Spectralism Today:

A survey of the consequences for contemporary composition of the French Spectral School of the 1970s and 1980s

PhD Thesis

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Summary

The origins of the work of Gérard Grisey, Tristan Murail, Hugues Dufourt and Michael Levinas – collectively, the ‘French Spectral School’ – L’École Spectrale – have been explored in some depth by a number of authors, notably Julian Anderson, whose ‘Provisional History of Spectral Music’ describes many of the inspirations on which they drew in elaborating their approach to composition. Furthermore there are a number of French-language publications by the composers themselves, as well as by academic researchers, which examine in detail the methods and processes which animate their work, and the theoretical and philosophical bases of their music.

Rather less thoroughly explored to date, at least in English, is the music of the subsequent generations. There are a number of prominent composers who have either themselves worked in what may be considered a ‘spectral’ style (many of whom studied with one or more of the spectralists named above), or whose music bears the imprimatur of spectral thought, but whose work has moved beyond ‘pure’ spectralism, instead employing the techniques derived by their predecessors as elements in a wider musical context.

The present thesis therefore aims to examine a selection of mainly early twenty-first century works in order to reveal the extent of the spectral influence on their authors, and therefore to make certain assertions with regard to the significance of the legacy of L’École Spectrale for composition today.

Notes:

All translations are by the present author unless otherwise stated. Where a translation has been made the original will be given in footnotes, surrounded by square brackets. All other quoted material is in the published language.

Where it is necessary to refer to a specific pitch, Scientific Pitch Notation (SPN) has been used throughout. Thus, ‘middle’ C is labelled ‘C₄’, the C an octave lower, ‘C₃’, and the C an octave higher, ‘C₅’, and so forth.
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It would have been a tall order to undertake this research without the commitment and curiosity of the musicians for whom I have been fortunate to write. The Ligeti Quartet, the Alton College Sinfonietta and the Surrey/Hampshire Orchestral Collective (amongst others) have performed my music with great enthusiasm, offering thereby another form of encouragement for my work.

There are, additionally, a number of musicians whose influence has been profound, whether or not I have been able to work with them directly. A short list must include, as inspirations, Olivier Messiaen, Pierre Boulez and Gérard Grisey, and as friends and colleagues, the late Martin Read, Pande Shahov, Alex Forsyth, Laurence Hall and James Casselton.

Most of all, I must offer my love and thanks to my wife Alix, who has, by turns, been supportive, understanding and provocative, inspiring me to continue and enabling me to engage with my subject.
Introduction:

*L’Ecole Spectrale*
‘Spectral music’ is a term employed to describe certain aspects of a range of contemporary compositions influenced by the works of the so-called ‘French Spectral School’ (L’Ecole spectrale) of composition, which is generally considered to have been initiated in Paris in the mid-1970s, principally by Gérard Grisey, Tristan Murail, Hugues Dufourt and Michael Levinas, all of whom were associated with the ensemble L’Itinéraire at this time. Whilst each contributed to this new approach to composition, the present study, in many respects, will find it useful to refer principally to Murail and, especially, Gérard Grisey, as the two members of this group who were most responsible for the techniques and processes which may be considered as inherently spectral. The approaches of Dufourt and Levinas quickly developed away from ‘pure’ spectralism, the former employing a combinatorial, post-serial language alongside spectral principles and the latter preferring to investigate the possibilities of composition with timbre and with microtonality in a manner rather different from the work of Murail and Grisey. Despite its basis in the use of sound as material, and as a consequence, a certain common approach with the work of the latter two composers, Dufourt’s and Levinas’s music therefore falls outside the scope of spectral music as it seems, often, to be understood. This said, the use of the term ‘spectral’ in today’s media, and indeed by otherwise informed musicians, seems, fully forty years since the composition of the first mature works of Grisey and Murail, to occur in a rather vague or imprecise manner, probably due to the fact that it appears to be difficult to define with much accuracy to which it refers. It is therefore important to revisit and to attempt to arrive at a provisional understanding of the term and its corollaries, so that a firm basis may be established for further discussion.

The term musique spectrale itself was coined in a 1979 article of that name by Hugues Dufourt (Dufourt, 2014: 335-340), and, as Anderson (2000) and Rose (1996) describe, generally refers to works composed using the acoustical properties of a natural or artificial sound as a basis for musical composition. Whilst the term ‘spectral’ is suggestive (in the most literal sense) of the use of harmonic spectra as material for the construction of a work, the compositions of Grisey, Murail, Levinas and Dufourt himself also exhibit a number of other techniques and approaches to

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1 For a more detailed overview of the work of these composers, as well as a description of some of their works, see Julian Anderson’s A Provisional History of Spectral Music (Anderson, 2000) and François Rose’s Introduction to the Pitch Organization of French Spectral Music (Rose, 1996).

2 Dufourt, in his article Musique Spectrale (which coined the term itself) said: ‘I never wanted... to give up the freedom of articulation that I feel is the best aspect of the serial heritage. I therefore elaborated a grammar of pitches independent of timbre but capable of congruence with it.’ (Dufourt, 2014: 386). (“Je n’ai jamais voulu, pour ma part, renoncer à une liberté d’articulation que j’estime être le meilleur de l’héritage sériel. J’ai donc élaboré une grammaire de hauteurs indépendante de celle du timbre, mais capable au besoin de lui être congruente.”).
composition which make a complete definition of the term’s meaning a much more complex proposition.

As Grisey himself stated, ‘Spectralism is not a system... it’s an attitude. We consider sounds, not as dead objects that you can easily and arbitrarily permutate in all directions, but as though they were living objects which are born, live and die.’ (Grisey, 2008: 265-266). Murail has also, on several occasions, been keen to make his feelings clear on the matter, declaring that ‘Neither Gérard Grisey nor myself are responsible for that designation, which always struck us as insufficient.’ (Murail, 2005a: 149). More recently his comments have become even more provocative: ‘[…] there is not [sic] such thing as spectral music per se. There are spectral methods or spectral techniques and then you can do whatever you want with them.’ (Murail, 2010: 108), and ‘[The term spectral...] is not even true any more. [sic]’ Nonetheless, despite the evident unease of these (and other) composers with the term, there exist a number of works which seem collectively to have been gathered under the epithet musique spectrale due to certain commonalities of technique, language and philosophy.

The apparent origins of spectral composition in the music of, amongst others, Varèse, Scelsi, Messiaen and Dutilleux have been explored by a number of authors, including, notably, Julian Anderson (2000 and 2010). Conversely, one area which remains largely unexplored is the in-depth study of post-spectral approaches to composition – that is to say, the manner in which the subsequent generation has been influenced by the discoveries of the French spectral school of the 1970s and 1980s.

This is not to ignore the existence of the parallel researches of, for example, the American composer James Tenney, or the Romanian Horațiu Rădulescu, who, when asked by Bob Gilmore about his development of ‘the spectral technique’ from the late 1960s, replied, ‘Yes, yes, from ’69. I think I was the first one.’ (Gilmore, 2003: 110). Furthermore, according to Guy Livingston, who interviewed him in 2007, Rădulescu ‘refers to the music spectrale crowd in Paris with scorn (“they’re the Mafiosi.”)’ (Livingston, 2007). Both Tenney and Rădulescu certainly display an interest in composition with overtones and could thus be considered, with a reasonable degree of accuracy, as spectral composers. Nevertheless, the works chosen for close analysis in Part 2 of the present study reflect

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3 [“Le spectralisme n’est pas un système... c’est une attitude. Nous considérons les sons non comme des objets morts que l’on peut aisément et arbitrairement permuter dans toutes les directions, mais comme des objets vivants qui naissent, vivent et meurent.”].
4 Personal communication with the author, 31.10.2013. Despite the slight misappropriation of the word ‘true’ (perhaps ‘valid’ might have been more suitable?), Murail’s meaning is clear.
5 These other composers whose importance lies in their influence on Grisey and/or Murail include Iannis Xenakis, György Ligeti, Karlheinz Stockhausen and Per Nørgård.
the influence, not of Tenney or Radulescu, but of the composers who, in the 1970s, were associated with L’Itinéraire: the French Spectral School, or L’École Spectrale. Therefore, as described above, it will be primarily upon the work of Gérard Grisey and Tristan Murail that Part 1 will be based.

In the present thesis it is the influence on today’s composers of L’École Spectrale which is of chief interest. Part 1 will therefore begin by offering a brief summary of the key principles and techniques of spectral composition as found in the works of Murail and Grisey, before proceeding to examine in detail three selected pieces composed in the first years of the twenty-first century. In this manner certain conclusions will be reached with regard to the degree that a spectral influence acts upon the work of the three composers concerned, each of whom may be considered to demonstrate what may be loosely referred to as a ‘post-spectral’ aesthetic. Finally these works will be discussed collectively by topic, along with other, less overtly spectrally-influenced, music from the same timeframe which nevertheless owes a minor debt to the spectral school, in order to demonstrate the presence, and the extent of the influence of, spectralism in a selection of representative works of today. Additionally, so far as I am aware, at the time of writing no in-depth studies of the work of Dalbavie, Saariaho or Mantovani have been published in English (indeed, little exists in any language), and this thesis therefore forms the first introduction to their work intended for an Anglophone readership.

For my own work as a composer, furthermore, it has proven important to situate what might be thought of as ‘pure’ spectral music – which is to say, the work of Grisey and Murail – within a wider historical and stylistic context. Much of the music that I have composed in recent years bears the imprimatur of spectral techniques, and in order that I might engage in reflective practice it has been vital for me to come to an understanding of their influence on my own style.

It is important to remember that in parallel with the work of the spectral school, much research was being undertaken in the field of electronic and electroacoustic music and that a good deal of cross-fertilisation took place between these two domains. Arguably, without the computerised analysis of live sounds, acoustic spectral composition would not exist and this interchange is therefore unsurprising. The three case studies in Part 2, however, will analyse works whose spectral influence comes primarily from the acoustic works of Grisey and Murail and although the composers concerned have all, to some degree, worked with electronics, this aspect of contemporary composition lies outside the scope of the present study, which aims to offer an appreciation of the
as opposed to the electronic or electroacoustic – approach to composition based upon the discoveries of the ‘spectralists’ of the 1970s and 1980s.
Part 1:

A Brief Guide to Spectralism
What follows is a brief outline of the chief principles and techniques of what has come to be called spectral composition, as practised by Gérard Grisey and Tristan Murail, who were the two composers whose work may be considered most representative of this approach. There exist a small number of published articles which discuss spectral music,\(^6\) as well as several books in French which enter into much greater detail than is intended here,\(^7\) but the following guide should prove useful for readers who are as yet unfamiliar with the work of the spectralists.

Each heading is employed for convenience but it will, it is hoped, become clear that the approach of these composers was rather to use each technique as a component in the global context of the work in question, so that there are frequently points of relation, and often intimate connections, between categories.

**Harmonicity**

In the context of Western art music, it has been the concept of the chord which has represented the ‘agreement’ - literally, the accord - of a number of discrete pitches to form a vertical (in notational terms) aggregate with a given character. For the spectralists, however, there was a radical rethinking of this aspect of music, inspired by the naturally-occurring phenomenon of the harmonic spectrum.

All naturally-occurring sounds comprise a fundamental frequency and a series of overtones. This proposition may be verified by pressing the sustain pedal of a piano (so that all strings have the potential to vibrate) and striking any low note. Careful listening will allow a series of overtones to be heard, with the loudness diminishing as the pitch – which is to say the frequency – increases.\(^8\)

More accurately, a harmonic spectrum may be described as one in which the frequencies of all overtones, or partials, are exact multiples of the frequency of the fundamental. Thus a fundamental of A with frequency 55 Hertz\(^9\) will produce overtones of 55 x 2 = 110 Hz for the second partial, 55 x 3 = 165 Hz for the third, 55 x 4 = 220 Hz for the fourth etc., as shown in Ex.1.\(^10\)

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\(^8\) This phenomenon was described in general terms by Messiaen (with whom both Grisey and Murail studied at the Conservatoire de Paris) in Volume 7 of his Traité de Rythme, de Couleur et d’Ornithologie (Messiaen, 2002: 102). It is also striking that much of Messiaen’s harmonic language relies on phenomena of resonance (likewise described ibid.), and even directly upon the harmonic series itself.
\(^9\) 55 Hertz = 55 cycles per second.
\(^10\) The microtonal notations employed here are explained in the appendix.
As early as 1973, notably in Derives (Grisey, 1973-74), Grisey was beginning to compose using approximations of harmonic spectra to generate harmony, as shown by Baillet (2000). However, his first mature composition which demonstrates elegantly this approach is Partiels (Grisey, 1976a), which forms the third part of Grisey’s cycle Les Espaces acoustiques. John Croft, in underlining the importance of the work has suggested that:

‘There is a sense in which Les espaces acoustiques is the one and only spectral work; anything composed since this cycle might, of course, be informed by it in many ways, but one cannot go beyond it.’ (Croft, 2010: 195).

This work opens with a chord which may be described as an orchestration of the odd-numbered partials of a harmonic spectrum with a fundamental of E whose frequency is 41.2 Hertz (Ex.2).\(^{11}\)

\[^{11}\text{Grisey preferred, at this point in his career, to notate the 7}^{th}\text{ partial with a downwards-facing arrow as shown. This therefore represents a downward sixth-tone inflection in this example.}\]

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\[55Hz\, 110Hz\, 165Hz\, 220Hz\, 275Hz\, 330Hz\, 385Hz\, 440Hz\, 505Hz\, 660Hz\, 715Hz\, 770Hz\]

Ex.1 Harmonic series (approximated to nearest quarter tone) for fundamental A\(^\dagger\) (55Hz) with frequencies and partial numbers

*7th partial sounds approximately \(\frac{1}{6}\) tone lower than an equal-tempered G natural

Ex.2 Gérard Grisey: Partiels: first chord (bars 2-4)

It will be noticed that the eleventh (A \(\frac{3}{4}\) sharp) and thirteenth (C \(\frac{3}{4}\) sharp) partials are approximated to the nearest quarter-tone, the seventh (D natural) to the nearest sixth-tone. Whilst there exist several different approaches to so-called microtonality, in the case of the spectralists, it was employed in order to be able to express with greater exactitude the frequencies of the natural
overtone series. The eleventh partial of a fundamental E natural (41.2 Hz) has a frequency of 453.2 Hz (41.2 x 11) meaning that had Grisey decided to approximate to the nearest semitone he would have had to select A natural (440 Hz) or A sharp (466.16 Hz). By employing quarter-tones, however, he was able to notate the A quarter-tone sharp shown in Ex.2, which has a frequency of 452.89 Hz, and therefore approaches the frequency of the natural overtone more closely, resulting in a harmonic object more closely approximating the natural overtone series in notation and in performance.

This use of microtonal inflection by the spectralists represented a new approach to composition, since composers such as Varèse and Messiaen, who had begun to consider ‘natural resonance’ as a resource, had remained firmly within a semitonal harmonic world. Through the employment of quarter tones it proved possible to create a new kind of instrumental harmony that sounded, after the predominance of the serial and post-serial aesthetic of the 1950s and much of the 1960s, as a kind of renewal of the possibility of consonant music. Works such as Partiels are, as Marc-André Dalbavie describes, ‘neither tonal nor atonal’\textsuperscript{12} (Dalbavie, 2011), but nevertheless feature a harmonic paradigm which offers the composer the opportunity to make subtle modifications to a chord to achieve a wider range of effects than had been possible beforehand, including a greater potential degree of consonance.

\textbf{Inharmonicity}

An inharmonic spectrum is one in which the frequency of at least one element is not an exact multiple of that of the fundamental, meaning that the timbral effect is therefore of a sensation of dissonance, as opposed to the consonance of a harmonic spectrum. Nevertheless, Grisey, in his 1982 article \textit{La Musique: Le devenir des sons}\textsuperscript{13}, was careful to note that “The terms dissonance and consonance, applied to an interval, accumulate so much cultural ambiguity that psycho-acousticians have substituted other terms: thus, the degree of roughness.”\textsuperscript{14} (Grisey, 2008, 45-46). Later, in his article \textit{Tempus ex Machina}, which was begun in 1980 and revised in 1985, he described a ‘continuum moving from the simple to the complex which we find in the classification of intervals by their degree

\begin{footnotes}
\item[12] [...]\textit{ni tonale, ni atonale.}.
\item[13] In English this title would probably best be translated as ‘Music: the ‘becoming’ of sounds’. Whilst this does not read well, Grisey’s intention to treat music as an evolved form of raw sonic material is nevertheless conveyed.
\item[14] \textquoteleft Les termes de dissonance et de consonance appliqués à un intervalle recouvrent tant d’ambiguïté culturelle que les psycho-acousticiens leur ont substitué d’autres termes : ainsi, le degré de rugosité.’\textquoteright.
\end{footnotes}
of roughness and timbres by their degree of inharmonicity.\(^{15}\) \(^{16}\) (Grisey 2008: 63). It seems clear that Grisey’s intention was to escape the historically-charged opposition of consonance and dissonance in order to be able to compose upon a continuum, which he seems to have felt would offer much greater flexibility of method. Nevertheless, in La Musique: Le devenir des sons he went on to clarify his position: ‘Here is something that in no way changes our efforts. There remains, in fact, a polarity which will move from smooth intervals (consonance) to rough intervals (dissonance).’\(^{17}\) (Grisey, 2008: 46). Rather than rejecting totally a traditional approach to the matter, Grisey appears to have been trying to establish a new approach to an existing cultural phenomenon.

It could be argued, as Dalbavie has suggested, that, given that composers since the birth of polyphony a millennium ago have employed passing tones, suspensions and more or less dissonant harmony, almost all music is essentially inharmonic to some degree. Whilst literally true, there are certain types of, and approaches to, inharmonicity which were significant for the spectralists. An elegant demonstration of the effect which may be obtained through the manipulation of levels of harmonicity is provided by the opening of Gérard Grisey’s Partiels (Grisey, 1976a) discussed above, which begins by presenting the overtone spectrum of a trombone’s low E (41.2 Hz), before modifying the prevailing harmony gradually over time through a process of increasing inharmonicity in the form of the progressive transposition of selected partials (Ex.3).\(^{18}\)

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\(^{15}\) [“continuum allant du simple au complexe que nous retrouverons dans la classification des intervalles par leur degré de rugosité et des timbre par leur degré de inharmonicité.”] (The italics in the main text are Grisey’s).

\(^{16}\) The French term rugosité is problematic; whilst the best English translation would be ‘roughness’, in the English version of Tempus ex machina, published in a translation by one ‘S. Welbourn’ in Contemporary Music Review in 1987, it is given as the more historically-charged ‘dissonance’. I prefer the former since it conveys more clearly Grisey’s apparent meaning as well as the implied break with traditional musical thought.

\(^{17}\) [“Voilà qui ne change en rien notre affaire. Demeure, en effet, l’existence d’une polarité qui irait de l’intervalle lisse (consonance) à l’intervalle rugueux (dissonance).”].

\(^{18}\) Ex.3 retains Grisey’s original notation of sixth-tone accidentals as downward-facing arrows.
This transition, from a harmonic spectrum to a highly inharmonic one, enables Grisey to generate an increasing degree of tension, as well as giving the listener the aural sensation of a harmonic object being modified in stages until it has been transformed far from its original state. This impression is heightened by the gradual introduction of elements of noise into the texture, via extended techniques, including strings playing *sul ponticello* and the trombone creating a fluctuating tone through the use of a plunger mute.

For his part Tristan Murail employs a process of frequency modulation (to be discussed below) in order to obtain the opening harmony of his orchestral work *Gondwana* (Murail, 1980). As described by Viviana Moscovich, ‘This chord’s sound makes us instantaneously think of a bell.’ (Moscovich, 1997: 23). Murail, for his part, agrees: ‘The role of these aggregates—played by wind instruments—is to synthesize large bell sonorities.’ (Murail, 2005b: 131). This progression of inharmonic chords, as shown in Rose (1996), thus creates a striking opening for the work which is modified gradually over time, in a manner analogous, albeit with a different outcome, to that in Grisey’s *Partiels*.
Finally, two specific forms of inharmonic spectra, as employed by Grisey in *L’Icône paradoxale* and *Vortex Temporum*, are dilated and compressed spectra. In these, the fundamental frequency is still multiplied by consecutive integers, but with an additional distortion index applied.\(^{19}\) This distortion results in spectra in which the intervals between the overtones are either, relative to the harmonic spectrum, dilated or compressed, offering the composer an additional harmonic resource by which the harmonic progress of a work may be controlled.

As an example, the spectrum with a fundamental A (55 Hz) shown in Ex.1 might be distorted by applying an index of, for example, 0.94, resulting in the following (compressed) distorted spectrum with a much less consonant – a much more ‘rough’ – effect (Table 1 and Ex.4).\(^ {20}\)

\(^{19}\) The equation employed, where \(f\) is the fundamental frequency, \(p\) is the required partial number and \(i\) is the distortion index, is \(fp^i\). The result, where \(i\) is less than 1, will be a compressed spectrum, and where \(i\) is greater than 1, a dilated spectrum. Furthermore, in musical terms, the degree of deviation of each partial from harmonicity will increase with pitch: for example, in the table below, where a distortion index of 0.94 has been applied to a fundamental A natural (55Hz), the second partial is distorted by three eighths of a tone, the sixth by seven eighths of a tone and the twelfth by a tone and a quarter.

\(^{20}\) To differentiate the notated microintervals, a downwards-facing arrow is employed in Ex.4 to represent a sixth-tone downwards inflection, and conventional accidentals with arrows to represent eighth-tone inflections.
<table>
<thead>
<tr>
<th>$p$</th>
<th>$f \times p$ (Hz)</th>
<th>Musical pitch equivalents</th>
<th>$f \times p^{0.94}$ (Hz)</th>
<th>Musical pitch equivalents</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>55</td>
<td>$A_1$</td>
<td>55</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>110</td>
<td>$A_2$</td>
<td>105.52</td>
<td>$A \frac{3}{8}$ flat</td>
</tr>
<tr>
<td>3</td>
<td>165</td>
<td>$E_3$</td>
<td>154.47</td>
<td>$E$ flat</td>
</tr>
<tr>
<td>4</td>
<td>220</td>
<td>$A_3$</td>
<td>202.44</td>
<td>$G \frac{1}{3}$ sharp</td>
</tr>
<tr>
<td>5</td>
<td>275</td>
<td>$C#_4$</td>
<td>249.69</td>
<td>$B \frac{3}{8}$ sharp</td>
</tr>
<tr>
<td>6</td>
<td>330</td>
<td>$E_4$</td>
<td>296.36</td>
<td>$D \frac{1}{4}$ sharp</td>
</tr>
<tr>
<td>7</td>
<td>385</td>
<td>$G \frac{3}{8}$ flat$_4$</td>
<td>342.57</td>
<td>$E \frac{3}{8}$ sharp</td>
</tr>
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<td>8</td>
<td>440</td>
<td>$A_4$</td>
<td>388.39</td>
<td>$G \frac{3}{4}$ flat</td>
</tr>
<tr>
<td>9</td>
<td>495</td>
<td>$B_4$</td>
<td>433.86</td>
<td>$A \frac{1}{4}$ flat</td>
</tr>
<tr>
<td>10</td>
<td>550</td>
<td>$C#_5$</td>
<td>479.03</td>
<td>$B \frac{1}{4}$ flat</td>
</tr>
<tr>
<td>11</td>
<td>605</td>
<td>$D \frac{3}{4}$#$_5$</td>
<td>523.93</td>
<td>C</td>
</tr>
<tr>
<td>12</td>
<td>660</td>
<td>$E_5$</td>
<td>568.58</td>
<td>$D \frac{1}{4}$ flat</td>
</tr>
</tbody>
</table>

Table 1: Frequencies and pitches of a harmonic spectrum with fundamental $A = 55$Hz and the same, distorted by an index of 0.94.

Whilst the example given here is a compressed spectrum (i.e. one with a distortion index which is less than 1), it is equally possible, by using a distortion index greater than 1, to generate a dilated spectrum.

Much more significant was the discovery that by manipulating a spectrum it is possible to alter the timbre of a given harmonic event. For the first time timbre was elevated beyond its role as a
function of orchestration, to a compositional parameter in its own right. As Grisey and Murail realised, and as the increasing inharmonicity of passages such as Ex.3 above demonstrates, the timbre of a given chord\textsuperscript{21} can govern not only its own character but also affect the discourse of the music in which it features in a manner analogous to the consonance-dissonance paradigm with which composers have been familiar for many centuries.

It should also be mentioned here that towards the end of his life Grisey began to consider the harmonic series, not only as a vertical, harmonic phenomenon, but also as a source of pitches to be employed horizontally. As Baillet (2000) has shown, if the odd-numbered partials of the series are rearranged in a scalar fashion, a ‘mode’ is produced (Ex.5a) which may then be used melodically – or even, as at the opening of Grisey’s final completed composition *Quatre chants pour franchir le seuil* (1998), polyphonically (Ex.5b).

\textit{Ex.5a} Harmonic spectrum on E (41.2Hz) (to 32 partials, approximated to the quarter tone), and the odd-numbered partials of the same, rearranged and collected within one octave

\textit{Ex.5b} Gérard Grisey: *Quatre chants pour Franchir le seuil*, opening polyphonic lines.

This represented a significant evolution in Grisey’s thinking. Deliège suggests that: ‘If [...] spectral music] lends itself marvellously to the treatment of chords..., it fails where counterpoint is

\textsuperscript{21} Whilst the terms ‘spectrum’ and ‘chord’ are, theoretically distinct from one another, there is a sense – such as in the present context, where instrumental, rather than electronic music is under discussion – in which the two may be considered to be quasi-synonymous.
concerned. It is perhaps difficult to create true polyphony whilst retaining the morphology of harmonic entities.’\(^{22}\) (Deliège, 2003: 883), and perhaps Grisey’s use of the harmonic series in a linear manner was therefore an attempt to address this problem, even though doing so might call into question the spectral credentials of his later works.\(^{23}\) In any case, the fact that the source of these pitches was the natural overtone series means that they cannot be ignored in the present context.

One further technique which the spectralists employed in order to generate a musical discourse was that of interpolation. Two contrasting harmonic areas may be joined by an intermediate harmony as, for example, in Murail’s *Gondwana* where, as François Rose describes: ‘Each of the intermediate chords is a composite of the two adjacent chords. For example [at the work’s opening], the third chord is made of a combination of some elements of the second and fourth chords.’ (Rose, 1996: 34). This technique therefore permits the music to move from one harmonic area to another efficiently, allowing the discourse to flow in a logical, yet malleable manner (Ex.6).\(^{24}\)

\[\]

**Ex.6 Tristan Murail: Gondwana: First four harmonies (adapted from Rose, 1996: 34)**

\(^{22}\) [“Si [...] la musique spectrale] se prête à merveille au traitement de l’accord..., elle ne parvient pas à l’étallement contrapuntique... [il] est peut-être difficile de créer une vraie polyphonie en sauvégeant les morphologies des entités harmoniques.”].

\(^{23}\) Not that Grisey would have worried about this; according to Julian Anderson: ‘By 1996-8 whether or not something would be considered spectral was something he found completely absurd and irrelevant to his concerns’ (Personal communication, 2012). Rather, it is in a musicological context that such labels are of interest, even if they exist only to comprehend better a composer’s output.

\(^{24}\) In Ex.6 the microtonal accidentals are employed as indications of a note’s upwards or downwards inflection rather than as precise sixth- or eighth-tone adjustments. In François Rose’s original paper these are indicated with simple arrows; for clarity I have opted for the symbols shown here.
**Instrumental Synthesis**

By the late 1960s it had become possible, thanks to advances in the field of electroacoustics, to record and analyse the spectra of instruments in order to discover, as Grisey put it in an early article, ‘the internal structure of sound’. This analysis revealed, amongst other characteristics, not only which partials are present in the sound of each but also which are relatively stronger or weaker than others. It was therefore possible to discover the precise components of the timbre of an instrument. More specifically, for the spectralists it was possible to use these data as compositional material by reconstituting selected partials using an instrumental ensemble and furthermore, as alluded to above, to control the timbre of a given chord by adjusting the relative strength of component pitches, via dynamic adjustment and instrumentation. Harmony and timbre, by being considered as interdependent, were thus fused into a single musical parameter.

One of the most striking examples of the technique of instrumental synthesis is to be found in Grisey’s *Les Espaces acoustiques* (Grisey, 1974-1985), which takes the form of a ninety-minute cycle of six pieces, the whole being based, using a range of approaches and techniques, on a fundamental E natural (41.2 Hz). The clearest example of instrumental synthesis in the cycle is to be found, once again, at the opening of the third piece: *Partiels* (Grisey, 1976a). The piece opens with low E naturals played by the trombone and double bass, which appear to ‘generate’ the pitches played by the remainder of the ensemble, an effect which the listener (especially if they are familiar, even to a modest degree, with acoustical physics) might perceive as higher-frequency overtones of these low E naturals. In fact this passage was inspired by, or rather modelled on, sonograms that Grisey made of a trombonist playing the low E natural in question25 and thus this opening chord may be viewed as a simulacrum of that original model, stretched in time to allow the listener to experience its internal components as they unfold.

It must be acknowledged that to assume that the technique of instrumental synthesis is somehow mimicking exactly the characteristics of a given sound would be false, given that as Boulez points out:

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25 One might ask why a low E was chosen, especially given that a tenor trombonist can only produce this frequency with difficulty. Perhaps this was, in fact, played on a bass trombone, or perhaps the sonogram which was produced was of the E an octave higher, which is the tenor trombone’s lowest non-petal tone note, and which is therefore the most resonant pitch available, since the instrument’s slide is at its fullest extent, and then transposed downwards by an octave to bring the higher partials into a register more easily playable by the wind and strings. In any case, it is noticeable at the outset of *Partiels* that it is the double bass that plays E (41.2 Hz), and that the trombone is an octave higher, at 82.41 Hz.
I remember a composer who worked at IRCAM\textsuperscript{26} on the construction of spectra which he then reconstituted with musical instruments: I pointed out to him that the instruments added their own spectra and that the original spectra could not be reconstituted in this way! (Albéra, 2003, quoted in Goldman, 2010: 221)

It should also be noted, though, that the spectralists himself made no such claim and that he was well aware that this technique, which could be argued to have reached a certain level of reproductive fidelity with regard to the sounds being synthesised, was simply a means of accessing, of revitalising, certain categories of harmony and, as he put it, ruggedness.

It is also important to mention, briefly, another technique which the spectralists elaborated, which involved further analysis of instrumental sounds. In *Transitoires* Grisey again synthesises an instrument – in this case, a double bass played employing five modes of attack: *pizzicato*, *ordinario* and three degrees, so to speak, of *sul ponticello*. In so doing he offers the listener the opportunity to discover, through the imitation of his spectral analysis and the distribution and manipulation of chosen overtone-representing pitches, the ways in which the attack of a note affects its character, on a radically different timescale from that in which it normally occurs. As Rose describes, ‘He conceived both the entire orchestra and a smaller group of instruments as two synthesized string basses, which we might call a macrophonic and a microphonic one.’ (Rose, 1996: 11). The two ensembles therefore serve to ‘amplify’ and ‘stretch’ the original double bass sounds, in order that the listener might experience more readily the manner in which they behave.

**Periodicity**

It is, of course, evident that music is reliant on the temporal dimension. As an art form which, essentially, presents a series of sound events, there is an intimate connection here between these events and the order of their occurrence. As significant as this is in all musical forms, for the spectralists time was raised to a position of the utmost importance. From the earliest spectral compositions the behaviour of sounds over given periods proved to be fertile ground for the generation of musical material, not least because in analysing the component parts of any sound one will inevitably, at some point, have to confront that sound’s nature as a physical phenomenon – which is to say, as vibrations in a given medium.

\textsuperscript{26} L’Institut de Recherche et de Coordination Acoustique-Musique (Institute for Acoustico-Musical Research and Co-ordination).

This is not to suggest that preceding composers were unconcerned with the behaviour of sounds in time. Much of Boulez’s writings lean heavily on the temporal aspect of music, whether he is referring to his well-documented distinction between *temps lisse* (smooth time) and *temps strié* (pulsed time), or simply discussing his love of instruments whose chief sonic characteristic is one of resonance. Messiaen also speaks at length, citing (amongst others) the work of philosopher of science Henri Bergson to illustrate his points, of humans’ perception of sonic (musical) phenomena as they occur in time.

However, as with the spectralists’ new-found approach to harmony through the harmonic-inharmonic paradigm, their subtly different view of periodicity as a musical phenomenon offered a renewed means of controlling the temporal progress of a work. This is most clearly demonstrated by certain of Grisey’s works, such as in *Quatre Chants pour franchir le Seuil* (Grisey, 1998), where the syllabic structure of the poem that Grisey sets dictates the duration of musical elements at a variety of temporal levels, from the overall form down to the level of melody.

Grisey also found it useful, notably in his later works, to expand and contract objects in order to explore their behaviour over time. Already in *Partiels* the ‘trombone’ spectrum which gave rise to the chord shown in Ex.2 is extended over many seconds and, by the time he composed *L’Icône paradoxale* (Grisey, 1992-1994), he was speaking of: ‘...radically different timescales (the time of whales, the time of humans, the time of birds...).’ (Grisey, 2008: 157). In his employment of these juxtaposed timeframes Grisey was again hoping to create an effect which would act upon the listener’s perception of this aspect of his work; once again, there is a sense in which the music is opened up for the listener to experience in new ways.

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27 From the very beginning, Boulez’s music demonstrates this predilection for phenomena of resonance. This is demonstrated amply by *Notations* for piano (1945), *Le Marteau sans Maître* (1956) which features an array of resonant instruments (from tuned and untuned percussion to guitar and even the much more modest resonance of the viola played *pizzicato*), *Pli selon Pli* (1959) and *Rituel in memoriam Maderna* (1975) – to say nothing of his later works which continue and extend his researches in this area, frequently through the dual media of natural and electronic resonance.

28 In Tome 1 of his *Traité de Rythme, de Couleur et D’Ornithologie* Messiaen explores Bergson’s theories at length under the heading ‘Bergsonian Time and Musical Rhythm’ (“*Temps Bergsonien et Rythme Musical*”) (Messiaen, 1994: 31-36).


30 [“...temps radicalement différents (le temps des baleines, le temps des hommes, le temps des oiseaux...).”]
**Frequency Modulation: Combination Tones**

The technique of frequency modulation proved useful to the spectralists as a means of generating harmonic structures in their work. As described by John Chowning:

In FM [Frequency Modulation], the instantaneous frequency of a carrier wave is varied according to a modulating wave, such that the rate at which the carrier varies is the frequency of the modulating wave, or modulating frequency... [and] frequencies occur above and below the carrier frequency at intervals of the modulating frequency. (Chowning, 1973: 46-47)

In other words, when a given frequency (the ‘carrier’ wave) is modulated by another (the ‘modulating’ wave), further frequencies are produced as a direct consequence of the vibrations of the original two. These are often referred to as ‘sum’ and ‘difference’, or simply ‘resultant’ tones, since the most prominent frequencies which are caused may be calculated simply by adding and subtracting the carrier and modulating frequencies. The harmony resulting from A natural (440Hz) modulated by G natural (392 Hz) is shown in Ex.7.

![Ex.7 Sum and difference tones for a carrier frequency A natural (440Hz) modulated by a frequency of G natural (392Hz)](image)

Further frequencies may then be obtained, which are caused by the interaction of these pitches, by multiplying these tones so that, for example, in addition to a + b and a – b, as above, the composer might calculate 2a + b, 2a – b, a + 2b and a – 2b (which is to say, ‘second-order’ resultant tones) with (for the same two generative pitches) the musical result shown below (Ex.7):

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31 The conditions of performance, such as the acoustic of the room, the listener’s aural capabilities and so on, bring the perception of these frequencies into question. In any case, however, the conceit remains a useful method for the generation of harmony.
This procedure may then be extended to third-order and fourth-order tones continuing, potentially, indefinitely to generate an even more complex musical result.

Whilst this procedure was of immense significance for the technological synthesis of sounds, for the spectralists Grisey and especially Murail, frequency modulation offered another means of generating harmony for composition which was derived from the properties inherent in the natural behaviour of sound.

A particularly interesting use of the technique appears at rehearsal number [14] of Partiels, where the horn and the trombone play a C natural (65.41 Hz) and a D flat (69.3 Hz) respectively. When the lower frequency is subtracted from the higher, a difference tone of 3.89 Hz is obtained, which is well below the human threshold of hearing\(^{32}\) (this would equate to a pitch an eighth of a tone above a low B - almost three octaves below the lowest note on a piano). Therefore, to obtain the required

\(^{32}\)Whilst the actual frequencies are dependent on a number of external factors, as a general rule humans can hear frequencies in the range between approximately 20 Hz and 20,000 Hz.
frequency, Grisey asks the double bass to play a series of repeated notes;\(^{33}\) eleven in the time of four crotchets, which works out at one note every 0.2479 seconds – which is to say a pulsation very close to 3.89 notes per second, or 3.89 Hz. By placing generative frequencies close together in the low register Grisey has employed pitch to generate pulsation, and pulsation to imply pitch – and the distinction between harmony and pulse has been thoroughly blurred.

**Liminality**

As noted earlier, the term ‘spectral’ was one with which Grisey and Murail were uncomfortable, since, to repeat Murail’s words it ‘struck us as insufficient.’ (Murail, 2005a: 149). Indeed, Grisey went further, suggesting alternative terms, including ‘Differential’, ‘Transitory’ and ‘Liminal’, although none of these managed to dislodge Dufourt’s epithet. The last of Grisey’s suggestions, however, is instructive, since it offers a key as to his (and, presumably, Murail’s) intentions.\(^{34}\) This use of the term ‘Liminal’\(^{35}\) is significant, since – again in Grisey’s words: ‘I propose [the epithet]... Liminal, because it means the deployment of boundaries where psychoacoustical interactions between parameters operate, and the interplay of their ambiguities.’\(^{36}\) (Grisey, 2008: 45).

It is therefore vital to note that, irrespective of their use of harmonic or inharmonic spectra, of pulse and of combination tones, the most important aspect of the music that Grisey and Murail were creating was (in their opinion) its ability to open up new areas of experience for the listener; to transition between states of musical existence, not in order simply to move from one to another but to experience the process of transformation itself – to attempt to discover what lies between discrete musical phenomena.

**Process and Form**

So far I have offered a guide to the means by which the spectral school of composers of the 1970s and 1980s elaborated not only their works, but also their compositional philosophy. In essence, it would seem, a spectral composition is one in which, as noted above, the acoustical properties of a natural or artificial sound are employed as a basis for musical composition. As Grisey put it, ‘We are

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\(^{33}\) These repeated notes are all F sharps, which is a pitch suspended from the previous aggregate. The pitch is not as important here as the rate of pulsation.

\(^{34}\) In a sense, the term ‘Liminal’ is also the most significant of the three since it might be seen to imply the two other terms, ‘Differential’ and ‘Transitory’.

\(^{35}\) ‘Limen’ means ‘threshold’ in Latin.

\(^{36}\) [‘Je propose [l’épithète]... Liminaire, parce qu’elle s’applique à déployer les seuils ou s’opèrent les interactions psycho-acoustiques entre les paramètres et à jouer de leurs ambiguïtés.’].
composers, and our model is sound, not literature, sound, not mathematics, sound, and not the theatre, the visual arts, quantum physics, geology, astronomy or acupuncture!”\(^\text{37}\) (Grisey, 1982: 53).

Furthermore, it is noteworthy that much spectral music relies heavily on technical processes for its generation and that a work’s global form is a consequence of the unfolding of these processes over time. In this context Baillet describes: ‘[..a] ternary articulation, belonging particularly to the works of Les Espaces acoustiques, which Grisey compares to human respiration.’\(^\text{38}\) (Baillet, 2000: 68). Similarly, as Julian Anderson describes, in Murail’s \textit{Mémoire-Erosion} (1976):

Each note played by the horn is imitated by the ensemble of nine players after a varying time-lag: the work is, in fact, an instrumental simulation of the analogical studio technique known as the "reinjection loop". A sound played live is recorded by a tape machine passed on to a second machine which plays the recorded sound, then sent back to the first machine to be combined with a new recorded sound, which is in turn played by the second tape machine and so on. (Anderson, 2000b)

\(^{37}\) ["Nous sommes des musiciens et notre modèle est le son et non la littérature, le son et non les mathématiques, le son et non le théâtre, les arts plastiques, la physique des quanta, la géologie, l’astrologie ou l’acupuncture!"].

\(^{38}\) ["L’articulation ternaire propre en particulier des œuvres des Espaces Acoustiques, que Grisey compare à la respiration humaine."].

\(^{39}\) Thus a work begins in repose (harmonic and periodic), ‘inhales’ (increasing tension, inharmonicity and aperiodicity), and exhales (decreasing tension) and returns to a state of repose.
Summary

It is not difficult to view the work of the spectralists as a violent reaction to the predominance of serialism in, especially, France over the preceding decades – Grisey, for one, writes with a certain amount of aggression on the matter in his seminal text *Tempus ex machina* (Grisey, 1987), in which he describes Boulez’s temporal categories of smooth and striated time as ‘a conductor’s invention which is devoid of meaning on a strictly phenomenological level’.\(^{40}\) In later years, however, this attitude seems to have calmed somewhat,\(^{41}\) and Murail’s view on the matter (Grisey, tragically, died in 1998 at the age of 52) seems, today, to have softened. To the suggestion that his *Reflections* (Murail, 2013) shows, superficially, similarities with Pierre Boulez’s orchestral *Notations* (Boulez, 1945/1978-2004), Murail told the present author that any reaction to Boulez ‘Wasn’t a musical thing; it was a political thing.’\(^{42}\) With hindsight, spectralism, as a movement within contemporary concert music, has begun to take its place alongside the other currents which appeared in the latter half of the twentieth century, such as serialism and minimalism.

The following parts of this thesis will examine the influence that the spectral approach has exerted on the following generations of composers, with particular emphasis on the work of Marc-André Dalbavie (b.1961), Kaija Saariaho (b.1952) and Bruno Mantovani (b.1974), each of whom possesses a personal approach to composition but each of whom has, in some way, fallen under the influence of the work of, chiefly, Gérard Grisey and Tristan Murail.

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\(^{40}\) "[…] l’invention de chef d’orchestre dénuée de sens sur le plan strictement phénoménologique."

\(^{41}\) Grisey makes a footnote in a revision of this article in which he says: ‘This short essay, written in 1980… was revised in 1985… and published… in 1987. My experience and my musical practice are such that I would tend to consider certain declarations as too peremptory’. ["Ce court essai, réalisé en 1980… a été révisé en 1985… et publié… en 1987. Mon expérience et ma pratique musicale sont telles que j’aurais tendance à considérer certaines déclarations comme trop péremptoires."]

\(^{42}\) ["C’était pas une chose musical; c’était une chose politique."] Personal communication with the author, 31.10.2013.
Part 2

Case Studies

Marc-André Dalbavie studied with Michel Philippot and Claude Ballif at the Conservatoire de Paris, where in 1981 he encountered the so-called ‘spectral’ composers Gérard Grisey, Tristan Murail, Hugues Dufourt and Michael Levinas, who had been invited to present their work to the students. Dalbavie has spoken of the first time he heard Grisey’s Partiels with colleagues at the Conservatoire:

‘[Partiels]... stunned us by its aspect of consonance... this consonance is neither tonal nor atonal’

(Dalbavie, 2011), and it is therefore unsurprising that he soon began to work in a style that, whilst retaining an awareness of modernist composers such as Boulez and Ligeti, owed a great debt to the discoveries of the early 1970s by the composers of L’École Spectrale represented by Dufourt, Levinas and particularly Grisey and Murail. Dalbavie’s early works Seuils and Diadèmes were composed using techniques pioneered by these composers and yet his subsequent development as a composer has demonstrated a clear evolution beyond these beginnings. Célestin Deliège, in his description of Dalbavie’s work, poses the provocative question, ‘has Dalbavie, for some time now, been a spectral composer?’

(Deliège, 2011: 896), apparently calling into doubt the continued spectral influence on Dalbavie’s music since the 1980s and early 1990s.

There is an undeniable shift, in the character of Dalbavie’s music of the 1990s and after, towards what Philippe Manoury (pejoratively) describes as ‘the Philharmonic style’, although Dalbavie himself is careful to avoid pastiche. As discussed in Part 1, conventional forms of melody, harmony and rhythm were elements to which the first generation of spectralists composed in explicit reaction or, at least, were elements in an attempt to find new, acoustically-based analogues – yet these elements are present, in forms that are recognisably closer to a more conventional, ‘classical’ style than in the music of the spectral composers, in much of Dalbavie’s more recent output, including the orchestral work Color (2002), Concerto pour flûte (2007), Sonnets (2007) and Sinfonietta (2005a).

The existence of a potentially ‘non-spectral’ aspect to Dalbavie’s music notwithstanding, to a listener familiar with the work of the ‘pure’ spectralists there nonetheless remains an audible resemblance

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to their music in Dalbavie’s work. As noted above, he speaks of his discovery of Grisey’s Partiels (1975) as representing a turning point in his development as a composer (he is also a deep admirer of Grisey’s final completed work, Quatre Chants pour franchir le seuil), and the combination of what seem to be spectrally-derived and non-spectral objects – such as tonal-referencing minor triads, which were entirely absent from the spectralists’ methodology – that are made to coexist results in a multifaceted musical discourse that is considerably more complex than might, at first hearing, be apparent. The actual extent of any spectral influence, the techniques that it lends to Dalbavie’s compositional methodology and the resulting effect will therefore be discussed in detail below with reference to the various objects which Dalbavie employs, taking as exemplar the abovementioned Sinfonietta.

Sinfonietta was composed to a commission from Radio France and Radio-Canada, and was premiered in 2005 at the former’s Festival Présences, conducted by the composer. Dalbavie’s intention was to pay homage to the similarly-titled work by Janáček and, in aligning himself so directly with this cornerstone of the orchestral repertoire, Dalbavie, perhaps surprisingly for one who had previously worked at the modernist IRCAM and whose music had been championed by Pierre Boulez, situated his work firmly within the classical symphonic tradition. It was in 1901 that Debussy declared ‘since Beethoven the proof of the uselessness of the symphony has been shown’ (Debussy, 1901) and, notwithstanding certain notable examples such as Messiaen’s Turangalîla-Symphonie (1949), leading French composers of the twentieth century seem to have agreed. It therefore appears doubly unconventional that an early twenty-first-century composer should write in the symphonic genre – and yet Dalbavie produced a four-movement symphony conforming to the paradigmatic classical Allegro-Scherzo-Adagio-Presto Finale model.

As eccentric as this might therefore seem, as Sophie Stévance comments, there had been a certain symphonic leaning in Dalbavie’s music from the beginning: ‘from the Chamber Symphony (1980) to the Sinfonietta… [Dalbavie’s] reflection on the symphony is undeniable.’ (Stévance, 2010: 104). Dalbavie himself, in conversation with Guy Lelong, leaves one in no doubt as to his intentions: ‘Sinfonietta… refers, very simply, to the genre of the symphony. It seemed almost natural to me to confront this beacon that is symphonic writing.’ (Dalbavie, 2005b: 101).

46 Personal communication to the author, 5th February 2015.
47 Turangalîla, it should be noted, is hardly a conventional symphony, in any case.
48 [‘…depuis la Symphonie de chambre (1980) jusqu’à la Sinfonietta, …la réflexion sur la symphonie est incontestable’.]
49 [‘Sinfonietta… se réfère tout simplement au genre de la symphonie. Il m’a presque paru naturel de me confronter à ce phare de l’écriture symphonique.’]
Despite these deceptively simple statements, however, it is clear that Dalbavie, alongside the more archetypal aspects of the symphonic form, effects a measure of formal, even of constructivist, modernist thinking, so that the classical-symphonic aspect of the work remains under constant review as the form unfolds.

The bridging of the gap between modernity and tradition, although such a gap is perhaps often more perceived than real (one should not forget that Schoenberg considered himself a musical descendant of Brahms and that even Boulez has taken care throughout his career to perform and record repertoire that he feels important to contextualise his musical language), is one aspect of Dalbavie’s work that generates a stylistic tension. As will be made clear below, modernism and tradition are made to coexist, a situation that would have been unacceptable fifty years earlier, at least to certain members of the modernist generation born around 1925, yet which, despite the risk of incoherence, permits Dalbavie to enrich his music in multiple ways simultaneously.

**Process and coincidence**

Dalbavie’s intention in *Sinfonietta* was to create, in his own words, a ‘multi-track symphony’ (Dalbavie, 2005b). Given the forces concerned, which is to say a standard modern symphony orchestra with no pre-recorded or live electronics or even electronic instruments, this description appears rather incongruous. Yet as he expands on his statement it becomes clear that, without electronic means (though alluding to certain studio processes), his intention was to create an instrumental work that relied on similar effects to those at the disposal of the sound engineer: ‘There are... several independent strata, rather like tracks on a mixing desk, and the different speeds and characters will be affected on each of these levels... But the difference... [is that] these strata are not only mixed, but interact with each other.’

There are therefore a number of processes at work in *Sinfonietta*, each of which is capable of behaving both independently and in tandem with the others. It is through the composer’s control of these processes, privileging, broadly speaking, each in turn, that the four movement symphonic form is obtained. Dalbavie describes ‘phenomena of coincidence’ and ‘polyphony’

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50 E.g. Boulez (b.1925), Berio (b.1925), Stockhausen (b.1928).

51 “[Il y a... plusieurs couches indépendants, un peu à la façon des pistes d’une table de mixage, et des vitesses et des caractères différents seront affectés à chacune de ces couches. Mais... la différence [est que] ces couches ne seront pas seulement mélangées, elles interagiront les unes avec les autres.”]

52 Dalbavie’s interlocutor Guy Lelong coins the term ‘Principle of coincidence’ [“Principe de coïncidences”] later in the same interview (Dalbavie, 2005b: 36).
of process (Dalbavie, 2005b: 22) to describe this control, which he had previously achieved in works, including the aforementioned Color, but which reaches a subtler level of development in Sinfonietta. In the composer’s own words: ‘At the beginning the piece will have the aspect of music that is being ‘mixed’ and the symphony emerges progressively, only really being discernible once the whole work has been heard.’ (Dalbavie, 2005b: 101).

It is the presence of this multiplicity of processes that challenges an appraisal of the degree to which Dalbavie’s work since 2000 has continued to be influenced by, as he puts it, la pensée spectrale - spectral thought (Dalbavie, 2005b). In order to be able to draw conclusions, it is necessary to examine these processes individually, gradually assembling the whole picture, which will itself only become clear at the end of the analytical process.

**Colour and Color**

An archetype which seems to represent a constant in Dalbavie’s orchestral music is that of a sustained Klangfarbenmelodie which is often characterised by a degree of angularity, suggesting, at least superficially, a modernist approach to melodic writing. The composer reveals his intentions in the melodic dimension for the first time in his 2002 work for the Orchestre de Paris, Color. This title was chosen, according to Dalbavie, for its multiple meanings and significations. Color in [American English is the equivalent of Couleur in French (linking this work with, most obviously, Messiaen, whose ‘intellectual’ synaesthesia is well documented – not least by Messiaen himself; volume 7 of his Traité includes a chapter entitled ‘Son-Couleur’ – ‘Sound-Colour’) (Messiaen, 2002: 102-107). More importantly for the present study, as Dalbavie explains:

[Color is] also the term that was used in the Middle Ages to describe a principle of melodic generation; more precisely, the color qualifies the sequence of notes forming the basis of a melody... the melody is no longer only perceived as the consequence of a process, but becomes the very basis of the work. (Dalbavie, 2005b: 76)

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53 [“polyphonie de processus”].
54 [“Au départ, la pièce aura l’aspect, disons, d’une musique de mixage, et la symphonie émergera progressivement, pour n’être vraiment discernable qu’une fois l’œuvre entendue.”]
55 Color was premiered at Carnegie Hall in New York, suggesting one reason for the American spelling.
56 [“[color est] aussi la terme qu’on utilisait au Moyen Age, pour désigner un principe d’engendrement mélodique, la color qualifiant plus précisément la suite de notes formant la base d’une mélodie... la mélodie n’est plus seulement perçue comme la conséquence d’un processus, mais devient la base même de l’œuvre.”]
In *Color*, therefore, this manipulation of melody is a technique employed to obtain a sense of continuity and to achieve a melodic dimension in the discourse whilst the various processes at work in the music are revealed. Evidently Dalbavie found this a useful technique, since the same principle is apparently in operation, three years later, in *Sinfonietta*.

As shown in Ex.1, the opening bars of the work culminate in a chord of E minor, which serves to enhance the entry of the four horns in unison on a sustained E4. This chord possesses a dual nature: the first as the culmination and eventual focus of the first five, melodically fragmented bars; the second, the first middle-register sustained pitch which is heard, as the preparation for what may be thought of as *Sinfonietta*’s ‘color’ theme, the beginning of which is shown in Ex.2.

Rhythmically the color theme consists of an alternation between sustained pitches (of varying durations) and semiquaver anacruses. There appears to be no pattern in Dalbavie’s choice of intervals in this theme, as might be expected of Messiaen or Boulez (the former’s ‘Permutations
Symmetriques\textsuperscript{57} and the latter’s technique of interval rotation\textsuperscript{58} come to mind). Rather, one receives the impression of a single, extended melodic statement that moves freely to any desired pitch, whether directly or in stages. It might be tempting to try to explain this in terms of a compositional system such as those of Messiaen and Boulez, not least since such an explanation has the potential to lend authority to one’s conclusions. There is, however, an explanation which has no need of such devices – and it comes, once again, from the composer himself:

...when I left IRCAM... I had decided to abandon all the techniques of writing that I had worked out with the computer ... because I was coming to master them more and more, even to the extent of knowing in advance what the program was going to give me ... and I began to write freehand.\textsuperscript{59} (Dalbavie, 2011).

It seems reasonable to conclude that the color theme in \textit{Sinfonietta} was written not utilising an all-pervading matrix, but, as Dalbavie puts it, \textit{à main levee} – ‘freehand’. Whilst intellectually this is perhaps less satisfying an analytical conclusion than the reconstruction of a rigorous compositional methodology, it remains the most compelling solution.

An extra quality of resonance is lent to this theme by the prolongation of selected pitches (Ex.3).

\textsuperscript{57} See: \textit{Traité de Rythme, de Couleur et d’Ornithologie}, Tome 3 (Messiaen 1996).
\textsuperscript{58} As demonstrated by, amongst others, Jonathan Goldman (Goldman 2011).
\textsuperscript{59} [“\textit{lorsque je suis parti de l’IRCAM... j’avais décidé d’abandonner toute les techniques d’écriture que j’avais élaborée avec l’ordinateur... parce que je commençais à les maitriser de plus en plus, même à savoir ce que le programme allait me sortir... et je commençais à écrire à main levée.”}]
This application of what might be thought of as instrumental reverberation within the orchestra ‘blurs’ the texture, giving the music a simulated echo effect. There is also an extremely subtle effect here, as bars 154-159 (see below) contain two simultaneously-occurring examples of the same process. The first of these is performed by horns, trumpets and flutes, which employ triplet quavers instead of the color theme’s original semiquaver anacruses (Ex.4a), with the result that there is an almost imperceptible augmentation in effect. The second example is performed by the violins and

60 Perhaps in much the same way as Grisey, in the words of Timothy Sullivan’s analysis (Sullivan 2008), ‘blurs’ the opening passage of *Quatre chants pour franchir le seuil.*
clarinets, and takes this principle further by augmenting progressively the anacrusis from semiquavers to quaver triplets, quavers, crotchet triplets and, finally, crotchets (Ex.4b).
Ex 46: Salaback: Stylophone, 1st movement, augmenting echo effect (bars 154-159)
The color theme continues in this manner throughout the first movement, with three hiatuses, each of which represents a point of arrival, which Dalbavie describes as an ‘axis of resonance’ (Dalbavie 2005b: 66), and one major climax. Perfect fifths, perfect fourths and semitones are privileged throughout the progress of the theme, with occasional instances of other intervals, including tritones (which may be thought of as the addition of a perfect fourth and a semitone, and therefore logically deducible from the ‘privileged’ intervals). The predominance of perfect fourths and fifths is indicative, since the quasi-dominant/tonic intervallic relationships that are implied from note to note result in the impression of a continuously resolving progression from one to the next, allowing Dalbavie to create an atmosphere of tonal ambiguity – until the theme gives way to another object, or another process, such as the affirmation of a chosen ‘axis of resonance’ or, in the case of the movement’s principal climactic point at bar 161, a moment of rupture in the discourse (Ex.5).

It is interesting to note that this climax is achieved by stacking perfect fifths to create a harmonically ambiguous ten-note chord over sustained fortissimo. A naturals and A flats played by the entire string section – and also that Dalbavie inverts the paradigm found in certain earlier works (notably Ravel’s Daphnis et Chloé, which opens with consecutive fifths stacked from low to high), by beginning on A6 and progressing, not by ascending but by descending.

Whilst the resulting object’s verticality suggests a break with the linear conception of the color theme proper, the continued employment of perfect fifths, especially with the semitone dissonance of the sustained string A-A flat pedal, offers an example of the potential of Dalbavie’s ‘principle of coincidence’. It is almost as though the descending ladder of fifths is a new expression of the color theme and such is the clarity of the music’s articulation that it is not too much to suggest that even a

61 Or, as a diminished fifth, the subtraction of a semitone from a perfect fifth.
listener unfamiliar with intervallic nomenclature will be likely to perceive the qualitative similarity of these two apparently (from the notational point of view) disparate entities.

At the end of the movement there occurs another example of Dalbavie’s ‘principle of coincidences’. The color theme returns after the climax discussed above, continuing in much the same manner as before, until a selected group of pitches are achieved, transforming the theme by the prolongation of these notes into the chord on which the movement closes (Ex.6).

There is one final characteristic of the color theme that is of relevance to the present study. Though the actual pitches of the theme seem to be rather freely chosen (the privileging of, for example, perfect fourths and fifths noted above notwithstanding), there is a consistent melodic contour throughout the first movement, which approximates the peaks and troughs of a sine wave (Ex.7).

It is debatable as to whether a listener will perceive this ‘waveform’ upon hearing *Sinfonietta*, especially since the peaks and troughs are so widely spaced in time. Nevertheless, there exists a precedent for this compositional conceit, since Gérard Grisey, notably in *Vortex Temporum*, takes sine, sawtooth and square waves as models for the construction of melodic gestalts.62 Although Dalbavie’s compositional methodology is quite different from that of Grisey, and acoustical analogies do not appear to be of great significance, at least for his more recent work, it is still likely, given his spectral background, that he retains an awareness of them as a potential model for the composition of musical objects.

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62 As shown by Jérôme Baillot in his analysis of *Vortex Temporum* (Baillot 2000: 213-229).
The Rhythmic Motive

There is a further object which, like the color theme, appears to be a frequently occurring element in much of Dalbavie’s music, and which is related to one that Stacey Brown describes (in discussing Color) as a rhythmic motive (Brown, 2010: 114). This motive makes several appearances during the course of Sinfonietta, the first of which, from bars 45-6, is shown in Ex.8.

It is of benefit, having examined the color theme, to examine this element of Sinfonietta’s discourse at this point, since, despite its character (which, by virtue of its orchestration, dynamics and durations is quite different from the color theme), there remains a common contour in evidence – suggesting that the rhythmic motive might be considered as a greatly accelerated, compressed-interval version of the greater melody.

Once again there is a parallel here with the work of Gérard Grisey, since as discussed above, in his works Le Temps et L’Ecume (1988-9) and L’Icône paradoxale (1994) Grisey experimented with the expression of musical objects in contrasting timeframes, which he explained as ‘bird time’ (extremely temporally compressed time), ‘human time’ (time as humans perceive it) and ‘whale time’ (extremely temporally dilated time), as well as employing dilated and compressed spectra in the manner described in Part 1.

Whilst Dalbavie’s methodology, as discussed earlier, is not as reliant on specific models as that of Grisey, the technique of temporal and intervallic compression that appears to be in operation is, conceivably, another process that Dalbavie is employing to transform material.

Harmonicity and Harmony

As described in Part 1, there are certain works that are often acknowledged as emblematic of what might be termed ‘pure spectralism’ and it is worth repeating here the comment by John Croft that: ‘There is a sense in which *Les Espaces acoustiques* is the one and only spectral work; anything composed since this cycle might, of course, be informed by it in many ways, but one cannot go beyond it.’ (Croft, 2010: 195).

The movement – or rather, the component work of the cycle – that is most often referred to in support of this viewpoint is *Partiels* of 1975. As already noted in Part 1, this piece opens with a statement of an orchestrated – an instrumentally synthesised, which is to say simulated – harmonic spectrum with a fundamental pitch of E (41.2 Hz). It is clear that overtone spectra play a key role in the construction of many works by Grisey, Murail and others, and it would therefore be a simple matter to conclude that any subsequent spectrally-influenced composition will feature, in some form, such spectra – and that without them the appellation ‘spectral’ will automatically be false. However, as noted in the introduction to this thesis, this is precisely the misunderstanding that Philippe Hurel, who studied at IRCAM alongside Dalbavie, is seeking to correct when he implies that the harmonic-inharmonic\(^{64}\) aspect of spectral composition should not be considered the most influential aspect of the music of *l’Ecole spectrale*: ‘Rather than the harmonic problems of spectra… which are the hallmarks of Grisey’s music, younger composers are stimulated by [spectral music’s] melodic, rhythmic and formal consequences.’\(^{65}\) (Hurel, 2001).

Nevertheless, any examination of the degree to which a work may be considered as ‘post-spectral’ must include an appreciation of the incidence or otherwise of vertical harmonies – which is to say, in the present context, chords that might be analogous to harmonic spectra – since, as perhaps the most striking and paradigmatic aspect of ‘pure’ spectral music, they remain at least indicative of a certain train of compositional thought.

With specific regard to Dalbavie’s *Sinfonietta*, however, and in common with much of his mature output, at first listen (and even at first glance, in respect of the score) the analyst seeking spectral ‘chords’ is likely to be disappointed. Though the work exhibits a degree of consonance, even of resonance, that might suggest a common approach with the spectralists, there are no instances of such a direct employment of spectra for chord generation anywhere in the present work. This is not

\(^{64}\) As described in Part 1, a harmonic spectrum is one whose partials are all exact multiples of the fundamental, whilst an inharmonic spectrum contains frequencies which are not exact multiples of the fundamental.

\(^{65}\) \[“Plus que les problèmes harmoniques du spectre, de temps “étiré” ou temps “contracté”, de microphonie ou de macrophonie, de seuil… qui sont la marque de Grisey, ce sont les conséquences mélodiques, rythmiques et formelles de l’aventure spectrale qui stimulent les compositeurs plus jeunes.”\]
to say, however, that the harmonic influence of spectralism is not present but it is rather an indication of the subtlety and refinement of Dalbavie’s method. 

One harmonic aggregate which is worthy of mention in this regard is the chord which closes the first movement. This chord comprises, from bass to treble, the pitches B₁, F♯₂, D♯₃, A₃, D₄, A₄, D₅, G♯₅, C♯₆ and F♯₆ (Ex.9).

![Ex.9 Dalbavie: Sinfonietta, 1st movement, final chord (bar 196)](image)

Clearly the lowest three pitches (and the F♯₆), taken in isolation, form a common chord of B major. The A, in conjunction with these, suggests a dominant seventh and the remaining pitches D, G♯ and C♯ seem, from one perspective, to possess the quality of an added minor 3rd, a major 6th and a natural 9th of B major, respectively, whilst a jazz musician might conclude that this chord should be heard as a B7#9 chord (with the 13th and natural 9th implied). Yet a third view in the present context might lean towards the theory that certain resonant chords tend towards timbral fusion – and given Dalbavie’s background as a spectral composer this would be teneable.

The preferred interpretation in the present study, however, is that, depending on context, all three explanations could be equally valid – and that this multiplicity of identity is exactly what gives Dalbavie’s music its ability to make processes coincide and ‘infect’ one another. In music based, (as the composer reminds us) on ‘polyphony of process’, it is essential that objects be capable of holding multiple identities, in order that they may participate in multiple processes within the confines of a

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The published score contains several apparent misprints, since several of the pitches of the first movement’s final chord seem to be missing accidentals. The assumption has therefore been made here that this is indeed the case since, firstly, Dalbavie’s music shows a general tendency towards the prolongation of resonant harmonic objects, rather than the sudden subversion of the previous, rather resonant chord, and, secondly, the (only) recording of the work which has been released, which is conducted by the composer, appears to conclude with a prolongation of exactly the same chord as that present in the preceding bars. Furthermore, for clarity, certain enharmonic spellings have been disregarded here and the anomalous low E played by the timpani is assumed to be a misspelt E flat.

The potential for a vertical harmonic object to be perceived as a single timbre, as discussed by, amongst others, Murail: ‘In… Mémoire-érosion (1976)... I tried to take into account the spectra and timbres of the instruments in constructing the harmony for certain passages... and to develop an auditory continuum between timbre and harmony.’ (Murail, 2000: 6-7).
given work, as well as – potentially – referencing a number of influential sources. Therefore, this single chord might be viewed as holding simultaneous identities as a harmonic spectrum analogue (creating a degree of harmonic stability to close the movement), as the vertical consequence of a horizontal phenomenon (the color theme’s melodic progress during the final section of the movement, as shown in Ex.5 above) as well as a third identity (provided by its upper structure) as an evolution and enrichment of another, distinct, harmonic object.

The chord in question is first encountered as a vertical construction in perfect and augmented fourths in bar 5, its orchestration (six muted solo strings, five of which play natural or artificial harmonics) lending it a distinctive character (Ex.10).

![Ex.10 Dalbavie: Sinfonietta, chord in perfect and augmented fourths (bar 5)](image)

Similar chords occur throughout the first movement, as well as in the second and third movements (although instances are much less frequent in the latter two), sometimes constructed in fourths, frequently in perfect and diminished fifths, giving a similar but subtly altered effect and occasionally incorporating a wider range of mixed intervals. Furthermore, as shown above, the first movement’s closing chord (see Ex.9) similarly contains, in its upper structure, one augmented and three perfect fourths – a further example of Dalbavie’s ‘principle of coincidences’.

Related to this chord is what might be termed the ‘pulsed chord motive’, which comprises a superposition of either perfect fourths, perfect fifths or, rarely, mixed intervals. It is first encountered in its ‘fourths’ version in bar 9, on trombones, tuba and contrabassoon, then again, transposed and in perfect fifths, in bar 26, and a third time, in a combination of a perfect fourth, an augmented fourth and a diminished fourth (supporting an E flat minor triad) in bar 65. In spite of the changing intervals and the consequently differing pitch content, the similarity of dynamics and articulation causes each of these presentations to be recognisably versions of the same motive (Ex.11).
After several more appearances the ‘pulsed chord motive’ disappears as the first movement ends, makes two appearances in the scherzo and none in the Largo third movement, before returning in the finale – taking on its ultimate role only at the very end of the work, where (as will be discussed below) it helps to carry the music to its conclusion.

It should be noted here that all three of these harmonic objects relate in some way to a principle of construction from perfect and augmented fourths, and perfect fifths – which are the very intervals of which the color theme is composed, implying a high degree of intervallic unity within the work.

**Axes of Resonance**

A technique which occurs frequently in Dalbavie’s music is the use of ‘axes of resonance’ to anchor the music around a certain pitch. This is one of the composer’s most clearly audible gestures, especially given that these axes are often affirmed through the use of chromatic motion from woodwind, trumpets and horns, and of glissandi on stringed instruments and trombones to ‘pull’ the musical discourse on to the chosen axis. As the composer explains:

...since *Seuils*, one can hear very clearly in my music zones of sonic polarity, which function a little like centres of gravity for resonance. These poles are in fact notes,
pitches, which serve as the basis for the construction of harmonic fields, textures and melodies.\[^{68}\] (Dalbavie, 2005b: 65-66).

*Sinfonietta’s* third movement, represents a quasi-continuation of the color theme, since despite the transformation of the intervallic structure the character is preserved through the use of a similar alternation between sustained pitches and anacruses (although in this movement the latter are quavers, replacing the first movement’s semiquavers). There appears, additionally, a resonant axis (D4) which is present nearly throughout, except for short periods of a few bars where it disappears, appearing to be obscured by other pitches, before being reaffirmed by horns or trombones in *fortissimo* unison, such as in bars 328 - 332 (Ex.12).

It is interesting to note that this ‘axis of resonance’ therefore fulfils much the same role in the third movement as the color theme in the first, providing a sense of continuity and of unity, despite the simultaneous operation of other processes. In addition, far from requiring one instrument, or even one section to sustain this axial pitch for the whole movement, Dalbavie orchestrates this single pitch as shown in Ex.13 (for clarity all other pitches are omitted in this reduction), causing a constant, subtle, yet noticeable change in colour.

\[^{68}\] [“depuis Seuils, on entend très nettement dans ma musique des zones de polarité sonore, qui fonctionnent un peu comme des centres de gravité de résonance. Ces pôles sont en fait des notes, des hauteurs, qui servent de base à la construction des champs harmoniques, des textures et des mélodies.”]
Whilst the orchestration of a single pitch can hardly be claimed to be a novel concept in the twenty-first century, the manner in which Dalbavie approaches this technique could be considered to be innovative. In the Portrait compiled by France Musique in 2011 (Dalbavie, 2011) Dalbavie describes how, whilst working at IRCAM in Paris, he came to understand that every instrument projects its sound in a different manner, and that, crucially, timbre is a function of space. In other words, each instrument possesses a unique timbral identity, which is a result of its construction as well as the manner in which its sound is diffused in the concert hall. The orchestration shown in Ex.13, of one to four muted horns, a muted trombone, a flute in its lowest register and muted violas, brings into play a wide range of instrumental timbres which depend on an equally varied range of methods of projection, thus permitting the composer to employ timbre, alongside melody, rhythm and harmony, as a means of colouring – affirming or subordinating to some degree – a chosen axial pitch.

Dalbavie also, at times, treats axial pitches in a linear manner, with polyphonic lines approaching each pitch through a technique of gradual elimination, leaving the privileged pitch sounding alone, as shown, for example, in bar 9 and in bars 35 – 39 of the first movement (Ex.14a and b).

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69 Several of Dalbavie’s works – notably the Violin Concerto (1996), The Dream of the Unified Space (1999) and Concertate il Suono (2000) explore this further, in that they require the orchestra to be placed around the audience.
The focusing of the listener’s attention on a chosen ‘axis of resonance’ is a device which Dalbavie uses frequently in his post-2000 works and it proves an effective means of controlling the harmonic progress of a movement or piece. In the case of all four of Sinfonietta’s movements, the ‘axes of resonance’ serve two purposes. Firstly, the flow of the prevailing theme is interrupted by its own convergence on an axis, creating sudden harmonic stasis which contrasts with the harmonically ambiguous theme, and secondly, the axis is invested with the sense of a surrogate ‘tonic’ – signalling to the listener that a significant point has been reached in the work’s discourse. This sense of arrival is often undermined; for example in the first movement by the sudden frenetic activity in demisemiquavers shown above, creating a paradoxical sense of motion and stasis at the same time. Once again this is an example of Dalbavie’s ‘polyphony of process’ at work: harmonic stasis and a high level of rhythmic activity coincide, creating friction and generating the energy required to propel the music forward.

**Thème d’Accords**

There occurs in the finale a theme which has not appeared before in Sinfonietta. Above a demisemiquaver violin accompaniment, woodwinds and brass perform the descending chorale-like passage shown in Ex.15, which might, to borrow a term of Messiaen’s, be labelled a ‘thème d’accords’ – a chordal theme.

Indeed, this passage is reminiscent of certain moments in the works of Messiaen – most strikingly, in its highly resonant character, the woodwind descent in the seventh movement of Eclairs sur l’au-delà (1992) (Ex.16). This resonance is so much a characteristic of the theme that to attempt to reduce it to a single melodic line would be to do away with its essence.
Ex. 15: Iblsauer: Sinfonia, 4th movement, 'theme d'accords' (bars 440-444)

Ex. 16: Messiaen: Eclairs sur l'au-delà, 7th movement, 'Et Dieu essuiera toute larme de leurs yeux...'

as shown in Hill (ed.) (1995)

52
The source of the resonance of this theme lies in the fact that, after the first two chords, which are composed of mixed perfect and augmented fourths, each successive sonority contains an increasing incidence of ‘resonant’ pitches – which is to say that each chord resembles a harmonic spectrum to an increasing degree as the theme continues. For example, as mentioned above, the first two chords are constructed entirely from perfect and augmented fourths – a construction which admits no particular tonic, since there are so many candidates for a potential fundamental.\(^{70}\) In addition, it should be noted that the first three chords in the Messiaen example contain these intervals in their upper structures, and that, by his own admission, one of Messiaen’s characteristic sonorities was the ‘complex of alternating augmented and perfect fourths’\(^{71}\) which he derived from his fourth mode of limited transposition (Messiaen, 2002: 127).

The third, fourth, fifth and six chords of the Sinfonietta’s fourth movement’s thème d’accords are identical in content to one another but descend in pitch from one to the next. In contrast to the first two chords of this theme, the lowest three pitches of chords three to six could be said to represent the root, major third and flattened seventh of a dominant seventh chord, whilst the remaining two pitches might be explained as the nineteenth and thirteenth partials of a spectrum whose fundamental is represented by the root of the same dominant chord. These four chords may therefore be seen to correspond more closely to the harmonic series than the first two, with a consequent increase in their level of harmonicity and, therefore, in the degree of resonance contained within them.

Each subsequent chord from the seventh to the final, eighteenth chord in this theme continues this trend. Rather than cataloguing them all, it is sufficient to note that, in addition to the general process of increasing resonance, the last five contain, at their bases, major triads of, respectively, A, A flat, F, E (if the A flat is considered enharmonically as G sharp), and E flat, lending these chords a quasi-tonal character. This brings to mind, once again, the music of Messiaen, whose own harmonic practice includes many chords with triadic components, including several in evidence in Ex.16, as well as his ‘chord of the total chromatic’ (Ex.17); according to Messiaen: ‘The powerful natural resonance of the implied low E, and the joyous strength of the major third G#... this is what we hear above all.’\(^{72}\) (Messiaen, 2002: 182).

\(^{70}\) It may be useful to observe here that chords similar to this were common in the early twentieth century in the atonal music of composers, such as Schoenberg, who employed chords in fourths precisely for this reason.

\(^{71}\) [“...complexe de quarts augmentées et justes alternées”].

\(^{72}\) ["La puissance du mi grave sous-entendu, et la force joyeuse de la tierce majeur sol dièse... c’est cela qu’on entend par-dessus tout.”].
Although this theme passes quickly (Ex.15), and it is unlikely that a listener will perceive any of its component chords as individual sonorities, the progression from atonal fourth chords to resonant, harmonic spectrally-referencing constructions is palpable, and represents a further example of Dalbavie’s process-based compositional approach, leading in this case not to a particular ‘axis of resonance’ but to a culmination on a chord that might be viewed as the theme’s ultimate goal, manipulating the quality of each component to achieve the desired effect.

A final note is important with regard to this thème d’accords: after an identical repeat of the theme shown in Ex.15, there is a second melodic line that employs, rather than the rational rhythms of the theme’s first appearance, a combination of rational and irrational values (Ex.18).\(^73\)

The harmonies here are, for the most part, similarly based around triads and ‘resonant’ added pitches (there are several chords that appear in both versions of the theme, marked * in Ex.18), so that, whilst the rhythms are altered, the character of the initial statement of the theme is preserved by the quality of the sonorities employed. Therefore, despite the difference in the rhythm and the precise harmonic objects which are present, this is recognisably the same theme, despite the additional, interpolated chords, which in any case retain the distinctive, resonant character of the first version of the melody.

\(^{73}\) In French terminology, rational values would in this case be the crotchets, quavers and semiquavers which are divisible by even numbers, and irrational values would be those values indivisible by two - in this case, the quaver triplets.
La grande forme

Having examined in detail selected objects and processes which contribute to *Sinfonietta*’s discourse, it becomes necessary to consider the global form itself. One of the chief concerns of the first generation of spectral composers was to take into account the totality of their works, partly in answer to the ‘generative’ approach of the serial composers, to whose music they were, to a degree, composing in reaction, and partly since, in taking sound as their model, it was probably inevitable that, whilst not ignoring the detail of their works, the listener’s appreciation of the entirety of a work would be brought into play. To this end, as mentioned in Part 1, Grisey spoke of a ternary form in certain of his works, inspired by the model of human respiration, with its own ‘ternary’ cycle of inhalation, repose and exhalation, whilst Murail seemed to take a more ‘technological’ model as inspiration, at least in his earlier works, such as in the aforementioned *Mémoire-Erosion* (1976) for horn and ensemble.

It now begins to be apparent, after consideration of the processes that animate *Sinfonietta*, that Dalbavie, in many of his works, has indeed retained certain techniques pioneered by the first generation of spectral composers. Murail’s borrowing of a studio technique to generate a form is clearly very similar to Dalbavie’s concept of a ‘multi-track’ symphony and his ‘principle of coincidence’ and the processual aspect of spectral music is certainly preserved – even extended – by Dalbavie’s ‘polyphony of process’.

As noted at the head of this chapter, when *Sinfonietta* is perceived in its entirety, Dalbavie’s intentions become explicit. The various objects that have been examined above interact with one another, sometimes causing each other to alter in unexpected ways, sometimes disappearing before resurfacing in a later context. Yet, taken together, they create a sense of thematic, motivic, *symphonic* unity that is only truly comprehensible with hindsight.

The listener is helped in this regard by *Sinfonietta*’s closing pages, beginning at bar 511. The final phase is reintroduced in an exact reprise of material from the scherzo second movement. However, after only forty-nine bars, at bar 558, there appears a sustained D4 on the trombones, followed by a CS on trumpets and flutes – thus introducing a variant of the color theme, which is now heard alongside a variant of the rhythmic motive and the pulsed chord motive. These vie for control of the final bars, before the color theme dies away, leaving the rhythmic motive to reduce, on its final five appearances, from twelve notes, to eight, four, three, two and finally a single pitch. Yet that single
pitch, C, happens also to be the top note in the pulsed chord motive as it finally appears, punctuating the appearances of the rhythmic motive, prompting one to question whether, finally, the one has been subsumed into the other (Ex.19).

This closing passage is representative of much of Dalbavie’s music, illustrating the expressive potential of his methodology, and it only remains to say that, whilst the process of reduction that takes place here can only be fully traced upon examination of the score, the aural effect of *Sinfonietta’s* coda is to create the impression of multiple strands of music coalescing, then fading away – which, after all, is exactly what may be observed in the score’s notation.

**Conclusion**

How close, then, is Dalbavie’s *pensée spectrale* to the spectral school of the 1970s and 1980s? As noted at the outset, *Sinfonietta* may be perceived as containing a high degree of consonance and it
is perhaps significant that Dalbavie’s music has found acceptance worldwide, including with some of the major American orchestras, which have a (sometimes undeserved) reputation for avoiding music that might be perceived as too ‘new’ or too ‘difficult’ for listeners (hence Manoury’s description cited above (see footnote 45) of ‘acceptable’ works being composed in the ‘Philharmonic style’).

Nevertheless, Dalbavie’s music possesses a surprising level of complexity, and the discoveries of *L’Ecole spectrale* have played a major part in the elaboration of his working method. Whilst melody and tonal references, including minor triads, are important elements in Dalbavie’s work, and despite the comparative rarity in many of his recent works (in Sinfonietta, it must be noted, this is a total absence) of the quarter-, sixth- or eighth-tone microtonality employed systematically by the spectralists to obtain increasingly fine control of harmonic phenomena, there remains in his handling of processes, his use of extended resonant harmonies and his desire to focus the listener’s attention on chosen objects or ‘axes of resonance’ a kind of ‘spectral attitude’. As Grisey put it, ...‘spectralism is not a closed technique, but an attitude.’ (Grisey, 2008: 265-266).

It therefore seems clear, in the light of the foregoing analysis, that (to attempt to answer Deliège’s rhetorical question) whilst Dalbavie has not been a purely spectral composer – if such a thing exists – for more than two decades, his experience of spectral composition remains a rich source of technical procedures and of musical expressivity.

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74 These include the Chicago Symphony, the New York Philharmonic, the Minnesota and the Cleveland Orchestras.

75 See page 5 and footnote 3 for a fuller quote and the original French.
Kaija Saariaho studied at the Helsinki Conservatory and with Paavo Heininen at the Sibelius Academy. Attending the famous summer school at Darmstadt in 1980, she met and was taught by Brian Ferneyhough and Klaus Huber, with both of whom she studied subsequently at the Musikhochschule in Freiburg. Perhaps more significantly for her future, she encountered in Darmstadt the music of the spectral composers Gérard Grisey and Tristan Murail, whose work provided an attractive alternative for Saariaho to the post-serial approach that she had been pursuing until this point. After attending the computer music course at IRCAM in 1982 she moved to Paris, where she has lived ever since.

Saariaho’s compositions from the first years after her move to Paris include Verblendungen (1982-84) for orchestra and tape, and Lichtbogen (1985-86) for flute, percussion, harp, piano, string quartet and double bass, both of which works demonstrate clearly the influence of spectral thought. In the composer’s words:

Verblendungen is a piece for tape [whose] basic material consists of two violin sounds, a sforzato and a pizzicato… The organisation of these timbres [is] founded on the idea that the orchestra and the tape follow opposite directions on the axis between sound and noise76 (Saariaho, 2013: 272)

The harmonic material [of Lichtbogen] comes from the analysis of short transitions played on the violoncello, from an artificial harmonic sound to complex sonorities – ‘multiphonics’. 77 (Saariaho, 2013: 275)

These descriptions seem typical for Saariaho, whose programme notes indicate frequently her shared preoccupation with the spectralists concerning timbre and instrumental colour, although it is

76 ["Verblendungen est une pièce pour bande [dont] le matériau de départ consiste en deux sons, un sforzato et un pizzicato de violon… L’organisation de ces timbres répond [à] l’idée que l’orchestre et la bande suivent des directions opposées sur l’axe son-bruit.”].

77 ["Le matériau harmonique provient de l’analyse de brèves transitions jouées au violoncelle, depuis un son harmonique artificiel jusqu’à des sonorités complexes, «multiphoniques».”].
noticeable, examining these in chronological order,\textsuperscript{78} that her language moves gradually towards more poetic or expressive description and away from technical details, as time goes on. In writing about her opera *L’amour de loin* (Saariaho, 2000) Saariaho’s emphasis appears to have shifted decisively towards the dramatic potential of her work, making no mention of any compositional techniques beyond her selection of a subject and characters, and her working relationship with other members of the creative team. Whilst the circumstances of a text’s publication might, of course, cause its author to modify its style or content to suit its intended audience, it is striking nevertheless that this trend may be said, in the case of Saariaho’s published writings on her works, to be generalised.

This change in the written presentation of her works to the reader might easily give the impression that spectrally-derived techniques are less significant than previously in Saariaho’s work, or at least that they have receded to a point where they represent a background influence rather than a major compositional technique. A typical recent work might bear a superficial sonic resemblance to, say, Tristan Murail’s *Gondwana* (Murail, 1980) – and yet there is often a noticeable element of a type of melody not found in the emblematic works of the spectralists, as well as a general level of complexity that would, potentially, defeat the purpose of a ‘pure’ spectral composer by obfuscating the sonic material that was the *raison d’être* of the work itself.

Given Saariaho’s background as a composer influenced by spectral techniques, yet whose more recent work seems to have acquired a wider set of references – simultaneously entering the mainstream repertoire\textsuperscript{79} - it is interesting to examine her work in a post-spectral light in order to discover what, if anything, remains of the spectral approach in Saariaho’s current output.

The present study will focus on *Laterna Magica*, which, through its formal, harmonic and motivic complexity, affords the opportunity to uncover a great deal with regard to Saariaho’s working method. It is also significant that much of Saariaho’s music is influenced by poetry, literature or the visual arts, as well as by the physical phenomenon of light in varying forms (such as the abovementioned *Lichtbogen*, whose first influence was the *Aurora Borealis* – the ‘Northern Lights’).

\textsuperscript{78}Saariaho’s complete notes on her works were published, in French, as *Journal des Oeuvres* in Saariaho (2013).

\textsuperscript{79}According to the website of Saariaho’s publisher, Chester Music – part of Music Sales Classical (Music Sales Classical 2015), two of her recent works, *D’om le vrai sens* (2010) and *Laterna Magica* (2008) have received thirty-seven and thirty-one performances to date respectively – a situation which, for works composed only five and seven years ago respectively is extremely unusual. Both have also been issued on the same CD release (Ondine, 2011).
Inspired as it was by the autobiography, as well as by the work (particularly the film *Cries and Whispers* of 1972), of Swedish film director Ingmar Bergman, *Laterna Magica* represents a work which may be described as emblematic of the composer’s music.

**Formal divisions**

Saariaho takes great care in *Laterna Magica* to create an overall form which moves elegantly from one type of material to the next, giving the impression of a single seamless structure. Nevertheless it will be useful, in discussing the work, to be able to refer to each section in turn, and therefore for the purposes of the present analysis, I suggest that the form of *Laterna Magica* may be divided into six sections, each of which represents a different compositional approach or prevailing stylistic character. These divisions are not Saariaho’s – at least, the score contains no such explicit suggestion – and it is perhaps unlikely that the listener will perceive the boundaries between these sections as clearly as the following scheme might suggest, but it will facilitate the following discussion (Fig.1).

<table>
<thead>
<tr>
<th>Section</th>
<th>Bar/Rehearsal mark</th>
<th>Prevailing characteristic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Dialectic between chordal strata and melodic theme</td>
</tr>
<tr>
<td>2</td>
<td>102 (Rehearsal [7])</td>
<td>Transition to chaconne: melodic development</td>
</tr>
<tr>
<td>3</td>
<td>139 (Rehearsal [10])</td>
<td>Chaconne/Recitation of text</td>
</tr>
<tr>
<td>4</td>
<td>226 (Rehearsal [17])</td>
<td>Development of harmonic/melodic dialectic</td>
</tr>
<tr>
<td>5</td>
<td>316 (Rehearsal [24])</td>
<td>Development continues; quasi-continuous semiquaver texture</td>
</tr>
<tr>
<td>6</td>
<td>439 (Reh. [34]+7)</td>
<td>Coda – interplay of assorted materials</td>
</tr>
</tbody>
</table>

Figure 1: Saariaho: *Laterna Magica*: Proposed formal divisions

As will become clear, there is a great deal of shared material between these sections, with certain chord progressions and melodic motives reappearing in more or less altered forms throughout the work. Whilst Saariaho’s music cannot be analysed satisfactorily in purely classical terms, there remains a high degree of harmonic and melodic development at work in *Laterna Magica*, to the extent that she achieves a sense of structure which might nevertheless be viewed as analogous to the formal principles represented by certain classical forms.

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80 Also entitled *Laterna Magica*, in reference to the early ‘magic lanterns’ that were the first machines which permitted static images to appear to ‘move’.
In order that the global structure can be properly understood, since Saariaho’s writing is of a degree of complexity that might not be immediately perceptible upon first hearing the piece, it will be useful to describe certain aspects of the composer’s style as they appear in *Laterna Magica*, before examining how each operates within the work’s wider discourse.

**Harmony and Harmonicity**

As discussed in the Part 1, one of the principal techniques employed by the spectral composers of the 1970s and 1980s involved the manipulation of harmonic objects to achieve control over their degree of harmonicity, that is, the degree to which a chord resembles a harmonic spectrum and therefore the overall impression that the listener is likely to receive of a sensation of consonance or dissonance. Whilst a composer working outside the context of ‘pure’ spectral music might not specifically employ such a technique, it is noteworthy that a similar approach might nevertheless offer the means to create a harmonic discourse in an analogous manner.

It is immediately apparent from the opening section (bars 1 – 101) of *Laterna Magica* that harmony will form a significant and sophisticated element of the work’s discourse. Throughout the piece, Saariaho employs a series of chords, which display a range of characteristics and which contribute collectively to the articulation of the work’s global form. As a composer who has worked at IRCAM, and whose previous experience has included a high degree of spectral thought, it might seem inevitable that the harmony in *Laterna Magica* will display traces of spectral construction. In fact, whilst this will indeed be seen to be the case, additional aspects of the work’s harmony mean that it is rather more complex than such an assumption would suggest.

The work opens with a complex chord (chord A) which is chiefly composed of two harmonic elements which, as will be shown below, belong to two distinct strata of chords. The first is an ‘all-interval’ chord (chord a) played by six horns, and the second is a five-note chord played by divided strings (chord 1), as shown in Ex.1.

Ex. 1: Saariaho: *Laterna magica*, opening harmony (bar 1)
It is noteworthy, in the manner in which Saariaho arranges these two elements, that both chord a and chord 1 bear a relationship to forms of spectra. In the case of chord a, containing the notes B₂, G₃, D₄, Eb₄ and F♯₄ might be seen to refer to partials 5, 8, 12, 13 and 15 of a harmonic spectrum with fundamental G₀ (24.5Hz), with the remaining pitch (Ab₃) representing an ‘inharmonic’ element through the downward transposition by an octave of partial 17 (Ex.2).

In the case of chord 1, the manner in which Saariaho voices the chord suggests, if one is familiar with spectral techniques, that she is employing a type of compressed spectrum with a fundamental A₁ (55Hz), in much the same manner as may be found in works such as Grisey’s *Vortex Temporum* (1995) *L’Icône paradoxale* (1996), and *Quatre chants pour franchir le seuil* (1998). In the present case, if this is indeed the method by which Saariaho has constructed this chord, she has employed a rather simple process, lowering the second, third and fifth partials by a semitone (A₂, E₃ and C♯₄ becoming G♯₂, Eb₃ and C₄), and the fourth partial by a tone (A₃ becoming G₃) (Ex.3).

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81 This method for analysing the harmonic content by assigning a theoretical fundamental, thus rationalising a chord by relating it to a harmonic spectrum, was proposed by the Belgian musicologist Célestin Deliège (Deliège, 2001), who based his own research on the similar theories of Hindemith.
It will also be noticed that the actual pitch content of chord a and chord 1, as shown above, is for the most part, unique to each. Upon closer examination, however, it becomes clear that there is a close intervallic relationship between the two. Employing Allen Forte’s method of pitch class analysis (Forte 1973), one can see that chord a may be reduced to the unordered set \([0,1,2,5,8,9]\) and that chord 1 may likewise be reduced to the unordered set \([0,1,2,5,8]\). Furthermore, when combined to form the global sonority that opens the work (chord A), the aggregate of all of these pitches gives the unordered set \([0,1,2,3,5,6,8,9]\), demonstrating, through the common elements \([0,1,2,5,8]\) and the resultant high degree of intervallic similarity between the two component sets and their combination, the identity of chord a and chord 1 as subsets of chord A.

In the context of the work’s opening, the coexistence of these two timbrally distinct, yet intervallically related entities, which as chord A create a third, combined sonority whilst refusing to fuse into a single unified timbre, provides a paradoxical condition of unity and incongruence, a condition which proves, as the piece unfolds, to be one of the principal means by which Saariaho articulates the work’s global form. From this single harmonic occurrence it becomes noticeable that, whilst there is, in terms of the significance for these chords of the parameters of timbre and of harmonicity, a degree of spectral thinking in play at the outset of *Laterna Magica*, it would seem that the composer’s harmonic approach is rather more sophisticated than this alone would tend to permit, since it apparently also bears the imprimatur of post-serial techniques.

This contention is borne out as the opening section of the work progresses. Section 1 comprises two series of chords, the first (chords a-g) performed by the six horns, the second (chords 1-8) by divided strings. Furthermore, this harmonic dialogue between two distinct harmonic progressions is broken up by frequent appearances of motivic-melodic ideas, which are developed in a variety of manners and which will be discussed subsequently. The complete harmonic progression that makes up the first section is shown in Ex. 4.

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82 The exceptions to this are the G3, which is common to both chords, and the pitch class A flat/G sharp, which likewise appears in both, albeit in different registers.

83 It should not be forgotten that Saariaho’s early compositional experience was with post-serial techniques, and that she studied with (in particular) Ferneyhough, whose own music relies heavily on such methods.

84 There is another chord in section 1 which, as will become clear later, does not feature in later developments of this chord progression. It is therefore to be considered as apart from chords 1-8, and is therefore marked ‘x’ in Ex. 4.
Ex.4 Saariaho: *Laterna Magica*: Harmonic progressions in Section 1 (bars 1 - 102)
It is noteworthy that there are frequently one or more common pitches between each chord and the next, both within each discrete stratum and between the two strata, creating a sense of continuity which seems likely to remain with the listener, despite the motivic-melodic interjections which threaten to break the progression’s integrity. It is also striking that each of these chords could be viewed as spectrally-derived, or at least as bearing some relationship to one or more harmonic or inharmonic spectra, since, firstly, each chord’s construction mimics the model provided by the harmonic series (large intervals in the bass and increasingly smaller intervals as the chord ascends into the treble) and, secondly, each could be analysed according to Deliège’s proposed method, as demonstrated for chord 1 above. For the purposes of the present study, however, it will be sufficient to note that each chord rests on a specific fundamental pitch and that, as the first section of the work unfolds, Saariaho’s choice of chords, and their voicing (shown in Ex.4) enables her to control the level of harmonic tension inherent in the music.

This is accomplished in a manner similar to that employed in, for example, Grisey’s Partiels (Grisey, 1976a). As shown in the introduction to the present thesis, in this work Grisey begins with a harmonic spectrum on E (41.2Hz), employing a linear process of increasing inharmonicity to draw the musical discourse forwards and heighten the tension for the listener. Saariaho’s approach in Section 1 of Laterna Magica is much more harmonically ambiguous, yet arguably it represents a similar process. The progression of chords that she employs might rather be described as nonlinear, in that, instead of proceeding from a harmonic spectrum, via increasing inharmonicity, to a construction with extremely inharmonic tendencies, not one of the chords that she employs is completely harmonic, with the result that at no point does the discourse come to rest on a wholly consonant chordal construction. Rather, a much more complex situation occurs, which due to this complexity is much more problematic to analyse in terms of its perception by the listener but which allows Saariaho to open the work with music which creates an atmosphere of expectation, and even, perhaps, disquiet, preparing the way for the development which follows.

It is plausible that these chords were constructed without deliberate, or conscious, reference to spectral means – in her article ‘Harmony in my music today’, the composer explains that ‘...for me, the intuitive approach has always been primordial where harmony, and composition in general, are concerned.’ 85 (Saariaho, 2013: 178) – and yet, conversely, the characteristics displayed by these harmonic elements, as well as the manner in which they interact, suggest a high degree of logical construction. Ultimately however, it must be concluded from the material itself that, whether

85 [“...pour moi, l’approche intuitive a toujours été primordial en ce qui concerne l’harmonie et la composition en génerale.”]
conscious or unconscious, deliberate or intuitive, Saariaho’s sense of harmony continues to bear the imprint of her spectral heritage.

A hidden ‘chaconne’

Harmony continues to animate *Laterna Magica* as the work continues. Section 3 (bars 139-225), for example, takes the form of a whispered recitation (which will be discussed in more detail below) by the members of the orchestra, which consists of a short excerpt from Ingmar Bergman’s autobiography, appearing – perhaps surprisingly – to take the form of a chaconne.

There are three repetitions of a basic progression of chords, which, despite their minor pitch differences resulting from Saariaho’s manipulation of each chord’s voicing are nevertheless based on a series of eight fundamental pitches which form the progression’s lowest pitches; one might even describe them, with a degree of accuracy, as a bass line. These pitches, A natural, A flat/G sharp, B flat, B flat, B natural, D natural, C sharp and G natural, are shown, along with the chord progression that they underpin, in Ex. 5.

This sequence of chords, the bass notes (and much of the other pitch class content) of which are directly related to chords 1-8 from section 1 (see Ex.4, above), is employed by Saariaho in an almost strophic manner. In addition to the sense of return that each new beginning on the first chord (with the bass note A natural) offers to the perceptive listener, Saariaho punctuates each appearance of these eight chords with melodic material derived from a rapid semiquaver motive (which will be discussed in detail subsequently), performed by muted trumpets in bars 163-166, and by oboes, supported by (unmuted) trumpets and trombones in bars 190-194.
It might seem too much to describe this progression of chords as a chaconne – such an overtly classical, historical term might seem inappropriate in the context of what amounts to an early 21st-century modernist orchestral work. Nevertheless, this cycling of a series of chords (which is not limited to this section, since much of the rest of the work employs the same progression of fundamental pitches – it remains in operation throughout much of the ‘development’ represented by sections 4 and 5, although the progression is often fragmented and the harmonic rhythm varied) is clearly a significant component in the composer’s formal construction of *Laterna Magica*, and may at least be viewed as referencing the form of the chaconne, even if the level of surface detail present tends to conceal such a form within the overall complexity of the discourse. Furthermore it is interesting that, in his lecture given in June 2013 at IRCAM, Saariaho’s compatriot Magnus Lindberg describes (haltingly) the opening section of his work *Joy* (1990) in precisely these terms:

> The harmonic world I organise... I’ll set it up in a way that it becomes somehow the core of a certain work. I spoke about a chaconne, but in a way it’s a classical... it’s a stupid word for it, but after all it is a chaconne, but what I mean with is that for me it’s not arbitrary that the chords chosen are built around certain root positions. (Lindberg, 2013: 20’12”)

The fact that Lindberg, whose background mirrors Saariaho’s to a high degree, is willing to use the word, and the (at least) superficial similarities in his and Saariaho’s thinking lend a degree of credence to the view that *Laterna Magica* is indeed, in part, constructed upon a ‘hidden’ chaconne. To what extent, though, may such a construction be related to any measure of spectral composition? In its historical reference a chaconne-like structure suggests a technique that predates the spectral school of composition by three centuries, and therefore that perhaps the underlying principles of this part of *Laterna Magica* are less concerned with the latter than with some quasi-classical method. In fact this passage is another indication of Saariaho’s compositional evolution with regard to – or perhaps it would be more accurate to say her enrichment of – the basic ‘pure’ spectral techniques of, for example, Grisey or Murail. Whilst formally there appears to be a chaconne-like structure in this passage, the overall trajectory of the texture of Section 3 is modified through a process of filtering so that each repetition of the ‘chaconne’ progression evolves, in terms of its texture, and therefore its precise harmonic content, from its predecessor. This processual attitude

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86 Both Saariaho and Lindberg studied at the Sibelius Academy with Paavo Heininen, both studied with Brian Ferneyhough, both were influenced by, in particular, Gérard Grisey (Lindberg, additionally, studied with Grisey in Paris) and both have worked at IRCAM.

87 Lindberg’s evident discomfort at using the term ‘chaconne’ is instructive, since it appears to demonstrate a desire to avoid being labelled, perhaps, a neo-classicist, or a neo-tonalist – whilst, presumably, remaining entirely comfortable in his own mind about the validity of the term.
to composition, similar to that in operation in Section 1, as discussed above, bears a great resemblance to the approach of the spectralists in its slow transformation of material. In this respect it is useful to remind oneself of Murail’s (perhaps provocative) comment, discussed in the introduction, that ‘there is not (sic) such thing as spectral music per se. There are spectral methods or spectral techniques and then you can do whatever you want with them.’ (Murail, 2010: 108). This seems, in many respects, an apt description of Saariaho’s approach to harmony and texture in Section 3 of *Laterna Magica*.

**Melody**

One of the fundamentals of music which is conspicuous by its absence from ‘pure’ spectral music is melody. In one sense, given the spectralists’ preoccupation with timbre, harmonicity and periodicity, as well as the emphasis that they placed on the concept of a work as a single, unified whole (rather than as the result of a generative serial process) this is not surprising, since melody plays little part in each of these musical dimensions. Emblematic spectral works such as Grisey’s *Partiels* (Grisey, 1976a) or Murail’s *Gondwana* (Murail, 1980) make no use of melody in the traditional sense, and even Grisey’s *Prologue* (Grisey, 1976b) for solo viola, which employs neumatic principles derived from plainchant does so in order to produce forms which will be subjected to processes more in keeping with spectral principles than ‘classical’ melodic-motivic development.

A work which displays melodic characteristics, therefore, might seem problematic for analysis in spectrally-influenced terms, since it might be assumed that the use of melodies or motives will undermine the work’s relationship with spectralist principles. In the case of *Laterna Magica*, however, melodic, or rather motivic writing is employed in an extremely flexible manner, allowing ideas to be modified and developed with great suppleness which, it could be argued, reflects, rather than rejects, spectral thinking.

The first idea that might conceivably be described as melodic occurs in bar 6. Spanning almost three octaves, this motive (motive a, Ex.6) contains a high degree of chromaticism, although the effect of this is softened somewhat by the precise intervals involved.

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88 This is unsurprising, of course, given the ‘chaconne’ progression’s relationship to chords 1-8 from section 1.
On the face of it this motive would not sound out of place in a high-modernist serial work from the 1950s. The intervals – a descending minor ninth, an ascending perfect twelfth, an ascending diminished fourth and a descending semitone – create in themselves no clearly perceptible tonal centre and the sustaining of each pitch by brass instruments and by the resonance of the harp, piano and percussion only adds to this tonal ambiguity. However, it must not be forgotten that chord 1 continues to sound on lower strings behind motive a’s first appearance, and that this first melodic statement has been prefaced by the horns’ chord a – and that therefore the cumulative effect of chord A, fresh in the listener’s memory, will continue to have a bearing on their perception of this motive. It is also noteworthy, in the light of the foregoing analysis of *Laterna Magica*’s harmonic aspect, that motive a, if reduced to an unordered pitch class set, may be represented as \{0,1,2,3,6\}, and thus displays common intervallic content with chords a and 1 – and an even closer relationship with, since motive a is therefore a subset of, chord A.\(^89\) What is more, the fact that Saariaho sustains each pitch to create a combined sonority, (as well as creating an echo effect on the final two pitches, G flat and F natural, by means of overlapping repetitions on oboes and clarinet), lend the motive, finally, a secondary identity as a harmonic, chordal object (Ex.7).

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\(^{89}\) It is also important that both motive a and chord a share the four pitch classes G, A flat, D and F sharp/G flat, and are therefore related not only intervallically but in their actual content.
The second melodic motive to be heard (motive b), in bars 17-20, is performed by four trumpets and takes the form of a rapid ascending figure in semiquavers and triplet semiquavers (Ex.8).\(^9\)

\[\text{Ex.8: Saariaho: Laterna Magica: motive b (bars 17-20)}\]

Whilst on paper motive b appears to be a completely different type of musical object from motive a, upon closer examination – and certainly upon hearing this motive in the context of the work – it may be seen that there is a shared privileging between the two of the pitch classes G and A flat, which were the first two pitches heard in both instances. Furthermore, the pitch class G natural is the lowest pitch of motive a (meaning that as its identity transforms from melodic to harmonic as discussed above, G natural becomes the root underpinning the resultant chord), and is the last, and highest pitch of motive b, (providing motive b with its ultimate goal and most prominent note). When, therefore, motive a is taken in conjunction with the horns’ chord a, which, as discussed above, might be viewed as a harmonic spectrum with an added (inharmonic) element, with a fundamental G, the question inevitably arises as to whether the pitch class G really is beginning to function as a kind of surrogate tonic, or axis, for this part, at least, of the work.

Throughout the piece motives a and b are subjected to a large number of transformations, which permit Saariaho to develop the work in multiple directions. Variants of motive b, for example, may be found alternating with the chords discussed at length above, as well as in more thematically-developed forms such as those performed by oboes at figure 14 (bar 190) and trumpets at figure 36 (bar 458) (Ex.9a and b).

\[^9\] In her notes on Laterna Magica, Saariaho describes ‘...very dynamic rhythmic material inspired by flamenco.’ [‘...un matériau très dynamique inspiré par le flamenco.’] (Saariaho 2013 : 332-333). It seems likely that it is to motive b that she is referring.
Derivations such as the one shown in Ex.9a and b occur frequently in *Laterna Magica*, each time (as here) retaining certain characteristics of the original motive, such as the semiquaver/triplet semiquaver rhythmic profile and the rising melodic contour, as well as employing timbrally-related instruments (generally trumpets or oboes) to enhance the listener’s perception of the relatedness of each presentation.

Due in large measure to the frequency and pervasiveness of the appearance of these developments, motive b might seem to be the more vital of the two in *Laterna Magica*. Credence is lent to this view by the fact that in addition to these frequent appearances its influence on the prevailing texture of large parts of the piece is clear; both sections 2 (bars 102-138) and 5 (bars 316-438) rely to a high degree on a texture of almost-continuous semiquavers derived from motive b. Representative figures which demonstrate this derivation are given in Ex.10a and b.
Ex.10a: Saariaho: *Laterna Magica*: Section 2; texture derived from motive b (bars 113-116)
Taken at the larger structural level, however, the significance of motive a as a formal device is revealed, since its few appearances, although they always retain the same basic gestalt form, occur at important turning-points in *Laterna Magica*’s discourse:

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Bar no./rehearsal no.</th>
<th>Tempo/performance indication</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
<td>Doloroso</td>
<td>First exposition</td>
</tr>
<tr>
<td>2</td>
<td>96</td>
<td>Maestoso, poco grave</td>
<td>Close of Section 1</td>
</tr>
<tr>
<td>3</td>
<td>245</td>
<td>Subito doloroso</td>
<td>Developmental</td>
</tr>
<tr>
<td>4</td>
<td>303</td>
<td>Calmo, maestoso</td>
<td>Developmental</td>
</tr>
<tr>
<td>5</td>
<td>308</td>
<td>Maestoso</td>
<td>Developmental</td>
</tr>
<tr>
<td>6</td>
<td>439</td>
<td>Doloroso</td>
<td>Developmental</td>
</tr>
</tbody>
</table>

Figure 2: Saariaho: *Laterna Magica*: Appearances of motive a

As fig. 2 shows, motive a appears at the work’s opening (bar 6), then in a transposed, but otherwise intervallically-identical form at the close of the first section (i.e. just before the first rapid semiquaver texture marking section 2 begins). There are then four more appearances, each of which is subtly different from the others, whilst conforming to the original gestalt form of the first occurrence (Ex.11a - d).
These four appearances of motive a (Ex.11a-d) serve to interrupt the discourse generated by the interaction of motive b-derived semiquaver material and harmonies in section 4. The effect thus obtained is one of friction between these differing objects, resulting in a sense of material being juxtaposed and forced to coexist in a manner analogous to a classical development section.
Given the principle of constant development implied by the ‘generative’ procedures of the serialist composers of the 1950s and 1960s, and the influence that their works exerted upon subsequent generations, it is difficult to find an example of a work which so overtly employs juxtaposition as a developmental technique, unless one turns to the works of Messiaen. It is striking that in the latter’s Turangalila-symphonie (Messiaen, 1949), the eighth movement, which represents that work’s development section (indeed, its title is ‘Développement de l’amour’), Messiaen interrupts rapid, pulsed, rhythmic material with outbursts of the symphony’s ‘theme d’amour’ in largely homophonic form – in much the same way as Saariaho does with motive a in Laterna Magica. This may be coincidental, of course but this commonality of approach surely allows the establishment of something of a precedent for Saariaho’s employment of a similar approach in the present work.

In any case, it is clear to see that Saariaho’s motivic-melodic melodic ideas in Laterna Magica have several important functions; as cells which allow the generation of large-scale textures, as collections of pitches that can give rise to harmonic entities, as in the case of motive a, and as markers, or signals, at structurally important moments – as well as melodic motives in their own right. As suggested above, this functional multiplicity seems to embrace, rather than to deny, spectral thinking, since the objects in question – which happen, in this case, to take the form of melodic motives – are not employed as generators of a thematic discourse, but as sonic entities in their own right which are then developed according to a variety of processes.

**Tonal allusion**

Whilst it would be incorrect to describe Saariaho’s music as tonal, and whilst she makes no use of conventional (common-practice tonal) harmonic functions, there is a distinct possibility that the listener to, for example, Laterna Magica will perceive a kind of allusion to tonality in Saariaho’s constructed harmonic discourse. As discussed above, there appears to be a privileging of the note G early in the work, and the ‘hidden’ chaconne described earlier implies by its very nature a repeated return to a harmonic starting point.

This view is reinforced by the composer herself: in her 1995 article ‘Harmony in my music today’, she states, ‘A general rule is that my harmonic constructions contain a ‘principal chord’, which one may

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91 As described, in the context of the music of Pierre Boulez, by Jonathan Goldman (Goldman, 2011).
92 Although, living in Paris, with a heightened awareness of Messiaen this seems unlikely – Pirkko Moisala, in her biography of Saariaho (Moisala, 2009), mentions him several times as an influence, and it was Messiaen’s opera Saint Francois d’Assise (Messiaen, 1983) that provided the impetus for Saariaho’s own L’amour de loin.
consider as the equivalent of the tonic chord in tonal music.’ (Saariaho, 2013: 181). In *Laterna Magica* this principle is illustrated by Saariaho’s decision to employ certain chords as markers (in much the same manner as she employs motive a, as discussed previously), which lend not only a sense of structural integrity to the work as it progresses through differing textures and harmonic environments, but also, through the repetition of certain privileged harmonies, a point of reference that allows for a sense of return to a quasi-tonic sonority. It is instructive to read the composer’s own comments, which provide an insight into the composer’s intention in this regard:

In contrast with... materials dominated by a strong rhythmic identity, I made use of textures devoid of pulsation... in the form of the six horns which intervene regularly... and which make reference to Bergman’s film *Cries and Whispers* (1972) in which different scenes are linked by a red-screen transition.’ (Saariaho, 2013: 333)

The clearest indicator of this phenomenon is the frequent return to the horns’ chord (chord a) from bar 1. This is heard in its original form (which is to say as a block chord on six horns) three times in section 1, then once again at the beginning of section 4. Two bars later, in bar 231, it reappears, once again on the six horns, but this time it is given a slightly modified identity, since each pitch is rhythmicised using patterns of, in general, quavers, triplet quavers and semiquavers (Ex.12).

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93 [“En règle générale, mes constructions harmoniques comportent un «accord de base» que l’on peut considérer comme l’équivalent de l’accord de tonique dans la musique tonale.”].

94 [“En contraste avec... matériaux domines par une forte identité rythmique, j’ai fait usage de textures dénuées de pulsation... a l’image des six cors qui interviennent régulièrement... et qui font référence au film *Cris et chuchotements* (1972) de Bergman, dans lequel les différents scènes s’enchaînent grâce à une transition par un plan rouge.”].
Chord a then reappears in its original form, but on stopped horns in bar 286, where the texture changes and the piccolo is assigned a sustained melody, then again in bar 293, between two appearances of motive-b related material on trumpets. In bar 362 it appears, once again rhythmicised – although here the texture is even more complex than in bar 231, since each horn moves between pitches (whilst retaining the durational sequence that it was assigned in bar 231, ex.12, above), and because the trumpets extend the principle further into the treble (Ex.13).

![Ex.13: Saariaho: Laterna Magica: chord a rhythmicised (changing pitches) (bars 362-363)](image)

After two more appearances in bars 413 (applied to a syncopated quaver-crotchet pattern) and, once again in its basic form, in bar 442, chord a returns to close the work in the final six bars, where slow fluctuations of pitch threaten to cause the harmony to disintegrate, before finally coming to rest in the form in which it opened the piece (Ex.14).
It should be mentioned that each appearance of chord a always takes place in conjunction with other elements, whether it is juxtaposed with a contrasting melodic motive or it forms part of a larger progression of chords. Furthermore each of the other chords shown in Ex.4 above reappears many times (in more or less altered forms) throughout the work, and it must be admitted that in a non-tonal context, theoretically at least, any chord, or pitch, or sound could be made to function as a quasi-tonic by the composer, depending on the manner in which it is caused to interact with the other objects in the work in question. Therefore, if one is to identify chord a as *Laterna Magica*’s surrogate tonic, further evidence is required.

In the event this evidence seems conclusive, since, first and foremost, chord a opens and closes the work. It is possible that a listener will perceive this connection if their ear is sufficiently musically developed, and even if this is not the case, Saariaho has invested the chord, through her choice of intervals, with a particular timbral and harmonic identity which provides a sense of stability, permitting the work to open and close in a similar manner. Additionally, it is noticeable that many of the appearances of chord a occur at significant structural points in the work, assigning a function for chord a which may be considered to be analogous to the return of the tonic chord in a common-practice tonal work. Clearly Saariaho’s hope is that this chord will provide a frame of reference for the listener, within and around which the rest of the work can function.

Once again, if this premise is accepted, it is important in the present context to ask whether this is another indicator of a move away from spectral composition for Saariaho. Whilst the spectralists were trying to distance themselves from the Boulez-led serial and post-serial aesthetics, they were equally concerned with escaping historical methods as exemplified by, for example, the common-practice tonal system. It would therefore, once again, be easy to assume that the presence of a
tonic-like sonority in a work will counteract any spectrally-derived thought, drawing the discourse away from the piece’s processual, evolitional aspect in favour of a more traditional harmonic structure. Yet once again it becomes clear that Saariaho has found the means, through the sparing — and strategic — use of Laterna Magica’s ‘tonic’ chord, to merge the two techniques into a single inclusive approach, allowing the work’s harmonic discourse to unfold as shown above in connection with the ‘chaconne’ of Section 3 and the harmonic contour of chords 1-8 in Section 1, whilst achieving a clear sense of closure as the music returns to its opening chord in its final bars.95

**Periodicity**

As noted in the introduction to this thesis, the ultimate aim of the spectralists was to base their compositional work on the fundamental characteristics of sound. One of these characteristics, without which sound cannot exist, is periodicity. Given that all sounds are, fundamentally, vibrations in a given medium (such as air or water) which are then perceived by the human ear and interpreted by the brain, it is unsurprising that part of the spectralists’ research involved the examination of how sounds behave in time — in other words, the study of the periodicity of the waves at the root of all sounds for potential exploitation in the domain of composition.

One of the practical consequences of this research was the ability to ‘stretch’ time, musically speaking. Returning once again to Grisey’s *Partiels* (Grisey, 1976a), at the work’s very opening there appears (as, likewise, discussed above) a low E (41.2Hz) on trombone (doubled an octave lower by double bass), followed by an instrumental synthesis of the component frequencies of the sound spectrum produced by a trombone playing that pitch. In order that this would be perceptible to the listener, Grisey extended the timescale over which this takes place, so that a short note on a trombone in real time becomes a passage lasting several seconds in the piece. This permits the listener to experience, via simulacra, the sound that is being synthesised from the ‘inside’, so to speak — or, at least, over a timescale to which the human brain can more easily adapt.

Whilst Saariaho, by the time she composed *Laterna Magica*, had moved away from such a literal approach, there nevertheless exist within the work a number of instances of passages, or sonic objects, which are presented over contrasted timescales. As Saariaho herself says in her introduction

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95 It is also interesting to note that the whole of Grisey’s *Les Espaces acoustiques*, as discussed in the introduction, is based on a fundamental E (41.2Hz). Whilst this is clearly not a tonal work, the constant referencing of this pitch creates a kind of tonal analogy. As Julian Anderson suggests ironically, ‘...in a sense you could call this, if one was being a little bit frivolous, *Partiels* in E major by Gérard Grisey’ (*Radio 3’s Fifty Modern Classics: Gérard Grisey’s Partiels*, 2012).
to the work, ‘...the fundamental idea of the... piece... [is] the variation and interpretation of musical motives in highly varied tempi.’ 96 (Saariaho, 2013: 332).

An example of this approach may be found at bar 113 (shown in Ex.10a above), where the oboes, clarinets and trumpets develop motive b in semiquavers (thus retaining much of the motive’s original character), whilst the piano ‘shadows’ them with material which is clearly derived from the same motive, yet is presented in a polyrhythmic combination of quavers and crotchet triplets.

Likewise, whilst chords 1-8 of Section 1 and the eight chords of the ‘chaconne’ analysed above are neither absolutely identical in terms of harmonic content, and neither are the progressions themselves exactly the same – Section 1 features a number of additional, interpolated harmonies and extends over a timescale of several minutes, whilst the chaconne cycles much more rapidly through the progression – it is noticeable that the overall harmonic trajectory (or, employing an acoustical term, envelope) of the two, as mentioned earlier, is, in essence, the same, suggesting that as well as drawing upon certain of its harmonies, the chaconne progression might reasonably be viewed as an irrational diminution, or temporal compression, of the opening section.

**Liminality**

There is one final aspect of the work of the spectralists – perhaps the most important of all – that is applicable to *Laterna Magica*, and to much of Saariaho’s music in general. As described in the introduction, Gérard Grisey (in common with most spectral composers) found the term ‘spectral’ itself insufficient, and even inappropriate, to describe what they were trying to achieve. One of the alternatives that Grisey proposed (Grisey, 1982) was ‘liminal music’, which is to say music that operates through juxtaposition and contrast of disparate elements in order to force the listener to ‘hear between’ musical objects. Thus two harmonic states might be connected with a glissando, or a series of intermediate chords, the point being not to get from one to the other – the ‘goal-oriented’ paradigm of the Western Classical tradition – but to discover what lies in the boundary (limen being Latin for boundary) between the two objects of states concerned. In Grisey’s work this took the form, variously, of the exploration of the continuum between harmonic spectra and white noise, the effect of the dilation and compression of harmonic spectra and research into timbral manipulation, as well as the use of written texts as the basis for the very structure of a work. 97 Each of these

96 [“...l’idée fondamentale de la... pièce... [est] la variation et l’interprétation des motifs musicaux dans des tempi très différents.”].

97 As in *Quatre chants pour le seuil* (Grisey, 1998), as shown by Baillet (2000).
dialectics between opposites generates a liminal space, which Grisey hoped would act, via the listener’s memory, upon their very perception of the music they were hearing.

*Laterna Magica*, for its part, displays a high degree of liminality in its juxtaposition of different timeframes, as well as in the ‘diagonal’ aspect of the passages that blur the boundaries between ‘vertical’ harmony and ‘horizontal’ melody, such as when ‘melodic’ motive a is sustained to become a harmonic entity, or when motive b is transformed from a melodic cell, through repetition and multiplication, into the basis for the texture of an entire section.\(^{98}\)

Saariaho’s exploration of liminality in *Laterna Magica* reaches its apogee, however, due to her inclusion of, and transformation of, the spoken – or more accurately, whispered – text that having made three brief appearances in section 1 proceeds to occupy the whole of section 3 before disappearing altogether. This text takes the form of an excerpt from Ingmar Bergman’s autobiography – the book that inspired the work in the first instance – in which Bergman describes, in poetic terms, different types and characters of light. Rather than include parts for a conventional chorus, however, Saariaho assigns this role to members of (primarily) the orchestra’s eleven-strong woodwind section who declaim rhythmically the text.\(^{99}\) The first phrase of this recitation is shown in Ex.15.

![Ex.15: Saariaho: *Laterna Magica*: Section 3; recitation (beginning) (bars 139-141)](image)

This is, of course, a rather simple, albeit effective, device which by bringing the spoken word into the work lends it an additional, unexpected dimension. Saariaho extends its influence, however, even further, through her employment of instruments – firstly to support the voices with a range of harmonies on strings and horns, which, as section 3 progresses, disappear progressively so that by bar 224 the only instruments left sounding are the celesta and a solo violin, allowing the text to

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\(^{98}\) As Saariaho describes it in her notes on *Laterna Magica*, ‘...an ostinato in progressive acceleration which ends up losing its rhythmic nature, only to be transformed into texture’. [“...un ostinato en accélération progressive qui finit par perdre sa nature rythmique pour se transformer en texture.”] (Saariaho, 2013: 333).

\(^{99}\) Curiously, Saariaho notates pitches (D and C sharp) for the flutes, but only the rhythms for the remainder of the woodwind. This might seem to indicate that the flautists are to play, rather than whisper these notes – yet they, like the rest of the woodwind, are given the text below their staves. The score gives no indication as to what Saariaho is asking for, either.
become more clearly audible. As though to underline the importance of this moment in the work’s discourse Saariaho asks the entire orchestra, with the exception of these two instrumentalists, to join in the recitation of the final two whispered phrases, on the words ‘das helle Licht. Das Licht.’\textsuperscript{100} (Ex.16).

![Ex.16: Saariaho: Laterna Magica: Section 3; Recitation (ending) (bars 222-224)](image)

The liminality inherent in this passage comes by means of the supporting harmonies on strings and horns mentioned above, which often require extended playing techniques (principally in the string parts). As well as embellishing certain string notes with tremolandi, or with trills, which sometimes incorporate the upper auxiliary and sometimes harmonic sounds (by altering the left hand finger pressure between normal and light pressure), the effect of which is to colour the sound with pitch variations, altered bowing positions – \textit{sul tasto, estremamente sul ponticello} and bowing behind the instruments’ bridges – are required at various times, the effect of which is to colour the sound with different types of subtle ‘noise’ effects. The result is a range of timbres which depart from the ‘classical’ string sound and which begin to approach the timbre of the whispered vocal declamations (Ex.17).\textsuperscript{101}

\textsuperscript{100} ['The bright light. The light.'].

\textsuperscript{101} In this example S.T. indicates \textit{sul tasto}; N. indicates normal bowing.
Saariaho extends this link between voices and instruments in bar 42, (in which, following the first two brief whispered passages, which occur at bars 13 and 20, and which prefigure the complete recitation of section 3, the three trombonists blow air sounds through their instruments), and then in the work’s final nine bars, in which the woodwind and brass produce ‘breath sounds’ as shown in Ex.18.\(^\text{102}\)

Whilst each listener’s experience will inevitably differ, the similarity between timbre of the voices’ whispered recitation in Section 3 and these air noises suggests the existence of a real possibility that there will be an association between the two – consequently transferring the meaning of the text from one to the other, with the implication of a continuum between the two; a liminal space between spoken words and white noise through which meaning may nevertheless be transmitted. In

\(^{102}\) Saariaho notates pitches as illustrated in Ex.17, although in the preface to _Laterna Magica_ she describes these as ‘breath tones’, instructing the players to ‘use the [normal] fingering but... just blow air through the instrument’. This is problematic, since in the case of the trumpets, for example, the ‘normal’ fingering produces a ‘breath tone’ a semitone lower than expected – and, to compound the problem, the trumpeters may well be playing on instruments in B-flat, D, or E-flat and transposing mentally, rather than on trumpets in C as notated, which will each produce a different pitch to that expected. This seems, given Saariaho’s knowledge of orchestration, uncharacteristically careless. Perhaps she realises that, regardless of all of this, with the horns and strings still playing, it is unlikely that any specific or precise pitch will be heard in any case.
the article which Saariaho co-wrote in 1985 with psychoacoustician Stephen McAdams ‘Qualities and Functions of Musical Timbre’ the authors describe the poetic spoken word as a ‘sonic art founded upon timbre’¹⁰³ (Saariaho and McAdams, 2013: 61) before drawing parallels between spoken language and music: ‘…is the difference so great where timbre is concerned?’¹⁰⁴ (ibid: 69).

With regard to liminality it is also interesting to note that Saariaho asks the wind and brass, from time to time, to employ modified forms of vibrato, from ‘slow and wide’ to ‘rapid and quite narrow’, as she puts it in the score’s preface, with a resultant subtle variation in the timbre of the chords concerned. In addition the six horns are sometimes required to perform, in parallel, descending-semitone glissandi ending on grace notes as shown in Ex.19.

This unusual effect, enhanced by a diminuendo, and by the horns’ progression from open to stopped as shown above, gives the impression of, perhaps, light fading (through a process analogous to the ‘doppler effect’, by which a pitch seems to drop with a corresponding increase in distance) or of an object receding into the background.

These instrumental techniques, in altering the timbre, and therefore the quality of a given object, enrich the harmonic palette available to the composer, and enable the creation of a continuum between the objects or states – and, therefore, a further series of liminal musical spaces.

¹⁰³ [“…art sonore fondé sur le timbre”].
¹⁰⁴ [“La différence est-elle si grande en ce qui concerne le timbre?”].
Conclusion: Spectral, post-spectral or Postspectral?

In her biography of Saariaho, Pirkko Moisala seems perfectly at ease, in her discussion of the composer, in applying the epithet ‘spectral’, not only to Saariaho’s early works, but apparently to her entire output to date (Moisala, 2009). Such a free use of the term is one of the difficulties facing certain composers today, including Saariaho, since in addition to placing them within a single genre (never a useful situation for an artist) in the present case the problems are even greater, by virtue of the view that that, as Tristan Murail puts it, ‘there is not (sic) such thing as spectral music per se. There are spectral methods or spectral techniques and then you can do whatever you want with them.’ (Murail, 2010:108).

As shown in the present study, as well as in other works not analysed herein, Saariaho’s work shows a wide range of influences,\(^\text{105}\) including set-based post-serialism and a kind of common-practice-tonality-referencing use of quasi tonic chords, all of which are, to varying degrees, difficult or impossible to uncover in the work of the ‘pure’ spectralists.

This being so, there remains the fact of Saariaho’s background, and the undeniable influence on her work of the music of, principally, Grisey and Murail. Whilst it is going too far to describe her work as simply ‘spectral’, it is perfectly valid to suggest that without the influence of these figures her music would not exist in the same form today. Furthermore it is clear, in the light of the foregoing analysis of *Laterna Magica*, that Saariaho has found the means to enrich her work by permitting this spectral influence to coexist with a range of other techniques – and perhaps her greatest achievement, as far as the public perception of contemporary music is concerned, has been to compose music that is at once highly complex and rigorously constructed, yet appealing to a wide range of listeners, seemingly willingly programmed by major orchestras and operatic institutions – at the same time bringing a degree of the spectral approach to composition to a wider audience.

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\(^\text{105}\) According to Moisala, the music of Bach ‘may also have inspired the polyrhythmic and polysonoric features of Saariaho’s music.’ (Moisala, 2009:76).
Born in 1974, and therefore belonging to a different generation from Dalbavie and Saariaho, the composer Bruno Mantovani is an example of a young composer who has assimilated the lessons learned by the first generation of spectralists, and who has integrated elements of their discoveries – alongside other techniques – within his own music. The composer’s website, for example, states ‘Jazz, current trends, electroacoustic techniques and the latest research into spectral harmony are just some of the idioms that he has completely absorbed into his skills.’ (Mantovani, 2015). By his own admission this absorption results in many of his works in a complex synthesis of approaches, and it is perhaps initially difficult to identify to what degree spectral techniques contribute to his work. The following chapter will therefore consider selected passages from Mantovani’s 2002 work for ensemble, Le Sette Chiese, in order to attempt to ascertain the depth of influence of spectrally-derived techniques on his music.

**Espaces Acoustiques**

*Le Sette Chiese* was inspired by the so called ‘Seven Chapels’ in Bologna, which were constructed between the 5th and 18th centuries, inspiring Mantovani to explore, in music, the various architectural and acoustic environments of the complex. In his programme note, Mantovani says that his intention was to use the work as a means of ‘enlarging his expressive palette’ (Mantovani, 2008). This he achieves in large part by ‘spatialising’ the ensemble – an approach which seems popular in contemporary French music, having been employed by composers as well-known, yet as diverse, as Marc-Andre Dalbavie, Philippe Manoury and Pierre Boulez. In *Le Sette Chiese* there are four distinct groupings of instruments; two more or less identical ensembles to the left and right of the main platform, one smaller group of the lowest instruments of the ensemble behind the rest, and six *concertante* instruments (clarinet, bassoon, horn, trombone, viola and cello) on raised podia ranged around the back of the stage.

Throughout the work’s 40-minute duration material is passed around these groups, creating the illusion of a variety of acoustic environments.\(^\text{106}\) The opening movement, for example, *La piazza*

\(^\text{106}\) The space occupied thus is treated in different dimensions: conflict, progressive occupation, focusing, fragmentation, globalisation. These diverse principles are a means of rhythmicising the form...’. ["L’espace ainsi occupé est traité dans des dimensions diverses: le conflit, l’occupation progressive, la focalisation, l’..."]
Santa Stefano is an aural representation of the square which must be crossed by visitors to the complex of chapels, including a rather clichéd imitation (which is, nevertheless, quite effective) of a vehicle crossing the piazza, achieved by passing a single pitch between the concertante horn and the second trombone (Ex.1).

The crescendo of the horn, followed by the fortissimo attack and downwards glissando *al niente* of the trombone, allied with the passing of the sound across the stage, creates a good approximation of the ‘Doppler’ effect – the descent in frequency, and therefore in pitch, of a sound caused by the lengthening of sound waves as the sounding object moves away from the listener – and thus the impression that what the listener hears is an actual moving sound source.

Throughout the remainder of the work Mantovani similarly employs spatialised writing to evoke acoustic environments. In the second piece, *L’église de Saint Jean-Baptiste*, the two pianos pass a four-note aggregate between them, creating an echo effect which gives the impression of an architectural space quite unlike that of the piazza of the opening. The indication to employ the sustain pedals, along with the diminishing dynamics helps to further this echo effect (Ex.2).
Likewise, in the third movement, *La crypte*, the two bassoons and 2nd cello are given a unison melodic passage in quarter tones which accentuates the sense of a large space by making the melody appear from multiple sound sources (Ex.3).

The current interest among certain contemporary French composers in the use of spatialised ensembles is not without precedent, and Berlioz’s *Grand Messe des Morts* and Stockhausen’s *Gruppen* spring readily to mind, to say nothing of Mahler’s offstage brass ensembles or Giovanni Gabrieli’s works for antiphonal choirs of instruments. However, Mantovani’s aim appears, rather than to create a sense of drama, to be to create the illusion of different acoustic environments. As discussed in Part 1 of the present thesis, the intention to cause listeners to approach sound in different ways is an important aspect of spectral composition, and the behaviour of sound not only in time, but also in space, was of interest to its proponents, as titles such as Grisey’s *Les Espaces acoustiques* or Murail’s *Les courants de l’espace* suggest. It seems from the manner in which he distributes the ensemble, and the resulting acoustical effects in *Le Sette Chiese*, that Mantovani’s compositional thinking owes something to the spectral approach in this regard.

**Spectra**

Philippe Hurel, as noted above, has said that ‘Rather than the harmonic problems of spectra… which are the hallmarks of Grisey’s music, younger composers are stimulated by [spectral music’s] melodic, rhythmic and formal consequences.’ *(Hurel, 2001)*, and it would be foolish, especially given the range of additional techniques used by Grisey and Murail, for example, to attempt to understand the influence of *L’École Spectrale* on a later generation of composers by the presence of harmonic spectra alone. Nevertheless, it is noteworthy that whilst static harmonic fields were employed in

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107 See footnote 65 for French original.
pre-spectral music,\textsuperscript{108} it was only with the music of Grisey and Murail that, in their efforts to imitate through synthesis natural or synthetic sounds using instrumental ensembles, that harmonic fields, in the guise of spectra, achieved a degree of independence from other musical elements as a compositional device. Their employment by younger composers can at least, therefore, be an indication of such an influence, deserving investigation, as may the employment of micro-intervals, which are a potential indicator of some level of spectral influence.

Whilst melodic quarter-tone writing is in evidence throughout Le Sette Chiese, an example of a harmonic passage where quarter-tones are particularly evident is at the opening of the fifth movement, Basilique des Saints Vital et Agricola. The movement features a series of dyads played by spatialised brass instruments, culminating in a seven-note pitch field which corresponds to a ‘defective’ harmonic spectrum on B (Ex.4).

![Ex.4 Bruno Mantovani: Le Sette Chiese, 5th movement, Basilique des Saints Vital et Agricola, opening (pitches only)](image)

Given the presence of such ultra-chromatic intervals, these dyads cannot be related to common chords (unless they are analysed as ‘defective’ sevenths, thirds and so on), and their intervallic content can therefore, at best, only be described in terms of numerical values, rather than in terms of conventional harmonic practice. It is possible that Mantovani’s intention here was, once again, to create a sense of distance – the pitch of an instrument drops with a decrease in proximity, which explains the necessity of careful upwards tuning by players of ‘offstage’ brass parts, for example – and perhaps the simplest analytical solution may be found in the suggestion that by notating a widened minor seventh (dyad 1) or a narrowed augmented second (dyad 2), for example, the perceptual distance between the instruments, and therefore the sense of an increased resonance in the acoustic environment, might indeed be heightened.

\textsuperscript{108} For example, in the Prelude to Wagner’s Das Rheingold (which has, incidentally, been described by Marc-Andre Dalbavie (Dalbavie, 1991) as an early example of timbral evolution), and in the music of Debussy, as discussed (with regard to the opening of Pelléas et Mélisande) by Richard Langham Smith, who notes that ‘the opening two motifs... are identified with precise harmonic fields.’ (Nichols and Langham Smith, 1989: 85).
However, if the harmonic implications of each dyad are sought with regard to harmonic spectra, another potential result is obtained – which suggests not only a sense of varying degrees of distance, but also an ambience of natural resonance – and given the movement’s dedication to Messiaen, for whom resonance was such an important concept, it could be argued that the latter indeed forms part of the intended aural effect. Each pair of dyads implies a fundamental pitch which is not necessarily perceived directly, but which has the potential to be implied aurally by the listener as a function of the natural resonance created by the sounded pitches. For example, the first dyad, which comprises a B ¼ sharp and an A natural, it might be argued, could be viewed as approximations of the fourth and seventh partials of a fundamental low B ¼ sharp (63.5Hz). The second, comprising a Bb and a C ¼ sharp, could equally claim to be approximated seventh and eighth partials of a fundamental C ¼ sharp (29.1Hz). Given that any music notated conventionally – even in quarter, sixth or eighth-tone intervals – can only hope to approach natural resonance frequencies with a limited degree of accuracy, these assumptions are similarly approximate, but within a margin of error which is generally considered to be acceptable by spectral composers, as the opening of Grisey’s Partiels, discussed in Part 1, demonstrates.

The remainder of the dyads, along with a possible interpretation of their simplest implied fundamentals and the dyads’ consequent partial numbers, are shown in Ex.5.

A second passage which might be indicative of a spectral approach is at the end of the second movement, L’église de Saint Jean-Baptiste, in which the piccolo, the two clarinets, the second violin, the two violas and the glockenspiel play quarter tone-inflected lines (in seven different temporalities

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109 As in previous chapters, this relates to the work of Célestin Deliège as described in Deliège (2001).
which will be discussed below), restricted to a range represented by the major third between $F_6$ and $A_6$ (Ex.6).

Upon examination of the score the eye might lead one to expect a high degree of dissonance, yet the effect is rather one which might be achieved electronically by the simultaneous sounding of a band of neighbouring frequencies, with an implied fundamental of 43.65Hz – in musical terms, the pitch $F_1$ (Ex.7).

The impression is thus given of a filtered harmonic spectrum, leaving only a narrow range of high frequencies to sound. The parallel with the music of Grisey and, especially, Murail, whose works rely heavily on technological sound models, is clear.
Post-Spectral, Post-Serial

Much of Bruno Mantovani’s music relies on the use of fixed-pitch fields for its harmonic discourse, and whilst they do not always conform to the natural overtone series, the manner in which Mantovani employs such fields seems to share certain commonalities with those of ‘pure’ spectral composers. In most of his works there exist fixed-pitch fields, often decorated with arpeggiated figures (often limited to the pitches of the prevailing field) and dynamic swells which serve to highlight certain pitches in much the same way that ‘pure’ spectralists might privilege certain partials of a spectrum to alter its timbre. These fields are often marked by a tendency towards a slow harmonic rhythm, allowing each to register before moving to the next.

Perhaps the clearest example of Mantovani’s technique with regard to this use of harmonic fields, as far as Le Sette Chiese is concerned, is the ninth movement, La chapelle du bandeau. The entire movement, with the exception of a few additional ornamental figurations on timpani, consists of five such fixed-pitch fields, each of which contains the pitch F#, whilst containing varying degrees of dissonance, and which are contrasted with one another to build the movement towards its climax and eventual resolution. Mantovani describes the movement’s harmonic process as ‘a system of chords which occupy progressively the whole acoustic space.’

Are these harmonies truly spectral in conception? When compared with the harmonic, or even the inharmonic spectra found in the music of Grisey or Murail, which generally contain a number of quarter-tone inflections as noted above, and which can generally be related to an overtone series, it would seem that there is little resemblance. However, Mantovani’s use of dynamic swells and the independently repeating pitches of the concertante group at the close of the work which create an

110 [“un système d’accords occupant progressivement tout l’espace sonore.”].
effect of acoustic resonance\textsuperscript{111} mimic, once again, the behaviour of sound in a chosen environment, suggesting once more a point of conjunction with the spectralists’ preoccupation with the concept of sounds’ behaviour in space.

Furthermore, it is interesting that there appears to be a processual element to the harmonic discourse, since each field’s content is a modified version of its predecessor, thus achieving a sort of controlled evolution of the sound object in question, one or two elements at each stage being modified by a semitone. Although the degree to which this is perceptible for the listener is difficult to ascertain, as a compositional conceit this process could be described as analogous to the spectralists’ manipulation of spectra through the subtle alteration of selected elements (Ex.9).

![Ex.9 Bruno Mantovani: Le Sette Chiese, 9th movement, ‘La chapelle du bandeau’, pitch content analysis](image)

It is also important to remember that Grisey and Murail’s approaches to composition were not the only ones to be associated with L’Ecole spectrale, and that Hugues Dufourt – who, as mentioned above, was responsible for the coining of the term in question – prefers to explore the principles of spectral composition in conjunction with post-serial techniques such as interval rotation and set-based generation of material. In Dufourt’s own words, quoted above, ‘I never wanted… to give up the freedom of articulation that I feel is the best aspect of the serial heritage. I therefore elaborated a grammar of pitches independent of timbre, but capable of congruence with it.’ \textsuperscript{112} (Dufourt, 2014:386).

It would appear from the above discussion of the ninth movement of Le Sette Chiese that this approach is one that is also, on occasion, employed by Mantovani. Further weight is added to this argument by the opening of the fourth movement, La Basilique du sépulchre, in which the two

\textsuperscript{111} According to Mantovani, these are ‘a stylised chiming of bells (overlaying one another with independent frequencies).’ (Mantovani, 2008:7).

\textsuperscript{112} See footnote 2 for French original.
pianos present a succession of arpeggiated 12-note aggregates (Ex.10a), with the indication to keep the sustain pedals depressed, generating a further effect of resonating harmonic fields.

These gradually evolve towards the bass, becoming increasingly closely spaced (and, from the eighth, eliminating the pitch class F#/Gb), before culminating in a 12-note aggregate in the lowest register (Ex.10b), which is repeatedly sounded, and which, containing as it does three dense chromatic clusters, arguably sounds more as a single unified timbre than as a collection of pitches. This boundary between pitch and timbre was another important preoccupation of the first generation of spectralists, representing an aspect of the liminal approach inherent in spectral music as discussed in Part 1, suggesting yet another influence by these composers on the music of Mantovani.

**Temporalities**
Given the spectralists’ interest in the behaviour of sonic phenomena, it is unsurprising that Grisey and Murail would be interested in the manner in which different sounds manifest over time. One of Grisey’s most important theoretical texts, *Tempus ex machina* (Grisey, 2008: 57-88) deals with precisely this subject, and many of his, and Murail’s compositions take aspects of sonic phenomena as inspiration, or even as raw material, for the exploration of a variety of musical temporalities. Whilst Mantovani’s music does not manifestly set out to contrast multiple timeframes over the entirety of a work, as may be found, for example, in Grisey’s *L’Icône paradoxale* (1994), there are clear instances in *Le Sette Chiese* of several instruments playing simultaneously in multiple temporalities. Of the two principal examples, the more readily audible in terms of the listener’s perception of the temporalities in question is the percussion passage which immediately follows the brass dyads opening *Basilique des Saints Vital et Agricola* discussed above, and which forms the bulk of the movement. Reminiscent, perhaps, of the percussion ensemble passages in certain works of Messiaen, and therefore possibly intended as an homage by free imitation, the passage calls for one percussionist to perform in semiquaver quintuplets, one in semiquavers and one in quaver triplets, all related to the same basic crotchet pulse (Ex.11).

113 It is relevant to remember here the movement’s dedication ‘To the memory of Olivier Messiaen’ (“A la memoire d’Olivier Messiaen”).

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Ex.11 Bruno Mantovani: Le Sette Chiese, 5th movement, ‘Basilique des Saints Vital et Agricola’ bars 401-406 (percussion only)
In comparison with Grisey’s approach to time, perhaps, this is not music of extreme temporal complexity. Nevertheless, the aural effect is striking, especially when the spatial separation between the players is taken into account, and in performance the listener is likely to receive a clear impression of a multiplicity of simultaneous temporalities, together with an apparent concern to make this process perceptible.

A slightly different approach to the superposition of multiple temporalities is in evidence in the passage, the end of the second movement, *L’église de Saint Jean-Baptiste* (discussed above with regard to its harmonic content) from where seven instruments play, respectively, two, three, five, six, seven, eight and nine notes to the bar, each repeating a unique series of pitches in quarter tones between F₆ and A₆ (see Ex.6 above).

Whilst the score makes clear the different timescales which are superposed, the listener is, in this case, less likely to be aware of them individually, and more likely to perceive them as a unified sonority. The aural effect is therefore akin to that achieved in electronic music by filtering a narrow band of harmonic partials. This analogy indicates a commonality between Mantovani’s methodology and Murail’s imitation of technological processes mentioned in Part 1.

**Liminalité**

As discussed in Part 1, Grisey, in his article *La Musique: Le Devenir des sons* (1982), indicated his dissatisfaction with the term ‘spectral’, and proposed instead, due to his interest in bringing into play the thresholds between sonic phenomena, the term ‘liminal music’. Mantovani, for his part, seems also to have an interest in the music created by the progressive modification of an object’s state, with the result that one’s awareness of the intervening process is heightened. The clearest example of this in *Le Sette Chiese*, which represents a significant part of the second movement, *L’église de Saint Jean-Baptiste*, takes the form of an extended passage in which the entire ensemble rises in quarter tones between two six-part aggregates (Ex.12).

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114 See page 22.
Although whilst actually experiencing this process the listener’s attention is likely to be drawn to individual details, due to the textural complexity of the passage in question, in retrospect it has the potential to be assimilated in one’s memory as a single musical gesture, or process, distended in time, and if this is so, the gesture’s identity as a boundary between two objects – the liminal aspect of the passage concerned – might be considered of relevance.
**Conclusion: ‘un petit peu de tout’**

In an interview broadcast by *France Inter* in 2011, Mantovani stated, ‘...we’re in the most extraordinary period in the history of music... there’s no average, or common, musical language... a neo-tonalist might be working next door to a *bruitist*, alongside an American-style minimalist...’\(^{115}\) (Mantovani, 2011). Upon being asked where he saw himself in relation to these, he suggested, ‘Oh... I’m a little bit of everything – I’m more into [the idea of] synthesis than an unequivocal voice.'\(^{116}\) (ibid).

It seems, in any case, from the passages analysed in the present essay, that whilst Bruno Mantovani’s music demonstrates the influence of a wide range of musical genres, it is certainly important, in analysing his work, to consider his awareness of the spectral ‘attitude’ to composition. Whilst the multiplicity of styles, and the wide range of techniques, present in his music preclude the labelling of Mantovani as a purely spectral composer, his apparent use of some of the techniques initiated by Grisey, Murail and others of *L’Ecole Spectrale* suggests that one might be entirely justified in concluding that his adoption of certain aspects of spectral composition have resulted in a corresponding enrichment of his compositional palette.

\(^{115}\) [“...on est dans le plus extraordinaire époque dans l’histoire de la musique... il y a pas de langage moyen, commun... on peut avoir un compositeur néo-tonale qui est dans la pièce a cote d’un compositeur bruitiste, qui lui-même côtoie un répétitif américain…”].

\(^{116}\) [“O, moi, je suis un petit peu de tout... je suis plus dans la synthèse que dans l’univoque...”].
Part 3

Spectralism Today: a discussion
Today’s creative environment is one which erects few barriers to personal expression, and a composer is freer than ever to embrace, reject or combine a huge variety of aesthetics and techniques. Interviewed in the French magazine Diapason in 2010, Pierre Boulez stated ‘I notice individuals rather than [aesthetic] currents.’\(^{117}\) (Alexandre, 2010:22) The rich variety of work which may be heard today in concert, through recordings or via broadcasts tends to support this view.

Nevertheless, composers’ styles are built on the lessons passed down from their predecessors, and it is inevitable that each will fall under the influence of one or more distinct lines of musical evolution. As the foregoing case studies have demonstrated, for example, Marc-André Dalbavie has retained a recognisable degree of tonal thought in his recent work, whilst Kaija Saariaho and Bruno Mantovani both appear to employ set-based post-serial techniques, each simultaneously exploring other means which interest them.

In the context of the present thesis it is the influence on these composers of L’École spectrale which is of chief interest, of course, and the remainder of the study will be devoted to drawing certain conclusions and generalisations with regard to what we may now begin to refer to as a ‘post-spectral’ aesthetic. Whilst the four foregoing case studies remain important as in-depth exemplars, it will be useful to make reference to other works by composers who, it seems, have been influenced in some manner and to a greater or lesser degree, by the work of the spectralists.

This having been said, it will be convenient to approach such a study by topic, so that by means of what will amount to a broad comparative analysis of aspects of a number of composers’ work an overview will be gained of what remains of spectralism in today’s music.

**Harmony/harmonicité**

Significant portions of the case studies in Part 2 were devoted to the analysis of aspects of the harmony in the works in question. This is perhaps unsurprising, given the importance of this aspect of spectral music – as described above, Hugues Dufourt, in inventing the label ‘spectral’ itself within the article Musique Spectrale in 1979 (Dufourt, 2014a:335-40), highlighted the fundamental significance of the harmonic spectrum to the new aesthetic which he, Gérard Grisey, Tristan Murail and Michel Levinas were in the process of forging. Despite the dissatisfaction shown by his

\(^{117}\) [“Je repère des individus plutôt que des courants.”].
colleagues with the term,\textsuperscript{118} which was, and is, due to the fact that, as discussed in Part 1, the spectral approach was founded on the principle of the exploration of sound in all its aspects as material for composition (not just ‘vertical’ harmony) the harmonic series remains an important factor in post-spectral composition.

As discussed at length above, the music of Dalbavie, Saariaho and Mantovani relies to a significant extent, in all three cases, on vertical harmonic objects which are then, in each case, manipulated in one of a number of ways to achieve a desired effect. A chord may conform closely\textsuperscript{119} to the harmonic series on a chosen fundamental, or the composer may opt to introduce inharmonic elements, or to compress or dilate the harmony through intervallic adjustment as described in Part 1, in order to produce a less consonant (as Grisey preferred to put it, rougher) sensation.

It will be noticed, however, that in the case studies of Part 2, despite frequent allusions, there is not one instance of a fully harmonic spectrum, even allowing for notational approximation. The three composers in question clearly prefer to avoid such a timbrally pure, consonant object, which raises the question as to why this might be the case. As noted in Part 1, Célestin Deliège has suggested that, ‘If [...] spectral music] lends itself marvellously to the treatment of chords..., it fails where counterpoint is concerned. It is perhaps difficult to create true polyphony whilst retaining the morphology of harmonic entities.’\textsuperscript{120} (Deliège, 2003:883).

It is therefore understandable that, composers following in the wake of the spectralists of the 1970s have sought to overcome the inherent stasis of the harmonic spectrum – in the case of Dalbavie, Saariaho and Mantovani, by avoiding its use altogether. Even in the case of works such as \textit{in vain} (Haas, 2000) by the Austrian Georg Friedrich Haas (b.1952), in which the composer does employ harmonic spectra, these are heard in alternation with strongly contrasting material which allows the composer to retain control over the musical narrative.

As demonstrated by the earlier discussions of the work of Marc-André Dalbavie and Kaija Saariaho, however, it is entirely possible that a composer might be influenced by spectral harmony without such an obvious employment of the harmonic series. Another composer whose work may be viewed

\textsuperscript{118} To repeat: ‘Neither Gérard Grisey nor myself are responsible for that designation, which always struck us as insufficient’ (Murail, 2005a:149).

\textsuperscript{119} Throughout this discussion it should be understood that the underlying imprecision which may be created in performance, or by the necessity of approximate notation, is assumed to be a given.

\textsuperscript{120} See footnote 22 for original French.
in this manner, but which has become rather problematic in this regard is Saariaho’s compatriot and fellow Sibelius Academy alumnus Magnus Lindberg.

It was mentioned in Part 2, within the discussion of Dalbavie’s *Sinfonietta*, that certain observers feel a sense of regret that some composers have chosen, recently, to turn away from a modernist aesthetic in favour of what the composer Philippe Manoury calls the ‘Philharmonic style’.\(^{121}\) In coining this term Manoury (2012:74) was lamenting the fact that, in his view, this concession was mostly in order that composers might receive commissions from institutions such as the New York or Los Angeles Philharmonics, whose commissioning policies, he would seem to imply, are conservatively oriented towards what he sees as shorter, harmonically unadventurous works – and it was, in fact, Lindberg whom Manoury was criticising with this suggestion.

Lindberg, in his lecture given at IRCAM (Lindberg, 2013), does describe how, from around 1990 (primarily in his work for ensemble *Joy* (Lindberg, 1990), which was so named because of his excitement at discovering this new approach) he began to employ a system whose pitch content was derived from Allen Forte’s set theory, yet whose harmonic language was influenced by his knowledge and experience of spectral methods. But his post-2000 works show few signs, at least at first glance, of either. One such work which has proven rather popular, and which has indeed benefited from two commercial recordings in five years, is *Souvenir* (Lindberg, 2011), and it is instructive to examine certain moments of this work in the present context.

For most listeners, the general impression that the work will make seems likely to be one of an extended-tonal chamber symphony. Opening in C minor and ending in C major, it is difficult to see how such a historically-charged harmonic approach (which may bring to mind Beethoven’s fifth or Brahms’s first symphonies) might conceivably be reconciled with any kind of post-spectral thought (Ex.1).

\(^{121}\) See footnote 45.
Nevertheless, it is interesting to examine the appoggiaturas in the woodwind at the close of the work (shown above). The flute and clarinet’s partial scale may be viewed as part of the Lydian mode on C, and the oboe’s partial scale as part of the same mode on G – or, perhaps Lindberg’s spectral heritage is showing itself and these are semitone-rationalised fragments of the overtone series on C and G respectively.

Likewise, in the passage at bar 26 of the third movement, the upper woodwind lines might simply be triads moving in parallel but it is equally possible that these are, in a similar manner to the pitches of the thème d’accords from the fourth movement of Dalbavie’s Sinfonietta, high overtones of the fundamental frequencies heard in the bass (Ex.2).
Ex. 2 Magnus Lindberg: *Souvenir*: Woodwind triads/brass chords (3rd movement, bars 26-28)
These distinctions are, perhaps, simplistic, since a composer’s style may be influenced in multiple ways, and it is likely that both interpretations, in both cases, are equally valid. Yet the close of the second movement provides another small clue to Lindberg’s heritage, since as shown in Ex.3 it consists of a chord, built in stages, of E\(^7\) with, progressively, added ninth and major seventh, and sharpened fourth and minor third, and completed by the perfect fourth, flattened ninth and major sixth on the woodwind.

This eleven-note chord is a kind of harmonic spectrum analogue, and given Souvenir’s dedication (In memoriam Gérard Grisey), it may be seen as a nod to the latter as one of Lindberg’s mentors, and especially to the opening chord of Partiels, which this passage so closely resembles (see Ex.2 in Part 1). In the light of its inclusion in Souvenir, where it does not sound incongruous, it is difficult not to hear the remainder of the work as influenced, at least in a minor way, by the spectralists. Whilst it would be erroneous to describe Lindberg as a spectral composer, it is clear that the techniques and principles that he encountered earlier in his career continue to bear on his work today.

Rather different is the case of Pierre Boulez. During his lectures at the Collège de France he stated,

[The] simple use of acoustical proportions... [forms]... figures that are nothing more than transcriptions of portions of natural resonance... [and] this transcription takes place without taking into account the phenomenon of fusion of which timbre is constituted... [In] the most rudimentary cases one finishes up with dominant seventh or ninth chords [with]... very strong stylistic connotations...; in more refined cases, given the necessity of

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122 Notated, for some reason, as a flattened tonic; if this is, as argued here, a harmonic spectrum analogue, this 15\(^{th}\) partial would normally be notated as a major seventh, as in Grisey’s Partiels, for example.
123 Likewise, notated as a flattened fifth, rather than the more usual sharpened fourth.
124 It is interesting that Lindberg chooses to avoid microtonal notation here. Whilst he therefore remains consistent with the rest of the score, the ‘spectral’ character of this chord is potentially lessened in performance, unless the players and conductor choose to inflect the relevant notes accordingly, which seems an appropriate solution.
the use of micro-intervals which our instruments can only approximate with a degree of incertitude, one obtains interesting complexes of sound, which are only distantly related to genuine deductions of acoustic phenomena.125 (Boulez, 2005: 401-402)

Nevertheless, as Jonathan Goldman has shown with reference to Mémoriale (Boulez, 1985/1993), Derive 1 (1984), Anthèmes 2 (1997) and Notations pour orchestra (1945/1978-2004), there are more points in common between Boulez and the spectralists than might be expected. Speaking of the last two works cited, Goldman says:

The electronic environment of Anthèmes 2 (1997), which gives pride of place to frequency shifting and harmonizer effects, would not be out of place in an analogous spectral work. Elsewhere, certain very dense chords moving in parallel motion such as those found in the first of the Notations for orchestra (1976-1980) recall the products of frequency modulation found in the works of Murail or Grisey. (Goldman, 2010:224)

There are also moments in Sur Incises (Boulez, 1996/1998/2006) where instrumental effects of simulated resonance may be encountered which are similar to Dalbavie’s blurred echo effects and Saariaho’s evolving presentations of thematic entities. At the outset, for example, Boulez presents a series of figures on the three pianos (echoed, in the original, by the harps and percussion) which, although serially derived,126 adhere to what Dalbavie might term an ‘axis of resonance’ around F₂ (Ex.4).

125 « ...[La] simple utilisation de proportions acoustiques... [forme]... des figures qui ne [sont] autres que des portions transcrites de la résonance [et] cette transcription s’effectue sans tenir réellement compte du phénomène de fusion qui constitue le timbre. [...] [D]ans les cas les plus rudimentaires, on aboutit à des accords de septième ou de neuvième de dominante [avec des]... connotations stylistiques très fortes [...] [D]ans les cas les plus raffinés, étant donné l’emploi que l’on doit faire de micro-intervalles que nos instruments ne peuvent donner qu’avec une approximation très aléatoire, on obtient des complexes sonores intéressants, n’ayant à voir que de loin avec des déductions réelles de phénomènes acoustiques.”].

126 As shown by Coult (2013).
There are a number of other composers besides those mentioned thus far whose work references the harmonic series (and spectral thinking in general, for that matter), without being specifically ‘spectral’ in terms of the techniques described in Part 1. For example, in the work of György Ligeti (with whom Grisey was on very friendly terms), there are frequently indications in the Horn Trio (Ligeti, 1982), the Piano Concerto (1985-1988) and the Violin Concerto (1990, rev. 1992) for the brass players, in particular, to allow ‘natural’ notes (i.e. unaltered notes of the harmonic series) to remain untempered (Ex.5a). Again, the fifth movement of Ligeti’s Hamburgisches Konzert for horn and orchestra (Ligeti, 2001), for example, is built upon, and indeed is entitled, ‘Spectra’ (Ex.5b).

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127 George Benjamin recalls that ‘they were on very friendly terms, and Grisey adored his output (I remember him waxing passionately in response to a performance of the Violin Concerto, describing it as a perfect work of art).’ Personal communication, April 2014.

128 In this example, conventional accidentals with descending arrows represent sixth-tone inflections.
This is unsurprising, since the principles upon which spectral music was founded were, in essence, naturally-occurring phenomena of which composers have been aware for centuries and hardly unique to the work of Grisey and Murail. Nevertheless the fact remains that composers such as Ligeti continue, in a variety of ways, to explore the harmonic series as a source of material for the articulation of their works. In this respect, at least, the discoveries of the spectralists continue to exert an influence on subsequent generations of composers.

**Periodicity**

As noted in Part 1, all music has a relationship to time, and therefore to the concept of periodicity. Yet, as discussed above, the spectral approach to periodicity was specifically intended as an exploration of the behaviour of sound over a given timescale – achieving, in a sense, what the study of harmonicity did for the ‘vertical’ aspect of music in the ‘horizontal’ domain. It is notable, having examined the work of Dalbavie, Saariaho and Mantovani, that in many ways this attitude to periodicity has been cast aside in its most literal form, each composer instead exploring the different effect that the stretching or compression of an object might achieve, or presenting, in a manner
similar to Grisey’s use of ‘bird time’, ‘human time’ and ‘whale time’ in his later works, selected material in contrasting temporalities.

It is also interesting to read Pierre Boulez – again, the composer against whom the spectralists of the 1970s were, in many respects, reacting – stating with regard to his Dérive 2 (Boulez, 1988-2006/2009) that, ‘When I reflected on some of Ligeti’s compositions, I felt the desire to dedicate myself to some almost theoretical research into periodicity in order to systematically examine its overlays, its shifts and its exchange.’ (Universal Edition, 2015)

As tempting as it may be to find an influence here – Ligeti’s late works, which Boulez has conducted to great acclaim, are, as noted above, influenced by spectral principles in terms, not only of harmonicity but also of periodicity – does this really place Boulez in the ‘post-spectral’ category? An interest in researching the periodicity of music is hardly a guarantee of such leanings, and temporal and geographic proximity to the spectral school (Boulez conducted the première of Grisey’s Modulations, for example, and both Murail and Grisey worked for a time at the Boulez-founded IRCAM in the 1980s) does not mean that Boulez’s trajectory was altered by their work. Furthermore, after the anti-tonal, anti-periodic nec plus ultra of total serialism, it may have been inevitable that the original categories of harmony and pulse would be revisited in any case, with or without spectral principles. It is, nevertheless, interesting to observe the change in Boulez’s musical language at this time – as Goldman puts it:

It is during his first decade at the College [de France] that we detect a new beginning in his artistic evolution – which, musically, was already confirmed in his works such as Rituel (1974-1975) and Messagesquisse (1976-1977), finishing with his magnum opus of this period, Répons (1981; 1984, work in progress).\(^{129}\) (Goldman, 2003:81)

Returning to sur Incises (Boulez, 1996-1998/2006), and to the same opening passage shown in Ex.4, it is interesting to note that the appearances of the figures shown occur at varying intervals of periodicity, which are enhanced by Boulez’s use of accents, staccato and tenuto markings, giving the impression of a stretching and compressing of time (Ex.6).

\(^{129}\) [“C’est au cours de sa première décennie au Collège qu’on décèle un nouveau départ dans son évolution artistique — ce qui, musicalement, s’était déjà confirmé dans des œuvres telles que Rituel (1974-1975) et Messagesquisse (1976-1977), pour ensuite aboutir à son opus magnum de cette époque, Répons (1981 ; 1984, work in progress).”].
Furthermore, the closing passage of *sur Incises* requires the three pianists to play a series of related chords independently of each other (and of the conductor) – in other words, aperiodically – creating a musical texture that contrasts strongly with the *toccata* material\(^{130}\) which has comprised much of the rest of the work. There is therefore a dialectic\(^{131}\) created between periodicity and its antithesis which is not too distant from a certain kind of spectral archetype. Whether or not Boulez can therefore be said to have fallen under the influence of the spectralists, it seems clear that there exist certain points of commonality of compositional thought.

**Form and Process**

This commonality extends even further in the domain of musical form. As Goldman shows, Boulez’s recent compositional philosophy, by borrowing terms such as ‘envelope’ and ‘signal’ to describe musical events within his work, has demonstrated a concern with the experience of the listener that was, perhaps, less obvious in his earlier works: ‘What he proposes, by introducing these concepts taken from acoustics, is an enrichment of the language and a lessening of the confusion of the listener.’\(^{132}\) (Goldman, 2003:89).

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\(^{130}\) Boulez employs the word toccata himself in his *Une leçon de Pierre Boulez* (Boulez 2006).

\(^{131}\) As Goldman points out, much of Boulez’s work rests on what he describes as ‘very basic oppositional pairs.’ (Goldman, 2011: 1).

\(^{132}\) [“Ce qu’il propose, en introduisant ces concepts empruntés à l’acoustique, c’est un enrichissement du langage et un soulagement du désarroi de l’auditeur.”].
Thus Boulez, from the mid-1980s, began to employ a new vocabulary when speaking of his work, describing a piece’s overall form as its ‘envelope’, and alluding to recognisable, recurring ideas as ‘signals’. Borrowed, as he admits, from acoustical terminology, this change in approach suggests that, without abandoning the generative serial technique that he elaborated from the mid-1950s onwards, he was beginning to consider his works in their entirety, in much the same way that the spectralists had advocated from the beginning of their researches. It can be seen that a similar attitude was present in the work of Boulez and the spectralists and that perhaps a generalised approach was common to both camps. To call Boulez a spectral composer would be false – but it seems likely that such points of convergence between the two camps, in terms of the approach to periodicity in their works, are indicative of a certain commonality of thought between him and the spectralists as represented by Grisey and Murail.

Returning to the case studies from Part 2, it can be seen in all four cases that a certain processual aspect has entered into each composer’s technique. Dalbavie’s *Polyphonie de processus*, Saariaho’s transposition of objects to different timescales and Mantovani’s evolving pitch fields are all examples of techniques which demonstrate at least a general commonality of intention with the spectralists and, in all likelihood, a conscious shared approach. For these composers at any rate, the spectral attitude to form and process has proven to be an extremely fruitful means of constructing a musical discourse.
**Liminality**

Whenever two states of being are juxtaposed, there must exist a threshold – a liminal zone – between them, since instantaneous transformations (in the most literal sense) are all but impossible, especially when the time it takes for the observer to perceive any change and to assimilate any differences is considered. Speaking specifically of music, liminality is therefore present in all music, and to claim that the spectralists were the first to consider the raising of the use of thresholds to the level of a compositional device would be naïve. Nevertheless, Grisey was perhaps the first composer to speak of such a concept, and as such it was his (and his colleagues’) work that might be seen to have opened up discussion of this aspect of music.

As shown in Part 2, Dalbavie, Saariaho and Mantovani have all employed gradual transitions (akin to interpolations) between objects in their work and, in doing so, have offered the listener the opportunity to experience the zones between objects, discovering what lies between discrete states of being. Whether this represents the conscious use of a spectral technique or an intuitive approach to composition based on previous experience is difficult to ascertain from scores and performances (or recordings) but, whichever is correct, in each case their music has clearly retained this aspect of spectral thought.

Furthermore, Boulez’s use of the terms ‘envelope’ and ‘signal’, as discussed above, indicates, by the implied preoccupation with the formal progress of a work, a similar concern with the listener’s perception of the transition from one state to the next. In ‘Une leçon de Pierre Boulez’, for example, the composer describes how:

> The end of this first section finishes upon the note on which we began… it’s this kind of instinct that something has finished. Why? Because the first note that you heard... we will find it again at the end of this first large section... you can’t not hear it... I elicit in you a kind of Pavlovian reflex.¹³³ (Boulez, 2006)

In this manner Boulez brings together the first part of *sur Incises* as a global entity and, ideally, causes the listener to consider the transition between the beginning and the end of this first section of the

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¹³³ [“La fin de ce premier volet se termine sur la note sur laquelle on est parti… c’est… cette espèce d’instinct que quelque chose est terminée. Pourquoi ? Parce-que la première note que vous avez entendue... on va la retrouver à la fin de ce premier grand volet... vous ne pouvez pas ne pas l’entendre... Je suscite en vous une sorte de réflexe de Pavlov.”].

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piece. In this shared concern with the listener’s perception of, as Boulez would now describe it, the envelope of a work, a further measure of commonality thus exists between him and the spectral school.

Similarly, Ligeti’s interest in African polyrhythm led him, through the superposition of discrete rhythmic material, to create (in, for example, the piano concerto), concurrently unfolding timeframes which generate what might be considered a temporal liminal zone (Ex.7).

![Ex.7: Ligeti: Klavierkonzert: Polyrhythm (temporal liminality)](image)

Given the importance which Grisey attached to the concept of liminality, it is perhaps unsurprising that this part of his, and the other spectralists’, legacy has gained such purchase both on subsequent generations and on the work of their elders. Their work consciously challenges the listener’s comprehension of musical objects, opening up areas of perception that had not previously been considered, offering a new approach to musical perception for ulterior works.

‘Lost’ techniques

It is interesting to note that some of the techniques elaborated by the spectralists have neither featured in the case studies of Part 2, nor in this concluding section. None of the composers whose works were examined as case studies seems interested in the generation of chord complexes by
means of combination tones,\textsuperscript{134} the modification of instrumental attacks as employed by Grisey in *Transitoires* (Grisey, 1980-1981) does not feature, and instrumental synthesis appears to hold little fascination for them, beyond the level of crude imitation, for example, Mantovani’s ‘stylised bells’ which close *Le Sette Chiese*.\textsuperscript{135} This is not to say that no composers retain any interest for these techniques, of course, but rather that if the works chosen as case studies for the present thesis may be considered as representative of a certain post-spectral aesthetic to a greater or lesser degree, their omission of these approaches suggests that they either do not require such techniques for the articulation of their work, or that they cannot see a way to incorporate them intelligently or elegantly into their music (which is tantamount to the same thing in any case).

Whichever is the case, these are techniques which appear to have remained limited to the first generation of spectralists’ approach to composition and which subsequent generations have not felt it useful to assimilate. This is, perhaps, due to the fact that all of the pieces examined above are acoustic works, with no electronic elements. Given the power of computers today, it is possible that any composer who feels the need to work with frequencies to the degree implied by these techniques will turn to technology, since much more interesting and varied results may be obtained in this way. Indeed, all three of the composers featured in Part 2, as well as Lindberg and Boulez, have at least some, and in most cases a great deal of experience with electronic or electroacoustic composition, which suggests that, rather than a lack of awareness of such methods, none of the composers selected for discussion feel the need to incorporate such techniques for the generation of material in their purely acoustic music.

Regardless, it remains clear that much of the spectralists’ work remains valid in instrumental music today. Spectrally-influenced harmonicity, periodicity and formal processes, as well as the liminal spaces that the interplay of these fundaments can engender are in evidence in much of today’s contemporary concert music, and as demonstrated above are certainly significant elements of the work of the composers studied here.

\textsuperscript{134} Although Fabien Lévy suggests, in a chapter entitled ‘An amusing paradox’ [“*Un paradoxe amusante*”] (Lévy, 2004) that the multiplication of frequencies as practised by the spectralists is not so far removed from Boulez’s method of pitch multiplication as encountered from *Le Marteau sans Maître* onwards, as demonstrated by Koblyakov (1990).

\textsuperscript{135} This is not to suggest that Mantovani’s approach is not effective; rather that the technique involved is not an advanced one.
Conclusion

In the end, what remains of spectralism in the music of today? The present study has attempted, by examining the work of a range of composers who may be broadly considered to be descendants of the French Spectral School of the 1970s and 1980s, to show that, to repeat the words of Gérard Grisey, ‘Spectralism is not a system like serialism or even tonal music. It’s an attitude.’\(^{136}\) (Grisey, 2008: 265). Each composer studied has assimilated the techniques and principles that they have felt useful to their ongoing work, turning them to their own purposes, whether consciously or intuitively. Put another way, if the term spectralism retains any meaning at all, it has evolved and broadened, so that today it represents a diverse range of methodologies – or attitudes – which have empowered composers to develop their compositional styles in multiple directions.

In the course of this study, due to its bias towards the French Spectral School’s more direct descendants, certain composers have necessarily been omitted; almost no mention has been made of the more recent music of Tristan Murail himself, whilst the British composers Jonathan Harvey, Julian Anderson and George Benjamin, despite their connection to the Parisian contemporary music scene, together with their researches at IRCAM, have not featured, other than as witnesses to the continuing evolution of spectral thought. In addition there are composers outside France who might have been mentioned, including Donnacha Dennehy and Steve Lehman; the former living and working in Eire, combining spectral techniques with, as he puts it in his own words in an online interview, ‘post-minimalist tendencies’ (Wendt, 2015) and the latter composing in New York with what Tristan Murail (with whom Lehmann studied) describes on the Columbia University website as ‘spectral techniques in jazz-inspired music’ (Columbia University, 2015). Just as the deliberate decision to omit James Tenney and Horațiu Rădulescu from Part 1 of the present thesis is not intended as an indicator of irrelevance on those composers’ parts, the omission of these figures here does not mean that their work has no meaning for the study of post-spectralism in a wider context; rather it is a simple consequence of the present author’s need to select of a limited number of works for in-depth analysis.

It is hoped, however, that the overview that has been given of the situation with regard to what might be termed Franco-centric post-spectral composition offers an insight into the continued presence of spectral techniques in early twenty-first century music; the ‘spectral attitude’, as Grisey called it, or Dalbavie’s *pensée spectrale*. It has indeed been found that today’s composers have

\(^{136}\) ["Le spectralisme n’est pas un système comme le sont la musique sérielle ou même la musique tonale. C’est une attitude."]
inherited a wide range of compositional techniques which represent an enrichment of the expressive possibilities in contemporary music, and which seem likely to continue to influence the output of future generations of composers working in a wide range of styles.

In attempting to summarise the place which spectralism holds in the world of twenty-first century composition it is useful to cite Pierre Boulez, who stated in an interview published online, with regard to the era of ‘total’ serialism of the early 1950s, ‘Serialism was right for me and many of my generation because it gave us a strict discipline, but we could then go anywhere from there... But we went so far, it went to a point of absurdity’ (Carvin, 1993).

In pushing their system to absurd lengths, the serialists ensured that every possibility arising from their researches could be explored. In an analogous manner, Gérard Grisey, Tristan Murail, Hugues Dufourt and Michel Levinas created works – Grisey’s Les Espaces Acoustiques and Murail’s Gondwana to name but the two most iconic – which, in their own right, are significant contributions to the repertoire, but which took spectral techniques and principles to their furthest point possible without reaching a similar degree of absurdity, discovering, in so doing, a completely new approach to composition.

This new approach represented a renewal, after the modernist period which their work followed, of the musical language which subsequent generations have clearly embraced, absorbed and, ultimately, have begun to develop in multiple new directions. Clearly, the possibilities for the composers who succeed them are greatly enriched by their researches. Subsequent generations owe a debt of gratitude to L’École Spectrale Française.
Appendix: Microtonal notation

Since there is no absolute convention on the notation of micro-intervals, the following diagram serves to clarify the use of quarter-tone accidentals in the present thesis.

Since sixth- and eighth-tone accidental notations vary from composer to composer these are explained in footnotes throughout the text, as to attempt to tabulate these would overcomplicate matters. As a general rule, however, in early spectral works (such as Grisey’s Partiels of 1976) the seventh partial of the harmonic series (approximately a sixth of a tone lower than the nearest equal tempered semitone) is notated with a simple arrow:

In later works, such as Quatre chants pour franchir le seuil (Grisey, 1998), this simple arrow denotes an eighth-tone inflection, Grisey apparently having abandoned sixth-tone notation.

In Ligeti’s works of the 1980s and after, including the Hamburgisches Konzert (2002) the seventh partial (a sixth of a tone below the equal-tempered pitch) is notated with a downward-facing arrow attached to a conventional accidental:
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