

Part One:
Timbral Processes in Three Selected Works by Olga Neuwirth,
Kaija Saariaho and Clara Iannotta, and Their Influence on a Portfolio of
Creative Works

by

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Abstract

The instrumental music of composers Olga Neuwirth, Kaija Saariaho and Clara Iannotta inhabits an inventive sphere of approaches to timbre, inviting a variety of possibilities of considering how sound can be organised to create compelling narratives with timbre as a key parameter. This research aims to define the individual sound units within three of these composers' ensemble works and to determine how these sound units are assembled, how they interact with one another, and how their functions operate throughout the course of the work. These works are *Vampyrotheone* (1995) for three soloists and three ensemble-formations, *Oi Kuu* (1990) for bass clarinet and cello, and *Àphones* (2011) for 17 instruments. The intended outcome of this research is to enable an understanding of the form-creating forces throughout these works, which are conceived through a timbre-based approach, and how this might allow for insight into the compositional process of the composers. Aspects of these various approaches will be discussed in relation to a portfolio of my own works, encompassing a range of forces including works for accordion and clarinet, orchestra and chamber ensemble.

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CD Track Listing

- | | |
|---|-------|
| 1. <i>street : noise : graffiti</i> , for prepared jazz guitar and orchestra | 4:30 |
| 2. <i>Rille</i> , for improvising vocalist and orchestra | 10:00 |
| 3. <i>Vyatiṣaṅga</i> , for soprano saxophone, electric guitar, percussion and piano | 5:00 |
| 4. <i>Paramātmā</i> , for alto flute (dbl. piccolo), bansuri in F, percussion, harp, harmonium, violin, viola and cello | 13:30 |
| 5. <i>Acintya</i> , for string quartet | 14:50 |

(A recording of *Piṅgalā Iḍā* was unobtainable)

Links to Recordings

street : noise : graffiti - <https://soundcloud.com/sarah-ballard/street-noise-graffiti>

Rille - <https://soundcloud.com/sarah-ballard/rille>

Vyatiṣaṅga - <https://soundcloud.com/sarah-ballard/vyatisanga>

Paramātmā - <https://soundcloud.com/sarah-ballard/paramatma>

Acintya - <https://soundcloud.com/sarah-ballard/acintya>

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Clinamen / Nodus

Music by Olga Neuwirth

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Vampyrotheone

Music by Olga Neuwirth

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Àphones

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Sahaf

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Oi Kuu

By Kaija Saariaho

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CHAPTER ONE: INTRODUCTION

This exegesis focuses on three selected works by composers Olga Neuwirth, Kaija Saariaho and Clara Iannotta, namely *Vampyrotheone*, *Oi Kuu* and *Àphones*. These works were selected because they use timbre to varying extents both as a form-defining, teleological parameter and as an exploration of the timbral potential of acoustic instruments. The analyses of these works examine how each of these composers has utilised timbre, what the primary function of timbre is in each work and outlines the differences in approaches taken. I then discuss how these various approaches have influenced the composition of the works in my creative portfolio.

These three composers have all been influenced by compositional developments in the late 1950s and 1960s, a period during which composers such as Witold Lutosławski, György Ligeti, Iannis Xenakis and Krzysztof Penderecki were forging new approaches to sound. At this time there was an increased interest in permutations of musical material through methods such as aleatoricism, which is a method capable of generating complex textures made up of freely performed gestures and rhythms, particularly with large ensemble forces. There was also an increased interest in this time in the complex rearrangement of rhythmic patterns as a means of musical development, such as in Xenakis' work with his use of stochastic or randomisation procedures to generate various parameters of the work. Large-scale formal processes also became a focus during this time with the use of symphonic and two-part forms. Extended instrumental techniques were also significantly explored in this period, and they feature prominently in the works of the three composers studied, particularly in the approaches to string writing where bowing position, bow/finger pressure, and contact point with the string are all explored to create timbral nuance. The concept of the 'sound mass' texture also developed during this period. Douglas, Noble and McAdams describe sound mass as occurring "when the individual identities of multiple sound events or components are attenuated and subsumed into a perceptual whole, which nevertheless retains an impression of multiplicity."¹ Sound masses occur when large numbers of musicians play independent parts to form a texture. Canonic examples of this include *Atmosphères* by Ligeti, *Threnody to the Victims of Hiroshima* by Penderecki and *Metastasis* by Xenakis. Neuwirth, Saariaho and Iannotta all have continued to develop combinations of massed sounds to create their unique soundworlds.

¹ Chelsea Douglas, Jason Noble, and Stephen McAdams, 'Auditory Scene Analysis and the Perception of Sound Mass in Ligeti's Continuum', *Music Perception: An Interdisciplinary Journal*, 33/3 (2016), 287–305.

Olga Neuwirth, born 1968 in Graz, is known for her extensive works which cover a wide range of forces from *ondes martenot*, orchestra and live electronics, to video-operas. At the age of 50, she is a prolific composer, with over 100 works in her oeuvre. Her works often address topical sociological and political issues. With a history of study in film, art and music composition, her output includes multimedia works and she has collaborated with numerous artists in different fields to generate a diverse output. The eclecticism of her music is effected by a wide array of elements and influences. Those that particularly contribute to her unique soundworlds are the use of pastiche, electric guitar, synthesisers, novelty instruments and the influence of American culture, dadaism and surrealism, with inspiration taken from the work of artists such as David Lynch, Herman Melville, Edward Lear and Bruno Schulz. Labyrinthine musical narratives and the blurring between acoustic and synthetic sounds characterise her stylistic approach and play with the listener's recognition of instrumental sounds.

Kaija Saariaho, born 1952 in Helsinki, is connected not only to the Finnish tone poem composer, Sibelius, with her expansive, single-movement orchestral forms, but also continues on in the thread of the French tradition, capturing in her works the orchestral scintillation of the likes of Debussy, as well as following in the spectralist tradition, working contemporaneously with composers Murail and Grisey. These influences lead her to the Institut de Recherche et Coordination Acoustique/Musique (IRCAM) as a student, where her research into electroacoustic music greatly influenced her way of thinking about instrumental sound. Her work is often concerned with expansive forms that undergo slow transformations. While timbre is utilised to enhance melody and harmony, and to create structural contrasts in her work, pitch also maintains an important structural function.

Clara Iannotta, born 1983 in Rome, is of the younger generation of timbrally focused composers. She is concerned with greatly expanding the possibilities not only for instrumental technique, but also for instrumental preparation. Through these explorations she conjures up a sonic alchemy, her soundworlds full of gently explosive gestures comprising numerous components. The natural resonances of these gestures are extended by sustained components of high-register pitches and inharmonicity. While pitch acts as a subtle structural marker in her works, it is heavily masked by various playing techniques, which create timbral veils over the pitch structure. As her output increases, the vestiges of conventional usage of pitch are becoming fewer and fewer. Iannotta's attention to detail and her ability to defamiliarise the sounds of the instruments she writes for creates an electronic-sounding terrain, and one can be easily forgiven for thinking that there are electronic components present in her solely instrumental works. Most of Iannotta's works have been composed for chamber ensemble, but at this point in the development of her career she has made recent forays into works for orchestra and interdisciplinary forces.

This exegesis will attempt to compare and contrast the different uses of timbre in the three selected works by these composers. I will identify how timbre defines structure on a large-scale and by articulating smaller-scale patterns of tension and release. I will also discuss stylistic tendencies concerning timbre, determining how timbre is treated both vertically, in terms of the materials that are being created, and linearly, in terms of how these materials are arranged in these works. I will then outline the distribution of material and how this distribution creates a sense of direction and form. I adapt the term ‘sound unit’ from Denis Smalley’s ‘gesture-unit’ terminology and this is used throughout this exegesis to refer to sounds as discernable objects with their inherent ‘onset, continuant and termination’ phases.² These three phases constitute what Smalley terms a gesture-unit’s ‘energy-motion trajectory’.³ These sound units may be shaped in terms of timbral gradation, pitch trajectory, and gestural material. It is helpful to discuss the components of this music in terms of a ‘unit’ as opposed to a ‘gesture’ because there are not always identifiable melodic cells in these works or a sound may be perceptually significant, but the gestural component is connected to a continuant phase that continues for some time, making it difficult to discern object boundaries. This contrasts to an easily identifiable gesture with no continuant phase. The utilisation of the term ‘unit’ allows for more scope and enables one to isolate the gestural component from the continuant phase and allows the analyst to define what the gestural component is based on their perception. In identifying sound units, there may also be sustained pitches that transform timbrally, so the perceived motion or direction comes from the change in timbre from one state to another and is what constitutes the boundaries of the unit. In some instances, particularly in the analysis of Neuwirth’s work, I have found it useful to refer to the term ‘sound object’, which indicates clear gestures that are made up of easily definable attack-gestures or rapid and dramatic increases in dynamic. In addition, the term ‘macro-gesture’ is used throughout this thesis to describe a technique used by each of these composers whereby numerous gestural components contribute to a vertical sound mass across most of, if not the entire ensemble.

The methodology used to understand how timbre is being utilised in these works, and which will be extrapolated in Chapter 2, involves listening on vertical and linear levels to identify individual sound units. A distributional analysis is then carried out to illustrate where these sound units appear in the works. Finally, this data is used to compare and contrast the use of timbre in the three works. I use these methods contingent upon the needs of the music in each work, so these are not be applied as a template, but as tools to draw on where appropriate.

² Denis Smalley, ‘Spectromorphology: Explaining Sound-Shapes’, *Organised Sound*, 2/2 (1997), 107–126.

³ Ibid.

The final chapter will examine a portfolio of my creative works that have been influenced by these three works. The portfolio represents a variety of different approaches to timbre, some of which are influenced to different degrees by these composers. I will analyse in my works the types of sound units used, the large-scale sectionalisation of timbre and the relationships between these works and the approaches of the composers studied.

CHAPTER TWO: METHODS OF TIMBRAL ANALYSIS

2.1 Defining Timbral Parameters

This chapter explores the existing discourse on timbre as a form-creating force and seeks to find existing analytical approaches that have already been used. It also outlines a methodology for analysis based on theoretical frameworks by Judy Lochhead, Pierre Schaeffer, Denis Smalley, Andrew Lewis, Stéphane Roy, Helmut Lachenmann and Wallace Berry. These frameworks are discussed in section 2.2, and approaches and analytical terminologies derived from these have been applied to the analysis of the three selected works. The general findings of the analyses are also identified, stating the main features found in each of the three works.

Timbre is generally defined as “tone-colour; that which distinguishes the quality of tone of one instrument or singer from another.”⁴ This term, however, covers a complex set of parameters as well as psychological and musical issues that arise in relation to attempting to discuss and analyse timbre.⁵ As Stephen McAdams comments about the complex subject matter of timbre, “It covers many parameters of perception that are not accounted for by pitch, loudness, spatial position, and duration. It is thus, by definition, multidimensional.”⁶ Different perceptual dimensions of timbre include brightness, tone colour, roughness, and attack character.⁷ McAdams defines ‘roughness’ as “an elementary timbral attribute based on the sensation of rapid fluctuations in the amplitude envelope” and that it can be generated by “proximal frequency components that beat with one another”.⁸

McAdams also analyses the perceptual tendencies of listeners in perceiving successions of timbrally related sounds. This perception of timbral ‘streams’, which usually arise from the same sound source, is termed ‘auditory stream integration’, defined by Bregman and Campbell as “The perceptual connection of successive sound events into a coherent

⁴ Michael Kennedy, *The Oxford Dictionary of Music*, ed. by Joyce Bourne (Oxford University Press, 2013) <<https://www.oxfordreference.com/view/10.1093/acref/9780199578108.001.0001/acref-9780199578108>> [accessed 2 June 2019].

⁵ Stephen McAdams, ‘Perspectives on the Contribution of Timbre to Musical Structure’, *Computer Music Journal*, 23/3 (1999), 85–102.

⁶ Ibid.

⁷ Stephen McAdams, ‘Psychological Constraints on Form-Bearing Dimensions in Music’, *Contemporary Music Review*, 4/1 (1989), 181–98.

⁸ Stephen McAdams, ‘Perspectives on the Contribution of Timbre to Musical Structure’, *Computer Music Journal*, 23/3 (1999), 85–102.

“message” through time.”⁹ This idea is also useful, however, in the context of extended instrumental techniques that create similar effects on different sound sources, creating a stream of timbre throughout an ensemble. McAdams identifies that the guiding principle in the perception of these streams are that the sound events have similar spectrotemporal properties, referring to frequency and duration. All three composers in this study use auditory stream integration to create ‘meta-gestures’ which result from multiple timbral elements.

McAdams also confirms that timbral ‘roughness’ is a major component in musical tension. He defines roughness as “an elementary timbral attribute based on the sensation of rapid fluctuations in the amplitude envelope.” He also notes the direct relationship between ‘sensory dissonance’ and roughness, based on the fact that there are more of these rapid fluctuations found in the beating produced by dissonant intervals as opposed to consonant intervals. McAdams provides evidence that timbre plays an important role in musical structure, even in music that relies on conventional tonal procedures, and that it plays a role in large-scale movements of tension and release, contributing especially to the expressiveness of musical form. McAdams obtained this evidence by surveying the responses of listeners to the perceived degree of completion of a musical phrase. These musical phrases were played using two different types of instrumental forces, a piano version and an orchestral version. Due to the difference in response to the levels of tension and relaxation between the piano and orchestral versions, McAdams concluded that timbre does have an impact on the perceived levels of tension and release within a piece. This difference in response was due to the higher level of timbral complexity in the orchestral version as compared to the more timbrally uniform piano version.

In ‘Qualities and Functions of Musical Timbre’, McAdams and Saariaho discuss how the arrangement of timbral complexities in time is the domain of syntax and that it is through the construction of relationships between sound materials within an auto-referential network that semantics and form emerge.¹⁰ The categorisation of sounds by frequency content and the fact that the contrast between noisy and clear sounds constitutes a strong formal device are also discussed. The primary categories established are “noisy signals” and “tonal signals”, and the latter category is also divided into harmonic and inharmonic sounds.

Music that is timbrally focused requires a quantification of timbral parameters. There are also no formalist analytical procedures that attempt to categorise the structural functions of timbre, and this is particularly problematic for the analysis of works where timbre is clearly

⁹ Albert S. Bregman and Jeffrey Campbell, ‘Primary Auditory Stream Segregation and Perception of Order in Rapid Sequences of Tones’, *Journal of Experimental Psychology*, 89/2 (1971), 244–49.

¹⁰ Stephen McAdams and Kaija Saariaho, ‘Qualities and Functions of Musical Timbre’, 1985 <<https://quod.lib.umich.edu/cgi/p/pod/dod-idx/qualities-and-functions-of-musical-timbre.pdf?c=icmc;idno=bbp2372.1985.058;format=pdf>> [accessed 29 March 2019].

prioritised over other musical parameters. This poses a problem when composers such as Saariaho state that they are trying to replace, or at least come to an equal footing with, the form-creating forces of harmony with timbre. There is no analytical framework such as the Schenkerian method of analysis or Allan Forte's pitch-class set analysis. These analytical processes are very well-defined, but in the case of timbral analysis, there is no equivalent. While there is a strong correspondence between Western staff notation and the perception of pitch and rhythm in listeners, the same cannot be said of timbre. Timbral notation is relatively new, and often relies on textual explanation rather than graphical indication. Therefore one is forced to adopt a methodology that involves a certain level of subjectivity, as the analyst must bring their own individual perspectives as a listener, describer and categoriser to the selected works. The nature of notation itself also adds to this foregrounding of the analyst's perception in timbral analysis, as notation of extended techniques do not always indicate the resultant sound. The analyst is required to have knowledge as to the sounds the notation will produce.

2.2 Theoretical Framework

I began my research by searching for articles that analysed works by the composers in this present study. Because Iannotta is still quite young there is no analytical discourse on her works. The existing analyses of Neuwirth's music are also limited in number and as a result, in scope. Stefan Drees represents a sole concentrated effort in the analytical discourse on Neuwirth's works. In an analysis of her 1999 orchestral work *Clinamen/Nodus*, Drees provides a detailed, descriptive chronology of musical events that focuses on the composer's inventive approaches to timbre and space.¹¹ The analysis also relates Neuwirth's structural processes to the concept of the 'rhizome', derived from the philosophy of Deleuze and Guattari, which presents an alternative to traditional hierarchical structure.¹² Rhizomatic structure is non-hierarchical and heterogeneous, forming a multiplicity and proliferation of musical material. As a result, we get a sense of how the composer might be considering these structural parameters and a psychological reasoning as to how it maintains a sense of coherence in the absence of a conventional, linear formal model. Although sound organisation cannot escape the linearity of time, the sudden changes in material and moods that Neuwirth devises does suggest a kind of non-linearity, even though there is still a sense of each section being interrelated. While we also gain insight into the identities of sounds that are deliberately

¹¹ Stefan Drees, 'Tonräume Und Klangfarben Bei Olga Neuwirth', in *Composers-in-Residence: Lucerne Festival, Sommer 2002* (Frankfurt am Main: Stroemfeld, 2002), pp. 161–73.

¹² Gilles Deleuze and Felix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia* (University of Minnesota Press, 1987).

unidentifiable to the listener in Drees' analysis, we perhaps do not gain an understanding of the precise musical functions of sounds or how the sounds are arranged over time.

In her analysis of Saariaho's *Lonh*, Judy Lochhead analyses form through the observation of the sonic quality of 'radiance'.¹³ Lochhead's use of this term is somewhat ambiguous, however, for the purposes of this exegesis I have taken it to mean a timbral phenomenon created by the considered use of instrumental technique, register and choice of instrumentation, which in combination produce a shimmering effect as a layer on top of the relatively conventional pitch structures that Saariaho tends to use in her works. In more specific terms, Lochhead characterises this radiance as a quality that "emerges from the interaction of several coincident musical planes." These planes consist of "1) moments of sonic luminance, a quality arising from pitch range, spectral attributes, and culturally derived timbral associations, 2) moments of formal "flickering," and emergent quality arising from musical processes of association and uniqueness, and 3) moments of intensity arising from the culmination of transformational process." Lochhead first maps out the various sound 'events' into broad timbral categories such as vocal, electronic, nature and percussion. These are further broken down into subcategories, which are defined by register and the means of sound production, and mapped on a timescale. The three planes that contribute to radiance, namely luminance, flickering and intensity are also mapped on the timescale. When these three planes converge, enhanced moments of radiance are produced and these are marked on the timescale as moments of formal salience.

While systematic approaches to the analysis of timbrally focused instrumental music are relatively poor, there is a body of work in the electroacoustic domain that has tackled similar problems and can be applied to instrumental music. All three composers studied have experience of working with electronics and therefore have all been influenced by electroacoustic music to some extent.

Pierre Schaeffer's *Traité des objets musicaux* (1977)¹⁴ is fundamental to the analytical frameworks that have been developed to analyse electroacoustic and timbre-based instrumental music. This treatise grew out of Schaeffer's writings and exploration of *musique concrète*, a term he coined to describe a style of composition utilising real-world sounds, particularly those categorised as noise, which could be recorded from any sound source and arranged into a composition. *Traité des objets musicaux* discusses the identification, classification, and description of the shape or form (morphology) of 'objets sonores', or sound objects. The term 'objet sonore' refers to sounds "taken directly from the 'external

¹³ Judy Lochhead, 'Technè of Radiance: Kaija Saariaho's *Lonh* (1996)', in *Reconceiving Structure in Contemporary Music: New Tools in Music Theory and Analysis* (New York: Routledge, 2015), pp. 105–22.

¹⁴ Pierre Schaeffer, *Traite des objets musicaux: Essai interdisciplines* (Paris: Seuil, 1966).

world' of natural sounds and given noises.”¹⁵ Schaeffer also uses the term ‘l’acousmatique’, to refer to “a noise that is heard without the causes from which it comes being seen.”¹⁶ While Schaeffer is primarily referring to recorded sound played back through loudspeakers, and although the term acousmatic in the proper, defined sense refers to a listening experience in which the source of the sound is not seen, I relate this concept of Schaeffer’s to a phenomenon that can occur in contemporary instrumental music. This phenomenon occurs when an ambiguity emerges out of the instrument whereby the listener cannot readily associate what is heard with what is producing the sound and in this way produces a listening experience akin to that of the acousmatic. This is particularly so in orchestral settings, where there are a large number of instruments in the space, making it more difficult to hear the instruments in detail, and especially when timbre is foregrounded as a parameter and particular playing techniques defamiliarise the sounds produced by the instrument to the point where it becomes difficult to identify the source of an instrumental sound.

The foregrounding of timbre in much contemporary classical music invites the analyst to consider sounds in their temporal dimensions as sound objects, appealing to the aural experience of sound. The treatment of instrumental timbres, particularly in Neuwirth and Iannotta’s music, where the source of the sound is often obscured due to instruments creating sounds that they are not traditionally associated with, presents an interesting parallel to Schaeffer’s concepts and enables their music to be aptly discussed in the context of the sound object. While Saariaho is not so radical in her treatment of timbre and gesture, her music still contains distinct sound units, which are formed by transformations of timbre and so in the analysis of the majority of her works the term ‘sound unit’ is more appropriate.

In order to understand the function of the formal elements in the works of these three composers, we must consider how to categorise individual components or sound units that comprise the musical textures. The field of ‘spectromorphology’ was developed by electroacoustic composer and theorist Denis Smalley in his article ‘Spectromorphology: explaining sound-shapes’¹⁷ as a development of Schaeffer’s *Traité des objets musicaux*. Smalley particularly expands upon Schaeffer’s concept of ‘typomorphologie’, an approach to analysing sounds that examines both their *typology* (the “identification of sound objects in their context”), and their *morphology* (the “identification of sound criteria or description of sound objects in their contexture”).¹⁸ This is integral to developing an approach to analysing

¹⁵ Pierre Schaeffer, *Treatise on Musical Objects: An Essay Across Disciplines*, trans. by Christine North and John Dack (Berkeley, United States: University of California Press, 2017), 8.

¹⁶ Ibid.

¹⁷ Smalley, ‘Spectromorphology’. It is to be noted that the word ‘contexture’ is not used by Schaeffer in error, but is used as a sound-focused neologism.

¹⁸ Schaeffer, *Treatise on Musical Objects*. p. 292.

the organisation of sound in timbre-based instrumental music. In electroacoustic music, spectromorphology attempts to understand the relationships between sounds and their behaviours in the context of their temporal flow. Smalley defines this term as “the shape of sound over time” in his article *Spectromorphology*.¹⁹ In this article Smalley also discusses the difference between note and noise, defining note as an “intervallic pitch”.²⁰ The term noise is defined in two ways, the first Smalley describes as “qualitative – non-pitched roughness, granularity or grit”; and the second as “a saturated spectral state which cannot be resolved into intervallic or relative pitch”.²¹ This note-noise continuum is relevant throughout the discussion of the utilisation of timbre in the works of all three composers analysed in this exegesis. As the foregrounding of timbre and the sometimes indistinct roles of harmony and pitch in much contemporary instrumental music do not lend themselves well to conventional analysis, an analytical focus on sound is a more appropriate way to gain understanding of the relationships between sound units. Indeed, Smalley comments on the kinds of instrumental music that can be approached spectromorphologically,

In this music there is often a loss of instrumental identity as the orchestra is ‘resynthesised’ into a kind of spectromorphological hyper-instrument. While we may sometimes be conscious of instrumental identity, we can equally be persuaded to forget individual note-gestures as these individuals are subsumed in streams and collective motions. Even though this music is represented and achieved through musical writing, the score itself is a very inadequate representation of perceptual qualities. An aural approach which treats recordings of such works in the manner of an acousmatic tape work is often much more fruitful.²²

To facilitate this necessity to understand sound units in their functional sense, Smalley organises sounds into ‘spectral typologies’.²³ These spectral types are grouped along a continuum of three central reference points: note proper, harmonic spectra and inharmonic spectra. Smalley also proposes a collection of ‘onset, continuant and termination’ terminologies, which he terms ‘temporal phases’, and these are useful in the discussion of gestures and sound units found in the works of the three composers.²⁴ These terms refer to the energy-motion trajectory of gesture and its beginning, its sustain (if applicable) and its end.

¹⁹ Ibid.

²⁰ Ibid.

²¹ Ibid.

²² Smalley, ‘Spectromorphology’.

²³ Denis Smalley, ‘Spectro-Morphology and Structuring Processes’, in *The Language of Electroacoustic Music*, ed. by Simon Emmerson (London: Macmillan), pp. 65–68.

²⁴ Smalley, ‘Spectromorphology’.

Also to be mentioned in connection with Smalley's note-noise continuum is what Saariaho terms the 'sound/noise axis'. In the article "Timbre and Harmony: Interpolations of timbral structures", Saariaho discusses this sound/noise axis, which she says may be substituted for the notion of consonance and dissonance, and which she uses to "create musical tension and to replace the dynamic function of harmony".²⁵ Pure, clear sounds correspond to consonance, and rough, noisy sounds correspond to dissonance. This sound/noise axis can be applied on a microstructural or macrostructural level. It can be utilised to shape the large-scale form of a piece, by, for example, creating a trajectory from a 'rough, noisy' texture to a 'clear, smooth' texture, while on a smaller scale it can be used to create transitions between pure and noisy sounds within a single gesture. In her writing, Saariaho gives the example of increasing the pressure and moving the bow toward the fingerboard on a string instrument.²⁶

Situated within the *musique concrète* context, Andrew Lewis's analysis of Francis Dhomont's *Novars*²⁷ provides a useful model for timbral analysis by classifying sound types and behaviours, where the importance of the analyst's aural impression of the sound is highlighted (Fig. 1). Sound types and behaviours are separated into categories, which are then positioned on a temporal axis, in relation to where they appear in the recording. The overarching form is labelled with conventional structural terminologies such as 'exposition' and 'development'. The inclusion of sound behaviours provides an example of visually mapping the transformation of sound on a basic level to get a general idea of the underlying structural forces within the work. The categorisation of sound types here is well-defined due to the referential sound sources within the piece, but raises the question of how to define sound types in instrumental music that are somewhat more ambiguous.

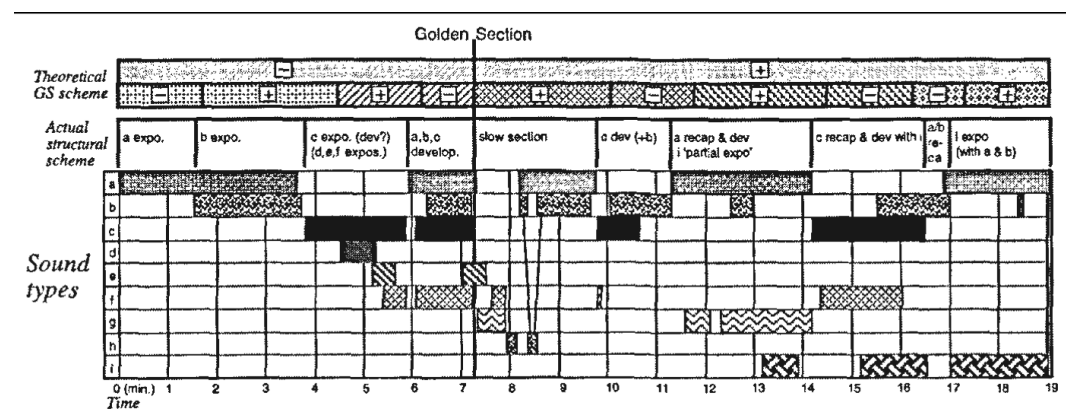


Fig. 1. Structural plan based on sound types from Andrew Lewis' article *Francis Dhomont's Novars*.

²⁵ Saariaho, 'Timbre and Harmony'.

²⁶ Ibid.

²⁷ Andrew Lewis, 'Francis Dhomont's *Novars*', *Journal of New Music Research*, 27/1-2 (1998), 67-83.

Another useful and complementary model is provided by Stéphane Roy's analysis of François Bayle's acousmatic work *Ombres Blanches*.²⁸ Roy establishes a detailed analytical framework that identifies the specific functions of sound units within the work. These sound units are given definitions that are adapted from terminologies that relate to syntax, particularly in regard to syntactic flow. Terminologies are also adapted from Leonard B. Meyer's writings on 'implicative relationships' in music. Using his extensive lexicon of 'syntactical units', Roy constructs a 'listening score', which uses the symbols to map out his aural perceptions of the organisation of sound units on hierarchical and temporal axes. Roy argues that a convincing analysis cannot be carried out without the consideration of the musical context in which a "sound event" appears.

This concept of sound typologies and objects also informs the construction of the instrumental music of Helmut Lachenmann. Lachenmann's 'klangtypologie' is a clear development of this Schaefferian sound philosophy. His description of his musical aesthetic as "musique concrète instrumentale", where the energies produced by the instruments are of prime interest and focus on the foregrounding of sound or noise, thereby reinforcing his affinity with Schaeffer's theories. In the analysis of his second string quartet, *Reigen seliger Geister*, Lachenmann identifies individual sound units, which include sound behaviours and timbres, and discusses transformational processes of specific playing techniques.²⁹

In terms of broader analytical projects, that account for a wide range of different musical languages and forms, Wallace Berry's book *Structural Functions in Music* presents some useful terminologies and concepts.³⁰ He uses the term 'progression' to refer to increasing musical intensity and 'recession' to indicate a reduction of intensity relating these to structural functions in music. He also refers to 'more penetrating colouration' as an element that can increase musical intensity. Progressive changes in timbre are defined as "events involving colouration, dynamic level, registral change, articulation" and that these result in "increased sonorous weight and penetration". Examples he gives of progressive timbral 'actions' are playing louder, higher registers, creating a sharper "focus" of intense colour, more percussive playing and stressed articulation.

I will draw on these analytical methodologies as they seem appropriate in relation to the works analysed. I am particularly interested in how relationships can be made between micro and macro-structural levels of form and considering how both the vertical elements of sound

²⁸ Stéphane Roy, 'Functional and Implicative Analysis of *Ombres Blanches*', *Journal of New Music Research*, 27/1–2 (1998), 165–84.

²⁹ Helmut Lachenmann, 'On My Second String Quartet ('*Reigen Seliger Geister*')', trans. by Evan Johnson, *Contemporary Music Review*, 23/3–4 (2004), 59–79.

³⁰ Wallace Berry, *Structural Functions in Music* (New Jersey: Prentice-Hall, 1976). pp. 7–11.

as well as the way in which the distribution of sounds can affect the listener's perception of form.

2.3 Methodology

For each of the works studied the first step taken was to complete a high-level sectionalisation, establishing how the piece is divided up into larger sections. The next step was to identify the sound units that comprise the music. This identification was carried out first of all through repeated listening on a subjective level and establishing which elements were particularly noticeable. Following this, listening was based on considering the effects of each sound object in isolation from the other sound objects surrounding it, and then describing them, using Smalley's terminologies where appropriate. The works were also listened to on a more refined level, identifying which sound objects are repeated. Analytical questions posed during this stage included: *How do I identify them as repeating? What is it I am listening for? What criteria am I listening for?* This process is comparable to listening for variations of a melodic unit. Further questions included: *In these pieces am I listening to something else? Is it melodic? Is it textural? Is it a gesture? Is it a particular contour? Is it a timbre?*

The next step was to categorise these sound objects, and identify any hybridised objects, in order to establish how these are distributed across the duration of the work. It was also necessary to discuss the kind of musical rhetoric that was created by the sound objects, drawing on Roy's terminologies. The categorisation of these sound objects was informed by the terminologies coined by Lachenmann, Schaeffer and Smalley. This process also required consideration of the ambiguity of sound types so as to be able to account for these more indeterminate elements in the analysis.

A basic mapping of formal trajectories was carried out for Iannota's *Àphones* by an approach based on Lewis's framework. This shows the various sound types and their distribution throughout the piece. The second phase was to consider the experience of these sound types throughout time and to track any continua or trajectories that were unfolding, in order to identify if ideas were simply building gradually or changing from one state to another. I also listened to establish the transformations that occurred in sound objects that were repeated, listening for timbral and gestural relationships and similarities. This approach relates to Roy's analytical model, in which he defines implication as, "an hypothesis that a competent listener makes about the progress or possible resolution of a pattern, based on inferences deduced from the context."³¹ In the analysis of Saariaho's *Oi Kuu*, I accounted for

³¹ Roy.

the timbral variations that are present in the work. This involved establishing which techniques Saariaho used and tabulating these, then describing each technique in isolation from its musical context and the effect that it has. These were then discussed in relation to the note-to-noise continuum. The noise aspect of selected sounds was discussed due to their association with the increase of tension. Using this approach, it is the analysis of the elements of noise within a piece that was useful in depicting how timbre influenced the large-scale structure.

The aim of these analyses was to be able to identify the inner workings of these three pieces in terms of the formal distribution and function of the sound units. These methods were necessary to establish the differences in approaches to extended techniques between the three composers as they are all working with extended instrumental techniques in interesting and innovative ways, but in qualitatively different ways. This method of analysis enabled me to compare and contrast and make generalisations about how each composer is considering timbre.

The general findings were that in Saariaho's works there are moments of total consonance and dissonance and she utilises timbre as a shimmering layer that is placed over an otherwise moderately conventional pitch structure. To use Lochhead's terminology, Saariaho often treats timbre as an aura of 'radiance', in that the playing techniques utilised such as harmonics and bowing position create overtones and higher partials, which surround the core sonic elements. In Neuwirth's works, on the other hand, pitch elements function more as a registral trajectory than as part of any conventional harmonic system. In *Vampyrotheone* she utilises a dialectic between heavily pitch-based material and more gestural and textural material. In Iannotta's works, it is much more difficult to find any trace of conventional pitch structure, with textures being connected by pointillistic gestures. These gestures serve as markers for repetitions and developments of the thematic material. Her approach to timbre is very much in pursuit of the timbral aggregate. Various sound units come together throughout *Aphones* to eventually form hybrid timbral and gestural units. Iannotta's work is also the most focused on timbral defamiliarisation, as a result of the extensive instrumental preparations and radical extended techniques she uses. All three composers utilise musical 'opposites' such as oscillation and stasis, noise and pitch, and inharmonicity and harmonicity. All three composers also use standardised techniques such as the moving between two playing techniques, for instance *sul tasto* to *sul ponticello* on strings, or muted to unmuted playing on brass instruments. It is due in part to each composer's selection of playing techniques and gestural types that gives their music their distinctive sound.

CHAPTER THREE: ANALYSIS OF OLGA NEUWIRTH'S *VAMPYROTHEONE*

3.1 Introduction

The instrumental music of Olga Neuwirth is characterised by a focus on timbral fusion, sound mass, strong gestural material, juxtapositions of texture and timbre, a labyrinthine approach to form, musical references, and the use of extended techniques to add colour to gestural material and to increase tension. Her approach is particularly influenced by Edgard Varèse with his intrepid approach to instrumentation, conception of “sound as living matter”³² and musical space, as well as Luigi Nono’s approach to space and politically charged subject matter, and Helmut Lachenmann’s interest in extended techniques that explore the realms of barely perceptible sounds, with which he creates soundworlds based on traversals of sonic polarities created by contrasting playing techniques.

The use of extended techniques in Neuwirth’s music are shorter-lived than one may find in Saariaho’s works, where extended techniques can continue through and connect up entire passages, whereas in Neuwirth’s work extended techniques are more diffuse and interspersed with normal playing, focusing on one technique at a time in a single unit rather than containing small-scale transformations of timbre by moving from one technique to another. By contrast, in Iannotta’s works the extended techniques are so highly integrated and foregrounded that they take on motivic significance and undergo transformation throughout the course of a work. Neuwirth’s music can move suddenly to unrelated timbral soundworlds, giving a sense of the surreal; sections within Saariaho’s works on the other hand are more clearly related in a conventional sense and utilise timbre and motif to create variations on previous material. While there are certainly elements of defamiliarisation in Neuwirth’s works, it is not developed to the same degree of focus as with Iannotta’s more radical approach. Neuwirth is primarily concerned with texture and the layering of elements, stating “I enjoy playing with different layers of material and with the material itself in a labyrinthine way, outfoxing myself and the listener alike in every new piece.”³³ For her the intrigue is created not only through the sounds she selects, but through the way she is able to manipulate teleology and the listener’s expectations. The term defamiliarisation as used here refers to the use of playing techniques to create various effects and colours that are not usually associated

³² Chou Wen-Chung, ‘Varèse: A Sketch of the Man and His Music’, *The Musical Quarterly*, 52/2 (1966), 151–70.

³³ David Allenby and Olga Neuwirth, ‘Olga Neuwirth: Composer Interview’, *Boosey & Hawkes*, 2002 <<https://www.boosey.com/cr/news/Olga-Neuwirth-composer-interview/10312>> [accessed 12 May 2019].

with the instruments in question, to the extent that the listening experience is akin to that of the acousmatic, thereby creating a sense of surrealism in her work. Although the term is well-established in 20th Century critical studies in art, literature and film, where it is used to indicate the presentation of common elements in an unfamiliar way so that the reader or observer is able to gain new perspectives, the intended meaning in the context of this thesis is primarily in relation to the production and presentation of instrumental sounds.

As an exemplar of her compositional approach, *Vampyrotheone* (1994), for three soloists and three ensemble formations, illustrates a strong focus upon timbre, commanding a diverse timbral palette and extremes of register to create complex textures and combinations of sounds. Timbre also plays an important role in the sequencing of musical events that occur within Neuwirth's works. This focus on timbre can also be observed in the composer's attempts to abandon standard ensemble forces in favour of mixed ensembles with auxiliary and unorthodox instruments. In the case of *Vampyrotheone*, the ensemble includes in addition to standard instruments a saxophone, electric guitar and other novelties such as e-bows, children's guitars and a German toy instrument called a 'pippo-singer', which is blown and produces a whistle. These instrumental additions provide a means of increasing the timbral palette and provide an element of inharmonicity that an individual part can contribute to the work. Selected instruments are also prepared with objects that alter their timbres, again providing an element of inharmonicity that can be utilised to enhance certain timbres within the ensemble. Smalley states of inharmonicity, "To be regarded as properly authentic, an inharmonic spectrum cannot be resolved as a single note, and its pitch-components need to be considered relative, not intervallic".³⁴ The overall role of inharmonicity in *Vampyrotheone* is to increase tension, which is utilised in the same way as the contour of a melody or progression of harmony from consonance to dissonance can also create an increase in tension. Inharmonicity is also utilised at key structural markers, where the orchestra creates attack-decay gestures comprising many components. The role of these concentrated instances of inharmonicity is to provide contrast between more harmonic polyphonic materials and provide points of formal tension from which changes in texture emerge. These initial considerations set the foundation for a timbre-focused approach to the organisation of sound in this work.

3.2 Sound Objects

Denis Smalley's 'onset, continuant and termination' terminologies are useful in the discussion of the gestures found in Neuwirth's works. The first element to note in the piece is the

³⁴ Smalley, 'Spectromorphology'.

constant timbral changes that are occurring, providing the music with forward momentum in lieu of obvious melodic or rhythmic motifs. Although the analyses of the works throughout this dissertation are informed by Denis Smalley's concept of the 'sound object', I have preferred to use the term 'sound unit', as a sound that is perceptually significant, but is open ended in the sense that where it begins and ends may not be easily identifiable. Each sound unit, such as a gesture or shape, is always undergoing transformation, even if only on the level of dynamics. The opening tutti gesture, for example, consists of gestures that transform in some way, whether through pitch (in the form of glissandi or scallic material), playing technique, dynamics, or a combination of these elements (Ex.1). Within this opening gesture, the violin plays a *sul tasto* double-stopped glissando figure, which increases in dynamic and moves towards normal bow position near the end of the gesture. Singular, resonant gestures are also considered a transformational gesture due to their attack-decay potential, as the natural decay is akin to a decrescendo.

Ex. 1. Tutti gesture containing transformational sound units in the opening of *Vampyrotheone*. This example also shows the use of tremolo and trills figures to create a stream of activity and the use of metallic timbres throughout the ensemble to create a timbral stream.

The types of gestures used within the piece can be categorised as:

- sustained pitches
- ascending/descending motion pitch trajectories (glissandi, scallic material)
- tremolo/trill/iteration gestures
- oscillatory figures
- simple attack-decay gestures

Examples of these various gestural types are shown below.

Bass Clarinet in Bb

Ex. 2. Ascending motion pitch trajectory figure in bb. 1–2 of *Vampyrotheone*.

Violoncello 2 (prepared)

Ex. 3. Descending motion pitch trajectory figure in bb. 1–2 of *Vampyrotheone*.

Clarinet in Bb

Ex. 4. Trill figure in b. 2 of *Vampyrotheone*.

Alto Flute

Ex. 5. Tremolo figure in b. 2 of *Vampyrotheone*.

Almglocken/
Crash Cymbal

Ex. 6. Oscillatory figure in bb. 3–4 of *Vampyrotheone*.

Violin

Ex. 7. Ascending pitch/iteration figure with timbral change in bb. 1–2 of *Vampyrotheone*.

Beyond this opening macro-gesture, when sustained pitches occur they do not usually remain at the same dynamic level, giving even the simplest material a sense of direction. These sustained pitches may initiate or terminate a sound object, or they may prolong it, contributing to the collective timbre of the texture at hand. In the opening, for example, a horn emerges *al niente*, providing a path into the sound mass to follow. At bb. 2–3 pulsating rhythmic swells in the muted bassoon and tuba provide echoes of the initial impact and sound mass that they follow on from. Further on, in bb. 4–5, the bass clarinet and B♭ clarinet contribute shape and subtle colouration to the overall sound mass. These various components help to bind the succession of more complex gestures together by acting as the stable components within a large-scale onset-continuant-termination gesture.

If there is no transformation to be found in a single instrumental gesture, even at the basic level of crescendo or decrescendo, then it is often the case that the pitch has a ‘marker’ function. These instances of sonic markers provide formal articulation, signalling section changes and creating cohesion between sections. An example of this marker function occurs at b. 12, where bass clarinet 1 enters playing a *senza vibrato* C#6 at a soft dynamic at the point of a *ffff* gestural attack in the alto flute, bass clarinet 2 and B♭ clarinet. This bass clarinet tone is at the foreground of the texture due to its register and contrast to the gesture out of which it emerges, providing a plane beneath which there is more nuanced colouration and activity from the rest of the ensemble. This sustained sound unit is repeated at b. 14 and b. 17, becoming quieter upon each repetition and creating a sense of structural stability, allowing the texture to establish itself. This utilisation of sustained pitch is elaborated on later in the piece from bb. 141–154, where the entire ensemble is playing held pitches *senza vibrato* at *ppp* dynamics, creating a hatched, woven texture. This is unified with glissandi gestures (Ex. 8).

Handwritten musical score for orchestra, measures 144-146 of *Vampyrotheone*. The score features sustained pitches and glissandi across various instruments, creating a hatched texture. Instruments include B-Kl, VL, Kb1, Picc, B-Pos, Perc1, E-Git, Va, Vc1, Kl, Kb2, Hr, Celesta, B-Sax, Vc2, Kl, XL-Tr, Tb, and Perc2. Dynamics range from ppp to p.

Ex. 8. The use of sustained pitches and glissandi to create a hatched texture in bb. 144-146 of *Vampyrotheone*.

Oscillatory figures are another important musical unit that feature in some of the textures. It is to be noted that an oscillation broken down into its components is made up of small-scale sequential timbral transformations, with the fluctuations in pitch. Therefore, there is an inherent sense of motion within these units due to these fluctuations in pitch. At b. 3, percussion 1 and 2 give a clear example of a resonating oscillation. A cymbal is placed on top of an almglocken and this is struck with a soft mallet and left to resonate, creating oscillations until the resonance has decayed. These oscillations are created from the upward and downwards movement of the cymbal when struck. Trills can also be interpreted as a type of oscillatory figure. At b. 3, in the double bass 2 part, the A string is prepared with a paper clip, creating an inharmonic ‘multiphonic’. Trills between a D and an E \sharp create gestural dynamism. From b.15 glissandi are strung together to create a drawn-out oscillatory effect in both timpani, double bass 2, and cello 1 and 2. These drawn-out oscillatory figures feature again towards the end of the piece from the section starting at b. 141 in the electric guitar and strings, this time exaggerated, reminiscent of Varèse’s use of sirens in his work *Ionisation*.

The tremolo figure first appears in the extreme lower register of the piano at b. 1, striking the strings over the resonance board of the piano with soft mallets, a tremolo between the two notes. This idea is then continued in the alto flute, violin, clarinet and piccolo trumpet in b. 2, all playing a tremolo figure, trill or other iterative technique. This figure then undergoes more timbral transformation at b. 3 in the double bass 2 part (Ex.1). This double bass is prepared on the D string with a paper clip, creating an inharmonic effect. The role of tremolo/iterative figures in this piece becomes integral on a formal level, to the extent that they are used as a motif throughout. These gestures function as high-tension moments in tutti build-ups or in the aftermath of these build-ups. This figure becomes integral at bb. 60–66 where most of the instruments are playing tremolo figures to create surges of tension. These figures generative of tension due to the pull between the two pitches in question and this rapid fluctuation creates a sense of instability because there is uncertainty as to when or how there will be harmonic resolution.

Pitch material does not usually function in a conventional motivic sense, but simply increases or decreases tension through units of ascending or descending pitches, thereby transforming the timbre of the instrument through a change in register. Until an arrival point is reached in a succession of ascending or descending pitches, there is tension created due to the anticipation of an eventual goal or resolution to a sequence of pitches. The timbre of an instrument can take on a more strained quality especially when pushed to higher registers, as is often the case in Neuwirth’s writing. This tension results from the changes in playing techniques required as the pitch increases, such as tenser embouchure, increase in breath required and pressure of the bow on the string. Physical elements such as the gauge of the string on stringed instruments in playing in the upper register and the need to play with more

pressure as a result to create friction with the bow, and the physical limitations of the instruments in their upper registers also have an effect. An example of the use of scalic materials in this work can be seen in b. 1 in the bass clarinet and horn, where the gestures both contain scalic material, which anticipate a tutti arrival point. The vibraphone and xylophone also provide an example here in which mallets are swept across the resonators of the instruments to create a percussive sound with a hint of pitch, resulting in an alteration of timbre as the resonators become smaller or larger as the glissando ascends or descends. The second of these gestures is the glissandi or pitch run figures. These are often used in conjunction with the iterative figures either side of a percussive attack to lead up to or dissipate it. An example of this occurs in the opening in the violin, percussion 1 and 2, bass clarinet, horn, and cello 2.

An example of these various processes in a context where the material is more sustained and gestural material is not quite as prominent can be seen at bb. 15–17. Here, a cymbal is placed on top of the timpani and a mallet is rubbed against the inner edge of the cymbal to create a resonant metallic sheen, which is amplified by the timpani, the pedal moving up and down to create pitched resonance oscillations along with a constant fluctuation in dynamics. Sequential ascending and descending glissandi also occur in the strings, creating the drawn-out oscillatory effect. The bassoon and piccolo trumpet transition back and forth between muted and unmuted states while the piano and electric guitar offer resonant attack-decay gestures.

At times in the piece, streams of different timbres are layered, creating timbral fusion and forward motion as preparation toward a punctuating gesture. For example, the opening section presents very high, metallic, scraping timbres, with substantial inharmonic components. This kind of timbre can first be heard in the vibraphone and xylorimba in b. 1, with the vibraphone using hard mallets and the xylorimba with a metal mallet. These are swept along the resonators of the instruments as a glissando gesture. This noise component is also present in cello 1 and double bass 2, which play sustained notes with paperclips on the strings, creating a rasping, granular effect, almost like that of white noise. This is then passed onto a hard-edged, metallic attack gesture, produced by hard mallets at *fff* on the vibraphone in an upper register and a hard rubber mallet on the piano string in its extreme low register, which has been prepared with a silicon ball on either side of the string. The electric guitar also contains some aspect of this timbre with its electronic, metallic sheen. From this resonance emerges the granularity of the bass trombone and tuba in F. This is then transmuted into the cello 1 and double bass 2, which are both prepared, cello 1 prepared with a paper clip on the string and is instructed to play with exaggerated bow pressure creating a similar effect with an even greater noise component. Double bass 1 is prepared with a metal platelet near the bridge, creating a gritty, inharmonic metallic sound. These sounds then merge with the timbre of

another double bass, also prepared with a metal platelet, and the overtones of this granular sound merge into high-register piano trills. This then merges into violin and viola tones, which also have an altered timbre due to preparation of the strings with paper clips. These timbres are then emulated in a bass clarinet multiphonic and by a high trumpet bisbigliando, which manages to maintain the pixelated, granular quality of the previous gestures. The result is a continuous stream of transforming timbre through gesture (Ex. 1).

Later on in the piece, this inharmonicity can be recognised in the quiet breath-like air noise of the strings from bb. 50–52, which is created by bowing on the side of the bridge. The previous expression of related timbres allows what would otherwise be an anomaly to feel well-situated within the work. This sound type is comparable to the trilled prepared strings and comes across as a muted version of this. This creates a timbral stream, which, along with all of the gestural prototypes and fluctuation of bow pressure resulting in dynamic swells helps to create a sense of momentum as the sound reaches points of dynamic intensity and then reduces, which repeats in sequence. This type of activity can be traced throughout much of the piece as a form-defining feature. The woody percussive effect, expressed through slap tones in the woodwinds and brass, woodblocks and col legno in the strings at bb. 72–80 can be interpreted as a contrasting timbre to the inharmonic metallic frequencies that pervade the piece. These timbres appear in a more pointillistic, deconstructed texture.

An example of timbral fusion occurs at bb. 45–48, where a stream of shrill timbres occur with the bass clarinet and baritone saxophone playing with teeth on the reed and the electric guitar playing on the strings using the screw at the end of a cello bow. This creates a sound remarkably similar to that of the shrill woodwinds. A barely perceptible veil of triangle tremolo adds to the timbral sound mass.

3.3 Form

These examples demonstrate the various components that make up the textures within the piece. The form is essentially created from a sequence of two main components: active, resonant gestures on the one hand and static gestures that contain timbral interest or oscillating pitch material on the other. This creates a dialogue between periods of high activity and more static textures. The juxtaposition of these in the piece results in the shaping of an exaggerated dramatic trajectory, which operates to create tension and release. This is very active throughout the entire piece, only being synthesised at the close of the piece from b. 183 where the active components, characterised by microtonal waverings in the bass clarinet, electric guitar and baritone saxophone, are slowed down to a tempo marking of 42. This is accompanied by very slow, drawn-out glissandi in the strings, sustained pitches in the

bass flute and small trumpet, tremolo gongs, and sustained white noise in the double bass created by a paper clip on the string and flautando playing (Ex. 9).

Neuwirth constantly pushes registral extremes beyond what may seem to be the perceptual limit. At climactic moments in her works, Neuwirth achieves this by writing in the upper most limits of the ranges of a particular group of instruments within the ensemble. To the listener it seems as though the height of tension has been reached due to the incredibly strained tone of the instruments in these high registers. At this point Neuwirth brings in another group of instruments with higher playing ranges to continue to increase this build-up in tension. For example, from the section beginning at b. 103, the strings, woodwinds and electric guitar gradually ascend in pitch through winding figures and glissandi until they arrive at a high-pitched cluster at b. 111 (Fig. 2). At this point there is a very strained quality to the woodwind pitches, and a sense that a climactic point in the piece has been reached. This is followed by a brief moment of stasis where an e-bow on the electric guitar is left to resonate. Next, the celeste enters with a quiet trill, which leads into another ascending, scintillating trajectory of trills, ornamented figures, sustained pitches and glissandi on high strings, piccolo, E \flat clarinets, pippo-singers, glockenspiel, piano and xylorimba. This culminates in *sul tasto* artificial harmonics in the strings, e-bow on electric guitar, children's instruments (including rattle, castanets and ratchet), glockenspiel, xylorimba and piano. Figure 3 depicts this culmination, with the square notehead representing the inharmonicity produced by the toy instruments as per the notation in the score, although this inharmonicity produces much higher, complex frequencies than can be accurately notated. This is also an example of Neuwirth utilising auxiliary instruments to expand registral limits and inharmonic boundaries, and in this way transforming timbre over the course of a section. The term 'inharmonic boundary' is used here to indicate a sound containing a high level of inharmonicity or noise component. By introducing these auxiliary instruments within a section, the overall timbral field can progress from a soundworld comprising resonant tones with less inharmonic component, like those described in the previous example such as celeste and piccolo, to sounds that comprise a larger degree of inharmonicity, in this case particularly the children's toy instruments and the *sul tasto* artificial harmonics in the strings, and in this way there is a transformation from clarity to roughness across the section. This process utilises Saariaho's sound/noise axis as a reference point whereby she utilises the terms 'pure' and 'clear', also implying that these sounds comprise less inharmonicity. This is also an example of the defamiliarisation process as described in the introduction for this chapter, for by introducing these auxiliary elements, the soundworld becomes even more estranged from that of traditional orchestral sound.

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Ex. 9. Synthesis of sustained/oscillatory and active material in the closing section (b. 183–186) of *Vampyrotheone*.

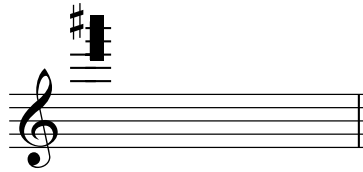


Fig. 2. Harmonic reduction of b. 111 of *Vampyrotheone*, showing a high pitched cluster, which creates a strained effect, giving the impression that the music has reached a climactic point.

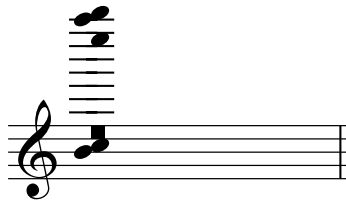


Fig. 3. Harmonic reduction of b. 129 of *Vampyrotheone*, showing a widespread arrangement of pitches, with the square notehead, as per the notation in the score, representing the inharmonicity produced by toy instruments. This represents a climactic point in the piece.

There is an alternation between soundworlds of different timbres in *Vampyrotheone*, allowing timbre to become an important means of quasi-motivic recognition and structure throughout the piece. The combinations of these are highly varied throughout. The changes between these block textures begin with quite equal durations until a level of stability is acquired. After the first couple of minutes the structure takes on an accordion-like form with sections for a time becoming much shorter and then lengthening again (Fig. 4). Towards the end this becomes quite erratic, still with an overall trend of shortened then lengthened durations. This creates a sectional rhythm in place of harmonic rhythm. These dialectical soundworlds are characterised by floating stasis on the one hand and very active textures on the other hand, which are full of gestural material. The floating, static, oscillatory textures feature synth-like, metallic electric guitar attacks that are left to resonate, high-register woodwinds, and very slow artificial harmonic glissandi in the strings, which oscillate back and forth between set pitches, whereas textures with more activity tend to feature piano and brass tremolo, woodwind trills and a wide array of percussion.

It is important to note that the timbral potential of the electric guitar, piano and strings have all been extended by the addition of preparations and the percussion calls for a vast array of instruments and mallets. The woodwind and brass, on the other hand, which cannot be so easily extended, are artificially extended through the requirement to play children's toy musical instruments such as plastic castanets, children's guitars, clappers and 'pippo-singers'. The children's guitars, for instance, are detuned to a microtonal tuning, which closely matches the soundworld to which it contributes, as the effect is largely inharmonic, emphasising the percussive white noise sound of the nylon strings, which is present in other

the bassoon and tuba in such a way as to heighten the delicate percussive timbre of the extreme register of the piano keys. These novelty extension instruments are utilised to highlight important timbres, which add to the range of inharmonic effects within the work.

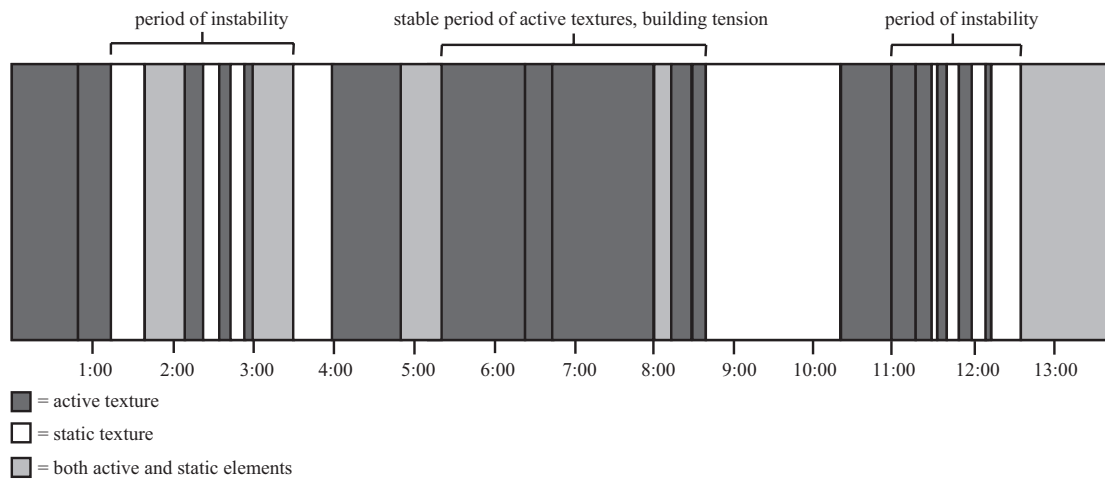


Fig. 4. Outline of form in *Vampyrotheone*, highlighting the dialogue between static and active textures, characterised by different sets of timbres and showing areas of formal instability and stability. Timings are based on the 2001 Kairos recording.³⁵

Vampyrotheone establishes form as a complex dialectic, emphasising abrupt juxtapositions of contrasting gestural and timbral sound-types. Sound mass and timbral fusion are used extensively throughout the piece to provide moments of high intensity. The use of unorthodox instruments and elements of inharmonicity in these sound-mass gestures and textures creates an array of innovative timbral combinations that take the listener far away from traditional orchestral idioms. While there are no conventional pitch structures in this work, pitch material provides a means of increasing and decreasing tension and is often combined with inharmonic components to enhance meta-gestures. The exploration of registral extremes creates another timbral element, which is utilised to shape the work.

³⁵ Klangforum Wein, *Vampyrotheone* (Kairos, 2001), 0012242KAI.

CHAPTER FOUR: ANALYSIS OF KAIJA SAARIAHO'S *OI KUU*

4.1 Introduction

Oi Kuu, for bass clarinet and cello by Kaija Saariaho obscures the distinction between harmonic and timbral formal processes. The amalgamation of these two parameters is a common feature of her output. This analysis of *Oi Kuu* examines how pitch and timbre produce different degrees of consonance and dissonance, creating long-term arcs of tension and release throughout the work. The methodological approach for the analysis of this piece involved listening for timbral dialogues, categorising sounds based on their relation to Saariaho's sound/noise axis and creating a harmonic reduction to establish the function of pitch.

Saariaho's music is characterised by timbral nuances applied to relatively clear melodic material, and slow changes to pitch centre and sound density. Her string writing is particularly distinctive, being strongly influenced by the spectralist tradition, with a focus on timbral transformations created by changes in bow position and pressure, and the exploration of various types of timbral trills. The harmonic organisation is quite clear in Saariaho's works, with reasonably stable sustained tones, prolonged vertical sonorities and harmonic fields, and repetitive harmonic structures, using formal techniques such as the chaconne.

Saariaho, Neuwirth and Iannotta all utilise timbre to shape musical phrases and large-scale form while in a context in which stable pitch references are still audible, to a greater or lesser extent, with Saariaho the most conventional in this regard. These pitch references are tonal centres to which the musical material repeatedly returns, which create a cadence-like effect and provide the music with a sense of conventional pitch structure. Saariaho's music is the most conventional in that very clear melodic themes and clearly defined harmonic language is utilised, which is traceable in the use of triadic materials throughout *Oi Kuu*. The approach that defines Saariaho is that timbre functions essentially as an *enhancement* of melodic line. Her music draws the listener into the inner life of timbre by applying particular techniques to entire sections, creating homogeneous soundworlds that at times have a quasi-meditative quality with the gentle layering of microstructural timbral transformations. These microstructural timbral transformations are transformations that take place on the level of a single gesture. For example, many of the multiphonics in the clarinet part in *Oi Kuu* increase in volume and through this increase in volume different multiphonics become more prominent and create a subtle change in timbre. Sectional divisions are more clearly

articulated in Saariaho's works than in the works of Neuwirth and Iannotta, due to clear changes in textures and musical materials.

Timbral modifications are not as radical or pronounced in Saariaho's work. There are no preparations or additional instruments such as electric guitar or novelty instruments, as one might find in the works of Neuwirth or Iannotta. Saariaho instead focuses on conventional, idiomatic techniques, particularly on the modulation of bow pressure and bow contact point in the strings, which she develops to a level of foregrounding. Ex. 10. shows the sorts of timbral transformations found in *Oi Kuu*, moving between *sul tasto* (S.T.), normal (N), and *sul ponticello* (S.P.) bowing positions. This particular approach to timbral transformation remains highly influential on my own approach to string writing and in most of the works in my creative portfolio traces of this are evident. This will be discussed in more detail in Chapter 6. In *Oi Kuu* these techniques are placed within a relatively conventional harmonic framework that still has some vestigial remnants of tonality and tends towards larger-scale pitch structures, whereas this is not as clear in Neuwirth and Iannotta's music.



Ex. 10. Transformational sound units in bb. 5–7 of *Oi Kuu*.

Clear harmonic and melodic frameworks are present in *Oi Kuu* and are enhanced with extended techniques such as multiphonics, varying degrees of vibrato, harmonics, fluttertongue and varying degrees of bow pressure and position. Saariaho's music generally tends to remain within these realms of extended technique. In this work, the harmonic framework creates the overall trajectory and is distinct enough for the conventional forces of tension and release to operate, while timbre contributes to tension and release on a more refined level. Saariaho says of this use of timbre to create tension and release, "For some years now I have a tendency in my music to relate the control of timbre with the control of harmony. Initially I began to use the sound/noise axis to develop both musical phrases and larger forms, and thus to create inner tensions within the music."³⁶ In a sense there is more linearity within Saariaho's work, where changes of timbre occur on a vertical level, just as melody is passed from one voice to another. Neuwirth, on the other hand, uses timbre to

³⁶ Kaija Saariaho, 'Timbre and Harmony: Interpolations of Timbral Structures', *Contemporary Music Review*, 2/1 (1987), 93–133.

create tension between different gestural prototypes, presenting a greater number of easily definable sound units within a dialectical form. This is the case even more so in the work of Iannotta, where timbre becomes the central focal point and a significant structural parameter, and where timbre is used as a motivic structural device that undergoes hybridisation and development to create musical meaning.

Saariaho's interest in the intricacies of acoustic sound evolved from her observations in electroacoustic music composition and the need to create constant variation within synthesised sound, leading her to draw out and focus on all the elements within the production of acoustic sound.

In connection with synthesis I also became aware that a synthesised sound becomes really boring unless it is varied constantly. I realised the degree to which an acoustic sound contains constant variations and that made me highly sensitive to it as well as to modes of playing. Gradually all that became very important, and it seemed to me necessary to make my notation more and more detailed. I wanted to know what kind of vibrato a musician used, how he placed his bow, things that were previously taken as given; I wanted to organise them in my music because I felt these elements could also have a true structural function.³⁷

It seems that Saariaho is not searching for new sounds, per se, as is certainly the case with Neuwirth and Iannotta, but seeking to utilise current methods of playing and to organise them systematically to create a sense of progression just as one might conceive of a melodic trajectory or harmonic progression. These modes of playing certainly have a structural function in *Oi Kuu*, and are exemplified through the interweaving of sonorities and intensification of melodic and harmonic tension and release. It is clear from her statement also that timbre is an important consideration in maintaining musical interest and as a formal parameter.

The approach to timbre in *Oi Kuu* is not unrelated to how we perceive the succession of music, particularly the concept of tension and release. Saariaho still utilises the idea of harmonic tension in her music by building up complex harmonies, but this idea of harmonic tension overlaps a great deal with timbre, and the concept of roughness in timbre is similar to harmonic density, in that roughness of timbre is linked to the interactions between “proximal frequency components”³⁸ and harmonic density produces harmonic tension through the interaction of pitches in close proximity to one another. In *Oi Kuu*, the line between harmony and timbre is blurred through the use of techniques such as multiphonics, double-stops and

³⁷ ‘Entretien Avec Kaija Saariaho’, in *Kaija Saariaho*, ed. by Risto Nieminen, trans. by Anni Oskala (Paris: Éditions IRCAM, 1994).

³⁸ Stephen McAdams, ‘Perspectives on the Contribution of Timbre to Musical Structure’, *Computer Music Journal*, 23/3 (1999), 85–102

harmonics. Saariaho says of the musical impetus for *Oi Kuu*, “It consists of elements which came to my mind when searching for a common denominator for bass clarinet and cello; harmony based on multiphonies of the clarinet; the multiphonies and color transformations of the cello; similar and different articulations; different colors in the same register.”³⁹ This mode of thinking can be observed in the exchange between *senza vibrato* and *molto vibrato*, and melodic intervals that grow out of double-stops in the first section of *Oi Kuu*. The cello seems to take on the characteristic of the bass clarinet multiphonics, with double stops comprising normal pitches and artificial harmonics, while the bass clarinet plays high *senza vibrato* pitches, which emulate the natural harmonics in the cello. This exchange between the clarinet and cello of various timbral common denominators creates a unity between the two instruments, creating not a dialogue as such, but a symbiotic exchange of timbral expression.

Saariaho creates a visual impression of the progression of large-scale form in this article, comparing the energy trajectory of her work *Verblendungen* to the progression in density of a brushstroke (Fig. 5).⁴⁰ Although this figure indicates how she conceives of large-scale form, it can be equally applied to the timbral transformations that occur within single gestures that move from noise/density to pure tones/clarity. An example of high to low energy on a microstructural level can be found in bb. 2–3 of *Oi Kuu* in the bass clarinet part (Ex. 11). The bass clarinet multiphonic begins with a high noise component due to the strain of the high register of the upper G# partial. When there is a change to the lower D# partial, the noise component reduces slightly, creating a progression from high tension to lower tension. While Saariaho’s sound/noise axis is useful for categorising sound types, she acknowledges that these terminologies are limited and do not allow scope for the potential of a hierarchical organisation of timbre as compared to the tonal system.⁴¹



Fig. 5. Saariaho’s impression of the form in her work *Verblendungen* (1984).

³⁹ Kaija Saariaho, ‘Oi Kuu « Kaija Saariaho », *Kaija Saariaho*, 2015 <<https://saariaho.org/works/oi-kuu/>> [accessed 22 August 2018].

⁴⁰ Ibid.

⁴¹ Ibid.

Ex. 11. Timbral transformation in the bass clarinet in bb. 2–3 of *Oi Kuu*.

In the programme note to *Oi Kuu*, Saariaho writes that the work marks a small break between the two orchestral works *Du Cristal* (1989) and *...à la Fumée* (1990), which form part of her spectral period.⁴² After the composition of *...à la Fumée*, she seemed to move away from this spectral focus towards repetition and rhythmic patterning, such as in *Orion* for orchestra (2002). *Oi Kuu* explores vestiges and remnants of the spectral thinking from *Du Cristal*, but due to the limitations of forces, it does not contain the same degree of textural density. While there are no distinctly spectral harmonies, it is reminiscent of the spectralist approach in the way that the harmonies are widely spaced at the bottom and intervals get closer together towards the top, and there are pitches that emerge above the other sonorities in the same way as an upper partial emerges from a harmonic series in such canonic spectral works as Gérard Grisey's *Partiels*.

4.2 Form

The form of *Oi Kuu* was determined by listening for changes in texture and observing moments of resolution at the end of a section indicated by sustained trills on an 'anchor' note that are lengthened by fermata. And although these sustained anchor pitches give a sense of resolution to the previous section, the sustained trill also give the sense that the music is about to move to a new section for want of the resolution of the trill, and the fermata intensifies this anticipation of resolution. Each section is also marked by a change in tempo, and, in all but the fourth section, begins from a D anchor point. The form of *Oi Kuu* is a quasi-rondo form (A B A C A) (Fig. 6). The first section from bb. 1–21 is characterised by slowly evolving clarinet multiphonics and cello harmonics interspersed with melodic figures. The second section (bb. 22–34) has a contrapuntal texture featuring dialogue between tremolo cello harmonics and fluttertongued bass clarinet pitches. bb. 35–45 herald a return to the slowly emerging and disappearing clarinet multiphonics of the first section. This is paired with subtle *sul ponticello* harmonic tremolos in the cello. The fourth section (bb. 46–64) provides the

⁴² Saariaho, 'Oi Kuu « Kaija Saariaho »'.

greatest contrast with cello crunch tones and mellifluous bass clarinet runs. The piece closes (bb. 65–84) with an interaction between metallic timbres created by clarinet multiphonics and iterations of harmonics that fluctuate between *sul ponticello* and normal bowing positions on the cello. There is a contrast between the function of the instruments in the A sections as opposed to the B and C sections. The A sections consistently contain clarinet multiphonics, while in the B and C sections the clarinet moves from a harmonic function to a more melodic function. These sections also contain gestures closer to the noise side of note-noise continuum with fluttertongue clarinet in the B section and cello crunch tones in the C section. Cumulatively, these various sections create a formal progression of an increase in intensity and density of timbre.

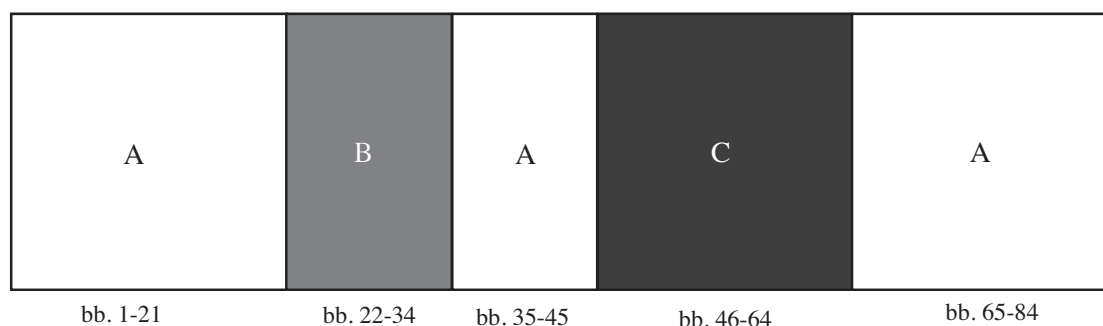


Fig. 6. Form and proportions of *Oi Kuu*.

4.3 Pitch and Timbre Structure

From bb. 1–10 there is a gradual increase in tension (Ex. 12). The first degree of harmonic tension occurs when the bass clarinet glissandos halfway through b. 1 from a D to a D \sharp at the beginning of b. 2, which is then sustained for some time. Throughout this, the cello plays a sustained D \flat , and the arrival of the bass clarinet at the D \sharp creates tension due to the beat frequencies that result and destabilisation of the tonal centre. The clarinet multiphonic, in b. 2 consisting of the D \sharp , an E and a G \sharp against the D and F in the cello, also contributes to the increase in tension. The granular quality of the upper partials of the bass clarinet multiphonic here creates a buzzing sound, heightening the tensional effect. This buzzing effect is more prominent in the higher partial due to the increased air pressure required to attain it.

Ex. 12. bb. 1–14 of *Oi Kuu* in which at bb. 1–10 a gradual increase in harmonic tension occurs.

Harmonic destabilisation begins to increase at b. 5 with a C \sharp in the cello against a D \sharp in the bass clarinet. Further on in the bar the cello also plays a tritone double-stop. In this low cello register, the tritone interval produces a granular, oscillatory effect. b. 7 maintains this level of increased tension, with a G \sharp harmonic that floats above the rest of the material, wavering slightly as it is played as part of a double-stop and is thus not as stable as if it were being played alone. There is then another increase in tension just before b. 8 with the arrival of a multiphonic G \sharp in the bass clarinet in addition to an F \sharp below. These pitches, combined with the G \flat and G \sharp in the cello, result in a harmonic configuration of registrally separated microtones, creating a spatial effect. The discrepancy in tuning, as well as the differences in tone colour between the instruments, contribute to an increase in tension with the delicate and volatile microtonal cello harmonic combining with the granular, bright tone of the bass clarinet's clarino register as part of a multiphonic.

At b. 9, the volatility of the cello harmonics is increased through the fact that an artificial harmonic and natural harmonic are being played simultaneously. This is further destabilised when the player is called on to play *molto vibrato*, resulting in the pitches moving between the harmonics, the stopped note and the open string as the movement of the hand makes the harmonics less clear. It is the nature of some playing techniques that they create a greater noise component, such as any techniques that utilise more bow or air noise. This includes techniques such as *sul ponticello*, *flautando*, double-stops, harmonics, multiphonics, crunchtones and breath noise. Saariaho has long been interested in bow position and bow pressure as parameters. The increase in tension is dissipated in b. 11 by a low, grounding C in the cello. The other pitches here are very much in the background of the texture, providing harmonic whispers.

Despite the chromatic, microtonal world that Saariaho explores in this work, nevertheless there are still vestiges of tonal elements that occasionally come to the surface. Figure 7 shows a harmonic reduction of bb. 1–22, outlining the vertical relationships between pitches and

over-arching pitch structure. There is an interweaving relationship between the bass clarinet and cello parts, to the extent that, particularly in the opening section from bb. 1–21, it sounds as though they are behaving as one entity. Pitches are transferred from one instrument to the other and the cello complements the bass clarinet multiphonics and vice versa. At this point, the D and F has become the fundamental harmonic unit, implying a D minor sonority. The G \sharp (11th harmonic) and E (9th harmonic) over the top of this suggests a higher extension of a D harmonic series. Having this D and F present provides a sense of triadic stability, indicating a vestige of conventional harmonic language. This is further developed by the fact that the cello then plays a C \sharp in b. 4 and the bass clarinet a G, hinting at a third-inversion A⁷ chord and a tonic-dominant relationship between the harmonic material. Following on from this, there is a G in the cello at b. 5, which is comparable to a subdominant sonority, albeit with the absence of a B \flat or a D. The cello pitch here provides timbral richness and foundation for the granular bass clarinet multiphonic. After this point the material departs from these tonal vestiges, however the D often returns with either an F or an A as an area of harmonic stability and the appearance of these pitches supports the stability provided by the D minor sonority, which grounds the work throughout. Each instrument assists in turn in expanding the harmonic field, generating these ‘extended’ sonorities. As the piece progresses, and when the texture becomes more contrapuntal from b. 16, it is as though the instruments are operating out of the same source, that the lines are emerging from a single bed of sound, blending into unison and echoing each other in a dialogue at bb. 17–19.

The figure displays a musical score for piano, spanning measures 1 to 22. The notation is presented in two staves: a treble staff and a bass staff. The key signature changes from one flat (Bb) to one sharp (F#) at measure 7. The score illustrates the harmonic reduction of the piece 'Oi Kuu', focusing on vertical relationships between pitches and large-scale pitch structure. The measures are numbered 1 through 22 above the staff. The notation includes various musical symbols such as notes, rests, and accidentals, representing the harmonic material discussed in the text.

Fig. 7. Harmonic reduction of *Oi Kuu* (bb. 1–22), showing vertical relationships between pitches and large-scale pitch structure.

In common with many of Saariaho's earlier works *Oi Kuu* treats melody as an articulation of a harmonic field, akin to an Aeolian harp. Saariaho discusses this approach in reference to her work *Im Traume* for cello and piano, describing the harmonic material as an "area" which is "modified by differing events at the level of timbre and texture."⁴³ This is particularly apparent in the second section of *Oi Kuu* from b. 22, where the melodic intervals are quite wide, creating a harp-like effect in which particular pitches from a wide area are plucked out and articulated.

The structural anchor points in this work, where most of the resolution is found, occur where there is a D in the lower voice, typically occurring at the beginning of sections. Each time this tonic note is presented in a different timbral context. The first is a unison at b. 1, shaded by *sul tasto* in the cello. The second occurrence is at the beginning of the second section at b. 22 in the cello, played pizzicato. At the beginning of the third section at b. 36, it appears as part of a double-stop with no timbral alteration. In the fourth section it is featured throughout most of the section as part of a *sul ponticello* cluster. Its final appearance is in the closing section at b. 65 in both the bass clarinet and the cello, as in the opening, with the cello playing a harmonic tremolo. The harmony always reverts back to this D anchor. The most consonant and stable harmonic moments generally feature fewer notes and wider intervallic spaces or triadic formations. In contrast to this, the second section from b. 22 does not have any sustained cello material, which allows for greater freedom and instability. The piece ends in an unresolved manner with an A \flat ⁷ chord.

The concept of oscillation and stasis is also very important in shaping the sound in this work. In the opening at b. 1 there is a synergy created through the unison, which results in clear overtones and provides shape to the sound, evolving over time. The combination of the bass clarinet and the movement of the cello from *sul tasto* to normal playing creates some change in how the notes interact and results in a shimmering of overtones. This oscillatory effect is then passed on to the multiphonic in b. 2, which has a harsh, granular timbre to it, and this is in itself like an oscillation. This then progresses onto a *molto vibrato* oscillation of the same clarinet multiphonic. There is a great deal of inner movement on a micro-structural level. The progression described above of this shimmering or oscillatory quality appearing successively through various instruments can be described as a 'pitch stream'. It highlights a progression of instrumental techniques that are used to bring out various oscillatory figures, creating layers of timbral activity. The microtonal interactions also add to this texturing of oscillatory figures.

Oi Kuu is a work containing traces of conventional pitch structures, and utilises timbre as a means of enhancing harmonic tension and release, operating upon Saariaho's note-noise

⁴³ Saariaho, 'Timbre and Harmony'.

continuum. The musical ideas within this work are presented in varying timbral and gestural forms, but there is no hybridisation or synthesis of these elements. Large-scale structure is quite conventional in this regard, as in more conventional forms the musical ideas are presented as variations and developments, but it is not usually found that a completely new idea emerges out of the development of the original musical ideas, as is the case in Iannotta's work. Structure is clearly definable through the use of juxtaposition of contrasting materials. Noise occupies a brief section of the work as a contrasting element and as a point of high tension. Saariaho relies on a relatively limited set of extended techniques to enhance and shape the musical phrases, and she works within these limits to create her characteristic soundworlds. A clear harmonic trajectory is identifiable through this work, utilising pitch anchor points as means of resolution throughout the piece.

CHAPTER FIVE: ANALYSIS OF CLARA IANNOTTA'S *ÀPHONES*

5.1 Introduction

Born in Rome in 1983, Clara Iannotta creates soundworlds that are characterised by scintillating harmonics, half-harmonics, sine waves, white noise, metallic percussion, teeth-on-reed woodwinds and rich multiphonics. A sonic 'alchemist' of sorts, her approach to sound is highly innovative, with traditional Western instruments prepared using materials such as aluminium foil, silk tissue and polystyrene to create subtle sounds with a high degree of inharmonicity. This alchemy also extends to the way her musical ideas hybridise and transform over the course of a piece, particularly on the level of timbre. As a child Iannotta was given deconstructed electronics to play with by her father, and it would seem she approaches ensembles in a similar way, treating each instrument as an individual component within a carefully designed circuitry of sound. As she comments on this formative experience, "I learned to look at every object not for its being, but for its potential, what it could become".⁴⁴ Iannotta finds countless ways to reinvent instruments, developing myriad combinations of techniques to create striking and dynamic sound objects.

5.2 Extended techniques and timbre in *Àphones* (2011)

Àphones (2011) is a work for 17 instruments including woodwinds, brass (doubling harmonicas prepared with silk tissue), percussion, prepared piano, harp and strings. This music is less concerned with the kinds of transformational sound units and pitch structures that can be found in Saariaho's work than it is with resonant gestures and the internal, oscillatory activity of the extended techniques used. The term transformational unit is used in the context of Iannotta's work to indicate the span across which a parameter transforms, such as from one playing technique to another or one dynamic level to another. It does not indicate where the sound begins, or ends, which is sometimes difficult to define into a simple unit in Iannotta's work as in addition to the gestural material present, there are also a lot of sustained materials. Although transformational sound units, which gradually change from one parameter to another, do occur in Iannotta's work, they tend to be used to create a fluctuation in tension at key moments, rather than being woven together to create whole sections of the musical fabric. The use of the term transformational unit in relation to Iannotta's work has

⁴⁴ Aaron Holloway-Nahum and Clara Iannotta, 'London Symphony Orchestra - The People Here Go Mad. They Blame the Wind.', *London Symphony Orchestra*, 2017 <<https://lso.co.uk/more/blog/762-clara-iannotta-discusses-the-people-here-go-mad-they-blame-the-wind.html>> [accessed 6 May 2019].

been informed by Smalley's discussion of the note-noise continuum and this analysis describes various examples of transitions across this continuum in varying degrees, which are used as a means of formal impetus.

In addition to Saariaho's use of *sul ponticello*, *sul tasto*, breath tone, increased bow pressure, multiphonics and harmonics, Iannotta also calls for more radical techniques including teeth on reed, muffled Bartók pizzicato, *col legno tratto*, slap-tongue, bowing on the bridge, string half-harmonics and woodwind half-aeolian tones. While Saariaho's techniques situate her approach near the centre of the note-noise continuum, Iannotta's wide range of techniques allows her to stretch across the entire breadth of this continuum, using noise for increased impact and exploring the boundaries of liminality. Iannotta's use of half-aeolian and half-harmonic tones were particularly influential on a number of the works in my creative portfolio and this will be discussed further in Chapter 6.

Iannotta explains that she finds a sense of originality through her combinations of extended techniques:

What's really important to me is just try to be original, because I know that there's nothing we're inventing now, it's like impossible... But I really think that we can be original combining the sound. It's like everyone knows the flavour of an apple, and everyone knows the flavour of a pear, everyone knows the flavour of the mango, but what if you put this and this and this together with these spices, then you will just taste something that you say hmm, ok maybe it's this, where you can't really recognise all the flavours. So I really think that, at least what I'm working on, is more like combining sounds and try to find a way to give you something that you say, hey! What is she doing? Who's playing now? It's more like this.⁴⁵

In this way, Iannotta defamiliarises instruments in her works, instilling a sonic curiosity in the listener. The most striking of these sound combination gestures in *Àphones* occurs in b. 1. (Ex. 13). This macro-gesture comprises two categories of sound units. The first are the percussive, resonant gestures played with soft mallet on gong, piano prepared with blu-tack on the strings, glissando with metal rod on the harp and muffled Bartók pizzicato. The second category of sound types are sustained gestures including harmonicas prepared with silk tissue and artificial string harmonics. The cumulative effect is a burst of shimmering high frequencies that seem to radiate out from within the muffled Bartók pizzicato in the cello and double bass. The focus on the cumulative gesture as a total sound object also masks each individual instrumental component.

⁴⁵ Daniel Vezza and Clara Iannotta, 'Episode 36 - Composer Conversations', *Composer Conversations* <<https://composer-conversations.netlify.com/#/36>> [accessed 6 March 2018].

Iannotta also has a particular interest in music as an existential, physical experience, stating, “music should be seen as well as heard.”⁴⁶ Her approach of combining sounds to create unfamiliar timbres also relates to this drawing of attention to the physical means of producing sound. This interest in the creation of new types of sounds is influenced by sonorist composers such as Penderecki, Gorecki and Lutosławski, as well as composers of *musique concrète* such as Schaeffer, Pierre Henry, Francis Dhomont, Smalley and Bernard Parmegiani. Iannotta is also particularly influenced by Helmut Lachenmann, who coined the term *musique concrète instrumentale*,⁴⁷ where he defines his categorisation of sounds as “...primarily delineated not by the usual parameters, but rather through the (always differently deployed) bodily energetic aspects of their foregrounding of sound or of noise.”⁴⁸

The scores of Iannotta are very beautifully rendered, depicting gestural material through graphics that allow for an organic expression of gesture and visually depicting this materiality of sound. The cello and double bass parts at bb. 53–56 are an example of the physicality of the gestures she sometimes utilises, requiring the performers to move their hand rapidly up and down the fingerboard (Ex. 14.). *Aphones* is a highly gestural piece and in her works she often asking players to play many additional instruments or materials, and due to this she prefers to consider the way she organises sound as a ‘choreography of sound’ rather than an orchestration.⁴⁹ Examples of additional instruments and materials in this piece include the woodwinds and brass playing prepared harmonicas, the brass creating sounds by shaking aluminium foil, and the pianist scraping glasses along the strings of the piano.

⁴⁶ Alethea Coombe and Clara Iannotta, “‘The Shadow of a Fundamental Sound...’: An Interview with Clara Iannotta’, *Kupka’s Piano*, 2013 <<https://www.kupkaspiano.com/kupkas-piano-blog/2013/09/11/the-shadow-of-a-fundamental-sound-an-interview-with-clara-iannotta-2>> [accessed 5 October 2018].

⁴⁷ Lachenmann.

⁴⁸ Ibid.

⁴⁹ Coombe and Iannotta.

The image shows a musical score for the piece *Aphones*, measures 53 to 56. The score is written for a string ensemble consisting of Violin I, Violin II, Alto, Violoncelle (Cello), and Contrebasse (Double Bass). The time signature is 3/4. The score includes various playing techniques and dynamics. The Violin I and II parts feature half-harmonics (SP) and half-pressure fingering (AST). The Alto part includes half-pressure fingering (AST) and half-pressure fingering (AST). The Violoncelle part includes half-pressure fingering (AST) and half-pressure fingering (AST). The Contrebasse part includes half-pressure fingering (AST) and half-pressure fingering (AST). The score also includes dynamics such as *p*, *mp*, *pp*, *f*, and *mf*. The score is marked with a circled 53 at the beginning of the first measure.

Ex. 14. Use of graphic notation to show playing technique in the cello and double bass, use of *col legno tratto*, and use of half-harmonics in the rest of the string section at bb. 53 – 56 of *Aphones*.

Of the three composers studied, Iannotta's materials include very conventional pitch materials. Most traces of scallic or triadic implications are obscured by the extended techniques that she utilises. In *Aphones*, for example, wherever there is scallic material Iannotta uses half-pressure fingering that results in an indistinct half-pitch, half-noise sound, obscuring any tonal implications. She also uses half or full *col legno* bowing, creating an even more ephemeral flurry of obscured pitch and noise (Ex. 14). Where Saariaho uses a more limited continuum of timbres, generally from pure harmonic tones through to granular crunch-tones, Iannotta's collection of techniques is more extensive and explores the use of very delicate and subtle sounds, which are often at the limits of audibility. Iannotta also has a preference for high frequencies and inharmonicity, often utilising very high clusters and various types of harmonics. In a number of her pieces she places paperclips on the strings, prepares the piano and uses found materials such as aluminium foil to create an element of inharmonicity in the work. According to Iannotta, this tendency towards what she terms 'weaker' sounds is a result of the development of her tinnitus. "...since I couldn't hear my internal sound, I became very interested in creating and hearing the internal sound of each object. Which means I am really trying to make my research internal. I want to hear it. Since I can't hear mine, I want to hear yours."⁵⁰

Aphones also showcases Iannotta's radical and pronounced approach to timbral modification, with the inclusion of unorthodox instruments such as prepared harmonicas,

⁵⁰ Sam Adams and Clara Iannotta, "Intent on Resurrection" Composer Believes "Music Should Be Seen as Well as Heard" - CSO Sounds & Stories', 2016 <<https://csosoundsandstories.org/intent-on-resurrection-composer-believes-music-should-be-seen-as-well-as-heard/>> [accessed 27 April 2019].

music box machines and cassette players, enabling her to extend her timbral palette. Neuwirth also includes unusual instrumentation, particularly in her larger ensemble works. Iannotta's choices of these instruments aim for subtle, unstable sounds. The instability of these sounds, which often comprise unstable harmonics that flicker between pitches, create a scintillating effect, whereas Neuwirth draws on more novel forces such as electric guitar and toy instruments to create a sonic phantasmagoria, in which the sequence of sounds creates a surreal, dream-like atmosphere. The use of novel instrumental forces is not present in Saariaho's work, where she draws upon standard instrumentation to create her atmospheric soundworlds.

Iannotta prefers to work with chamber ensembles rather than orchestras to allow time between composer and performers to focus on the production of the sounds at a detailed level.⁵¹ The composer remarks that for her it is sound itself that is the impetus for her works.

When I have to start a new piece, in general I'm not really influenced by an idea from a book or from a movie or from nature or something, it's not that, it's just a sound I like that either I think about that sound or I heard that sound in another piece of someone else and I take that sound and I say ok, now I will try to work on this sound and give you my own vision of that sound. I am the filter and I will take your sound and I will try to make it my own.⁵²

It is this detail and study of carefully selected sounds that many of her works explore. For instance, in *Aphones*, it is as though the entire work is contained and encoded within the initial gesture and the proceeding material is an expansion of this, a dissection and dispersal of many elements to create fields of activity. The harmonica material in b.1 remains largely unchanged throughout the piece, apart from a few minor changes in register. Alongside the repetition of this sound unit, however, there are other sounds that seem to expand from it. At b.15 the first instance of the alto, tenor and baritone saxophones playing multiphonics occurs, starting from a dynamic marking of *ppp*. These sounds appear related to the harmonica harmonics in their spectral complexity and metallic timbre, but are like a version of the original harmonica material at a lower register (Ex. 15). There are also more inharmonic sounds that emerge in the piece that seem to relate to this original sound, such as bowing on the bridge in the strings and breath noise in the woodwinds. Sinuous half-harmonic scalar material also appears at various points in the piece in the woodwinds and strings, which emulates the scintillating quality of the original material. Throughout the piece glissandi emerge in the strings, brass and in the piano through scraping a glass up the strings, and pitch bends emerge in the woodwinds. These glissandi and pitch bends originate in the harp glissando at b. 1, which is produced by the string being plucked and a metal bar being moved

⁵¹ Vezza and Iannotta.

⁵² Ibid.

simultaneously up or down the string. The prepared piano glissando in combination with pizzicato string glissandi are particularly reminiscent of the original glissando figure as the means of production is similar (Ex. 16). The pizzicato strings give a similar effect to the plucked harp and the rapid movement of the glass along the piano string is similar to the movement of the metal rod up or down the harp string. These two figures together produce a more timbrally complex version of the original figure, providing a similar effect with its orchestrated resonance, in this case created by the glissando with brushes on crotale and glass swept along piano strings. The muffled gong motif that is prominent from bb. 6–38 (Ex. 17) has its origins in an amalgamation of the gong and muffled Bartók pizzicati in the cello and double bass at b. 1.

The musical score for Ex. 15 is divided into two systems. The first system consists of three staves labeled HARMONICA C, HARMONICA A, and HARMONICA F. Above the first staff is a 3/4 time signature. The second system consists of three staves for saxophones. The score includes various musical notations such as notes, rests, and dynamic markings like *mp*, *pp*, and *ppp*. There are also markings for *cres. molto* and *decres. molto*.

Ex. 15. Prepared harmonica harmonics and multiphonics in alto, tenor and baritone saxophones. b. 14–16 of *Aphones*.

Ex. 16 is a musical score for three staves, all in 2/4 time. The first staff is labeled 'CROTALES' and features a glissando (gliss.) starting on a whole note, with dynamics *ppp* and *mp*. The second staff is labeled 'CORDIERA' and includes a glissando (gliss.) and a note with a cross (x) marked 'p', with a performance instruction '[frotter les cordes des vitesses]' (friction the strings with speed). The third staff is labeled 'E♭ F# G# A# B♭ C# D#', 'SOURDINE EN PLOMB', and 'SOURDINE EN BOIS', featuring a glissando (gliss.) and a note with a cross (x) marked 'mp', with a performance instruction '[arpéger les notes en étouffé avec une croix]' (arpeggiate the notes in muffled with a cross).

Ex. 16. Glissando motif in b. 112 of *Aphones*, which can be perceived as a development of the original macro-gesture at b. 1.

Ex. 17 is a musical score for three staves, all in 2/4 time. The first staff is labeled 'GONGS' and features a muffled gong (gong étouffé) motif, with dynamics *pp* and *pp*. The second staff is labeled 'Percussion' and features a muffled gong (gong étouffé) motif, with dynamics *pp* and *pp*. The third staff is labeled 'SOURDINE EN PLOMB' and features a muffled gong (gong étouffé) motif, with dynamics *pp* and *pp*.

Ex. 17. Muffled gong motif bb. 17–19 of *Aphones*, which has its origins in an amalgamation of the gong and muffled Bartók pizzicati in b. 1.

5.3 Spectromorphological description

Iannotta and Neuwirth both explore modulation of the continuant phase after the onset. This can also be interpreted as a composed attack-decay gesture in Iannotta's work due to the often delicate nature of the continuant phase. Many of the preparations and auxiliary instruments that the performers are asked to perform are designed to create quite complex timbral constellations. This is a prominent stylistic feature of Iannotta's work. Smalley's spectromorphological terminologies are helpful in identifying sound types in her works. These are shown in a diagram by Smalley outlining the possibilities of transformation between note, inharmonicity and noise (Fig. 8). 'Granular noise', defined as textured impulses, is associated with sounds such as sea, wind and static interference.⁵³ Prominent examples in *Aphones* occur at bb. 125–127 in the piano part, where glasses are scraped against the strings, (Ex. 18) and at bb. 152–167, where the saxophones are instructed to shake leaves of aluminium foil (Ex. 19). Smalley describes the function of granular noise as "a decorative or subordinate strand or trace, or a pocket of added intensity."⁵⁴ These streams of granular noise in *Aphones* function as decorative and subordinate strands within the texture due to their delicate nature and sustained quality. The 'contour energy' and 'inflection', described by Smalley as "the direction and energy of motion through spectral space" of these particular sound units is characterised by a 'drifting', 'floating' quality.⁵⁵ It is the uniformity, meaning that the quality of the sound is continuous, and sparseness of the texture in which they are situated which gives these streams of granular noise created by the leaves of aluminium foil this drifting, floating quality. These qualities also relate to Smalley's association of granular sounds with that of the sea and wind.

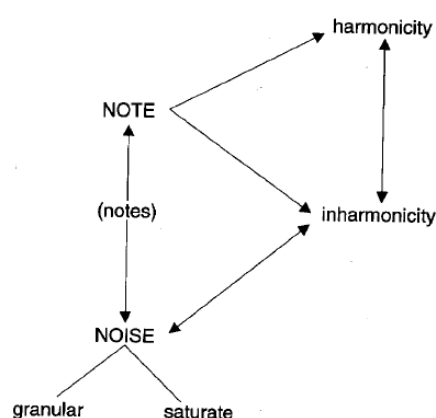
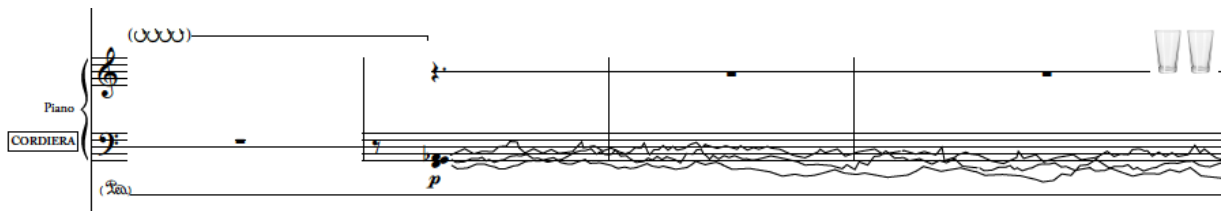


Fig. 8. Denis Smalley's note to noise diagram outlining the possibilities of transformation between note, inharmonicity and noise.

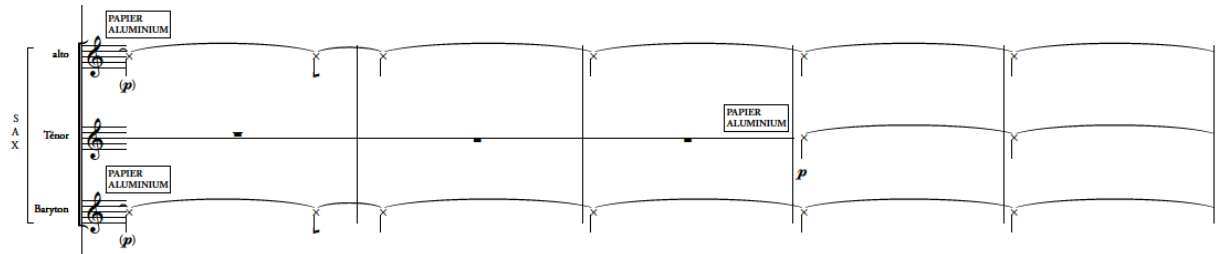
⁵³ Smalley, 'Spectromorphology'.

⁵⁴ Ibid.

⁵⁵ Ibid.



Ex. 18. 'Granular noise' produced by glasses scraped along piano strings in bb. 125–127 of *Aphones*.



Ex. 19. 'Granular noise' produced by saxophone players shaking leaves of aluminium foil in bb. 159–163 of *Aphones*.

5.4 Sound objects

Sound objects are used in combination in *Aphones* to create microstructural form. For example, in the opening of the piece, two sound objects are combined as discussed in the introductory section (Ex. 13), creating a sound envelope. The first is a percussive gesture and the effect of its resonance is utilised in creating tension and orchestrated decay envelopes. It is composed of muted Bartók pizzicati in the strings, glissando with metal rod on the harp, piano harmonics, and the gong played with soft mallets. Subsequent repetitions of this figure are presented as reductions of the original figure in numerous combinations of elements such as a vibraphone pitch struck with soft mallets paired with a harp harmonic or a vibraphone glissando paired with a piano harmonic. The resultant effect of the original gesture is an effervescent percussive implosion. This figure functions as a catalyst and sets the sustained sound unit in harmonicas and strings in motion. The scintillation of the prepared harmonicas serves as a wash of sound from which other high frequencies seem to emerge through the string harmonics. The function of this sound object is that of a trigger/catalyst and it acts as an exaggerated dissolution of the energy of the initial percussive gesture.

At the beginning, the sound objects Iannotta uses are easily discernible, but as the piece progresses they begin to become intricately transformed and combined even after only a minute. For example, between bb. 39–41 there is a collection of various sound units in the strings that undergo transformation (Ex. 20). In violin 1 and the double bass there is a combination of glissandi and harmonic pitch moving from normal bow pressure to increased bow pressure. These two gestural types originate in the metal rod on harp glissando in b. 1 (Ex. 21) and the string harmonics moving to increased bow pressure from bb. 13–14 (Ex. 22)

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The image shows a musical score for two instruments: Violoncelle (Cello) and Contrebasse (Double Bass). The score is written in bass clef with a 2/4 time signature. The Violoncelle part includes a section with a wavy line indicating a tremolo or sustained oscillation. The Contrebasse part features a series of notes with dynamic markings: *f* (forte), *pp* (pianissimo), and *pp* (pianissimo). Performance instructions in French are provided: "(glisser en gardant la position harmonique artificielle de quarte)" and "MSP". The score is partially obscured by a large black diagonal shape on the left side.

Form of *Aphones*

The form of *Aphones* can be simplified as a binary structure (Fig. 9). This binary structure was identified by tracing the repetition of the opening tutti gesture in b. 1, which occurs throughout bb. 1–98. At b. 98 this repetition of the opening gesture ceases and the texture becomes defined by sustained saxophone multiphonics. The section breaks within these two sections, and even between the two main sections themselves, are not always straightforward to define, and there is an element of ambiguity as to where the sections start and end, due to the dovetailing and blending of gestural typologies (Ex. 23). There are a number of ways one could interpret the microstructural form of the piece depending on the importance the listener places on the gestural material. There is a great deal of ‘foreshadowing’ that occurs, where new material is introduced in advance of a new section, creating the sense that a new section has already pre-emptively started while the current material is transforming or fading out. For example, at the section starting at b. 83, the half-aeolian and half-harmonic scallic material is present in the woodwinds and strings, along with percussive gestures in the percussion, piano and harp. At this point, the double bass plays a wide array of techniques from previous sections such as *sul ponticello*, wide vibrato of varying speeds, and transformations of bow pressure and position. At b. 85, new material in the brass consisting of *ppp* sustained microtonal pitches emerge, some of which are played with a slow vibrato. Shortly afterwards, at b. 88, sustained *pp* saxophone multiphonics begin to appear and at b. 92 the double bass starts to bow on the bridge, while the previous material continues on. At b. 95 it would seem that the new material in the saxophones and brass is firmly established, but on closer listening there are gradually diminishing *col legno tratto* gestures varying between *molto sul tasto* and *molto sul ponticello* until b. 97, which is derived from previous string material. This glissando movement of the bow that results from sliding between the two bowing positions appears to translate briefly into drawn-out trumpet glissandi from bb. 95–98, after which the sustained brass material drops away. It is only the tempo change at b. 98 that gives a clearer indication of a sectional division; otherwise, the musical material is intricately dovetailed and interwoven. This blurring between sections makes the form seem somewhat kaleidoscopic and indistinct, and allows scope for varying perceptions of microstructural and macrostructural form.

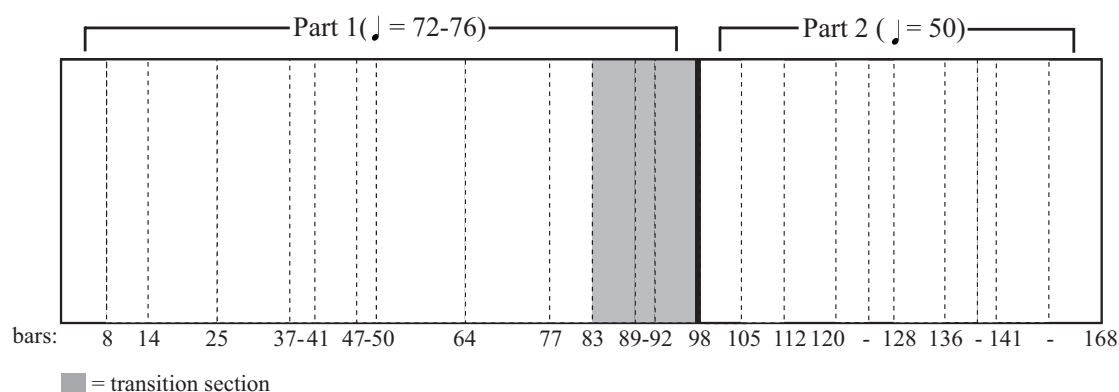


Fig. 9. Form of *Aphones*, defined by the gestural motif that can be found in b. 1.

Ex. 23. bb. 93–97 of *Aphones* showing half-harmonics, *col legno tratto* and $\frac{1}{2}$ *legno* string material, sustained microtones in the brass, half-aeolian fluttertongue pitches in the flute dovetailed with saxophone multiphonics, bowed polystyrene and double bass bowed on the bridge to create blurring between sections.

Ex. 23. bb. 93–97 of *Aphones* showing half-harmonics, *col legno tratto* and $\frac{1}{2}$ *legno* string material, sustained microtones in the brass, half-aeolian fluttertongue pitches in the flute dovetailed with saxophone multiphonics, bowed polystyrene and double bass bowed on the bridge to create blurring between sections.

Iannotta comments in an interview that she selects material that is so unstable and difficult to reproduce that no single performance can ever obtain the perfect sonic image of the notated material:

“In music I like anything that is completely imperfect, but the problem is that if you’re a control-freak, even if you try to reduce imperfection, it becomes just a perfect imperfection, which is of course absurd, it sounds absurd. So the only way I could reproduce this is trying to find techniques, sounds, that are so unstable, that are so difficult to reproduce, that every single time you’d never have the perfect image of it.”⁵⁶

For example, the second section at b. 98, is characterised by *pp* saxophone multiphonics. There is a fragility in these sounds that comes as a result of starting from a quiet dynamic and a brief period of instability from when the breath starts until all the notes of the multiphonic are sounding. These multiphonics also create beat frequencies and the oscillation that these produce is constantly in flux.

The form of *Aphones* was determined by listening for repetitions of the percussive gesture or ‘announcement’ figure at b. 1, which becomes a rhythmic motif from b. 8 (Ex. 24) and also ‘begetting’ figures that lead into these. Roy uses the term ‘announcement’ to indicate a “very prominent sound unit” and the term ‘begetting’ to describe “a brief morphological unit that becomes increasingly complex and varied. I also listened for changes in material, which heralded a change in section. This occurred primarily at b. 88, where the sustained *pp* saxophone multiphonics are reintroduced, and at b. 92, where the double bass returns to bowing on the bridge. For a short time from bb. 98–111, there is stasis, until an interruptive event comprising brushes swept along crotales, a glass scraped across a range of piano strings, an arpeggiated note cluster in the harp and pizzicato glissandi in the violin 2 and cello occurs at b.112. This gesture is like a shadow of the original percussive motif in the piece, as if it is now being presented through a different lens. This gesture also acts as a structural marker for the second half of the piece amidst the scintillations of the prepared harmonicas, quiet saxophone multiphonics, the prolonged scraping of glass along piano strings, and sustained *ppp* double bass pitches that transform between *alto sul tasto* and *molto sul ponticello* bow position. The appearance of the percussive gesture in this orchestration provides a considerable timbral development from the very clear resonant pitches and focused noise aspect in the first half of the piece, to the granular inharmonicity and radiance in the second. As the gesture is repeated, it takes on new orchestrations. There is a constant kaleidoscopic reassemblage of this sound unit throughout *Aphones*. This second form of the percussive gesture takes the implosive component of the combined gesture and incorporates it

⁵⁶ Johannes List and Clara Iannotta, ‘Porträtfilm Clara Iannotta OmU DE’, *Vimeo*, 2018 <<https://vimeo.com/269823191>> [accessed 5 March 2019].

into a single more simplified unit. The first instance of the developed form of the original gesture takes place at b. 112, where it comprises metal brush on crotales, a glass swept up piano strings, a harp cluster and pizzicato with a wide vibrato in the second violin and the cello (Ex. 25).

The musical score for Ex. 24, titled 'Rhythmic motif in b. 8 of *Aphones*', is presented in two systems. The first system includes parts for GONGS, VIBRAPHONE, Piano, and Harpe. The second system includes parts for Violon I, Violon II, Alto, Violoncelle, and Contrebasse. The score is written in 3/4 time, with a key signature of three flats. Measure 7 is marked with a circled 7 and a 3/4 time signature. Measure 8 is marked with a circled 8 and a 2/4 time signature. The score includes various dynamics (pp, mf, f, p) and performance instructions (e.g., 'col legno batt.', 'etouffé').

Ex. 24. Rhythmic motif in b. 8 of *Aphones*.

The image shows three staves of musical notation for percussion instruments. The top staff is for 'CROTALES' in 2/4 time, with a 'ppp' dynamic marking and a 'cresc.' instruction. The middle staff is for 'CORDIERA', also in 2/4 time, with 'mp' and 'p' dynamics and a note about 'frictionner les cordes des vitesses'. The bottom staff is for 'SOURDINE EN PLOME' and 'SOURDINE EN BOIS', in 2/4 time, with 'mp' and 'p' dynamics and instructions like 'pizz. fluído' and 'très peu de pression d'archet'.

Ex. 25. New form of opening percussive gesture in section B of *Àphones* (b. 112).

It is to be noted that there is some ambiguity about the phrase beginnings and endings, due to the percussive nature of the primary sound object. While these rhythmic figures serve as important landmarks in the form, they also sound like the conclusion of a phrase, as they trigger other material, serving as a catalyst for more subtle material to emerge and disperse. One can hear their role as dual in nature, as both a phrase ending and beginning combined. The fact that when this punctuation appears there is the introduction of new material also makes it sound like the beginning of a new phrase. Pulse streams maintain the rhythmic energy that is created by the percussive gestures while the rest of the ensemble plays in a freer, drawn-out texture.

Àphones utilises gestural and rhythmic elements of periodicity as structural parameters, and comprises an immense collection of sound typologies. Some of these sound typologies retain their original identities throughout the piece, creating a sense of continuity and while others morph on a timbral level, hybridising with other sound units, some to the extent that new timbral identities appear. Due to the complex organisation of sound units, there is an element of ambiguity about the form. Iannotta utilises combinations of sound units to create a sense of defamiliarisation, which is heightened through the radical approach to instrumentation, preparations and extended techniques. Timbrally there is a general

progression from the opening resonant, bell-like gestures to weaker, granular sound types with a greater component of inharmonicity by the conclusion of the piece.

CHAPTER SIX: DISCUSSION OF CREATIVE WORKS

6.1 Introduction

A focus on sound and timbre has always been present in my works. The investigation of the music of Neuwirth, Saariaho and the differences and similarities in the way they use timbre has provided me with a diverse field of inspiration and through analysing the intricacies of their compositional approaches I have been able to enrich and develop my own musical ideas. What follows in this chapter is a discussion of the influence of these composers' works on my own creative language and how my approach to timbral processes and instrumental music has developed over the course of this exegesis. Each of the works in the creative portfolio uses elements of extended timbral soundworlds, but as with the three composers each of the works approaches these soundworlds from a slightly different perspective. There is a unity throughout the portfolio through the use of resonance, timbral radiance, layered textures and single-movement forms that are shaped by timbral trajectories.

Apart from the influence of these three composers one of the other reasons for the variety in the musical approaches taken is the transformation of my own consciousness across the span of the portfolio. When I began this portfolio of creative works I was interested in how timbre could act as a foregrounded parameter to generate form, and I was particularly interested in the work of Kaija Saariaho and Olga Neuwirth in this regard. Previously I had always spoken about wanting to achieve a quality of transcendence in my works, to have an uplifting effect on the consciousness of the listener or to transport the listener to an otherworldly atmosphere or scene.

At the end of my first year of studies I came across the ancient science of bhakti yoga, which teaches through Sanskrit literatures such as the *Bhāgavad-gītā* about the realisation of transcendental knowledge through methodological delineation, experiential verification and repeatable demonstration. I drew creative inspiration from the bhakti concept of 'transcendental sound', beyond the conception of utilising the material phenomena of sound to create particular moods and effects. I discovered that it is only through the cultivation of a transcendental state of consciousness in oneself can one can hope to transmit this in sonic form to others.

After coming across this knowledge I had the realisation that I wanted to pursue music that had the potential to uplift the consciousness of others and give them a sonic experience of the transcendental reality. I imagined music that was able to effectively utilise extended techniques and scintillating, multi-faceted sounds to enhance melodic and harmonic

frameworks. I contemplated whether musical tension could be created through musical elements such as texture and gesture rather than just harmonic density alone. While I still took inspiration from the extraordinary textures and timbres found in the music of composers such as Neuwirth, Saariaho and Iannotta, in later works I experimented with the substitution of more modal, scalar materials for the elements of noise and dissonance, and the later works in the portfolio show a stylistic shift to that which is akin to that of Saariaho, with the utilisation of timbre as a means to provide a layer of colour over the musical materials. This development became prominent in *Piṅgalā Idā*, where the timbral focus lies in the inharmonicity created through the combination of clarinet multiphonics and sustained chords in the accordion in the opening of the piece. Following this section there is a departure from this focus with the use of simple scalar and harmonic materials. *Paramātmā* focuses on conventional use of melody and harmony and utilises timbre to colour scalar material, as is characteristic of Saariaho's work. A prominent example of this is in the transitioning from *sul tasto* to *sul ponticello* playing techniques in the strings. The final work, *Acintya*, utilises a wider array of extended string techniques to create detailed timbral nuances to colour melodic and harmonic materials.

While the works in this folio cannot be considered as a complete, established method or approach, nevertheless, a new direction started from within these works, particularly in *Paramātmā* and *Acintya*. Scalar and modal materials became more prominent in the later works of the portfolio while maintaining the textural and gestural complexity of the earlier works. With the minimisation of harmonic density, the music instead focuses on the enhancement of consonant sonorities through the use of extended techniques. Consonant intervals such as octaves, perfect fourths, and perfect fifths become more prominent in the later works and there is also an increased use of simple major scale material, albeit often in complex polyphonic textures.

A transition in approach can be clearly seen in the titles of these works. *street : noise : graffiti* is deeply focused on resonance, the microcosmic intricacies of sound, and the use of harmonic density and noise-based textures, being influenced by the urban sonic landscape; *Rille* is a transitioning work, utilising the fundamental approaches to timbre that my work has been based on for some time and exploring transformational gestures, while taking a step back to the integration of pitch material; *Vyatiṣaṅga* and *Piṅgalā Idā* are focused attempts at timbral fusion; *Paramātmā*, delves back into the world of simplified conventional pitch structure, utilising timbre as an enhancement to pitch material and teleological force; and *Acintya* is a reconciliation of myself as a composer and bhakti yoga practitioner, integrating pitch elements into a network of timbral shading. In the later works I became interested in the possibility of maintaining the textural complexity of the earlier works, but with more scalar and modal material, becoming less reliant on the tensional properties of harmonic density.

It is to be noted that in the discussion of these works I use the term ‘transformational sound units’. I have adapted this term from Smalley’s ‘gesture-unit’ terminology, which indicates a note and its onset, continuant and terminal phases.⁵⁷ I have used the term ‘sound unit’ as opposed to ‘gesture-unit’ because of the connotation the word ‘gesture’ has to sounds that contain motion, whereas in the works that are analysed in this exegesis, transformations can occur over longer spans of time through static, held pitches and are not so easily discernible as what one might usually consider to be a gesture as such. I define ‘transformational sound unit’ as a sound or collection of sounds, which undergo some change over time whether this is through dynamic, playing technique, or register. The boundaries of these units may not always be easily discernable, and so I have determined the units based on the general span across which the transformations occur. Attack-decay gestures are also considered a transformational sound unit due to their inherent sound envelope as the sound decreases.

6.2 *street : noise : graffiti*, for prepared jazz guitar and orchestra

street : noise : graffiti focuses on utilising timbre to generate form through transformational sound units. I wanted to explore how the spectromorphology of sound units could be woven together to create an effervescent landscape of timbre, with a dramaturgy akin to that created by conventional melody and harmony. This approach was particularly influenced by the music of Neuwirth and Saariaho. The musical material consists of transformational gestures, such as the transformation of pitch, dynamics and playing technique, including transformations of embouchure, finger pressure and bow position. These transformational sound units were important in building the most textural moments in the piece. In one example, at bb. 21–22, both flutes unfold a sequence of syllables with sharp attacks through different vowel positions (Ex. 26). The gradual change in vowel sound should create an impression of a timbral transformation. This instance of timbral transformation is a condensed form of bb. 14–20. Other examples of transformations include b. 22 where the timpani plays with the fingertips on the skin, moving gradually from the edge to the centre while descending in pitch (Ex. 27), and b. 75, where flute 1 transforms from sibilance, to air tone, to normal playing technique (Ex. 28).

⁵⁷ Smalley “Spectromorphology: explaining sound-shapes.” *Organised Sound* 2/2 (August 1997): 107–126

(D trill key)

dense

move through sequence of vowels from a fast to slow rate, with the same articulations as previous

sparse

Fl. 1

Fl. 2

ff

p

(D trill key)

[tʃa] [tʃɛ] [tʃi] [tʃɔ] [tʃu]

Ex. 26. Timbral transformation in flutes 1 & 2 through different vowel sounds in bb. 21–22 of *street : noise : graffiti*.

Timpani III

dense

angled edge

less dense

centre

fingertips on timpani skin

R.H. small, repeated circular motions with palm on timpani skin

f

pp

pp

mf

pp

(with continuation of sporadic fingertip rhythms)

Ex. 27. Timbral transformation in the timpani through moving playing position in b. 22 of *street : noise : graffiti*.

[sss]

air tone

senza vib. normal tone

pp

mp

Ex. 28. Timbral transformation in flute 1, b. 75 of *street : noise : graffiti*.

My compositions are usually inspired by extramusical concepts, but in this case the inspiration was purely sonic. At the time I had a health condition that enabled me to hear very subtle sounds, while also being overly sensitive to noise and high frequencies. There was construction noise on the street that I was living on, something like that of a circular saw. I found it a very penetrating sound and it had quite a physiological effect on me, so much so, that it felt all-consuming. At the same time as all this noise was going on, I was listening to recordings of the so-called 'rolling-tone' bassoon extended techniques by Pascale Gallois. These two sounds interacted scintillatingly, complementing one another in both pitch and timbre. I decided to incorporate these sounds into the soundworld of the orchestra, selecting the most metallic, scintillating sounds from the orchestra I could find such as fluttertonguing, multiphonics, held pitches a quarter-tone apart, whispering into the embouchure hole of the flute, and the sounds of metal found objects on the electric guitar. These techniques helped to timbrally recreate the sound object that had inspired me. While the bassoon gesture was sonically very rich, the student bassoonists could not manage to reproduce the sound that Pascale Gallois had created. I decided to therefore transcribe the gesture across the orchestra, not in a precise analytical way, but as an impression of how I heard it. And so the whole work grew out this transformation of the construction noise, into this bassoon technique and finally into the sound mass of the orchestra.

I am often inspired to write a work when I hear performers who are able to produce intriguing timbres and effects on their instruments. This was the case when I heard experimental guitarist Daniel Beban perform in an Audio Foundation concert with prepared guitar a couple of years earlier. I am interested in the idea of fusing the organicism, complexity and timbral interest that can come from a sensitive improviser and the intricacy and detail that is possible with composed ensemble music. As Beban was unable to perform in my piece, I decided to simplify my selection of techniques and utilised the prepared jazz guitar to provide colour and resonant gestures, composing a part for student guitarist Jake Church to perform.

Sound contains the potential to transport the listener by triggering associations with past sensory experiences, which are stored in the subconscious mind. As all sensory experiences experienced within in these bodies are experienced within space, the associations that are made between the impressions of sounds heard in the past and stored within the subconscious mind, and the current listening experience evoke atmospheres, based on the spaces in which those previous sensory experiences took place, and the visual and emotional associations they had in the past. The word atmosphere is taken here to mean the sense of a place or environment as experienced by the five knowledge-acquiring senses (eyes, ears, nose, tongue and touch). The basis of this knowledge is found in the prime yoga text *Bhagavad Gita As It Is*, particularly in Chapter Thirteen: Nature, the Enjoyer and Consciousness.⁵⁸ This means that every person will have different experiences and perceptions of the music, but nonetheless, the subconscious mind is always aroused in this way in the process of hearing sound, whether in a passive or active state. This potential interests me musically, and so in planning this piece I searched for unusual sounds that were highly resonant to help evoke a sense of space, such as a plucked cooling rack placed on the timpani (Ex. 29) and the striking of a chrome pipe, which had been inserted underneath specific guitar strings, with a metal knife handle (Ex. 30). Overtone-rich, resonant sounds can create a spatial effect, perhaps because of the microtonal tuning of the overtones, which creates a wavering of tone, and the fact that we are able to hear the passing of time through the decay of sound. In developing the piece, I consulted Beban and recorded him playing a selection of sounds using various preparations on jazz guitar. I decided to limit myself to the preparation and techniques that I found the most sonically effective. I inserted a 12-inch chrome pipe beneath strings II to IV and placed it horizontally across the pickup nearest to the fretboard. I also used a metal knife handle to strike the top of the rod and the piercing attack and resonance from the rod was picked up. Rotating the rod altered the pitch of the resonance and, in this way, glissandi and vibrato were also possible. With this single preparation there was a wide range of timbral nuance to explore.

58

cooling rack
pluck with thumbs and fingers, both hands
improvise on bars
irregular, increasing in speed

Timpani I

wire brush
gliss. across all rungs of
cooling rack

mp *f* *ff*

(pedal setting)

Ex. 19. Plucked cooling rack on timpani in bb. 11 – 14 of *street : noise : graffiti*.

hit near top of metal bar with
metal knife handle at point indicated
on diagram

ff (max. possible without
distortion)

Ex. 30. Prepared jazz guitar gesture created by striking a chrome pipe, which was placed beneath selected strings, with a metal knife handle in b. 14 of *street : noise : graffiti*.

The masking of instrumental sonic identities through the use of extended techniques, preparations and resonance was another idea that I had become interested in at the time of writing this piece. This masking contributes to the effect of ethereality and mystery, in that the sounds are coming from potentially unidentifiable sources. The electric guitar is highly adept at producing a wide array of sounds that are quite unrelated to its conventional sound, and can be easily sonically manipulated by other objects. The fact that it is electronic also allows for other devices to be utilised such as synthesizer pedals, providing more timbral options. With the intention of masking sonic identities of instruments there is a constant search involved to extend the potential of each instrument with new gestures that are highly effective and unique. I do not usually work with techniques such as tapping on the bodies of string instruments, for example, because there are more effective percussive sounds to be found among the percussion section, and as such they do not seem to expand the unique potential for sound on string instruments. Ultimately I was searching for sounds that would be difficult to recreate with any other instrument or object. This approach to selecting sounds at this early stage of the folio was influenced by Neuwirth, who is expert in finding and making use of unorthodox, resonant sounds, and whose music I was deeply absorbed in at the time of commencing this research. In composing this first piece in the portfolio I was not yet familiar with Iannotta's music and her practice of exploring the potential of instruments in creating unorthodox, resonant sounds, and so her influence is not applicable to this particular work.

The guitar often acts as an interrupter and landmark figure. In the first instance of this at

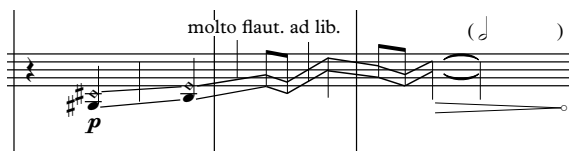
b. 14, the flutes, timpani and violins act as a pixelation and dispersal of the attack of this gesture from bb. 14–20. To begin with, I conceived of this material visually, akin to that of pointillism in art, where an image comprises small dots. Thus the term pixelation is used in this case to compare the percussive gestures in the flutes, timpani and violin to particles of the original gesture in the prepared guitar. The flutes play through a sequence of vowel sounds with sharp attacks, the timpani plays with the fingertips on the rim of the skin, slowly moving inwards to the centre of the timpani and violins 1(b) and 2(b) play *alla chitarra pizzicato* behind the bridge, moving from frequent to less frequent activity (Ex. 31). The clarinets take a subtle A \sharp partial, which is not the main sounding pitch from the resonance of the guitar and foreground it, zooming in and extending only this aspect of resonance from the guitar. This pitch is blurred by other close-proximity pitches throughout the woodwind section. In this way my response to the spectral nature of the sound was not scientific, I was not trying to be precise with what a sound specifically contained, but instead this was an impression, a focus on my perception of the sound and what I wanted to draw out of it. In other instances the orchestra are pre-emptive of the gestural material to be carried out by the guitar, such as at bb. 19–20 where the lip glissando in bassoon and the microtonal glissandi in cello(a) and the double bass herald the glissando in the guitar at b. 21, which is created by rotating the chrome rod after it has been struck.

street : noise : graffiti places more emphasis on timbre as an important formal parameter than other works in the folio. Microtonal clusters are utilised to create timbral interest through the occurrence of beat frequencies. Alto saxophone fluttertonguing in the opening also contributes to this oscillatory timbral interest. Within the microtonal clusters and unisons present in the opening timbral transformations occur, creating an interior sense of activity and progression. I envisaged these beat frequencies as micro transformational gestures banded together, as a sort of oscillation with their micro fluctuations in pitch and dynamics. I then expanded these out into drawn-out oscillatory gestures in the oboes and strings in the form of ascending and descending glissandi (Ex. 32). At b. 42, linear glissandi begin to emerge, which then become ascending scallic gestures at b. 62, moving into the final aleatoric section of the piece. The analysis of Neuwirth's *Vampyrotheone* also outlines the use of oscillation, which was an influence in this piece, particularly in relation to beat frequencies created by multiphonics and oscillation created by the resonance of instruments and objects. An example of this in *Vampyrotheone* is the use of a cymbal on top of the timpani, which is struck and the timpani pedal is moved up and down, which affects the resonance of the cymbal and creates an oscillatory effect. This technique inspired a similar effect created by the use of a crotale on the timpani and the movement of the timpani pedal to create a drawn-out oscillatory effect of the resonance of the crotale. There is however, more focus on stasis in *street : noise : graffiti*,

and overall it is concerned with prolonging the sound and change of timbre, rather than making use of a lot of pitched gestural and scalar material.

[illegible]

Ex. 31. The attack figure in the prepared jazz guitar at b. 14 and subsequent sonic pixellation and dispersal of this gesture through the flutes, violin 1(a) and violin 2(b) in bb. 14–18 of *street : noise : graffiti*.



which often provide harmonic stability and foundation are playing a high harmonic pitch. The timpani produces the only bass frequencies in this example and are produced by the timpani by rubbing the finger against the skin of the timpani. This creates a very delicate effect, and the resultant pitch is not heard very strongly. This lack of strong harmonic foundation and distance between these lower pitches in the timpani and the rest of the orchestra in the higher register creates this feeling of sparseness.

Ex. 33. Sparseness in bb. 28 – 34 of *street : noise : graffiti* through use of registral contrast.

6.3 Form of *street : noise : graffiti*

There is a dialectic between sustained pitch and texture, and between pitch and inharmonicity at play in this work. The dialectic between pitch and inharmonicity is blurred however, and at times there is a synthesis of these elements such as at from bb. 57–60 where air noise in the flutes and strings are combined with sustained microtonal pitches in the rest of the woodwinds and harmonics in the strings (Ex. 34). At other times the proportion of inharmonicity increases, such as in the closing aleatoric air noise section. A textural dialectic can also be found in Neuwirth's *Vampyrotheone*, in which sections alternate between textures containing highly gestural material and shorter duration static pitch streams, and this approach certainly influenced the consideration of the form of *street : noise : graffiti*.

The form of *street : noise : graffiti* is shown in figure 10 and sections are distinguished divided by their predominant musical materials. The piece begins with a texture focused on pitch streams and timbral shadings of these, then moves onto textures containing noise elements before returning again to the pitch streams of the opening, utilising microtonal pitches to create polyphony. At the end of the section from bb. 41–61 noise elements begin to be integrated again into the texture along with the pitch material and at b. 62 the noise elements in the form of air noise take over completely in an aleatoric texture at the conclusion of the piece.

senza vib.
air noise
ff (poss.)

air noise
f

senza sord.
mf

ST
air noise
ff (poss.)

N
air noise
f

p

mf

mf

air noise
f (poss.)

N
air noise
ff (poss.)

p

pp

arco
pp (only just perceptible throughout)

Ex. 34. Synthesis of noise elements and pitch in the string section at bb. 57–60 of *street : noise : graffiti*.

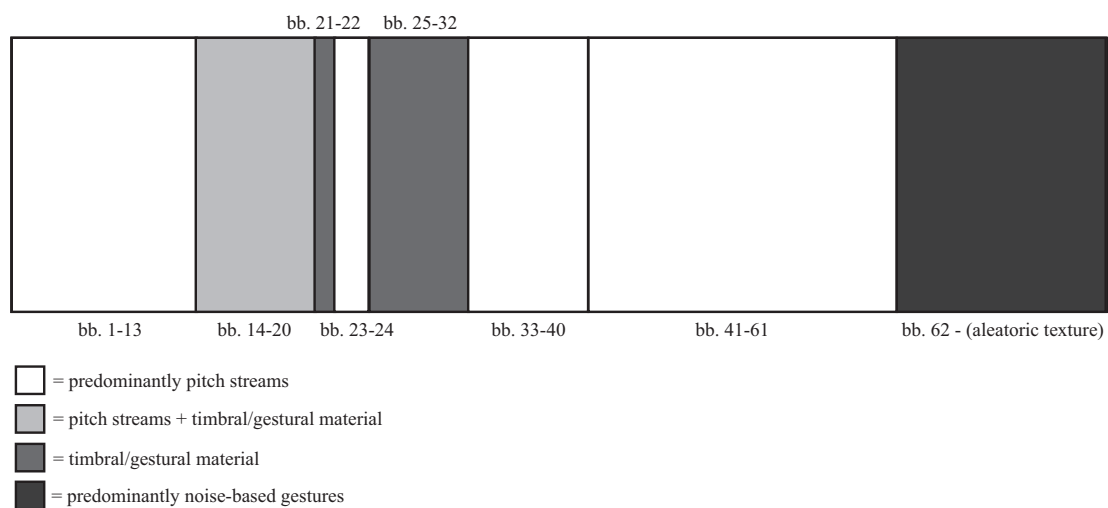


Fig. 10. Form of *street : noise graffiti*, showing divisions in foregrounded musical materials.

6.4 *Rille*, for improvising vocalist and orchestra

Rille was composed as part of the Auckland Philharmonia Orchestra's 'Gallery of Sound' composer project, in which five New Zealand composers were selected to write a work in response to an artwork from the Auckland Art Gallery's New Zealand collection. I selected a photograph by James Chapman-Taylor, *The wind in a frolic* (c.1945). I was attracted to the sense of spirit that this photograph captures and the dualities within it such as light and dark, line and curvature, and motion and stasis. The work contains elements of aleatoricism, improvisation and precise notation, which have different potentials for creating dynamic relationships between sounds when carefully considered. The density of the aleatoric sections correspond to the density within the photograph, created by low exposure and resulting in areas in the photograph that are very dark and dense due to an absence of light. The density of this aleatory, undulating harmonics and triangle beater scrape on the tam-tam also correspond to the intense movement captured in the photograph through the movement of the wind, evident in the wind-swept material the woman is holding, and her movement as she is dancing, kicking her leg into the air with pointed toes. The use of harmonics reflects the light nature of the wind and the sheerness and fragility of the material the woman is holding and also the luminosity of the light reflected on the woman's leg and the clouds in the background. The ascending and descending harmonic glissandi correspond to the lines and motion created by the woman's legs in her balletic movement. These are all examples of sound units used to express the various parameters within the photograph (Fig. 11).

Rille is partly concerned with the spontaneous and intuitive creativity that stems from the act of improvisation. Soloist Chelsea Prastiti had trained as a jazz singer, but also sings in a range of different groups, from traditional Bulgarian a cappella choir to experimental improvisation, and I became intrigued by the sounds she utilised in her improvisations while listening to her performances with the Saturnian Noise Collective. Her improvisation style is characterised by crystalline pointillistic tones, theremin-like warblings, and guttural, nasal melismata. In the score I provided her with simple pitch guidelines and written instructions as to the sort of gestures I wanted. At times I directed Chelsea to imitate sounds from the orchestra in an attempt to integrate her voice timbrally into the texture. *Rille* is partly concerned with the synergy between the sound mass of the orchestra and the improvising singer and how the voice is able to timbrally emulate the orchestra.



Fig. 11. James Chapman-Taylor's photograph, *The Wind in a Frolic* (c.1945).

Rille is also concerned with texture and the combinations of timbre within a texture. There is a focus on the transformation of timbre on a microcosmic level. Many varieties of transformational sound units can be found on the first page within the opening aleatoric section. There are resonant attack-decay gestures (Ex. 35), glissandi and scallic gestures with changes in bow position (Ex. 36) and more complex timbral units such as undulating bowing between two harmonics while moving from sul tasto to sul ponticello (Ex. 37).

© FLEXATONE
single pitch by tapping top beater onto metal sheet
no gliss. or tremolo

Ex. 35. Example of a resonant attack-decay gesture using the flexatone (Percussion 1), in the opening aleatoric section of *Rille*.

④ arco
with harmonic finger pressure
SP → N → SP

Ex. 26. Harmonic glissando in viola (b), opening aleatoric section of *Rille*.

© undulating bow
alternating slowly between the two strings
ST → SP

Ex. 37. Undulating harmonics in viola (a), opening aleatoric section of *Rille*.

6.5 Form of *Rille*

In terms of large-scale timbral organisation, there is no clear trajectory in *Rille* and many sections contain a mixture of pitch and inharmonic elements. The piece begins with a high degree of inharmonicity with an aleatoric section filled with numerous different sound units ranging from tremolo on large gong to double bass pizzicato on the strings behind the bridge. The sections then navigate through a range of extended techniques such as half harmonics, natural harmonics, half-aeolian tones and playing behind and on the bridge, being interrupted on two occasions by reoccurrences of the opening aleatoric textures. The piece ends with an aleatoric section consisting of unison B tones. Fig. 12 shows the sectional divisions in the piece and the predominating instrumental features within each section.

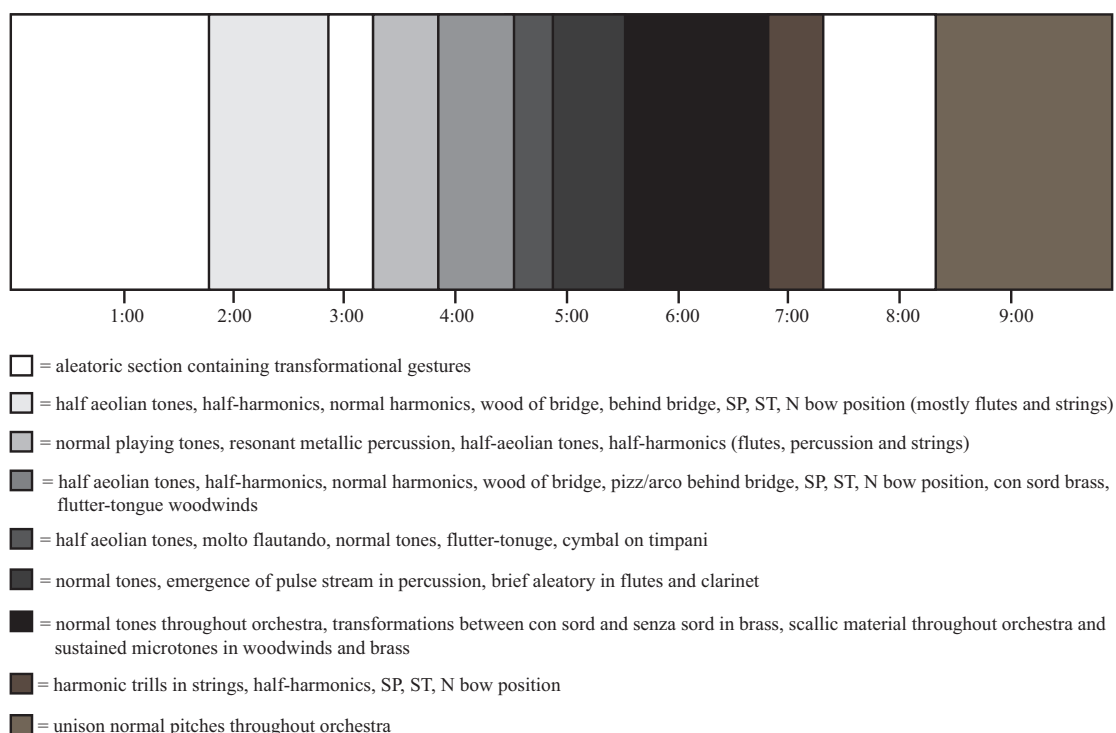


Fig. 12. Form of *Rille* detailing the predominant instrumental features of each section.

Rille takes its influences from all three of the composers studied. The sudden changes in texture are inspired by the juxtaposition of material in Olga Neuwirth's works. The aleatoricism in the opening and throughout the piece is strongly influenced by her orchestral work *Clinamen/Nodus*. In the opening of *Clinamen/Nodus* for instance, there are five groups containing a great variety of percussion instruments and each of these groups has a different selection of gestures labelled 'a', 'b', 'c', and 'd'. These are given in various orders in the different groups in the score, and after the first statement of all gestures, the players are free to repeat the gestures in any order until the conductor's cue after 25". After this point, specific

gestures are specified again in each group. The string section is divided into ten groups, and they follow a similar aleatoric process. Further on in this aleatoric section, the various groups are instructed to stop playing at different times and this creates a fade-out effect. This also dissipates the tension built up by the complexity of the aleatoric texture when the entire ensemble was playing. An example from the score of this aleatory is provided in Ex. 38 and Ex. 39. This same approach is found in the opening of *Rille*, where the percussion, harp and strings are instructed to play various gestures in a particular order and then left to freely cycle through these gestures in any order (Ex. 40). They are also instructed to stop playing at various different times to create this fade-out effect and dissipate tension (Ex. 41). The selection of gestures and grouping of instruments is not as complex as in *Clinamen/Nodus*, but this simplified version creates a similar overall effect. It is to be noted that the percussion section in *Clinamen/Nodus* is immense, with each of the five groups containing ten different types of percussion instruments, whereas in *Rille* there are only seven different types of percussion instruments across the four groups of percussion.

In the aleatory of *Clinamen/Nodus* there are techniques used in the percussion such as mallets swept quickly across the resonators of the vibraphone, timpani harmonic tremolos with pedal glissandi, rubber mallet swept around the tam-tam, mallet swept up and down a guiro, and more simple gestures such as the sounding of a gong. The full selection of percussion gestures is provided in Ex. 42. These gestures inspired similar approaches to creating gestures on instruments in *Rille*. For example, in percussion 1, drum sticks are swept along tubular bells, which was inspired by the sweeping of the mallets across the vibraphone resonators. Also in this group of percussion instruments crotales are hit together to resonate, which was inspired by the simpler gesture of the sounding of the gong. In percussion 2 a wire brush is swept in a circular motion around a large gong, inspired by the sweeping of a rubber mallet around the tam-tam. In the timpani fingertips are rolled along the skin of the timpani to create friction while the pedal of the timpani is moved up and down, which was inspired by the use of harmonic tremolo and pedal glissandi in *Clinamen/Nodus*. These gestures can all be seen in the score excerpt provided in Ex. 40. In devising the gestures used in *Rille*, I tried to take the means of creating the gestures utilised in *Clinamen Nodus* and applied this in similar ways but on different instruments to create different effects and sometimes the means used to create the gestures in *Clinamen Nodus* were combined with a completely new technique in *Rille*. In other cases the devised technique was completely unrelated to those utilised in *Clinamen/Nodus*.

Alle beginnen gemeinsam bei A

STREICHER: Alle Streicher beginnen mit dem Kästchen (a) des Mobile und zwar *sul pont.*
 Dannach Kombination der Kästchen frei. Jeder Streicher für sich eigenständig.
 Die Dauer der Tonhöhe im Kästchen (a) wird zu (b) hin immer länger,
 außerdem immer mehr und mehr in Richtung *sul tasto*.

SCHLAGWERKE: Beginnen mit dem angegebenen Kästchen in der Partitur. Dannach
 auch freie Kombination der Elemente des Mobile.

Die Gesamt-Dichte und Gesamt-Lautstärke wird vom
 Dirigenten angegeben.
 Höchste Dichte der Elemente bei A, dannach
 poco a poco weniger laut und weniger Einsätze der
 Elemente. Bei B niedrigste Dichte, aber es darf
 auf keinen Fall ein Loch entstehen.

VI I

(4) VI II

Vlc

Vc

Kb

S. S.

alle Skizzen des Mobile (1) + (2) Elemente
 (3) weglassen

Ex. 38. The aleatoric opening of Neuwirth's *Clinamen/Nodus*.

Handwritten musical score for "Die Schöne Müllerin" by Franz Schubert. The score is written on ten systems of five staves each. The notation includes various musical symbols such as notes, rests, and dynamic markings. The lyrics are written below the staves. The score is divided into sections labeled I, II, IV, and V. The title "Die Schöne Müllerin" is written at the top. The composer's name "Schubert" is written at the bottom right. The score is handwritten in ink on aged paper.

Ex. 39. The second page of the aleatoric opening of *Clinamen/Nodus* showing the gradual thinning of texture, creating a fade-out effect.

Rille

for the Auckland Philharmonia Orchestra and Chelsea Prastiti

Sarah Ballard
2016

ffff *decresc.*

c. 25"

ALL INSTRUMENTS begin at (a) and then cycle through all cells in any order until instruction changes. Each measure is 4.5"

Trumpet

- (a) *trumpet* (fresh)
- (b) *trumpet* (fresh)
- (c) *trumpet* (fresh)

Percussion 1

- (a) *trumpet* (fresh)
- (b) *trumpet* (fresh)
- (c) *trumpet* (fresh)

Percussion 2

- (a) *trumpet* (fresh)
- (b) *trumpet* (fresh)
- (c) *trumpet* (fresh)

Percussion 3

- (a) *trumpet* (fresh)
- (b) *trumpet* (fresh)
- (c) *trumpet* (fresh)

Harp

- (a) *trumpet* (fresh)
- (b) *trumpet* (fresh)
- (c) *trumpet* (fresh)

Violin I

- (a) *trumpet* (fresh)
- (b) *trumpet* (fresh)
- (c) *trumpet* (fresh)

Violin II

- (a) *trumpet* (fresh)
- (b) *trumpet* (fresh)
- (c) *trumpet* (fresh)

Viola

- (a) *trumpet* (fresh)
- (b) *trumpet* (fresh)
- (c) *trumpet* (fresh)

Violoncello

- (a) *trumpet* (fresh)
- (b) *trumpet* (fresh)
- (c) *trumpet* (fresh)

Double Bass

- (a) *trumpet* (fresh)
- (b) *trumpet* (fresh)
- (c) *trumpet* (fresh)

Ex. 40. Aleatory in the opening of *Rille*.

Ex. 41. Aleatory on second page of *Rille* showing a gradual thinning of texture to create a fade-out effect.

In the strings in *Clinamen/Nodus* there are very complex gestures such as triple-stopped col legno battuto moving from sul tasto to sul ponticello and back again, exaggerated bow pressure on the strings behind the bridge, harmonics played molto flautando whilst moving the palm of the hand freely across all the strings, and bowing on the bridge whilst increasing the bow pressure to create a whistling sound. The full selection of string techniques used in *Clinamen/Nodus* is provided in Ex. 42. In *Rille* the string section features techniques such as sul ponticello with an increase in pressure of the bow to create ‘crunch tones’ and returning again to normal pressure, quadruple-stopped strummed pizzicato, undulating bowing of harmonic pitches moving from sul tasto to sul ponticello, and tremolo between a harmonic and an open string, while moving from a normal bow position to sul ponticello (Ex. 40). The string techniques used in the aleatoric section in *Clinamen Nodus* are different to those used in *Rille*, however there is a relationship in that both sets of techniques include many instances that feature transitions between bowing positions.

The integration of aleatoricism within a few instruments into a notated texture, which is used in bb. 65–72 of *Rille* (Ex. 43) can also be found in *Vampyrotheone* in bb. 4–8 (Ex. 44). I was particularly inspired by the tapestry of colour and complexity of texture that this combination of aleatory and precise notation is able to create. The string writing in *Rille*, while influenced on a fundamental level by Saariaho in some sections with the use of harmonic trills and timbral shading, is also influenced by Iannotta’s *Àphones* through the utilisation of half-harmonics or aeolian tones (Ex. 45). This technique is mainly used in *Rille* throughout bb. 30–52 in the strings and woodwinds and an example is given in Ex. 46 in bb. 32–34.

Ex. 43. Aleatory within a texture in bb. 65–68 of *Rille*.

12

poco rall. - - - - -

System I:

- B-Kl: ppp , p , ppp
- VL: ppp , p , ppp
- Kb1: mf , f
- A.Fl.: ppp , p , ppp
- B-Pos: ppp , p , ppp
- Perc1: mf , ff , fff
- E-Git: f , mf
- Va: mf , f

System II:

- Vc1: mf , f
- B-Kl: ppp , p , ppp
- Kb2: mf , pp , f , p , mf
- Hr: ppp , mf
- Prn: ppp , mf

System III:

- B-Sax: ppp , p , ppp
- Vc2: mf , f
- Kl: ppp , p , ppp
- Kl.Tr: ppp , p , ppp
- Tb: ppp , p , ppp
- Perc2: mf , ff , fff

Legend:

- ⊙-place -> dem Ansatz / ⊙-style Sätze gleich laut wie vorher

Ex. 44. Aleatory within a composed texture in the horn in bb. 4-6 of Neuwirth's *Vampyrotheone*.

Ex. 45. Half-harmonics and aeolian tones in the flute, clarinet and strings in bb. 53–57 of *Aphones*.

9
3
4

The musical score is arranged in a system of staves. The instruments listed on the left are: Voice, Flute (Fl.), Alto Flute (A. Fl.), Clarinet (Cl.), Bassoon (Bsn.), Horn (Hr.), Trumpet 1 (C. Tpt. 1), Trumpet 2 (C. Tpt. 2), Trombone (Tbn.), Tuba (Tuba), Percussion 1 (Perc. 1), Percussion 2 (Perc. 2), Percussion 3 (Perc. 3), Harp (Hrp.), Violin I (Vln. I), Violin II (Vln. II), Viola (Vla.), Violoncello (Vcl. (c)), Violoncello (Vcl. (b)), and Double Bass (Db.).

Key musical features include:

- Flute (Fl.):** Measures 32-34 show a melodic line with dynamic markings *mp* and *p*. A slur is present over measures 32-33.
- Alto Flute (A. Fl.):** Measures 32-34 show a melodic line with dynamic markings *mf*, *mp*, *p*, and *pp*. A slur is present over measures 32-33. A performance instruction "(nicht bend!)" is written above measure 34.
- Violin I (Vln. I):** Measures 32-34 show a melodic line with dynamic markings *mp* and *mf*. A slur is present over measures 32-33.
- Violin II (Vln. II):** Measures 32-34 show a melodic line with dynamic markings *mp* and *mf*. A slur is present over measures 32-33.
- Viola (Vla.):** Measures 32-34 show a melodic line with dynamic markings *mp* and *mf*. A slur is present over measures 32-33.
- Violoncello (Vcl. (c)):** Measures 32-34 show a melodic line with dynamic markings *mf*, *mp*, and *pp*. A slur is present over measures 32-33. A performance instruction "harm. glen." is written above measure 34.
- Violoncello (Vcl. (b)):** Measures 32-34 show a melodic line with dynamic markings *mf*, *mp*, and *pp*. A slur is present over measures 32-33.

Ex. 46. Aeolian tones and half-harmonics in the flute, alto flute and strings in bb. 32–34 of *Rille*.

6.6 *Vyatiṣaṅga* for soprano saxophone, electric guitar, percussion and piano

Vyatiṣaṅga was written for ensemble Ensemble Nickel, made up of saxophone, electric guitar, percussion and piano. They are a group that explores the limits of the sonic potential of their instruments. This provided an opportunity to experiment timbrally. I prepared the electric guitar with blue-tak on the strings, which created a gong-like timbre, and utilised extended techniques such as teeth-on-reed, saxophone multiphonics, piano harmonics and jazz brushes on the piano strings. Due to this freedom I was able to focus on creating a timbral dialogue in the piece between instruments and this became a form-defining feature of the piece.

The form of the piece was conceived of as an electromagnetic field, full of sonic events and resonances that occur in fleeting, quasi-periodic bursts. Figure 13 shows the pre-compositional sketch of the piece, which was inspired by the concept of quantum entanglement whereby pairs or groups of particles function as part of a whole system even when separated by large distances. The instrumental lines collectively function like a web, taking turns at supporting and providing a path to whichever instrument contains the foregrounded gestural material. Pitch was often decided by the exploration of timbral qualities that possess an inherent resonance or that are selected in their most resonant forms on the instrument. For example, harmonic pizzicato was limited to the strings and nodes that produced the most resonant results and chords were selected on the guitar that resonated well even with the muting effect of the string preparation. Where there was more scope for the consideration of pitch in the case of creating the lines of the ‘web’, the initial choice of pitches was intuitive and thereafter was derived from the initial pitches and transformed.

There are times in the piece where I created ‘timbral streams’ between instruments. For example, at b. 9, fluttertonguing on the highest pitch possible in the soprano saxophone begins, at b.10 this is passed onto a high, iterative note on the piano and fingernails on the gong, then moving again into the conga, which is played with the fingertips at b. 12. (Ex. 47).

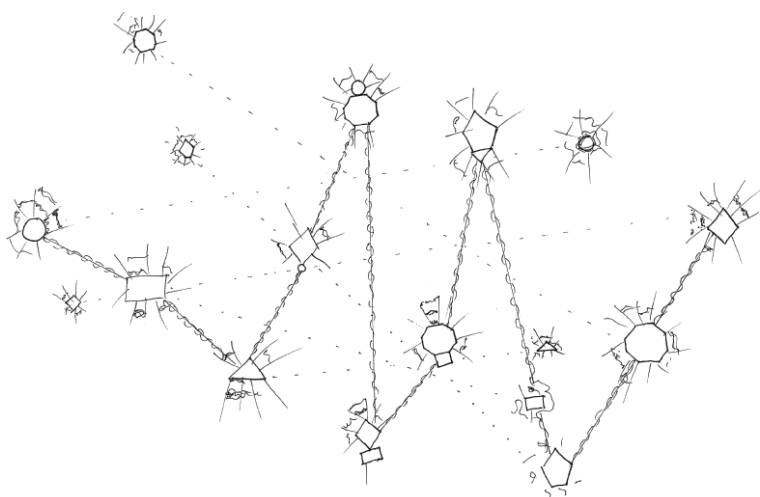


Fig. 13. Pre-compositional sketch of *Vyatiṣaṅga*.

Ex. 47. bb. 10–13 of *Vyatishanga* showing a stream of timbre from the high soprano saxophone fluttertongue to the high iterative note on the piano, to the fingernails on gong and finally to the fingertips on conga.

Vyatishanga was influenced by Chaya Czernowin's *Sahaf* (2008), which was also composed for Ensemble Nikel. I was particularly influenced by the free rhythms (Ex.48), iterative figures (Ex. 49), muted piano (Ex. 50) found in Czernowin's piece. These influences can all be observed in the opening bars of *Vyatishanga* (Ex. 51). In connection to this exegesis, Iannotta was taught by Czernowin and they share a common approach in their use of unorthodox instrumental techniques and instruments and the use of very gestural musical materials. In comparison with the other composers featured in this study, Czernowin is working with a very similar approach to Iannotta, with less of a focus on pitch and more of a focus on technique, timbre and gesture. I was particularly influenced by this work because of the explorative and inventive approach to making sounds, and the freeness of the material. Some interesting techniques in *Sahaf* include timpani being struck by chopsticks, a coin scraped along a piano string and the plastic coating of the end of a triangle being struck against the iron bars of the timpani. Although most of the unusual playing techniques in *Sahaf* were not adopted in *Vyatishanga*, it was the creative and exploratory approach to discovering interesting sounds that I wanted to apply in the process of composing this work. Some techniques that are featured in *Vyatishanga* as a result of this include the electric guitar being prepared with blu-tack on the strings near the bridge to create a gong-like timbre, a wire brush being swept along the piano strings, and scraping the gong with a triangle beater.

Ex. 48. Free rhythms in the guitar in bb. 6-7 Chaya Czernowin's *Sahaf*.

25

do NOT accentuate the beat

pp

normal

do NOT accentuate the beat

pp

(1)

Ex. 49. Iterative figures in bb. 25–26 of Czernowin's *Sahaf*.

23

♩ = 60

do NOT accentuate the beat

I mute

mp

(8b)

Ex. 50. Muted piano bb. 23–24 of Czernowin's *Sahaf*.

♩ = 72

Soprano Saxophone

Electric Guitar (prepared)

Percussion

small gong

timpani

single conga

Piano

pp

mp

ppp

ord.

6

6 XII

mf

pp

improvise on strings

muted str. (r.h.)

(on keys)

Ex. 51. The opening bars of *Vyatishaṅga*, showing the influences from Czernowin's *Sahaf* through the use of iterative figures, feather-beaming and muted piano.

Neuwirth was also an influence in the way that scallic pitch material ascends to dramatic tutti gestures. The electric guitar material was all based on my own explorations of the guitar and finding resonant, scintillating sounds. This search for these types of sounds was influenced by Iannotta's use of simple percussive gestures that are inherently resonant and have an extended decay.

A structural diagram has not been provided for this piece due to its through-composed nature, and the use of timbral transformations across single gestures, rather than progressively across the span of the piece. Small-scale transformations of timbre were used in this piece as a means of creating motion, as the incremental changes in timbre over repeated gestures create a sense of shape and progression from one colour to another. This echoing of similar timbres between instruments creates cohesion within the piece, and creates an impetus for the unfolding of the form of the piece. Timbres were selected intuitively and have no systematic placement within the piece. The result is a collage of colour, and it is this unpredictability and variety of timbre within the piece that generates much of the musical interest.

6.7 *Piṅgalā Iḍā*, for clarinet and free-bass accordion

Piṅgalā Iḍā was written at the request of Finnish accordionist Timo Kinnunen to perform with German clarinetist Nina Janssen-Deinzer in the 'Music in Botanical' concert series at the University of Oulu, Finland. This piece was conceptualised as a fusion of timbre between the clarinet and accordion. The material progresses through different timbral qualities, beginning briefly with the commonality between clarinet breath sounds and accordion air noise, serving as a subtle introduction into the blending harmonic relationship between the clarinet dyads and accordion harmonies, along with the emergence of quiet teeth-on-reed pitches in the clarinet. The piece ends with scallic material in the clarinet over sustained harmony in the accordion, ending in a high register on the clarinet juxtaposed with air noise in the accordion.

The concept of scintillation is one that was of interest from the start of my creative work and something that I was always searching for in listening to other works, as I found the inner worlds of sound that this effect can create sonically captivating. With this instrumentation I felt somewhat limited in terms of the ways I could create some aspect of scintillation. As a result this piece is more focused on melody and harmony than the previous works in the folio as I was primarily interested in the potential for the blending quality between the two instruments and the sonorous potential for the combination of rich accordion harmonies and clarinet dyads to provide this element of scintillation. I also wanted to exploit the extensive harmonic potential of the free-bass accordion, and the scintillation between complex harmonies and clarinet multiphonics to create bell-like inharmonic resonance effects. Bb. 44–

49 shows this blending relationship between the clarinet and the accordion with the clarinet dyads creating subtle swells over the top of a floating accordion harmony (Ex. 52). The D \sharp and F \flat microtones in the clarinet create beat frequencies with the D \sharp major chord and the consequent change in the clarinet to a G and B create a moment of lower tension before moving back again to the microtonal dyad. It is this ebb and flow of interaction between the richness and density of this combination that I was primarily concerned with.

I selected clarinet dyads specifically because I preferred the soft, breathy timbre in comparison to the harsh timbre of more complex multiphonics. The clarinet dyads were carefully chosen by listening to recordings from a number of sources, selecting those that were the most delicate and dynamically balanced with interesting timbral inflections and beat frequencies. I then improvised at a digital piano, set to the sound I found closest to the accordion, to find harmonies that interacted with these dyads to create elements of blending, scintillation and beat frequencies.

The musical score for Ex. 52 is presented in two systems. The top system is for the clarinet, showing a series of microtonal dyads (D \sharp and F \flat) with a tempo marking of 60 meditative. The bottom system is for the accordion, showing sustained chords. Dynamics range from *pp* to *f*.

Ex. 52. Interaction of clarinet dyads and accordion harmony in bb. 44–49 of *Piṅgalā Idā*.

A structural diagram outlining the progression of timbre has not been included for this piece because of the melodic and harmonic focus, which contrasts to the focus on the manipulation of timbre, which is more present in the earlier works of the portfolio. The timbral interest in this piece is in the harmonic interaction and blending between the clarinet dyads and sustained chords in the accordion, which often generate beat frequencies or a wavering of tones. The use of timbre in this work is comparable to Saariaho's use of timbre in many of her works, as an element that enhances melodic and harmonic materials at a surface level, rather than as a structural parameter that is integral to the form of the piece.

6.8 *Paramātmā*, for alto flute (dbl. piccolo), bansuri in F, percussion, harp, voice, harmonium, violin, viola and cello

This work sets texts on the subject of *Paramātmā* from the *Bhagavad Gītā*, each text revealing more details about the nature of *Paramātmā*, the Supersoul in the heart. The piece focuses upon timbral transformation on a registral level rather than through the use of extended

techniques. The opening features a very pure tone from the wine glass, representing the luminous self-effulgence of the Supersoul. This is sounded in unison with the violin, which plays *con sordini*, *sul tasto* and *molto flautando*. At the same time the bass drum creates an element of noise with jazz brushes swept around the head of the drum in circular motions (Ex. 53). My idea was that this unison violin pitch and brushes on the bass drum would somewhat shroud the purity of the wine glass pitch and that by the end of the piece the wine glass would play in unison for brief moments with the piccolo and bowed crotale to enhance the purity of the tone, otherwise playing the C# alone to allow the pure tone to come through. Through the gradual revelation of information about the Supersoul in the texts, at this point the music is at its most luminous, with high artificial harmonics in the strings, high frequencies produced by the playing of the wine glass, and the ringing of a small offering bell (Ex. 54) In this regard Lochhead's identification of the 'technê of radiance' in Saariaho's work⁵⁹ certainly applies to this piece in the way I was considering form through the use of moments of 'sonic luminance', 'flickering' and 'intensity', such as at this culminating point in the piece.

In considering the approach to harmony in this work, I was inspired by the following quote by the composer Arvo Pärt: "You can kill people with sound. And if you can kill, then maybe there is also the sound that is the opposite of killing. And the distance between these two points is very big. And you are free – you can choose. In art everything is possible, but everything is not necessary." Influenced by my bhakti practice, I chose to work with greater degrees of modal construction than I had in earlier works in the portfolio. Central to the practice of bhakti yoga is the performance of kirtana, a call and response musical meditation upon various Sanskrit mantras, and due to the communal element the melodies utilised are often modal and reasonably simple. Apart from these basic defining features however, there are no musical characteristic specifically adhered to in kirtana. I utilised the harmonium as a drone instrument, using mostly perfect 4ths and 5ths, particularly for their characteristic of consonance, as the main purpose of kirtana is the positive upliftment of all. This was also a practical measure, as the kirtaneer for whom it was originally written could not read music.

⁵⁹ Judy Lochhead, 'Technê of Radiance: Kaija Saariaho's *Lonh* (1996)', in *Reconceiving Structure in Contemporary Music: New Tools in Music Theory and Analysis* (New York: Routledge, 2015), pp. 105–22.

Wine Glass

Bass Drum

freely

pp

ppp

pp

ppp (sim.)

pp

ppp

pp

ppp (sim.)

molto flaut.
con sord.
S.T.
IV (non-harmonic)

pp

ppp

pp

ppp

Ex. 53. The obscuring of the wine glass pitch by brushes swept around the head of the bass drum and *molto flautando, con sordini* and *sul tasto* in the violin in bb. 1–4 of *Paramātmā*.

147

Picc.

Ban.

Mridanga

Karatalas

Glasses

Crot.

Hp.

Voice

Harm.

Vln.

Vla.

Vc.

rit.

mp

mp

mf

mf

mp

Offering Bell
blend as much as possible

f

bowed

mf

vis - thi - tam

v.n.

mp

mf

mp

mf

f(poss.)

mf

f(poss.)

senza vib.

mp

mf

mp

mf

f(poss.)

poco S.P.

v.n.

senza vib.

mp

mf

mp

mf

f

mf

mp

f

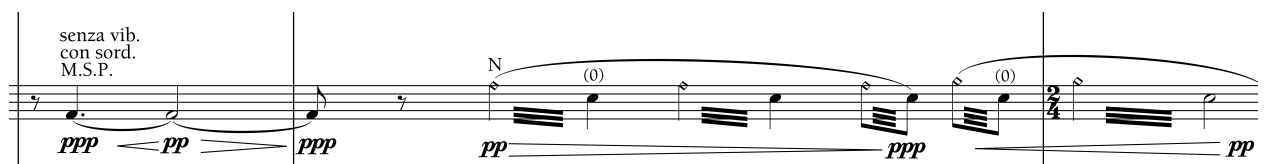
mf

mp

Ex. 54. Sonic luminance in *Paramātmā* at bb. 47–51 created through the use of high artificial harmonics in the strings, high frequencies produced by the playing of the wine glass, and the ringing of a small offering bell.

This piece was inspired again by wanting to work with particular performers after hearing them perform. When I heard Swami Madhuram Puri play the bansuri, a traditional Indian bamboo flute, I was captivated by the pure, warm tone of the instrument and I knew I had to involve this performer in a project. The bansuri part was originally intended to be composed, but I decided that the bansuri player would be more comfortable and in their element with the opportunity to improvise, and therefore this piece adds to the element of improvisation within the folio. *Paramātmā* was composed in full before meeting with Swami Madhuram Puri to discuss the improvisation. In the score I marked where the improvisations were to begin and end and discussed with Swami Madhuram Puri the role of the improvisation in each instance, in terms of how prominent it was to be within the texture and how it would relate to the other performers on each occasion. Swami Madhuram Puri selected a scale that matched the pitches used in the piece and improvised according to traditional bansuri methods of playing and his personal spiritual practice.

Paramātmā was predominantly influenced by contemporary kirtana: call and response music with Sanskrit mantras. I was particularly influenced by the melismatic style of singing by kirtana artists and the smooth, pitch-bending style of playing on the bansuri. The influence of this playing can be found in the flute and string writing where numerous pitch bends and use of glissandi. Saariaho was also an influence on the string writing, which can be seen in the use of timbral trills (Ex. 55) and variations and transformations in bow position (Ex. 56).



Ex. 55 Timbral trills in the viola in bb. 13–15 of *Paramātmā*.

Ex. 56. Transformations between bow positions in bb. 104 – 106 of *Paramātmā*.

I was again interested in this piece in the blending of timbre. I selected the harmonium for its blending quality and other instruments that traditionally invoke associations of light and purity, such as flutes, gongs, strings, mridanga, harp and offering bell. There are a number of instances where the instruments are directed to blend in with the texture as much as possible. This focus on blending is an attempt to create a sense of purity and tranquility in the music. This instruction to “blend as much as possible” indicates to the performers to be very sensitive and responsive to the other performers in order to attain a suitable volume, tone and tuning to achieve the effect of blending, which implies that all these elements are as to be as closely matched as possible. This blending can be achieved by a regulation in air or bow pressure, and also embouchure or in the case of string instruments the finger position, or in the case of the harmonium, the pressure and speed at which the bellows are compressed. Instances of these performance instructions occur in the strings at b. 48, the alto flute at b. 49, the harmonium at b. 103 and the offering bell at b. 149.

In the discussion of this work I have found it more appropriate to discuss the use of timbre as a means of generating a particular atmosphere instead of providing a schematic diagram, as the piece draws heavily on the tradition of kirtana, which is concerned with expressing emotion through melody and harmony. Within this piece timbre functions as a means of adding colour and nuance to the melodic and harmonic material, enhancing the traditional musical influences. This approach is also influenced by the way Saariaho often utilises timbre in her works as a means to enhance the melodic and harmonic materials, as also outlined in the analysis of *Piṅgalā Idā*. The change in the use of timbre across the portfolio reflects a transformation in approaches to timbre in accordance with my musical experiences throughout the course of my studies.

6.9 *Acintya*, for string quartet

This piece makes use of timbre as a large-scale formal parameter, perhaps most acutely out of any of the works in the folio. The opening utilises a mixture of techniques such as half and full *col legno*, *sul tasto*, *sul ponticello* and harmonic trills. There are moments amongst the timbrally shaded passages that a normal playing style emerges. The piece moves into the second half with the interruption of a pizzicato gesture and in this section bowing on the bridge, behind the bridge and on the thread behind the bridge are introduced. Scallic material played with very light finger pressure then begins to unfold and again there are glimpses of normal playing that emerge from the texture until this normal playing leads up to a climactic point. The close of the piece utilises floating natural harmonics, which gradually transform into bowing on the thread behind the bridge, then behind the bridge and finally on the bridge

until the entire quartet is creating gradations of white noise through this technique. The final gesture involves moving from the bridge to behind the bridge with a final utterance of pitch.

The pizzicato gestures were conceived as ‘sound globes’ and were inspired by reading about cymatics, (the study of sound and its visual representations) and longitudinal waves. I imagined sound as taking on a spherical form and wondered how one might be able to try to recreate a three-dimensional image in sound, despite the inherent time-bound linearity of listening. It occurred to me that Iannotta had already made a highly effective portrayal of such a sound-shape in *Àphones* with the primary meta sound object she uses in b. 1, as discussed in the analysis with its attack-decay envelope. I felt this was effective in conveying a sense of three-dimensional space through the resonant attack with the simultaneous glissando in the harp, which I perceived to be like an emulation of the radiation of longitudinal waves outwards from a source point. The scintillation from the prepared harmonicas also creates a spatial effect and their descrescendo to *niente* gives the sense again of this radiation of waves outwards from a point, of high intensity from this starting point and becoming weaker as it diffuses outwards and away from this point. I was inspired to recreate this type of sound-shape in the context of the string quartet using Iannotta’s approach. I directed the performer to rapidly improvise within a specified range with a light bow and harmonic finger pressure in violin 1 to create a scintillating effect, followed by a harmonic moving from normal bow position to *sul ponticello*. In violin 2 I utilised bowing on the bridge, moving to bowing behind the bridge. The violin 1 and 2 together made up the written-out resonance. The viola plays a pizzicato glissando and the cello utilises Bartók pizzicato (ex. 57).

8

♩ = 72

91

ff

ppp

ppp

f

pp

ppp

ff

ppp

pizz.

arco senza vib.

S.T. light bow pressure

arco III

3

3

3

* Improve rapidly within this range with a very light bow and harmonic pressure, including non-harmonic nodes. Elaborate trill and scalic patterns to create a scintillating effect

Ex. 57 Attack-decay gesture in bb. 91–93 of *Acintya*.

Acintya contains clear influences from all three composers studied. The harmonic trills, which are a feature of the first section of the piece are inspired by Saariaho's use of this technique, which she uses abundantly in her works, usually as a subtle enhancement to a texture. I decided to bring these trills to the foreground by having all strings playing different harmonic trills simultaneously to create a wash of coruscating pitches. The final coda section of the piece, which is made up of natural harmonics and bowing on and behind the bridge was directly influenced by a passage in Neuwirth's *Clinamen/Nodus*, in which she uses natural harmonics in different rhythmic cycles to create an ethereal, floating texture. I decided to end the piece with a dissolution of this idea by gradually having the quartet transition to playing a mixture of on the bridge and different positions behind the bridge and then finally the entire quartet plays in different positions on the bridge so that the beauty of the subtle timbral nuances of white noise can be heard. The half-harmonic, $\frac{1}{2}$ *legno* and *col legno tratto* string writing was influenced by Iannotta's *Àphones* and particularly the idea of a stream of sound becoming increasingly delicate and inharmonic. A particularly influential passage is at bb. 93–97 of *Àphones* where half-harmonic playing moves into *col legno tratto* playing along with transformations in bow position. The phrase ends at its most subtle point after transitioning to $\frac{1}{2}$ *legno* playing (Ex. 58). A similar effect was desired in *Acintya* at the transition from bb. 163–165 to the final section of the piece comprising natural harmonics (Ex. 59). This example shows the transition of normal playing to the integration of natural harmonics with *col legno tratto* playing, moving at the end of the phrase to a *sul ponticello* bowing position.

Although the treatment of timbre as a form-defining feature is more prominent in this piece than in many of the other pieces within this portfolio, I have chosen to provide examples from the score outlining this manipulation of timbre, due to the intuitive and non-systematic nature of the appearance of these techniques and transformations.

The image shows a musical score for five string instruments: Violon I, Violon II, Alto, Violoncelle, and Contrebasse. The score covers measures 93 to 97. The Violon I and Violon II parts are in treble clef, while the Alto, Violoncelle, and Contrebasse parts are in bass clef. The score includes various musical notations such as notes, rests, and dynamic markings (pp, mp, p). The Alto part is specifically marked with '1/2 legno' and 'col legno tratto' at the end of the phrase. The Violoncelle and Contrebasse parts show a transition from normal playing to a sul ponticello position, indicated by a wavy line and a 'p' marking.

Ex. 58. The transition from half-harmonic, to *col legno tratto*, to $\frac{1}{2}$ *legno* playing in bb. 93–97 of Iannotta's *Àphones*.

163 15

The musical score consists of three staves. The top staff is for Violin, the middle for Viola, and the bottom for Cello/Double Bass. The key signature has one sharp (F#). The score shows a transition from normal playing to *col legno tratto* (c.l.t.) and *sul ponticello* (S.P.) bowing. Dynamics include *p*, *mp*, *pp*, *mf*, and *pp*. Fingerings are indicated by numbers 3, 5, and 6. The score is marked with measure numbers 163 and 15.

Ex. 59. The transition at bb. 163–165 from normal playing, to *col legno tratto* to a *sul ponticello* bowing position before moving into a texture of natural harmonics and bowing on and behind the bridge in *Acintya*.

CHAPTER SEVEN: CONCLUSION

Through the analysis of the works of Neuwirth, Iannotta and Saariaho, it is clear that these composers are approaching timbre in notably different ways. On a small-scale, timbral transformations within individual sound units are utilised in all three works to create direction and fluctuations of tension and release. In *Oi Kuu*, Saariaho uses timbre to expressively enhance melodic trajectories. She also uses timbre to sectionalise the large-scale form of *Oi Kuu*, with clear groupings of timbral qualities organised across the work. It is through a relatively limited palette of extended techniques that Saariaho achieves these timbral nuances and structural variations. This comparatively more subtle exploration of timbre leaves the sonic identities of the instruments intact, and, rather than utilise combinations of timbres to create an effect of defamiliarisation, Saariaho makes use of the timbral commonalities between extended techniques on different instruments which are exchanged linearly, creating a sense of a singular trajectory, as opposed to a timbral or gestural dialogue.

In Neuwirth's *Vampyrotheone*, this use of timbre to create tension and release through the timbral transformation of pitch material is also present. Neuwirth however, exploits more noise-based timbres as a means of emphasising gesture, and a dialogue is created between these noise-based timbres and more subtle note-based timbral fluctuations that occur in static textures. An additional dimension of timbral exploration is found in *Vampyrotheone* through Neuwirth's inclusion of novel and unorthodox instruments into the orchestra, expanding the range of timbres that may not be recognisable to the listener. In contrast to this, Saariaho's works are for standard forces. As with Saariaho, Neuwirth selects timbres to create sectional juxtaposition. The range of extended techniques that Neuwirth calls upon are certainly more diverse than Saariaho, and there is greater ambiguity about the sound sources, particularly where there is a amalgamation of multiple timbral units to create a mass sound object.

Iannotta's *Aphones* takes the most radical approach to timbre of the three works. This work utilises timbral aggregates to form a gradually unfolding transformation of timbre across the duration of the entire work, and gives rise to new and related timbres in the final sections of the work. Not only is there a transformation of timbre, there is also a complete evolution of timbre in this work. It is also notable how Iannotta focuses on specific timbres as a project for sets of works, and in this way these timbral identities ideas evolve even further beyond the scope of a single work. For example, the timbre and polyphony of Freiburg's carillon inspired Iannotta to compose a trilogy of works exploring the timbre of these bells in *Glockendieserei* for cello and electronics, *Clangs* for cello and ensemble, and *D'après* for ensemble. Of the three composers studied, Iannotta has the greatest tendency towards higher frequencies and the boundaries of liminality. As with Neuwirth, Iannotta is concerned with the

defamiliarisation of instruments, and further expands on this through the use of instrumental preparations and a more radical approach to extended techniques. The potential of string instruments in particular is developed through techniques such as half *col legno* bowing, half harmonic finger pressure, and bowing on and behind the bridge. Iannotta's most recent instrumental work is so refined in its organisation and execution of extended technique that it is difficult to audibly reconcile the sounds with their acoustic identities, reaching a new potential in instrumental sound. If this is indicative of the development of instrumental technique and timbre then it can be safely assumed that there is yet more potential to be discovered.

These three composers outline a generational trajectory in the approach to timbre, one of increasing inventiveness and resourcefulness, searching beyond the standards of traditional instrumentation to enhance and modify the scope of timbres available. There is also a development in the way that timbre is used to delineate structure and the extent to which it is foregrounded as a parameter, from a tool used to enhance melodic and harmonic structures and to create sectional contrasts just as different melodic themes define different sections, to creating units of gestural timbral hybrids, giving more musical meaning and significance to the timbres themselves as a form-defining parameter.

The creative impacts of these works on my own compositions are varied and are not limited to a particular composer being of influence upon any piece exclusively. My sonic preferences were particularly influenced in terms of both extended techniques and instrumentation. Neuwirth's influence is found in the choice of instrumentation such as the prepared jazz guitar, electric guitar and found objects such as the cooling rack in *street : noise : graffiti*. Her influence can also be seen through the use of oscillatory material, the treatment of the ensemble as a canvas for the building-up of textures through micro-gestures, metallic timbres, and techniques that create a high intensity such as *molto vibrato* and teeth-on-reed playing. Scallic gestural units, which lead into attack-decay gestures, also take their influence from Neuwirth's writing. Saariaho's influence is fundamental to the general approach taken to the shaping of musical material throughout the portfolio, particularly in the string writing, which consistently utilises transformations of bow position and vibrato, as well as various types of timbral trills. A tendency towards writing for flutes, strings and resonant percussion are also present in my works as a result of the compositional potential Saariaho has been able to demonstrate with these instruments. The music of Iannotta has enabled me to consider a more inventive approach to sound combinations and the extent to which they may translated timbrally within the ensemble and hybridised, creating a means of timbral expression through an interplay of timbral gestural units. Her approach to form has also impacted upon the works in the folio, particularly the first and final works in which timbre is utilised as a large-scale formal parameter. Extended techniques such as *col legno tratto* along with more recently

developed extended techniques such as such as *½ col legno*, half-aeolian tones and half-harmonics have made their way into some of the folio works. Iannotta's tendency towards high frequencies and registers has also reinforced my inclination towards these elements, particularly through the use of string harmonics.

This study has shown that timbre does play an incredibly important formal role, and it does so in the following ways. Throughout all of the works under analysis and those composed for the folio, timbre has been a defining element in establishing various sections within the form, with varying techniques being used to contrast between sections and in this way providing definition between sections. It has also been demonstrated in these works that timbre can be an important device in facilitating the unfolding of musical form through finding timbral commonalities between instruments and having these translate from one instrument to another, just as a melody may undergo development and passed through the instruments within the ensemble in order to generate form. While the earlier works in the folio feature the use of timbre as a catalyst to generate and develop further materials and provide thematic definition to the overall form, later works predominantly utilise timbre as a means of enhancing melodic and harmonic structural parameters. The use of timbre in these instances, while less predominant as a form-defining feature, is still utilised to create contrast between sections within the works, albeit in a subtle manner as compared to the earlier works that focused on generating materials out of specific timbres and techniques in and of themselves. To conclude, the analysis of timbre within the selected works of these three has led me to apply extended techniques and timbrally directed approaches to form in an integrated, explorative and systematic manner in a variety of ensemble contexts.

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