, opinions and often the authority of others play a role in the composition. The collaborative process is the opposite of what Dennison Nash called 'ivory tower self-expression' (1955: 120). Nash referred to a popular perception of composers as lone, sole creators, when in most cases their process involves others, sometimes to a significant degree.

Serving someone else's vision and creative discussions with collaborators can be beneficial to a project and to a composer's artistic evolution. Composers can learn from their

[40] For more on the arpeggiator see Works, II, pg. 47.
[41] With relevancy to this research.

collaborators and collaboration can lead to 'innovation and generation of knowledge' (Creamer 2003: 556).[42] It can, however, limit a composer's pursuit of personal musical interests or self-expression. This can occur when such interests do not serve the project or are deemed not to by collaborative partners. Hayden and Windsor studied collaboration in Hayden's compositions and found '…incompatible aesthetics can impede successful collaboration by promoting conflicts in working methods and artistic aims' (2007: 38). Certainly, a challenge in composing for *Upload/Unplug* was exploring personal areas of interest, while working to a brief.

And so, as the composition of the show's score was a collaborative process, relevant details of it will be included as I discuss selected cues.

iii. Premise and narrative

The show opens with a voice recording, representing a fictional tech company called EPOQ, inviting the audience to take part in a show-within-a-show. EPOQ will then guide the audience in their interactions with a dancer playing an android called David throughout the performance. The interactions are done through personal tablet devices, provided by the production before the start of the show.

By playing simple games and answering questions on the tablets, audience members 'upload' personal data onto David's consciousness. Such data includes their loves, hates, fears, opinions and biographical details. The show-within-a-show's stated goal is to transform David into a human being with the data. However, a sinister data harvester, EPOQ's hidden agenda is to exploit and profit from the audience's personal information.

***

I will now focus on three cues: put them in dramatic context, describe the creative and collaborative processes behind them and their corresponding choreography and videography

[42] Creamer quoted Slater and Hearn (1996: 198) and referenced Palmer (1988) to establish how consensus, conflict and multiple perspectives contribute to advancing knowledge.

and discuss their musical attributes. Special attention will be given to the research's main areas of interest.

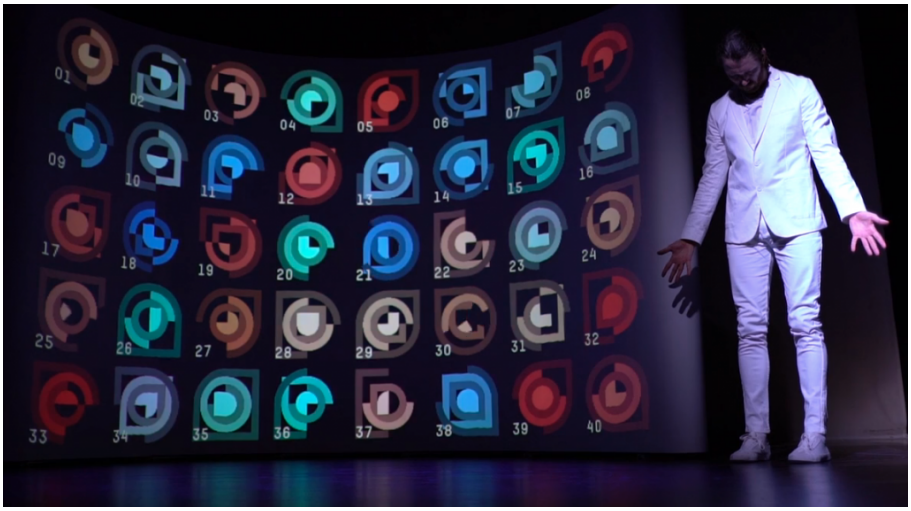


Fig. 3.VI.1. 'Upload/Unplug', a lifeless android (played here by David Ogle) is brought to life by audience members in a one-dancer interactive show. Photo by Mira Loew.

Selected cues from Upload/Unplug

i. *Reboot*

This scene launches EPOQ's show-within-a-show with the animating of the initially lifeless android David and establishes his relationship with the audience. As the first scene in EPOQ's show, it establishes its tone and aesthetics. Musically, it establishes style, themes, motifs, relationships with the visual content (choreography and videography) and a sound-world (harmony, tonality and orchestration).

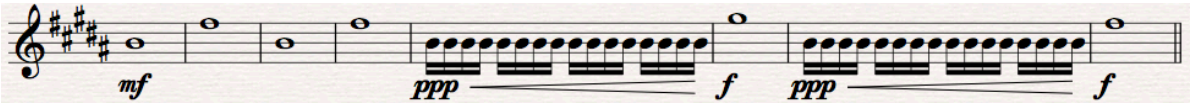
The scene begins with David motionless, as if lifeless (fig. 3.VI.1). A voice recording instructs the audience to play sounds by tapping, swiping or swirling on their tablet screens, as guided by synchronised on-screen animation. The animation then indicates when the audience should trigger bespoke sounds I had created. The triggered sounds were made to sync with a background track I had composed. The audience's taking part in the music creates a theatrical experience of animating the android. It is aimed to establish them as part of the show and get them invested in David's arc.

After discussions with the choreographer and the technical team, we agreed the pre-recorded track and bespoke audience-triggered sounds should all be relatively simple to suit a non-musician audience. At the same time, the sounds and track needed to have substance and development potential, as they were to be core musical components of the majority of the show. Given the android-becomes-human storyline, we thought an electronic score gradually becoming acoustic would help support it.

Fig. 3.VI.2. 'Upload/Unplug', audience members communicate with and influence the dancer (played here by Stefania Pinato) using tablet devices. Photo by Mira Loew.

I planned the music's structure based on choreographic sketches and the scene's intended structure. I chose to use sounds from a Roland JU-06 synthesiser, which, through experimentation, became my primary instrument in the show. I then wrote some thematic material to be played by the synth and used an arpeggiator effect on some of the notes, to symbolise David's breath, as he was 'coming to life' (see 1:16-1:34 in the video file 'Reboot', as well as fig. 3.VI.3 and ex. 3.VI.1).

Fig. 3.VI.3. The Apple Logic X arpeggiator effect's setting from 'Reboot' Logic file: playing a sustained note through this setting would result in its repetition in semiquavers as seen below in ex. 3.VI.1, in bars five and seven (1:16-1:34 in the video). The rising dynamics symbolise air 'breathed' into David.



Ex. 3.VI.1. 'Reboot' the breath theme. The arpeggiator effect is applied to bars five and seven, which show the end result of playing a semi-breve using the pattern in fig. 3.VI.3, above.

The arpeggiator-generated repetition of single notes in the breath motif (first instance at 1:25 in the video) became a key ingredient in *Upload/Unplug*'s score. The fast repetitions in the motif are reminiscent of Michael Gordon's *Timber* (2011) and *Rushes* (2009), in which a single-note motif repeats in every instrument to create complex textures. The *Reboot* motif, mimicking the act of breathing in its dynamics and call and response inner structure, would later function as the primary building block of textures in other cues. For example, a variation of it is labelled 'the spinning motif', in the cue *Completion*, discussed in the next sub-chapter.

ii. *Completion*

This scene shows large amounts of audience data uploading onto David and their transformative effect on him. Its choreography symbolises his transformation in correlation with text, pictures and other data and animation shown on the on-stage screens.

Before composing for the cue, I discussed its function in the narrative, structure and duration with the choreographer. I then watched a video of an early studio rehearsal from which I gleaned key choreographic vocabulary, as movement based around spinning, which

symbolised the character's metamorphosis. I was also informed of plans for an accompanying animated video which would play during the scene.

The video, as the dance, would have three sections: (1) Abstract animation (2) A gradual appearance of audience data as text and photos (3) A return to abstract animation, but of faster motion and textural density.

The music was to include an acoustic element. I chose piano to be this element for its timbral similarity to sounds previously used in the breath theme (ex 3.VI.3). The acoustic piano would symbolise the android's budding humanity and prepare for an acoustic sound-world replacing an electronic one in later cues. Some of the piano sounds in *Completion* are distorted, muffled or altered so only the hammer sound is audible. Fed through arpeggiator plug-in effects to create rapid, dynamic and percussive repetitions of these sounds (fig. 3.VI.5), their acoustic-mechanical quality helps symbolise a transformation from machine to human. The cue *Being,* which follows *Completion,* is composed for piano and synth: the right hand part is played with a JU-06 synth and the left with a piano sample. Its half acoustic and half synth sound symbolises a human-android hybrid.

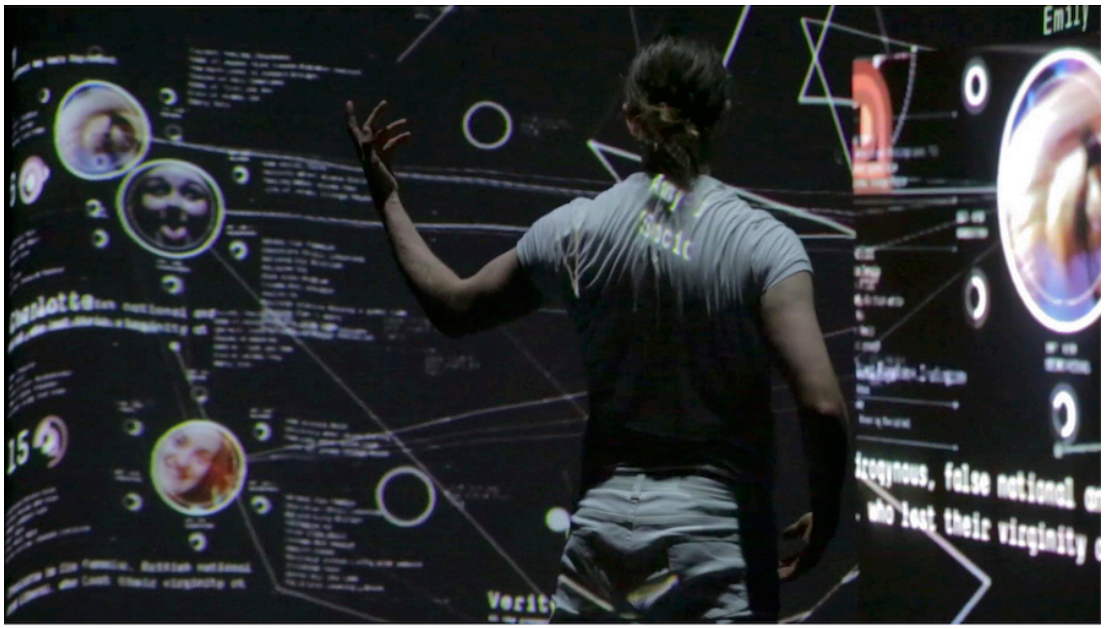


Fig. 3.VI.4. 'Upload/Unplug, Completion', the dancer dramatises the uploading of audience data onto his character, such as emotions, fears, likes, dislikes and selfies (animated on the screens facing him). Photo by Mira Loew.

As the scene was about transformation and the choreography employed a spinning motif, I followed suit in my music. The musical spinning motif is a variation on the breath motif from

previous cues such as *Reboot*. It was made with the JU-06 synthesiser and an arpeggiator plug-in (fig. 3.VI.5). It is heard for the first time as the cue begins (0:16 in the video titled 'Completion').

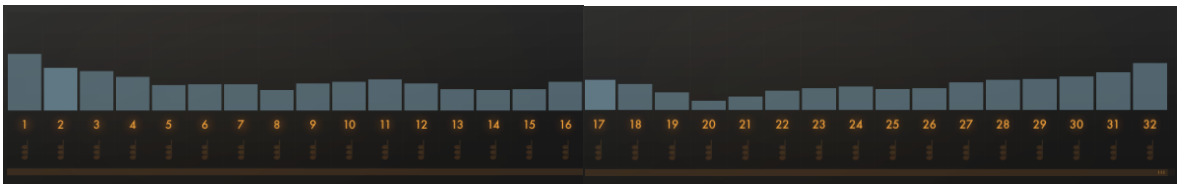


Fig. 3.VI.5. 'Upload/Unplug, Completion', a screenshot of the arpeggiator rhythmic setting for the opening synth motif and most of the elements in the cue which derive from it, including sampled acoustic piano notes. The graph indicates a 32 step setting with falling and rising dynamics. Various rhythmic values (from quaver to demisemiquaver) were used, at times simultaneously, in different instruments.

Following the cue's opening, more arpeggiator-generated single note repetitions are added. They occupy the foreground and background and form a dynamic texture of timbres. The texture's growing complexity represents the uploading of data onto David, as the animation and choreography grow dense and complex. I avoided chord arpeggios in the synthesised sounds and loops of arpeggios in any instrument. The piano sounds, the antithesis to the synthetic sounds, do have arpeggiated chords. They are played quasi rubato in the background until emerging in the last section, where the piano plays prominent arpeggios in the bass register. This serves as more symbolism of machine vs human, digital repetition vs repetition by hand.

Regarding timbre, the cue is made of a limited amount of source material; its sounds are altered copies of sampled instruments or synth parts. Such alterations included changing the synthesiser's setting or distorting effects. They helped me create a relatively integrated ensemble sound out of few instruments, like my JU-06 synth, or a cymbal sample. For example, I created five differing cymbal sounds out of one cymbal sound, forming a fake cymbal ensemble, as can be heard in the final section of the cue (4:08-ending). In addition, I applied a variety of rhythmic and dynamic settings to the arpeggiator effects which were generating rapid repetitions of the cymbals and other percussive sounds. Further, I staggered their onsets. All of this accounts for the dense, volatile atmosphere and dynamic texture of the final section (figures 3.VI.6-7).

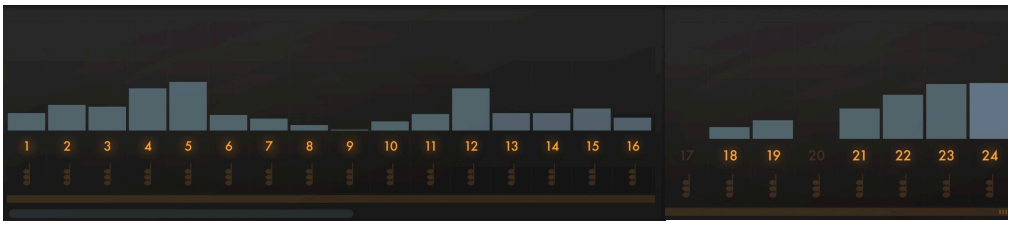
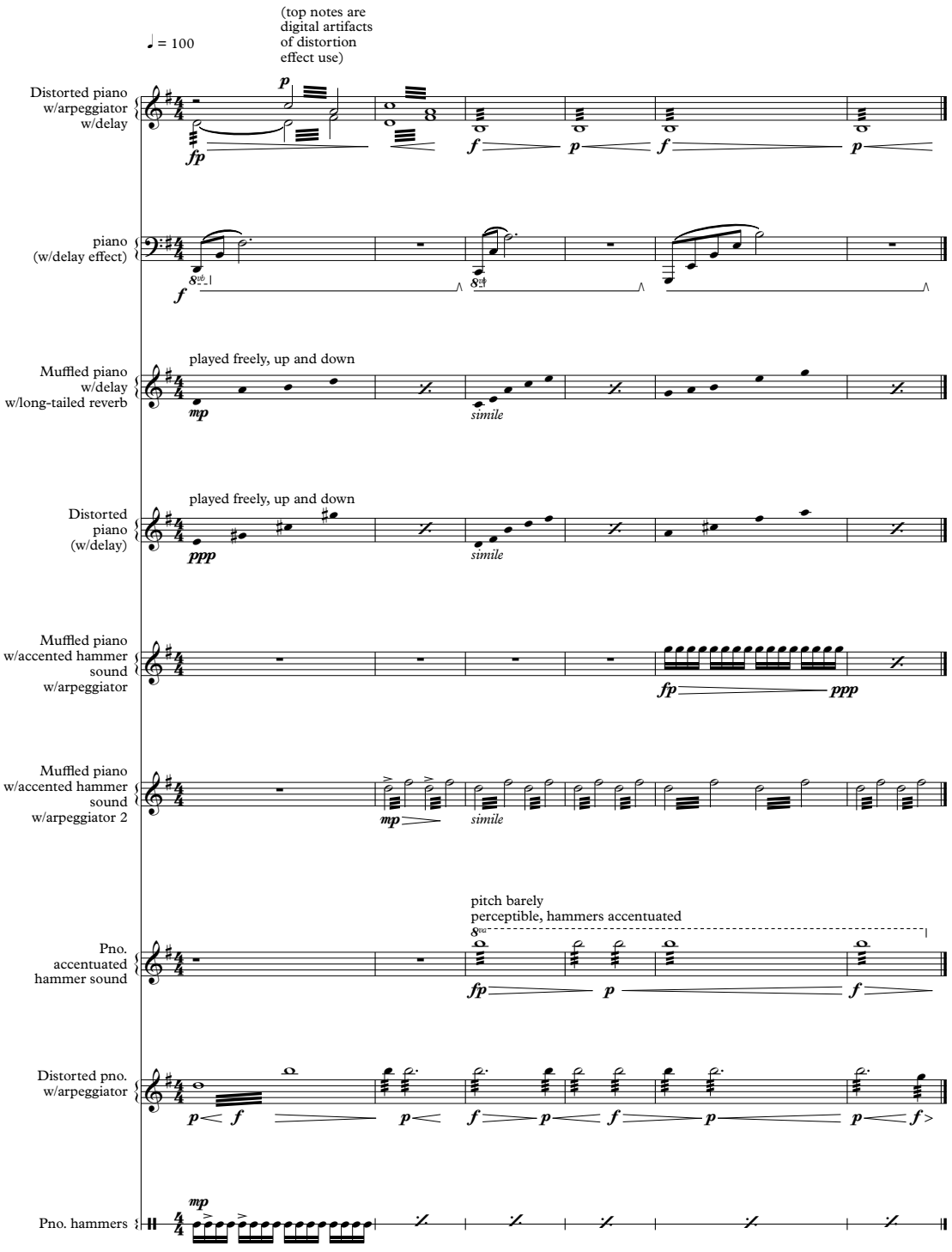


Fig. 3.VI.6. 'Upload/Unplug: Completion', a screenshot of an arpeggiator dynamic setting for a digital snare sound, which is part of the texture in the last section of the cue (4:08-ending). The rhythmic value of each step is a semiquaver triplet. The sudden rises and falls in volume in the setting along with variety in settings (see figure below) among participating instruments and their staggered onsets account for the shifts and bursts characterising the final section. This setting and others, with rises and falls such as these, were applied to all percussive sounds.

Fig. 3.VI.7. 'Upload/Unplug: Completion', an arpeggiator rhythmic setting applied to a digital cymbal sample. The rhythmic value of each step is a demisemiquaver. This example is brought to demonstrate the variety in settings amongst the percussive sounds in the final section, which was a factor in the intricacy of this section's texture.



Ex. 3.VI.2., 'Completion', 3:37-3:52: a rhythmically approximated transcription showing staggered dynamic shifts in timbrally altered sampled piano sounds, run through an arpeggiator (see fig. 3.VI.5). The tremolos in the transcriptions are measured and indicate a semi-quaver repetition of notes (tremolo indicated here for the sake of brevity). Not included in the transcription are electronic percussion, which mimic the tremolo figure in the hammer and distorted piano sounds, also in staggered dynamic crescendos and diminuendos.

iii. I am David

The scene explores David's sense of self and identity. The composition started with the choreographer, who wanted the statement 'I am David' whispered in the cue. We then discussed making a track made solely of this whispered statement. She then recorded herself whispering it in different ways.

A statement like 'I am David' has little to no meaning when void of context. In the context of an ambiguous android-human identity, it functioned more as a question or a probing statement, attempting to elicit a reaction. Thus, the musical cue aims to convey certainty and uncertainty in David's sense of self and the audience's sense of who or what he is, as both perspectives co-exist and affect the scene.

Much like other works in this research's portfolio, as *Dots and Rays,* this cue, which is more audio-art than music, is made of only one figure. In *Dots and Rays* that figure is seven identical notes decreasing in volume. Here it is 'I am David', which many instances form dynamic ambiguous textures. Timbral similarities between variations of 'I am David' facilitate an imperfect uniformity in these textures. This imperfect uniformity is due to the use of what Jonathan Harvey called 'family likeness' (1986: 188). Harvey was describing the effects of creating complex polyphonic textures with multiple sounds which were alike yet had some timbral contrast between them.

The *contrast* between the various instances of 'I am David' is measured, to keep it relatively low, but enough to give the overall texture a timbral gradient – a variety of tones and colours. Given this level of perceived individuality, the texture in this cue leans towards being of additive ambiguity. Its components can be distinguished, and their individualities perceived, to an extent. They do not comprise a complex new whole as in integrative ambiguity, but do not lead to the absence of ambiguity.[44] This fine balance or ambiguity 'recipe', which differentiating ingredient is timbral contrast, was reached through trial and error as I edited the cue.

[44] For definitions and examples of additive and integrative, see Context, II, pg. 27-28.

To manipulate the vocal recordings, I used reverb, delay, and EQ effects. I also shortened and/or looped some of the recordings and panned them to different positions across the stereo spectrum.

Notes on composing for dance, textural writing and timbral ambiguity

Timbral and textural ambiguities are used in *Upload/Unplug* to support the narrative and the choreographer's visual and dramatic visions. Musically, along with other parameters, the textural writing, to which timbral ambiguity is central, is key in supporting tone, visuals, symbolism and narrative development.

As expected, the collaborative process led to a '*generation of knowledge'* (as discussed earlier in the chapter), in the form of new music written for this project. However, the score for *Upload/Unplug* had significant influence on later pieces. One of them is *Dots & Rays* in which I mimic my use of arpeggiators in *Upload/Unplug,* but in acoustic instruments instead.

Use of the arpeggiator throughout the score is key to the creation of dynamic ambiguous textures. Timbral ambiguity is used in these textures to reduce individuality and create the shifting of sounds between foreground and background. The term 'texture' evokes the tactile sensation of fabric. As such, additive and integrative timbral ambiguities were useful to musically depict dense and dynamic animated textures or choreographic textures of similar characteristics. The cues discussed here are examples of such connections between the score and the visuals.

CONCLUSIONS

The subject of ambiguity has been widely discussed in academic literature, mostly in the fields of language and the arts. Musical timbre has also received considerable attention as has texture, in practice and in academia. Timbral ambiguity as a term, tool and concept, has, however, been the subject of little focused research. Textural ambiguity has rarely been directly explored in academia. This research aims to add to knowledge in these musical areas, as guided by three questions, separately answered below:

1. What roles does timbral ambiguity play in the creation of textural ambiguity in my music?

1.i. A facilitator of textural ambiguity

Timbral ambiguity is used throughout this portfolio to obscure distinction between textural layers. This leads to textural ambiguity due to a reduction in timbral contrast between textural layers. Textural ambiguity can emphasise sound groupings over individual sounds. It can also be a tool for novelty or be used to challenge listeners, as ambiguity has been used in music and other art forms – such is the independent value of ambiguity[45].

1.ii. A potential source of added interest which does not interfere with minimalist aesthetics

Ambiguity brings independent value and interest to music, but changes to timbral integration (ambiguity) *levels* can create independent musical tensions, such as timbral distinction vs integration. These tensions can serve as independent developing musical parameters or support other developing parameters. In the context of minimalism,[46] the question of how often and how much change should be introduced is central, primarily when featured parameters as melody, rhythm, pitch and harmony are concerned. In all portfolio works, timbral and textural ambiguities, created with timbral integration, add interest without

[45] See Context I. pg. 18-20.
[46] Minimalism as context in this thesis is explained on pg. 29-30.

directly changing or developing other parameters. Thus, they can add to the music without lessening the impact of – as in interfering with – minimalist aesthetics.

1.x. Further finding related to timbral ambiguity: A tool for greater efficiency

Efficiency and economy are thought to be factors in whether something is deemed beautiful.[47] In trying to be more efficient, I aimed to compose for fewer instruments in my pieces. In ambiguous textures, an instrument can occupy the foreground, middle-ground and background simultaneously. Thus, textural ambiguity can be a tool for efficiency, as it may require fewer instruments for the same number of functions, or more.

Minimalism is inherently efficient or strives to be for its use of minimal means for maximum effect. Continuing from item (1.ii), if interest is added to minimalist music with no more than negligible interferences with featured parameters, it can be said timbral and textural ambiguities are tools for adding value without decreasing efficiency.

2. What roles does timbral contrast play in the designing of ambiguous integrated timbres and ambiguous textures?

2.i. A key to controlling the level of timbral and textural ambiguities

My 2nd research question seeks formulae or, recipes, informally speaking, for timbral ambiguities. In these recipes, a key ingredient is timbral contrast. That is somewhat paradoxical, as contrast *elevates* distinction between timbral identities, acting as an antagonist of ambiguity.

This research found reducing or elevating timbral contrast levels in the portfolio pieces can 'move' sound combinations, as if on a spectrum, between timbrally non-ambiguous, additively ambiguous and integratively ambiguous states as well as within ambiguous states themselves. States of ambiguity in the portfolio are never completely additive or integrative. The spectrum they exist on is characterised by levels of timbral contrast (fig. 4.1).

[47] See Introduction, I, pg. 14.

Composers may benefit from awareness of the spectrum as they design ambiguous sound combinations. It visually demonstrates the direct relationship between timbral contrast levels with non-ambiguous and ambiguous states. It also shows the relationship timbral contrast levels have with the level of timbral integration within ambiguous textures. As apparent from the diagram in figure 4.1, as contrast is increased, integration is reduced until non-ambiguity is reached in the form of clear timbral distinction. Reducing timbral contrast in sound combinations increases integration and can lead to non-ambiguity in the form of masking.

It is important to understand the role of timbral contrast when trying to avoid auditory masking. When one timbre masks another, it obscures the masked sound's presence to a point on the spectrum where it is either impossible to detect or its presence is so negligible and ineffectual, no ambiguity is created. The result is either the perception of the first sound only or that of a dominant first sound and an additional vague timbral presence, which does not add value in the form of defamiliarisation and/or a new integrated sound group. In the second state, that of vagueness, masking is akin to what Leonard Meyer called '*undesirable ambiguity'*.[51]

As a reminder: in a state of additive timbral ambiguity, some contrast is meant to be perceived. In a state of integrative timbral ambiguity, contrast is either meant to not be perceived, or be so subtle as to facilitate the creation of a cohesive new timbre. Despite their labels, both additive and integrative timbral ambiguities are states of timbral integration. One, additive ambiguity, is less integrative than the other – characterised by more perceivable contrast – but still describes a state of integration.[52]

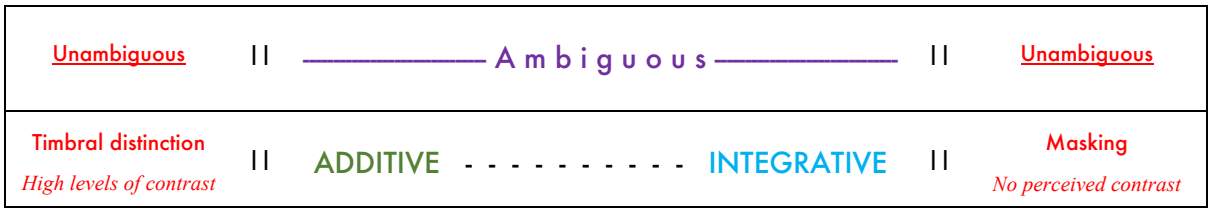


Fig. 4.1. A timbral contrast spectrum: the levels of timbral contrast are a key factor in the creation or cancellation of ambiguous states.

In the *Works* section, I mention so-called sweet-spots of integrated timbres, created in trial and error processes of combining sounds while composing. These sweet-spots were in fact

[51] For 'undesirable uncertainty', see Context, subchapter I, pg. 18.
[52] The terms additive and integrative are further explained in Context, II, pg 27-28.

points on the additive-integrative part of the spectrum. In the portfolio, points on the spectrum have been chosen with subjective judgment, as demonstrated in my detailing of my composition processes in the various 'Works' subchapters.

2.ii. A tool for designing dynamic textures

Timbral instability, a shifting of timbral quality within integrated sounds, can be composed or occur at random in acoustic and electronic sound sources. These timbral shifts within timbrally integrated sounds lead to an experience of textural *motion*. They turn textures more *dynamic*. Timbral shifts in the portfolio result from applications of timbral contrast, as shown, for example, in *Circuits, Glimmers* and *Gravel*.

2.iii. A provider of context to ambiguous states

Timbral contrast can serve as an antithesis to states of increased integration and so provide them with context. These states can be appreciated more for their textural and timbral nuance when set against unambiguous states which feature distinct timbres. For example, in *Pianos,* when a state of ambiguity follows a state of distinction, the latter gives the former greater significance, which helps make states of integration the focus of the piece.

3. What new interest and benefits does abstracting the behaviour and uses of arpeggiators to acoustic music provide?

3.i. It provides a composition system both rigid and adaptable; consistency and flexibility

As in process music, imitating a machine's (in this research, the arpeggiator's) way of generating patterns, provided me with a system according to which ideas could be organised consistently over time. Contrary to process music's composition practices, my way of mimicking the arpeggiator was not as strict. It allowed the use of more than one arpeggiator pattern or minor adjustments to a pattern for the sake of variation. Thus, pieces in which arpeggiator patterns were mimicked with acoustic instruments were composed systematically while accommodating intuition to a degree.

3.ii. It can defamiliarise repetitive composition

As an abstraction of a common practice in other styles, as electronica and pop, mimicking the use of arpeggiators in acoustic music is an act of defamiliarisation. It defamiliarises the practice and style to which it is abstracted. The research explores writing for acoustic instruments as if they were played through an arpeggiator, while making minor adjustments to would be arpeggiator patterns as they repeat. As demonstrated in such pieces as *Circuits* and *Dots and Rays*, the practice described above and in 3.i. was found to result in nuanced and less familiar repetitive composition.

Further research

Experimenting with sound combinations has vast potential. Employing integrated timbres different to those created in this research, could lead to new findings. Such further findings could be made, for example, with instruments outside the Western tradition.

More research could be done on the possible effects of textural/timbral ambiguity levels on structure. Ambiguity levels may define and differentiate between sections in pieces or delineate the main development arc in a piece. Featuring ambiguity levels as the *most* prominent developing parameter in a musical work is not an objective or a method in this research. Thus, making timbral/textural ambiguity levels a primary focus in new music or sound-art may contribute to further knowledge.

Timbral ambiguity, as a tool for efficiency when used for textural ambiguity, can be explored further as a means of reducing the number of instruments required for a piece. Performances and recordings of solo pieces or smaller ensembles are usually less expensive and complicated to organise. So, with fewer musicians to pay and coordinate, getting a new piece performed or recorded can be more practical. Furthermore, from my subjective artistic standpoint, I find value and beauty in the intimate nature of solo and small ensemble music and am more interested in writing for them, compared to larger forces. I intend to focus on composing for such forces in the foreseeable future. Other composers who share this preference, may benefit from exploring timbral ambiguity further in their own work.

Appendix: Scores and Media in the Portfolio

Glimmers (2018)

For B-flat clarinet, vibraphone and pre-recorded sound. Duration: ca. 15’.

Two Pieces for Sextet (2018)

For flute, oboe/cor Anglais, B-flat clarinet, viola, cello and upright bass. Duration: ca. 10’’.

Pianos (2021)

For piano and pre-recorded stereo sound. Duration: ca. 19’.

Two Pieces for Violin and Cello (2019)

Duration: Ca. 6’30’’

Accordion Loops (2017)*

Studio recording. Duration: 10’.

Upload/Unplug (2018)**

Mixed mediums and instrumentation, composed for contemporary dance. Ca. 34’.

* Audio recording only

** Audio and video recordings only

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