

COMMENTARY OF PHD IN COMPOSITION

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ABSTRACT

This thesis consists of seven pieces of varying instrumentation accompanied by an analytical commentary. The reader will be presented with a thorough analysis of a wide range of compositional techniques that have their roots in the new and revolutionary development that took place in music during the 20th century. A conscious effort has been made to define the large-scale form of every work via a thorough analysis of the moment to moment structural connections used in each case.

In order to illuminate the different aspects of the compositional process in a work, each analysis focuses on several specific areas – the work's general structure, the internal structure, the pitch structure and the organization of pitch material. As indicated by their titles, these parts provide detailed information on how the pieces are constructed as well as many interesting ideas concerning the aesthetic background of these works.

Table of Contents

Acknowledgments	4
Introduction	5
Chapter One: Suspension	8
Chapter Two: Balance	15
Chapter Three: Six Sketches	20
Chapter Four: Atoma	26
Chapter Five: Echo and Variations	37
Chapter Six: Metavasis	47
Chapter Seven: Envelope	53
Conclusion	73
Bibliography	75

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INTRODUCTION

As detailed in the abstract, this thesis includes seven compositions encompassing a wide variety of instrumental combinations and musical genres. In addition there are accompanying analytical essays that examine each work. The works range chronologically from 2001 to 2005.

Building on the great achievements of the musical revolution that took place during the 20th century, these works are inspired by composers such as Varese, Webern, Xenakis, Ligeti, and Penderecki. From these starting points a conscious effort has been made to develop a personal vocabulary of techniques and expressive nuances.

The detached cool world of Webern's musical geometric patterns was a source of influential material for me, with its network of cross-references and local symmetries through serial row constructions. For all their brevity and density of expression, these works are characterized by the unity of all their different elements, achieved through the total integration of material. In a similar way the spatial thinking of Varese's cubic music motivated me to adopt an approach to sound that always considered it in relation to some form of motion. The organization of material in Varese's music is based on symmetrical distributions of harmonic aggregates. What is astonishing is the way that these aggregates undergo a crystallization process, based on that found in nature, and the way that this process influences the overall musical form. The interrelationships Varese created between overall form and internal structure inspired me to find similar methods of interaction between form and material in my works.

The music of Xenakis has been another creative influence on me. Although his complex mathematical calculations are beyond my competence, he managed to cultivate music on a larger scale by using his knowledge of architecture and

mathematics to construct complex combinations of large-scale textural transformations. His music has a hypnotic power while simultaneously he pushes performers to their physical limits.

Finally, the production of static, motionless blocks of sound - a common practice in the music of Ligeti - has also been a point of reference during the composition of my works. In textural composition, composers like Ligeti and Penderecki consider sound as both texture and generalized shapes ready to be transformed, lacking all sense of pulse. Harmony is in suspension and the conventional individual parameters of music are not perceptible at all.

As a point of departure, I have frequently employed the theoretical framework of several physical phenomena (echo phenomena, Darwinian theory and envelope-based sound manipulation for example), as well as some compositional and experimental processes widely used in twentieth century music.

The provision of an analytical commentary is an attempt to invoke a general discussion of the overall structure and form of every work, as well as a means to provide a much more detailed approach to some technical features that are very important for the delineation of my compositional style.

To conclude this introduction I would like to provide a few brief details about each piece, thus giving an overview of the thesis as a whole.

Suspension, for oboe and string quartet, is an exploration of the many techniques and special playing modes invented during the avant-garde period, in order to explore the potential of the experimental sounds possible on these instruments. The timbral

interplay between multiphonics in the oboe and harmonic techniques in the strings adds a wide variety of nuances to the work.

Balance, for brass quintet, is a work focused on the aesthetic exploration of the practical limits between conventional brass sounds and a variety of different timbres created via extended playing techniques. In actual fact, this work unites two different modes of expression under a single formal process.

Six Sketches, for piano, provides a way to use twelve-tone techniques in a rather fragmentary and sketch-like way, employing an only partially consistent approach to serialism.

Atoma, for two violins and piano, is based on the atomic theory of the ancient Greek philosopher Democritus. The sounds of the piano together with the two violins create layered strands of repetitive gestures that change position in time and acoustic space.

Echo and Variations, for piano, cello and percussion, is a musical depiction of the echo phenomenon. This work is characterized by different patterns of repetition, altering each time the rhythm, pitch and timbre of the musical material.

Metavasis, for seven instrumentalists, is inspired by the Theory of Natural Selection (Darwin). A progressive process of combining sound events works as a point of departure for the beginning of a gradual selective abstraction of note aggregates.

Envelope, for timpani, percussion and symphony orchestra, is an elaboration of the physical acoustic characteristics of sound. This work constitutes a study of the way that instruments behave in terms of volume, pitch, rhythm and timbre.

CHAPTER ONE

SUSPENSION

The 20th century's musical developments unavoidably transformed the nature of musical art. The high modernistic tendency of the avant-garde period, which began after the end of the Second World War, led to the creation of new possibilities by the development of musical techniques and the abandonment of traditional aesthetics. Thus, new structural forms and ways of producing sound were explored via unfamiliar techniques of instrumental playing and by the use of electronics. As Geoffrey Burgess writes in his book *The Oboe*:

Central to the avant-garde agenda was the deconstruction of the formal division between music and noise. Adopting Kandinsky's anti-formalist manifesto 'colour makes a more insidious attack on the emotions than form', sounds formerly considered extraneous to music were incorporated into the new musical soundscape.¹

The new sound world created by the exploration of extended techniques pushed composers to discover new sonorities and stretch their imaginations by reaching for new ways of expression. Gradually, the aesthetics of the avant-garde movement were incorporated into the musical development of mainstream music.²

In my piece *Suspension* for solo oboe and string quartet, many techniques and special playing modes are employed in order to explore the new creative possibilities of non-conventional and unusual timbres. As the well-known Hungarian composer Gyorgy Ligeti declares in his introduction to his orchestral piece *Fluorescences* (1962):

¹ Burgess Hayness 2004: 267

² See Morgan 1993: 349-385

What most interests me about this piece is the sound, the liberated sound that resides outside the traditional manufacture of the instruments, indeed outside the instrument itself, and is free of the additional associations of patterned time. The individual instruments and their players too are for me quite simply a total source of sounds.³

In *Suspension* an extensive use of quartertones, micro-*glissandi* and multiphonic sounds is employed in the oboe part, giving a distorted and strident dissonant quality to the piece. In the beginning of 20th century such microtones were primarily played by stringed instruments. Later on, many composers such as Xenakis, Ives, Bartok, Stockhausen and Penderecki worked with microtones in both strings and wind instruments, providing a new source of creative material. In their book *New Techniques on Violin*, Patrizia and Allen Stronge write:

Perhaps the earliest examples of microtonal inflection in the 20th century are found in the music of Charles Ives. Ives was not thinking in terms of a tuning system; he was more interested in colouring and distorting pitch, exploring in the same manner that he explored polytonal writing.⁴

In a similar way the use of multiphonics - one of the most revolutionary discoveries of the 20th century in wind instruments - helps to enrich the harmonic profile of the work. One of the most characteristic compositional procedures of the work is in fact the transition from single to multiphonic timbres.

Experimental sounds are also produced by the string quartet. These include playing close to, behind or on the bridge, percussive effects and sweeping sounds made by the change of the position of the bow. Additionally, the performers are asked to play harmonic-like notes, producing a very vague and diffused sound with unfocused pitch, or to play *vibrato* gestures extending over a quartertone in width or even wider.

³ Schott 1989: 140

⁴ Stronge 2001:74

General Structure

Suspension is divided into four sections. Section *A* (b. 1 - 21) has a rather introductory and lyrical character. Multiphonic sounds are embedded in small fragmented phrases played by the oboe and enriched by a timbral variety of sweeping sounds, brief repetitive gestures and micro-*glissandi* produced by the strings. All these combined constitute the framework of the first section.

Section *B* (b. 22 - 37) is more aggressive and vivid. Its dramatic character creates a strong contrast to the previous section. The idea of harmonic enrichment of the multiphonic sounds, played by the oboe, creates dense strands of sound material full of micro-*glissandi*, which gradually transform into larger *glissandi* with ascending or descending directions and bow-bouncing repetitions.

From bar 38 the third section of the piece (Section *C*, b. 38 - 60) starts to unfold and the main developmental process occurs. During this section, interplay between mixed groups of instruments takes place, with rhythmical contraction and augmentation of repeated-note patterns, and a transformation of the bow-bouncing technique (*jete*) is combined with *glissandi* gestures of varying width. The oboe undergoes a constant timbral transformation through the multiphonic enrichment of its sustained D.

After the end of section *C* (b. 60) the piece moves to its last part. In section *D* (b. 60 - end) combinations of previous material undergo further transformations through varying contrapuntal devices. In the last 10 bars, the string quartet appears to 'analyse' the multiphonic sound produced by the oboe, adding colour and sustaining power to the final chordal aggregates.

Internal Structure and Organization of Pitch Material

Pitch consistency is derived from the superimposition of whole-tone tetrachords, leading to extended configurations based on the interval of the tritone. The whole-tone scale, although a traditional musical resource, retains its aesthetic interest here because it contains the interval of a tritone (C - D - E - F#), allowing the creation of interesting dissonant pitch combinations. A constant focus is maintained on pitch cells that consist of rising whole-tone steps in both melodic and harmonic terms. The oboe's linear consistency, based on fragmentary melodic figures, is interrupted by multiphonic enrichments that blur with the string's *glissandi* harmonics. The textural surface of the piece is constructed from *ostinato* figures, *glissando* gestures, harmonics, multiphonics and melodic linear patterns, all based on interconnected whole-tone aggregates. Additionally, different colours are created by omitting notes from the general stepwise melodic movement.

The permutation of pitch segments based on augmented fourth configurations delineates the sectional form of the work. In the first 12 bars of the piece all melodic and harmonic material is based on two model constructions: (F# - G# - A# - C - D - E and Eb - F - G - A - B - C#). Small melodic units played by the oboe give a lyrical but rather truncated character, and are combined with bow-bouncing gestures played by the string quartet. Although the compositional techniques employed in this piece allow for considerable freedom in the way that the pitch material is organized, the general harmonic outline of the work always ultimately relies upon transpositions and projections of the basic tritone interval.

From bar seven onwards the interval Eb - F in the oboe is gradually augmented and a new fragmentary sequence begins. In bars 13 - 21 fragments of whole-tone aggregates are blurred with *glissando* patterns, creating clusters of sounds. To be more specific, in bar 15 *glissandi* movements in the violins cover a registral area from B₃ to G₄, while *pizzicati* over the range F to B in the cello create a two-bar *substratum* (b. 15 - 16). In bar 17 a micro-*glissando* gesture around A - Eb, played by the viola, works as a

projection of the cello's F - B configuration. After further manipulations of this material in bars 18 - 19, a polarization around an E - Bb registral space takes place in bar 20.

The vertical layering of this opening material forms the *B* section of the piece (b. 22 - 37). Here the process of harmonic enrichment via multiphonics has an explicit role in the oboe line, while the strings start creating layers of sound strands. Overall, movements around different tritone configurations delineate the structural contour of the second part. In bar 22 the pitch formation B - Eb - F, based on an F - B tritone, acts as a point of departure for a sequence of interrelated musical gestures - multiphonic sounds by the oboe, *glissandi* gestures by the two violins and repetitive gestures and *pizzicato* phrases played by the viola and cello. Formations based on E - Bb (cello - second violin), C# - G (oboe - first violin) and F# - C (cello) start to unfold in bar 23. From this point onwards tritones are embodied in the pitch material in the following sequence of cells:

- b. 24: Eb - A (viola), G - C# (cello - second violin)
- b. 25: F - B (cello) C# - G (viola)
- b. 26: E - G# - Bb (violins)
- b. 27 - 28: G - C# (violins)
- b. 29: D - G# (oboe - second violin),
C# - G (viola - cello), C - F# (cello - viola)
- b. 32: F - B (cello - second violin)
- b. 33: E - Bb (viola - second violin)
- b. 35: F - B (cello)

Section *C* (b. 38 - 59) begins with the predominance of the note D. Here, the structure is built around a constant pitch. In other words a specific pitch functions as an axis. Multiphonics are also placed around this axis, in order to enrich the timbral spectrum. In bars 41 - 43, *glissandi*, starting from the note D and getting gradually wider, create a sweeping strand of sound in violins, while irregular repetitions of the notes G and Ab

function as a harmonic continuum. From bar 44 onwards, varying pitch combinations based on bars 41 - 43 develop the idea of building a web of sounds centred on a specific pitch (b. 46: C - E in the first violin, D - F in the second violin, b. 47: note A in cello as a continuum). In bar 48 a whole-tone harmonic formation is established (Eb - F - G - A - B - C#). After bar 50 a gradual departure from the note D starts to unfold. In an effort to emphasize this departure the oboe plays rising whole-tone steps, while the increasing density of the material, through *glissandi*, accelerates the rhythmical pulse. In bar 51, fragmented whole-tone elements begin to enter the piece, played by the viola. The contrapuntal exposition of these rotating upward gestures, with their rhythmical non-symmetrical entrances, leads to the end of the *C* section with a stepwise ascending scale that is contrapuntally divided among all the instruments. The violin and oboe conclude the section playing a chord based on an F# - C tritone.

The piece ends with section *D* (b. 60 - 80), at the beginning of which the pitch material is apparently based on the chordal configuration C - D - Eb - F - G and the diminished chord B - D - F - Ab. In actual fact this constitutes another hidden fusion of two further whole - tone modal components (B - C# - Eb - F - G - A and Bb - C - D - E - F# - G#), returning to the initial distribution of material in the opening section.

This process becomes clear in the two bars that follow the opening of the fourth section (b. 66 - 68), where a superimposition of irregular rhythmical patterns occurs. The pitch material of the last two pages of the piece is based upon the internal pitch elements of multiphonic constructions, allowing the string instruments to reproduce these oboe multiphonics and add their refined and characteristic colour to the harmonically vague and confused chords of the oboe. Thus, in this last section, the amalgamation of timbres leads to a maximum musical unity. In bar 78 the piece fades out with an E - Bb tritone.

It will be helpful to conclude by summarising the development of the pitch material in relation to the sectional form of the work, as shown in the following chart:

Section A b. 1: F# - C → b. 21: E - Bb

Section B b. 22: F - B → b. 37: F - B

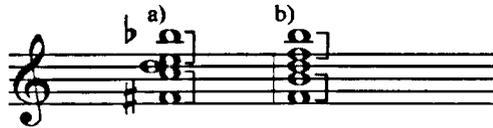
Section C b. 38: D → b. 59: F# - C

Section D b. 60: F - B → b. 78 - 80: E - Bb + F - B

As one can observe from the following example, the rotation of tritone aggregates between sections is symmetrically distributed around the note D:

- a) augmented fourth - major second - major second - augmented fourth
- b) augmented fourth - minor third - minor third - augmented fourth

Ex. 1.1



CHAPTER TWO

BALANCE

Balance, for brass quintet, is a work based on the aesthetic exploration of the limits between conventional brass sounds and a variety of different timbres created via extended playing techniques. New instrumental resources - including percussive effects, vocalizations, *glissando* gestures, *flutter tongues* and many others mouthpiece effects - are applied widely in many contemporary works in the 20th century repertoire. Today, this new language is still a source of creative possibilities, and many composers are still being inspired by the different sounds that well-known 'standard' instruments can produce.

Although this piece has an experimental character, a conscious effort has been made to balance the different modes of expression and unify opposing textural entities under the same structural process.

General structure

As far as the general structural framework of the work is concerned, *Balance* is divided into four distinct stages of development, based on a polyphonic and interchangeable flow of material between the instruments. The basic gestural characteristics of the work are *flutter tongue* attacks, repeated-note gestures and *glissandi* patterns that change their position in the musical texture through semitone intervallic relationships. The pitch material is based on chromatic segments that always encompass a five-note pitch aggregate. The idea of clusters⁵, introduced by the American composer Henry Cowell in 1912, is widely displayed throughout the piece in an effort to create the highest degree of unity. Thus, all sections of the piece draw their material from a small group of notes in a well-defined musical space. Constant transpositions of these notes are then combined with changes of vertical and horizontal register. Edgard Varese once said about the vertically defined musical space:

The new composers have not abandoned melody... there is a distinct melodic line running through their work... but the line is often vertical and not horizontal.⁶

On examining the score it becomes obvious that there are contrasting elements between the different sections of the piece. After the flowing and rather massive character of section *A* (b. 1 - 18) a more lyric one follows (Section *B*, b. 18 - 36). From this point onwards a dramatic change of mood takes place, with a combination of effects and extended playing techniques starting to unfold (Section *C*, b. 37 - 48). A return to the previous atmosphere in bar 49, with irregular repeated-note gestures, *flutter tongue* and *glissando* movements, functions as a recollection of what preceded (b. 49 - 57). The final section of the work (Section *D*, b. 58 - 74) is a blend of techniques and structural elements explored in the previous sections. *Flutter tongue* gestures and repetitive patterns are contrapuntally spread between the instruments and lead up to bar 68, where

⁵ See Cope 1977: 71-81

⁶ Bernard 1987: 41

half-valve techniques and air-based sounds are employed, leading the piece gradually to a structural decomposition.

Internal structure and organization of pitch material

The pitch structure of the work is based on a modal use of chromatic aggregates, which undergo circular transformations and delineate the internal formal structure. The chordal distribution does not follow any pre-constructed system.

With regard to the internal structure of the piece, in section *A* (1 - 18) every instrument undergoes a constant semitone movement, creating strands of clustered sound that intersect with each other. As one can see from the score, every instrument moves within pre-ordained pitch limits. The initial sonority is D - Eb - Ab - A - two intermingled tritones. The process then involves chromatic movements of the instruments around their given pitch limits, which function as pivotal points. A step-by-step construction of clustered sound aggregates leads to the emergence of a pitch area covering the range from C to F# in bars 15 - 18 (ex. 2.1a).

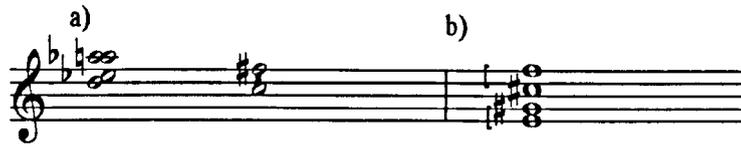
Section *B* (b. 18 - 36) is based on contrapuntal devices and starts with the gradual blending of irregularly repeated-note entries using the same chord as a point of departure (D - Eb - Ab - A). This is directly transformed in bar 22 into a clustered sonority covering a range from C# to F. From this point onwards chromatic sonorities, symmetrically distributed around C# - G#, undergo the following transpositions:

b. 22: C# to F

b. 29: G# to C#

b. 36: E to G# (ex.2.1b)

Ex.2.1



In bar 24 a cumulative process starts. The staggered entrances become progressively more dense and blurred by *glissando* patterns (b. 26 - 29). The first trumpet has a melodic line based on half-step movements (b. 24 - 28).

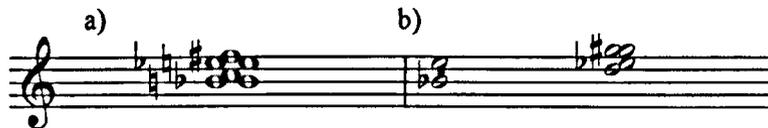
In bars 30 - 33 non-symmetrical patterns of repetition create a sound mass with a very active rhythmic and textural surface. A reduction in forces follows this outburst, and recurring *glissandi* in conjunction with rhythmic dissolution close the section (b. 34 - 36).

Section *C* (b. 37 - 48) has a fragmentary quality. Most of the musical material is derived from the linear activity of the previous sections, now disguised by the use of new textural resources generated via sound effects. The *glissando* gestures are partially transformed into small pitch bends that lead to silence or shrieks, reaching all the way up to the highest pitch limits (for example b. 45 - 46). The pitch structure is unified by the use of intersecting augmented fourth based chromatic chordal aggregates, creating cluster configurations. For example, from bar 39 to bar 43, the following pitch transformations take place: C# to G (first trumpet), Eb to A (second trumpet), C to F# (horn), and F to B (trombone and tuba). By the end of this section, the pitch material returns to the cluster found in the first section, covering the registral area F# to C. In the third section a variety of air-based effects, vocalizations, *flutter-valve* and *half-valve* effects are combined in order to enrich the acoustic landscape of the work.

Bars 49 - 59 function as a bridge between the third and fourth sections. In bars 49 - 51 successive entrances of repetitive gestures of varying speed bring the mood gradually back to its original point, leading to bars 51 - 52 where the chromatic cluster from F to C appears. Bars 53 - 57 are full of *flutter tongue* gestures, based on a free melodic elaboration and permutation of the chromatic material within the range F# to C.

Section *D* (b. 58 - 74) is characterized by the presence of *flutter tongue* and *glissando* gestures that lead to a *Coda*, constructing from a mixture of all the textural means deployed in the work. On entering this last section, varying use of the augmented fourth C - F# creates symmetrical chords - for example Bb - B - C - E - F - F# (b. 60 - 61) (ex.2.2a). In terms of pitch organization, the last *Coda* section follows the process of the first section in retrograde form. In bar 65 the chromatic aggregate covering a range from Bb to E is gradually transformed into the pitch motive D - Eb - G - G#, a process that leads to the end of the piece (ex.2.2b).

Ex.2.2



CHAPTER THREE

SIX SKETCHES

Serialism, an organized atonal system of composition introduced by Arnold Schoenberg in the early twenties, was one of the most revolutionary developments in musical history. By using a pre-determined row, created from the twelve-tone scale, for every composition, Schoenberg managed to bring unifying order to the material of atonal chromaticism.

Six Sketches, for piano, is a piece that relies on a purely schematic approach derived from twelve-tone technique. In composing this work, an effort has been made to conceive of the manipulation of the twelve-tone series - together with its transpositions and transformations - as a rich harmonic and melodic web of sounds to be used as a palette of colours with which to fill in geometrical structural patterns.

A continuous fragmentation and amalgamation of the row (ex. 3.1) and its formal components takes place during this piece. Unity is therefore preserved not by the use of the row as a single entity but rather as a modal sequence of notes, giving rise to different intervallic configurations created by using segments of the row. These row segments are interconnected without any pre-planned order. The move from one row to another does not follow any rule, being purely a matter of aesthetic choice. Pitch coherence is ensured by the intervallic consistency of the row, containing as it does intervals of semitones, fourths and fifths - all symmetrically arranged into trichords (ex.3.1).



It is self-explanatory that this approach cannot be consistent with a strict serial compositional technique. Instead the serial working in this piece acts as a point of

departure, and the series can be freely divided into many cells to be used for the creation of extended varying pitch aggregates. The mobile forms of the well-known abstract kinetic artist Alexander Calder could be used to describe in an accurate and effective way the manner the particular approach to serial techniques embodied in this composition.

Six Sketches explore a constant interplay between the theoretical basis of serial techniques and the application of variation form. Webern's comments on this are instructive:

Examining the development of variation technique one has direct access to serial technique. Relationship to theme or row is quite analogous. But Schoenberg once said: the row is more and less than a variation-theme. More, because the whole is more strictly tied to the row; less, because the row gives fewer possibilities of variation than the theme.⁷

I consider *Six Sketches* as six different ways of approaching the twelve-tone row. One could assume that this group of sketches is a sequence of variations, although there is a complete absence of a central theme. Every sketch is characterized by a focus on a different musical parameter, and this is done in a manner that prepares the way for the subsequent sketch. To be more specific, the accelerating and complex character of *First Sketch* leads to the *Second Sketch* that is fast and rhythmically simple. *Second Sketch* preserves the fast *tempo* acquired from *First Sketch*, but with the musical parameter of volume gradually increasing and, as one can see from the score, the spatial pitch distribution also gradually changing. In *Third Sketch*, small fragments of fast melodic and rhythmic figures act as remnants of the previous sketch. During this new sketch the parameter of density is changed via the creation of varying formal gestures. *Fourth Sketch* then makes a strong contrast by introducing the idea of scales, with the rising and falling movements of scale-like gestures creating a flowing motion. *Fifth Sketch* interchanges long and short note values and *Sixth Sketch* creates a contrast between the

⁷⁷ Universal Edition 1960, Webern 1932-1933:58

vertical and horizontal planes by the use of brief chordal gestures combined with trilling figures of varying duration.

Ex. 3.2

	10	17	16	11	12	19	18	13	14	111	15	110
P0	G	D	C#	G#	A	E	D#	A#	B	F#	C	F
P5	C	G	F#	C#	D	A	G#	D#	E	B	F	Bb
P6	C#	G#	G	D	Eb	Bb	A	E	F	C	F#	B
P11	F#	C#	C	G	Ab	Eb	D	A	Bb	F	B	E
P10	F	C	B	F#	G	D	C#	G#	A	E	A#	D#
P3	Bb	F	E	B	C	G	F#	C#	D	A	D#	G#
P4	B	F#	F	C	C#	G#	G	D	E	Bb	E	A
P9	E	B	Bb	F	F#	C#	C	G	Ab	Eb	A	D
P8	D#	A#	A	E	F	C	B	F#	G	D	G#	C#
P1	G#	D#	D	A	Bb	F	E	B	C	G	C#	F#
P7	D	A	Ab	Eb	E	B	Bb	F	F#	C#	G	C
P2	A	E	Eb	Bb	B	F#	F	C	C#	G#	D	G

First Sketch

Musical Parameter: Speed

Beginning with the amalgamation of P8 and RI7 (retrograde inversion of P7, ex. 3.2), the first sketch is a continuous transformation of the formal idea contained in the very first bar. In actual fact a multi-level construction is gradually unfolding, employing polyrhythmic non-symmetrical patterns and cross-rhythmic phrases.

On consulting the score it is obvious that the first sketch is characterized by increasing speed and density. The clarity and refined slowness of the first bars are gradually replaced by a more nervous and fragmentary texture based on more complex rhythmic combinations.

Pitch consistency is achieved by the use of intervallic relations taken from the row, constantly ornamented by adjacent notes. The resulting geometric shapes are subjected to spatial transformations, in order to create a rich fund of melodic progression. To be more specific, the intervals of the row are used to create a registral gap between the upper and lower melodic material, while multi-layered fragmentary melodic components create a rich fund of interconnected pitch cells (b. 5 - 6).

Second Sketch

Musical Parameter: Registral space – Volume

The highly compressed character of this sketch could be considered as a contrasting development of the previous one. In actual fact intervals taken from the transpositions of the row and its inverted forms are used to create shapes of varying structure. The pianist is asked to play gradually louder while the distance between their two hands gradually gets wider. In comparison to the previous sketch, here increasing density is

achieved not by a gradual increase in rhythmic complexity and speed but by the rising dynamic level of a regular and steady motivic pattern (b. 2).

Third Sketch

Musical Parameter: Density

The third sketch has an abrupt, subdued quality in comparison to the flowing character of the two previous sketches. In the first bar the initial 10 notes of the original row start to unfold in a pointillistic way. Before the end of this exposition, one can observe a mirror pattern in the last three notes of the row (C# - G# - D - F# - C - F). From this point onwards, small reflections of pitch cells, constructed from the row material, are used to create formal patterns. In actual fact a cumulative developmental process takes place, based on the multiplication of these pitch cells and upon the main intervals of the row. In bar seven a point of high culmination is reached, after which a reduction in forces resolves the dense complexity. The texture becomes homophonic, before fragmentary components of what has already been heard bring the sketch to its close.

Fourth Sketch

Musical Parameter: Direction

During this sketch the musical material is deployed in a more directly functional way. The basic characteristic of this sketch is the fragmentation of row components by the multiple transposition and permutation of small pitch cells taken from the row. Fast semitone scales, moving in different directions, alternate with chordal configurations based on a free manipulation of the row's intervallic configurations (see b. 10 - 11). The sketch finishes with a rhythmic and melodic dissolution of a rising scale pattern (b. 13).

Fifth Sketch

Musical Parameter: Note durations (a contrast between short and long values)

This sketch has a free melodic character. Grace notes function to give motivic impetus, while amalgamations of partial row transpositions, as well as inversions and multiplications of cells, act to preserve the linear consistency. Here, the series has a rather modal dimension to it. Having as a point of departure I₄ intermingled with P₁ row forms, a structural evolution occurs together with a gradual two level polarization (starting from b. 7). Leading up to this point three lyric phrases have been deployed, each one of which ended with a repeated-note motive (b. 2: F#, b. 3: B_b, b. 5 – 6: G).

Sixth Sketch

Musical Parameter: Duration of trill figures

The last sketch of the set of six develops the trill idea, combining it with accented chordal aggregates in order to create a dramatic atmosphere of flowing and multi-layered patterns made up of repeatedly recurring shapes. The chordal structure of the last sketch has a close relationship to the intervallic content of the row (see b. 4: parts of I₉ and I₆ row forms).

CHAPTER FOUR

ATOMA

Atoma is based on the atomic theory of the ancient Greek philosopher Democritus (460 - 370 B.C), who was born in Thracian Abdera. It is an experimental work centred on the concept of the gradual accumulation of similar sound elements.

Before progressing further it is vital that we examine some of the leading philosophical principles of Democritus's atomic theory⁸. According to the ancient philosopher, the basic characteristic of a physical entity is its material constitution. In fact, Democritus was the first systematic materialist in the history of philosophy. He developed the concept of a qualitatively uniform material substance, represented as a dense net of mobile atoms. From his point of view, every phenomenon is closely related to the mechanical movement of atoms, and as a result every entity in the real world is subject to quantitative measurement. He also believed that atomic theory exists not only in the material world but also in the spiritual world - a soul is made of atoms of fire, and an increase in the quality of its atoms simply means a closer approach to the real substance of being.

In general atoms differ in both size and shape, and they can be combined in an unlimited number of different forms. In practice they are perpetually moving and clustering together, forming groups and resultant entities. Smoother atomic movements lead to calmness, and unruly and irregular movements (of soul atoms for example) are responsible for every psychological disorder.

In *Atoma* this atomic theory is extended into the domain of sound. In other words, the pitch material of the piece is considered as a dense net of mobile atoms. This conception is based on the axiom that notes are atoms of the same substance, that they

⁸ See Audi 1999: 217-218

can adopt different positions in the composition's sound space and that these atoms can produce various shapes and models by moving, clustering and interacting with each other.

To be more specific, notes gradually change their position in time, thus affecting the pitch and rhythmic sequence of the piece. Changes of pitch represent the atomic movements in space and changes in rhythmic density represent the degree of atomic attraction. Repeated notes in alternating rhythmic associations reflect the linear movement of atoms on a similar spatial plane. Clustered sounds and dense rhythmical shapes imply the atomic accumulation from which, according to Democritus, true and genuine knowledge derives. Finally, semitone intervallic steps, as found towards the end of the piece, represent a diminishing developmental process leading to calmness. In accordance with the tempered twelve-tone scale, the semitone is considered the smallest existing interval in this piece.

Having made the above points, it should be noted that this gradual accumulation is often inverted during the piece by removing pitch material and loosening rhythmical density, in order to give a rather circular and recurring character to the overall structural design.

Pitch structure

In terms of the work's pitch structure, an initial point to note is the existence of a tightly constructed system that relies heavily upon modal and serial techniques. Every pitch in the first 64 measures of the piece is drawn from one of three modal aggregates (*a*, *b* and *c*) and one serial sequence (*d*). These pitch materials gradually overlap and interpenetrate one another, resulting in an emerging web of pitch associations. During the developmental process of the piece, a constant transformation of the interacting pitch aggregates leads to the dissolution of the initial strictly organized pitch consistency. As a result, from bar 65 onwards, the music material gradually starts to unfold more freely and spontaneously, without any systematic use of generally applied structural principles.

Another way to consider this would be to say that the pitch material is gradually emancipated from the pre-organized system initially employed. *Atoma* embodies the belief that pitch coherence, being in constant interaction with the overall structure of the piece, is not based only on any systematic use of pitches but also on the way that such pitches are used in practice. The continuous decomposition of modes does not affect the general structural motion of *Atoma* because the same intervallic relations and developmental procedures are maintained. To be more specific, the general use of clusters, sevenths and tritones, together with the recurring repetitive gestures that varying in their rhythmic density, act as the basic elements that unify the increasingly diverse pitch material. At all times, the different stages of this gradual system of pitch decomposition are closely related to the internal structure of the piece.

It is now helpful to continue with a step-by-step description of the structural framework of the piece. In general, the harmonic language is atonal. As mentioned above, at first

glance the pitch material of the work appears to be coherently structured. Three modal hexachords (*a*, *b* and *c*) and a serial hexachord sequence (*d*) are used. These modes are non-symmetrical constructions and consist mainly of major and minor thirds, tones and semitone intervals. The *d* material is constructed of fourths and augmented fourths and is subjected to several transpositions. These intervals act to provide a sense of unified harmonic motion (Ex.4.1).

Ex.4.1



It should also be noted that each of these modes could be divided in two trichordal sub-units (*a1* - *a2*, *b1* - *b2*, *c1* - *c2*). In fact, these modes imply the existence of a central axis in the middle of every hexachord. In terms of modal intervallic associations, although these modes are used as a restricted fund of pitch material, without any systematized pitch order, there also exists a corresponding relationship between the three modes (*b1*, *c1*: minor third-semitone, *a2*, *c2*: semitone - minor third, *a1*: semitone - semitone *b2*: semitone-tone).

Overall structure

From a structural point of view, *Atoma* appears to have a three-part formal design [*A* (*A1* - *A2*), *B*, *A'*]. However this impression is clouded by the use of non-symmetrical section lengths. Schematically, the work consists of a very long *A* section (b. 1 - 100) that is divided into smaller sub-units [*A1* (b. 1 - 42) and *A2* (b. 43 - 101)], an extended and rather transitional *B* section (b. 100 - 133) and a third very short section [*A'* (b. 134 - 146)] that is in fact a remnant or *Coda* of the *A* section. In support of this final section the *B* section is extended in length so as to create a stronger sense of closure, delaying the end of the piece and forming a link between the initial *A* and final *A'* sections.

Atoma has a non-thematic conception. There is a complete absence of motives, in the sense of clearly defined rhythmical and melodic units. Instead there are extended stretches of sound containing different patterns of repetition in order to vary both dynamic levels and textural structure. The piece is characterized by its static nature and a tendency to view musical progression in terms of rhythmical density in space. Rising figures based on *d* material create a strong contrast.

At the opening there are rhythmically staggered entrances of repeated chordal figures. Each instrument follows a different pattern of repetition. In other words, the piece can be viewed as a gradually alternating application of the repeated-note and repeated-chord idea.

Atoma relies on these structural ideas in order to build a coherent compositional framework. Having these principle considerations in mind, an effort has been made to alternate the musical material gradually, deploying it sequentially or applying

simultaneous transformations through rhythmical and textural means. These routines act as a constant process to structure the time scale of the piece⁹.

In *Atoma* the irregular *ostinato* figures intersect or lead up to *tremolo* figures. These *tremolo* and *ostinato* figures result in linear strands of sound which, when overlapped by repetition, start to create small recurring intervallic shifts and lead to the predominance of the *tremolo* and the repeated-note idea in the musical texture. At the same time the rising gestures of the *d* material gradually evolve into more fundamental rising semitone flows.

⁹ See Karolyi 1995: 97

Internal structure and organization of pitch material

I am going to detail the pitch organization of the piece section by section, moving through three larger structural sections with the first (section *A*) divided into several smaller sections.

Section A

As previously mentioned, the first section of *Atoma* is divided in two subsections [*A1* (b. 1 – 42), *A2* (b. 43 - 93)]. During these sub-units there are two climactic moments (b. 30 - 31 and 98). The second climax is in fact the first big culmination of the piece and takes place in two phases. The subsequent passage consists of a long chromatic climb leading to a very high pitch region in strings. Every climax in *Atoma* ultimately freezes into a sustained sonority (b. 31) or a freely repeated *ostinato* chord (b. 100 - 101) before receding again to a point of relative rest. This dramatic halting of musical flow underlies the overall shape of the piece, creating a high level of musical tension through subtraction.

A1

Bars 1 - 13: In detail, bars 1 - 13 are based on ‘*a*’ pitch material, divided into recurring clusters in the second violin and piano. In bar nine the first violin starts with truncated long notes on G#. Each successive entrance congeals into an *ostinato* figure, creating irregular patterns of fragmentary character. In bar 11 the second violin’s gesture leads to a *tremolo* figure. In general the opening configuration consists of small units that recur in varied forms. In terms of pitch material, the piano starts with *a2* material while the second violin has a *tremolo* figure (D# - E) taken from *a1* material. The exposition of this *a1* aggregate is integrated into the general texture in bar 12, when the piano takes up a D note in the low register.

Bars 13 - 26: At this point, the rising progressive evolution of ‘*d*’ pitch material takes

place. This rising gesture has a gradually compressed rhythm that leads to the recurrence of the principle idea in bar 16, played by the piano. Up to bar 22 a kind of development process based on the first idea takes place, which transforms into a more aggressive gesture of repeated demisemiquavers in bars 16 - 21. In bar 23 there is a recurrence of the *d* material, now transposed upwards by a seventh. The piano starts from a C in the left hand and moves towards *a2* material by the end of bar 25. The first violin then takes up the *d* material and the piano moves to a rhythmically condensed version of this material at the end of the same bar.

Bars 26 - 41: Leading on from this contrapuntal density based on different contrapuntal devices, the idea of repeated *ostinato* chords takes on an explicit leading role, resulting in the first, relatively brief, climax of the piece. In bar 31 a chord in the piano, together with a sustained clustered sonority in the strings, is all that remains from the gradual reduction in density. In terms of the pitch material, in bars 27 - 30 there is an amalgamation of *a* and *b* material (ex.4.2).

Ex.4.2 (*a2* transposed by a second and *b2* transposed by a third)

The musical score for Ex.4.2 consists of three staves: Violin 1 (Vln.1), Violin 2 (Vln.2), and Piano (Pno.).

- Vln.1:** Starts at bar 27 with a melodic line marked *a1* and *molto vibrato*. Dynamics range from *ff* to *p*. A second melodic line marked *a2* begins in bar 31, enclosed in a dashed box. Dynamics range from *mf* to *p*.
- Vln.2:** Provides a sustained accompaniment. Dynamics range from *f* to *p*. A label *b1* is placed below the staff in bar 31.
- Pno.:** Features a repetitive chordal pattern marked *loco* and *b*. Dynamics range from *ff* to *p*. Performance instructions include *p sub*, *cresc. poco a poco*, *accel.*, and *as fast as possible*.

From this point onwards the development process changes slightly. The repetitive figures start being interchanged in a double *tremolo* on the piano, with a wave-like motion, while the *tremolo* figure in the second violin is always hidden beneath the

surface, acting as a continuous underlying sonority. The first violin has an independent melodic line consisting of *d* material.

As regards pitch material, in bars 31 - 32 *a* and *b* material are still present. In bar 32 the first violin has *d* material. In bar 34 the piano plays *bl+cl* pitch material, while the *tremolo* figure continues in the second violin. Finally, in bars 35 - 40 *al+bl+cl* materials come to prominence, preserving a sense of pitch consistency. Up until this point it is obvious that the whole process had a cyclic character that recalls the very first idea of the piece - truncated sound leading to silence.

A2

Bars 43 - 64: In this second sub-section of the main *A* section (b. 43 - 93), the chordal working is developed in terms of its rhythmic and dynamic level. Here, the idea of a repetitive chordal figure comes into greater prominence, giving a wavering motion to the musical line. In bars 43 - 45 the *tremolo* and *ostinato* elements take on a fragmentary character. In bar 49 however, these elements gradually regain their previous role, and are enriched by *glissando* gestures in the second violin. The piano builds up the tension again by playing *ostinato* figures and irregular accented patterns (b. 53 - 64). In bars 62 - 64 a new cumulative process occurs, with interchanging flows of pitches and rhythmic patterns.

Bars 65 - 79: This process becomes gradually truncated by pauses that stop the ongoing rush of events (b. 65 - 76) and lead to the recurrence of the initial structural idea of repetition in bar 77. In these last 15 bars the pitch material has undergone a crucial transformation. Up to bar 64 *al* material is found in the strings, with the piano playing *bl+b2* materials.

From this strategic point onwards all the other pitch aggregates begin to interpenetrate one another freely. There is no pre-constructed system behind the flow of pitch material, although the general harmonic and melodic motion of preceding sections is preserved.

Bars 80 - 93: In bars 80 - 93 there begins a progressive process, based on the wavering flux of the demisemiquaver *tremolo* figure, while the strings contribute to the escalation with irregular rhythmical shapes. Pitch material is also gradually and freely condensed in range. This spreading process continues until bar 91, ending with a sustained sonority (similar to b. 31). After three bars which recall the initial fragmentary character, the piano adopts *d* material in sequences of perfect and augmented fourths, starting from the note A and leading to an interchanging chordal pattern, remnant of the previous passage. This transitory segment culminates in the abrupt entrance of a rising chromatic passage based on sevenths in the strings (b. 98), with chordal and melodic gestures in the piano based on an altered version of *d* pitch material. This climax is the first big culmination of the piece, and functions as a cadential comment to the condensed segment of bars 85 - 93, enhancing the tension created in the previous measures.

Section B

The second section (b. 101 - 133), while sharing similarities with the principle idea of repetition, is differentiated by new textural developments. In this section there are long notes in the string's high register, some of them harmonics, while truncated chords persist underneath the surface, forming a link with the previous section.

Bars 100 - 109: Evidence of *al* material can again be found, played this time by the piano and enriched by chordal additions in bar 100. From bar 107 onwards this material is transposed upwards by a fourth. The static situation thus created will be disturbed for the first time in bar 109 by a chromatic disturbance in the second violin. It is clear from the score that this kind of interjection is going to generate the second big culmination of the work.

Bars 109 - 133: In the next 23 bars this chromatic climb forms clusters of sound that lead to a massive rising climax (b. 128 - 130). This is the biggest culmination in the piece, immediately followed by a lengthening in durational values and a gradual

decomposition of the *tremolo* clustered chords, before a final rising climb (b. 131 - 133).

Section A'

This process brings the material back to its starting point by a very brief recapitulation of the first idea of the piece (b. 133 - 146), with *tremolo* and *ostinato* figures. The last section can be considered as an *A'* section, although its brevity makes it in fact function rather like *Coda*. The two final chords of the piece act as a final reminder of the repetitive character that underlies the entire work.

CHAPTER FIVE

ECHO AND VARIATIONS

In acoustics, when a frequency source creates a sound wave in space, an obstructive physical surface may throw it back without having absorbed it. The reflection thus created causes the continuous recurrence of the sound until it finally fades away. This repetition is called 'echo', and it depends on the sound volume and the ability of the space to absorb the sound waves.

Echo and Variations (E&V) for piano, cello and percussion, is a non-thematic musical elaboration of the echo phenomenon. This piece is focused on an aesthetic exploration of the echo sound, and the echo idea is used as a starting point in conceptualizing the general character of the piece. By and large, *E&V* contains a continuously transforming process based on progressively recurring segments and more extended gestures built from irregular rhythmical cells and incessant harmonic modifications. Thus, using more and more rhythmically complex timbral and intervallic alternations, this variation-based method gradually blurs the periodic succession of events.

To be more specific, the development of the echo process in this work takes place on three different levels:

Timbral echoes are used to develop repetitive gestures coloured by alternating instrumental combinations.

Distorted echoes are produced when the primary musical scheme begins to change in terms of its pitch and rhythm.

Cycling echoes are the impression of an endless repetition through the gradual proliferation and expansion of fragmentary musical components.

Pitch structure

In general the pitch structure of *E&V* is based on recurring intervals that build augmented and diminished chords. When interacting these chords lose their individual characters, creating clusters of sound. There is no pre-compositional system that defines the choice of pitches. An atonal harmonic language has been chosen according to personal aesthetic choices, with the view to creating dissonant aggregates within larger formal units. All pitches of the tempered scale are used, regardless of order, together with *glissandi* and wide pitch oscillations in the cello. Symmetrical relationships are often used within groups of pitches, creating chords that are blurred by additional adjacent notes not considered as part of the main chord. Finally the interaction of augmented and diminished chords is used as a way of creating cluster configurations.

Overall Structure

The analysis in this section is focused primarily on the piece's overall design rather than on details of its structure. It is important to note that while based on techniques of repetition and variation, *E&V* does not have a typical and clearly defined theme and variation form. Every phase is intersected and overlapped with the preceding and following ones, achieving a very clear structural continuity that makes the development process more lucid. The material is constantly transformed by timbral and pitch alternations, creating a shifting harmonic basis.

Musical coherence in *E&V* is not derived primarily from such traditional procedures as thematic or motivic development, but instead from the elaboration of textural entities. Instruments are mixed into composed multi-layered textures containing recurring shapes. A conscious attempt has been made to treat these shapes geometrically, replacing the idea of 'theme' by the more general concept of 'shape'. Every gesture has a specific development period after its first appearance, creating different patterns of repetition.

The piece can be divided in two sections of irregular length. Section *A* (b. 1 - 18) could be called the exposition section, and is divided into four phases. In these first 18 bars and in the first variation (b. 18 - 28), every phase concludes with a radical reduction of forces before immediately building again to a new surge of echo development. From bar 18 to the end of the piece, the main development section (Section *B*) occurs and this too can be divided into six progressive phases.

Looking in detail and from a structural point of view, the first 18 bars reveal a crystalline conception. Just like a crystal, whose surface regularity reflects its internal symmetry, this piece's compositional framework reflects its inner structure. In other words every phrase is part of a longer structural period, and both are constructed in the exact same way. Edgard Varese, who took delight in the creation of crystalline forms in

sound and music, describes very clearly this analogy to the process of crystallization in his lecture *The liberation of sound*:

There is an idea, the basis of an internal structure, expanded and split into different shapes or groups of sound constantly changing in shape, direction, and speed, attracted and repulsed by various forces. The form of the work is the consequence of this interaction. Possible musical forms are as limitless as the exterior forms of crystals¹⁰.

This first section of *E&V* (Section *A*, b. 1 - 18) is composed via successive varying phases of development. Each phase is a process of creation, exposition, elaboration and decomposition of the echo idea, using smaller or more extended cells that finally fade out. A continuous interchange between tension and relaxation takes place, while the blending of instruments creates a dense net of multi-layered textures.

The variations that follow (Section *B*, b. 19 - end) are constructed according to the internal structure of the exposition section (Section *A*) in expanded form. Each main variation section consists of six sub-sections. This is an augmentation of the process followed in Section *A*, dividing into six phases the extended alternations of the echo idea. Expansions and contractions gradually transform the material and reveal its inner structural possibilities in terms of texture, timbre, register and density.

In the first variation (b. 18 - 28), the fragmentary components of Section *A* are combined in a more explicit and lyrical way. Different patterns of repetition create a dense multi-layered texture, while rotating and distorting timbral echo developments combine to expand the echo idea itself. Compared to Section *A*, this first variation has a more extended elaboration of the melodic idea of bar 19, played here by the cello. The cello introduces the same circular technique of creation (b. 18), exposition (b. 19 - 20), elaboration (b. 21 - 24) and decomposition (b. 25 - 28) as that found in the general echo-idea.

¹⁰ Varese 1967: 203

In bars 29 - 32 a culminating and transitory process takes place, created by recurring relations similar to those used earlier. This process results in the second clearly defined variation (b. 33 - 39). In bar 33 the first sonorous outburst of the piece takes place, while more extended rotating melodic gestures create clouds with blurred harmonic contents.

The third variation (b. 39 - 47) amalgamates the process of creation, exposition, elaboration and decomposition of the echo idea. Up to bar 43 the rhythmic sequence has an unsteady character, while a timbral elaboration of similar pitches takes place via contrapuntal devices. From bar 43 to bar 47 this process leads to a rotating gesture in the piano that condenses the material before coming to a halt, allowing next variation to start. There is no fade out - just a continuous recurrence of the same material as the variation concludes.

The subsequent fourth variation (b. 48 - 53) is a complete contrast with the preceding third variation. Pitches start to be repeated, slightly altered each time, giving a feeling of gradual decomposition and breakdown.

The fifth variation (b. 55 - 62) is the most vivid and rich so far. It can be considered as the climactic point of the piece. The fast *arpeggio* gestures that create cloudy blocks of harmony are expanded in terms of timbre, with only hints of a repetitive character present at times, as a remnant from earlier variations. This intensive phase leads to a process of decomposition, with recurring intervals giving rise to the last variation of the piece (b. 63 - 80). These final 18 bars have a more homophonic character, vaguely referring back to previous material.

Internal structure and organization of pitch material

The first phrase of *E&V* lasts for two bars, and in an effort to approach the forming process of the piece with the greatest economy of means possible, every compositional procedure used later on in the piece is based on these two bars. It is also worth noting that the repeated-note idea rises from the triangular piano figures distributed in both hands, and that from the very first bar of the piece the echo idea is present.

In these first bars there is a timbral transference of the repeating gesture (a 'timbral echo') between crotales, marimba and piano, while the pitch oscillation (*vibrato*) in the cello creates a distorting effect (a 'distorted echo'). The triangular gesture in the piano changes position in time and space like an incessantly rotating shape (a 'cycling echo'). During these two bars rhythmic density gradually becomes more dispersed, just like the reflections of a sound wave that gradually fade away in space. Percussion motives - consisting of skins, metals and woods - also help to define the piece's larger formal shape. As a consequence percussive gestures are not independent from the formal pitch shapes that result when structural pitch cells are multiplied together.

As mentioned earlier, the first section of *E&V* lasts for 18 bars. The note F# is repeated by the piano, crotales and marimba in bar 1 - 2 as a timbral enrichment. The *vibrato* oscillation in the cello creates an unsteady basis, adding strength to the multi-rhythmic texture. In the first two bars the pitch material is drawn from the hexachord C - D - F - F# - B - Eb, creating a non-symmetrical construction based mainly on thirds and augmented fourths. This block of gestures soon fades out at the end of bar two, concluding the first phrase of the exposition section.

The second phrase of this opening exposition lasts for four bars, and is more vivid in its harmonic content. The marimba starts with ascending gestures in bar three, and these are then merged into the descending patterns in rotation that are played by the piano in bar four. In fact, the piano plays chordal aggregates in a way that allows the acoustic perception of the recurring note C. The pitch material here is based on an augmented

chord (Ab - C - E) surrounded by a diminished D chord and an E chord. At the same time the marimba - and later in bar four the piano - repeats in irregular rhythmical patterns the interval of G - C#. The second phase goes on with repetitive pitches played by the slide whistle (A), the piano (G - Db) and the cello (D - Ab), while the cello's oscillation functions as a unifying factor to the previous phase. The triangular ascending and descending patterns create a rather blurred harmonic texture, and the phrase concludes with the oscillating gesture in the cello, an echo of what has already been heard.

The third phrase of the opening exposition section is longer and merges into the section that follows it in bar 12. In bars 7 - 12, the percussion is more active and the triangular motivic patterns function more structurally, creating recurring configurations in the piano that dissolve in bar nine and return rhythmically in bar 10. Harmonically, this third phrase is based on augmented chords and symmetrical constructions around major thirds and their inversions. Recurring patterns are created around a C# combined with rotations of the formation E - Eb - A (b. 7 - 8) that are gradually altered in the piano, oscillating gestures in the cello, a B - Eb interval and F in the crotales and piano and a G# played by the cello.

At this point (b. 12), an amalgamation takes place between the third and fourth phrases of the exposition section. The recurring F in the crotales leads to the repetition of the F - Eb interval, while a new hexachord builds a different sonority in the piano, based on a major second - augmented fourth configuration (b. 12). The fourth and last exposition phrase ends in bar 18. This final phrase is characterized by the constant repetition of F in the cello and D and E in the piano, while rotating gestures based around augmented chords are freely developed. In bar 16 - 17 the rotation around the note G in the piano finally leads to a C# played simultaneously by both flexatone and piano in a new timbral enrichment.

Turning now to the variations that follow, we can see that the first variation (b. 19 - 28) has a lyrical character. Different patterns of repetition are played in irregular rhythmical

shapes, creating a rich texture of simultaneously developing gestures. The pitch material is built around the same intervallic configurations as in the exposition section. The phrase played by the cello is symmetrically elaborated around an augmented fourth, while multi-layered textures are constructed around diminished and augmented chords in the other instruments. The rhythmical density is gradually changing, leading to a recurrence of the augmented fourth gestures (b. 24 - 27: C# - G) in the piano.

Bars 29 - 32 play a transitory role based on intervallic configurations of major third and augmented fourth, leading to the second variation. This variation has a gradually agitating character, resulting in a more complex elaboration of the echo idea. After a dense *arpeggio* gesture in piano (b. 32), the second variation (b. 33 - 38) focuses on the creation of harmonic clouds and repeated pitches, creating an aggressive and wavering sound. The pedal triangular patterns in the piano are harmonically orientated towards augmented and diminished chordal aggregates, ornamented by adjacent pitches. These aggregates recur and their intervals start to change slightly (b. 34: cello), in order to create a distorted effect. *Glissandi* also give a slipping impression, while the timbral interchange of pitches between piano and cello (b. 37 - 38) leads to the next variation (b. 39 - 47).

The third variation is a combined elaboration of the rotating and timbral contrapuntal development found in previous variations. This leads to an obsessive repetition of an augmented chordal configuration played by the piano (b. 43 - 47), which then dissolves into an abrupt descending symmetrical sequence based around fourths and tritones (b. 48). In bars 39 - 43 the piano and cello play the same pitch in different patterns of repetition. The cello starts a melodic monologue via a sequence of *glissandi* that are blurred by outbursts of percussive action, and then the piano “freezes” on an A - C# - G - Ab gesture (b. 43).

In bar 48 the fourth variation begins to unfold, with triangular non-motivic rotating patterns that reappear slightly altered each time (‘distorted echoes’). The unsteady atmosphere of the previous variation is now extended into a mood of suspense, created

by *glissandi* and oscillating gestures in the cello together with fragmentary percussive patterns. It is obvious that the piece is proceeding towards its final climactic moment. From this point onwards, the harmonic content is very blurred and always based on the intervallic relations already heard. The waving motion is also always present, creating clouds of dissonant harmonic aggregates. This variation finishes in bar 54 and leads directly to the fifth variation.

The fifth variation lasts from bar 54 to bar 63 and it can be considered as the most active part of the piece in terms of both harmony and texture. The echo concept is rather compressed, reduced to a recurring *tremolo* (G#, G) gesture played by the marimba (b. 54). When examining the score, it becomes obvious that the semiquaver and demisemiquaver rotating patterns are periodically spread out to the full ensemble, creating a multi-layered texture as a result. The cello plays repetitive intervallic configurations that are gradually resolved into complex harmonic patterns via *glissandi* and oscillating figures, and coherence is preserved by the return of the *tremolo* gesture in the marimba. In bar 61 the whole process culminates in descending chordal shapes based on an augmented C chord that then resolves into the constant repetition of the note D.

The harmonic content of this fifth variation is based on augmented and diminished chordal configurations blurred together with several surrounding pitch alternations that refer to a polytonal musical environment. To be more specific, in bar 55 the marimba passes through a diminished chord of E. In bar 56 the piano turns around an augmented Bb chord while the cello implies F major and the crotales a diminished A chordal environment. In bar 57 the piano implies an F# minor chord in the right hand and an Eb diminished chord in the left hand. The rotating pedal gesture in the piano in bar 58 passes through E diminished, D diminished and Eb augmented chords. In bar 59 the piano and cello have a quick and rather vague passage via A# diminished and E diminished chords respectively. In the right hand, the piano passes through C minor as well as E augmented and B diminished chords, while the marimba builds up an augmented sonority of C. In bar 60 a G# *tremolo* hovers between intervals of minor and

major thirds and augmented fourths. In bar 61 chords of C augmented (marimba) and D minor (piano) are the basis for the blurred harmonic result.

The last variation runs from bars 63 to 80. From bars 63 to 66 a gradual abstraction occurs. The sound becomes more and more homophonic, while the cello oscillates within the pitches played by the piano. The main homophonic development occurs when the piano plays harmonic surges, reinforced by the tam-tam and with the cello continuing its irregular repetitive gestures. The compressed and staggering character of the last variation leads to the end of the piece via the decomposition of the sound elements that have been used in earlier variations. Oscillations in the cello are based on augmented fourth intervals, and the chordal sonorities in the piano pass through C augmented (b. 67), Eb augmented (b. 70), C augmented (b. 71) and C# diminished (b. 72). From this point onwards the pitch configurations unfold more freely, based on intervallic relations from earlier variations, and lead directly to the end of the piece.

CHAPTER SIX

METAVASIS

Metavasis, which in Greek means 'transition', is inspired by the theory of natural selection by Darwin¹¹. The continuous transformation of material substance results in the creation of new forms of existence. By observing nature, one might conclude that her forms are of great simplicity and perfection in a deterministic way. In fact, all natural forms have one thing in common - unity. In the progressive process of creation, physical selection leads to self-maintaining balanced systems through a process of subtraction. These systems gradually get rid of unnecessary elements, and as a result this process generates a strong sense of progression in its inner substance. Xenakis once said that "a musical thing must be a living organism, it must have a head and arms; it would be better to speak of biology than of architecture. A musical space is not three-dimensional, it is multi-dimensional"¹². As Webern concludes in his book *The path to the new music*:

Unity is surely the indispensable thing if meaning is to exist. Unity, to be very general, is the establishment of the utmost relatedness between all component parts. So in music, as in all other human utterance, the aim is to make as clear as possible the relationships between the parts of the unity; in short, to show how one thing leads to another¹³.

Metavasis is an effort to represent symbolically the route from chaos to unity. A mass of sounds decays progressively through collisions and fusions, expansions and temporal decompositions, to result in one single note. At first glance, this piece could be considered as a progressive form, meaning that every section results in the next one through a selective formal process. It can be divided into six sections and a *Coda*. By using a method of abstraction a progressive process takes place, in order to reveal the structural possibilities hidden beneath the sound surface. By minimizing the material

¹¹ See Beer 1996, Darwin 1859: 51-106

¹² Xenakis 1967: p.13

¹³ Universal Edition 1960, Webern 1932: 42

used, the greatest economy of means is preserved. By omitting material, the structural developing process gradually ends up on one single note. Of course, it is obvious that a similar process, sweeping towards a centre, could have been achieved with many different initial materials.

The basic characteristic of *Metavasis* is a chromatic friction between semitone intervals that creates strands of sweeping sound. Timpani and tubular bells give a dynamic urge via irregular *tremolo* patterns. *Glissandi* are used in the temporal degeneration of the material and signify a process of decomposition in this constructed material, fragments of which lead progressively to the next phase of development. *Tremolo* figures and *flutter tongues* are used as steady points of reference throughout the structural progression of the work. The semitone harmonic idea is gradually dispersed into the sound space resulting in a tense and wavering atmosphere, and contrapuntal devices are often used to create a wider timbral effect by the instrumental division of formal patterns. A gradual rhythmic contraction of the semitone intervals results in the genesis of trill figures that are gradually expanded outwards. In other words, the general formal procedure is based on the expansion of chromatic gestures that create recurring intervallic relationships (trills).

With regard to the pitch material of the work, there is no pre-constructed system at work. Chords of chromatic clusters move around the sound space without having any sense of harmonic centre, and with the view to supporting the general process of the piece, gradually omitting pitches in order to conclude on one single note.

General structure

As noted above, *Metavasis* is divided into six sections that are irregular in length, and a final *Coda*. Section *A* (b. 1 - 16) has a rather introductory character while in section *B* (b. 16 - 50) the first development starts to unfold. Section *C* follows (b. 50 - 87) with the second developmental process and section *D* (b. 90 - 110) then brings sudden contractions and expansions. Finally, in section *E* (b. 111 - 138) a third development starts, concluding with section *F* (b. 139 - 156), which is a rolling passage that leads to a *Coda* of 27 bars.

As a point of departure, the compositional context of *Metavasis* is based on a contrasting structural interplay between calm and tense moods with a gradual and constant interchange between truncated and continuously flowing figures, embodied in upward and downward gestural patterns. Aside from the overall form of the piece, sweeping blocks of sound based on chromatic movement are constantly transformed by the melodic expansion of the semitone interval to sevenths, evoking a gradual timbral split.

The continuous transformations of material create six different stages of development as follows:

Section A: Exposition of semitone gestures

Section B: Expansion of semitone gestures by permutation

Section C, D: Trill figures as a result of the increasing density in semitone movements

Section E: Mass of semitone movements

Section F: Fragmentation of gestures

Coda: The route towards a single note

Internal structure and organization of pitch material

In section *A*, structural coherence is derived from the repetitive character and waving-like motion of long notes, as well as from a restricted use of pitch material. The shifting harmonic basis of the first 16 bars leads up to the first development process of the piece (Section *B*). This section is constructed from strands of semitone intervallic relationships in the strings and woodwinds, creating sweeping phases of sound. The introductory character of section *A*, with its noisy and rather blurred harmonic content of long-note strands and sweeping sounds, is interrupted by a sudden explosion that results in the expansion of the material in three dimensions in the piano's range (width, depth and height) (b. 16). As a result, the linear activity of section *B* preserves the essential character of the piece, forming a link with the previous section.

In bars 16 - 52 the principle idea is spread out harmonically and the timbre becomes more conventional. The piano develops the semitone harmonic idea, which is dispersed over its range (b. 19 - 20). Here, the main target is to create a moving and slippery harmonic surface, with strings and woodwinds playing short *glissando* gestures that blur the harmonic effect of the semitone dissonant aggregates. The dissonant harmonic landscape created up to this point gradually recedes as part of the sound decomposition that occurs at the end of section *B*, using *glissandi* in the strings.

This first phase of development is immediately followed by section *C*, where *glissandi* are heavily integrated into the textural activity of the work. From this point onwards the concept of 'friction' starts to be developed via contrapuntal working, which leads to a timbral spread of the principle idea. This process is characterized by the transparent timbral enrichment of the vibraphone (played with the bow), and the contraction of the semitone idea multiplied and transformed into descending chromatic passages (b. 63 - 71). These gestures are further developed and result in the construction of trill figures generated by increasing the density of the repetitive pitch configurations (b. 73 - 78). This process progressively creates an elaborate system of melodic associations that establishes a mosaic-like structure of fragmentary ornamented components. As a result

of the multiplication of pitch cells, a vivid unfolding of rotating patterns occurs, based on an improvising mixture of expanding trill figures and recurring semitone and seventh intervals in the piano and vibraphone (b. 79 - 86). This process spins on to the end of section *C* with the use of *glissandi*.

After the various expansions and transformations of the material derived from the development of the principle idea - always enriched by chromatic additions - a drop in the dynamic and harmonic activity takes place from bar 89 onwards. This *D* section, reaches a point of relative rest that is reminiscent of the character of section *A*. At this point the interchange between calm and tense moods predominates, in a more dramatic version of what preceded. In actual fact this passage functions as a conclusion, in order to allow the resumption of the previous developing progression of events.

At the beginning of section *E*, the final development takes place. Here the piano has a leading role with ascending scale gestures, while the strings and woodwinds create a mass of descending semitone movements, producing a wavering and dense net of sounds that flows on until the end of the section. Every phrase leads towards dissolving *glissandi* gestures, and the work gradually gains balance via contrasting upward and downward linear overlapping strands, creating a massive harmonic fundamental (based on a semitone interval) which is the principle element in the harmonic motion of the work.

Generally speaking it is obvious that during the process of progression that characterizes the piece, a continuous transformation of material takes place. This process acts to discover new formal combinations through transformation as well as via the processes of expansion, contraction, subtraction and accumulation. This developing 'adventure' results in the reduction to a bare minimum of material that finally takes place in section *F* (b. 138). From this point onwards, the sound world becomes very dry and assertive, built from remnants of descending chromatic figures as an inversion of the material of the previous section.

Immediately after the last phase of development is over, the *Coda* starts to unfold, bringing the motion of the piece back to its original point of calmness. The Coda's basic characteristic is its eerie and whispering mood made up of shadowy and noisy sounds, while semitone 'friction' is always hidden beneath the surface. The truncated character of the previous section is reinforced, and the combined motivic elements (long notes, *glissandi* and descending gestures) gradually fade away leading to the end (for example b. 165 - 172). Descending *glissandi* function once more as a premonition of the end. The musical material is reduced to a bare minimum, and the work heads towards abstraction, ending with the obsessive repetition of one single note.

CHAPTER SEVEN

ENVELOPE

Envelope, for timpani, percussion and symphony orchestra, is a piece based on the envelope description of a sound - that is the way its volume changes over time.¹⁴ The piece explores the possibilities of the sustaining power of different instruments based on each instruments acoustic properties. The most significant element of the work, which constitutes its basic motivic idea and emerges as the primary controlling factor (as well as the main binding element in its construction), is the repeated-note idea.

The structural development of *Envelope* relies on grace-note configurations and repetitive figures that interpenetrate each other. They continually change their shape, rhythm, dynamic density and musical function while retaining their character and formal identity. A constant interplay between various permutations and transpositions of the intervals of a second (major and minor forms) is used to construct the harmonic framework of the piece. A technique of near-exact repetition is used in order to preserve the unity of the structural elements of the work. This approach is very well described in Jonathan W. Bernard's *The Music of Edgard Varese*:

This kind of event, which involves reference to some previous material, resembles the more traditional process of thematic or motivic development and offers potential contradiction to the un-directional nature of constant change. However, according to Varese, "if the themes reappear, they always occupy a distinct function in a new medium"-¹⁵

The overall form of the work is a one-movement *concerto*. Although a three-movement form (fast - slow - fast) is considered as the archetypal pattern of the *concerto* form, many modern composers have amalgamated these parts into one non-stop movement (for example Ravel's *Piano concerto for the left hand*). Here, the tempo changes as often as is needed in order to serve the structural requirements of the work. After a

¹⁴ Dobson 1992: 68

certain point in the work there is a similar amalgamation of the timpani, the percussion groups and the rest of the orchestra when from a point and after, the *virtuoso solo* part (*cadenza*) starts to be mixed with the general instrumental flow of the work.

The form of *Envelope* is primarily determined by the textural transformation of percussive formal patterns, achieved through the proliferation of small rhythmic units. In addition a rich fund of melodic shapes interact with micro-polyphonic textural patterns of changing density (based on non twelve-tone row constructions), which are created by a multitude of contrapuntal lines. Every line is subjected to an incessant permutation of its intervallic structures, leading to a variety of nuances. Interaction between chromatic formations and augmented or diminished chords constructs a sense of rich harmonic interference via the continuously changing patterns of colour and rhythm that result.

¹⁵ Bernard 1987: 43

Pitch structure

The pitch material of *Envelope* is based on chromatic configurations distributed in different transpositions so as to result in intervallic combinations of sevenths and ninths or cluster chords. These chromatic aggregates are often clouded by the use of augmented and diminished chords, or by implied minor and major chords that vanish and re-emerge through the dense chromatic web of sounds created by the superimposition of irrational rhythmical patterns.

In practice *Envelope* does not employ any general pre-constructed pitch system aside from a system of note generation based on a fixed set of intervals in an eighteen-note row (ex. 7.1). The choice of a row containing of more than twelve notes offers the possibility of repeating the same note more than once by playing the entire row. This row undergoes several manipulations and transformations in order to create the massive contrapuntal sections of the work, as well as the smaller row patterns of serial pitch and rhythm. Apart from this, pitch consistency is derived primarily by the multiplication of cells based on the use of the stepwise and half-stepwise movements. One could in fact conclude that there is a combination of serial and non-serial techniques employed in the piece. In addition there is a serialized (or isorhythmic) process used in the construction of the two large bass masses of the work that recall the practice of employing recurring pitch (*colour*) and rhythm (*talea*) patterns of different lengths in 14th century music. The result is an ever-changing combination of elements.¹⁶

¹⁶ Lester 1989: 256- 271

Ex. 7.1

	I0	I11	I5	I9	I3	I1	I10			I2	I4	I7		I6	I8			
P0	C	B	F	A	Eb	Db	Bb	Ab	C	B	D	E	G	Bb	F#	G#	C	B
P1	C#	C	F#	A#	E	D	B	A	C#	C	D#	F	G#	B	G	A	C#	C
P7	G	F#	C	E	A#	G#	F	D#	G	F#	A	B	D	F	C#	D#	G	F#
P3	Eb	D	G#	C	F#	E	C#	B	D#	D	F	G	A#	C#	A	B	D#	D
P9	A	G#	D	F#	C	A#	G	F	A	G#	B	C#	E	G	D#	F	A	G#
P11	B	Bb	E	G#	D	C	A	G	B	Bb	C#	D#	F#	A	F	G	B	Bb
	D	C#	G	B	F	Eb	C		D	C#	E	F#	A		G#	Bb		
P4	E	D#	A	C#	G	F	D	C	E	D#	F#	G#	B	D	A#	C	E	D#
	C	B	F	A	Eb	C#	Bb		C	B	D	E	G		F#	G#		
	C#	C	F#	Bb	E	D	B		C	Eb	F	G#		G	A			
P10	A#	A	D#	G	C#	B	G#	F#	A#	A	C	D	F	Ab	E	F#	A#	A
P8	G#	G	C#	F	B	A	F#	E	G#	G	A#	C	D#	F#	D	E	G#	G
P5	F	E	A#	D	G#	F#	D#	C#	F	E	G	A	C	D#	B	C#	F	E
P2	D	C#	G	B	F	D#	C	A#	D	G#	E	F#	A	C	G#	A#	D	C#
P6	F#	F	B	D#	A	G	E	D	F#	F	G#	A#	C#	E	C	D	F#	F
	E	Eb	A	C#	G	F	D	C		F#	G#	B	D	Bb	C			
	C	B	F	A	Eb	C#	Bb	G#		D	E	G		F#	G#			
	C#	C	F#	A#	E	D	B	A		D#	F	G#		G	A			

General structure

Envelope is divided into five phases of development, each of which is irregular in length. Viewing the work as a whole, the boundaries between sections are not explicitly delineated. There is always an intersection between the successive formal phases of the piece's structure, designed to unify the different developmental process employed in the work. Transitory parts serve as connecting passages, binding the main structural units of the work together. They also underline the general boundaries of the piece's structural framework.

Structurally speaking, the work opens with a brief introductory section of eight bars. The timpani play five successive rhythmical patterns of repetitive character divided by rests, while the two percussion groups gradually join with *tremolo* and grace-note figures. Section *A* (b. 9 - 38) preserves the opening repeated-note idea, harmonically spreading it through all the instruments of the orchestra and creating a variety of rhythmical combinations. This section can be divided in three subsections. In the first subsection (*A1*, b. 9 - 17) a horizontal and vertical expansion of the repetitive gestural patterns takes place. In the second subsection (*A2*, b. 18 - 31) a massive web of polyphonic sound starts to unfold in the violins and woodwinds (except the bassoons), while the repeated-note figure is intermingled with these polyphonic sound blocks. In the third subsection (*A3*, b. 31 - 38) there is a textural change in the process of development. The sound mass produced by the violins gets thinner, while a new dense polyphonic texture starts to unfold, constructed from repetitive formations and grace-note configurations. The violins create clustered sounds by the use of *glissandi*, and a gradual increase in rhythmic density created by the timpani and the two percussion groups takes place.

There then follows a transitory section, starting from bar 38 and leading up to the beginning of section *B* (b. 46 - 68). During this connecting passage, the piano creates a

rich web of fast rhythmical shapes in an oscillating horizontal structure. These intersect with the idea of pitch repetitions and the ongoing string sound mass.

Section *B* begins with the gradual unfolding of a new static textural entity consisting of a rhythmically loose polyphonic construction created by the bass instruments of the orchestra. Brief percussive gestures break this vague and rather obscure atmosphere. From bar 51 onwards a cumulative process begins, with sudden outbursts of trill figures and *tremolo* lines in a further elaboration of the repeated-note gesture. Brief rests play an increased role in the contrapuntal development that takes place in the bass instruments. Leading up to this point of the work, a wide range of abrupt dynamic changes and *sffz* gestures create a multilevel textural and timbral environment.

Section *C* (b. 69 - 87) works as a *cadenza*. From bar 79 onwards a dialectic phase between timpani, percussion and the rest of the orchestra start to unfold. The homophonic texture of the orchestra alternates with the active polyphonic structural context of the percussion ensemble.

Just before the beginning of section *D* (b. 90 - 98) a powerful passage in the oboes, trumpets, and violins (b. 88 - 89) leads to a four-bar elaboration of the current musical material, where a very brief recapitulation of the repeated-note idea contrapuntally unfolds (b. 94 - 98). In bar 99 this process currently halts, with a *sffz* in the violins delineating the beginning of a massive descent that concludes in a new shift in the bass instruments and constitutes the beginning of the last section of the *concerto* (Section *E*, b. 101 - 116). In this last section trills, *tremolo* strands and grace-note patterns gradually fade away, bringing the piece to an end.

Internal structure and organization of pitch material

Introduction (b. 1 - 8)

In the introductory part of the *concerto* (b. 1 - 8), the five successive timpani phrases are linked by the sweeping sounds of the percussion parts. A dialogue takes place between the repeated-note idea (C#) and a variety of colouristic effects in the rest of the orchestra. Many special performance techniques are employed (rotating the triangle stick around the surface of the tam-tam, playing the snare drum with the sand blocks, scrubbing the cymbal with a brush etc) in order to create a rich sound spectrum. In this opening section there is an analogy between rhythmical values and their dynamic intensity; the smaller the values are, the softer the dynamics become. From bar five onwards this process is gradually reversed, starting with the accelerating gesture played by the tambourine.

Section A (b. 9 - 38)

The first section of the piece (b. 9 - 38) contains a rich interchange of moods and abrupt changes in dynamics and instrumentation. The opening layering of the section gradually forms two interconnected augmented chordal aggregates - (Eb - G - B) and (Db - F - A) (b. 10 - 12).

AI (b. 9 - 18)

A variety of repetitive grace-note gestures are contrapuntally unfolded, based on the previous intersecting augmented aggregates, and result in overlapping *sfz* attacks that lead to strands of wavering sound. From bar 15 until the end of AI (b. 18) an accumulation of elements takes place. Recurring stepwise movements in the second trombone, bassoon and the cellos (b. 15) lead to a formation based on successive sevenths played by the horn and doubled over two octaves higher above by the violas. In bar 17 successive repetitive gestures played by the trumpets, together with an accelerating trill in the clarinets, result in an abrupt *sfz* ascent in bar 18 and then an

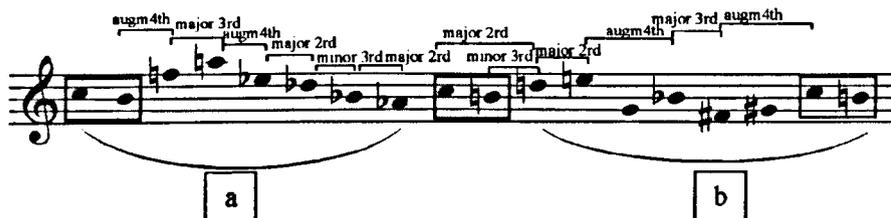
immediate fall in dynamics, leading to the beginning of the *A2* subsection by a radical change in the textural layering. From bar 15 onwards the violins adopt an accompanying role, playing a cluster of sounds in open position (C# - D - Eb - E).

A2 (b. 18 - 31)

During the second subsection of the *A* section of the work, a polyphonic block of sound based on contrapuntal devices start to unfold. The instruments involved are the following: violins, piccolo, second flute, oboes, Eb and Bb clarinets.

In practice the instruments are moving in a complementary way, filling in gaps in musical activity or doubling one another (b. 20 - 21). Their constructive framework is based on the use of a serial-like sequence of eighteen pitches. This takes the form of a non-symmetrical formation distributed around the notes C - B. When comparing the notes before and after this central semitone interval (that functions as a pivotal point), one can observe that this cell works as an axis. The symmetrical reappearance of the semitone interval on the row's boundaries yields a cyclic character to the pitch sequence that works as a point of reference in sound blocks created from the sequence. As one can observe in the following example, there is also an important correspondence between the 'a' and 'b' parts of the series. One could say that the *b* part incorporates the intervals of the *a* part (Ex. 7.2). Consistency is achieved across a wide variety of pitch combinations by the exploitation of these features.

Ex.7.2



To continue our examination of this *A* section we can see that the flute starts with the P₁₁ transposition of the row, based on the concluding note of the previous section. The oboes use the row's retrograde form starting with R₆. The Eb clarinet plays the inverted form in its third transposition (I₃) and the Bb clarinet plays the retrograde inversion RI₁₁. As for the piccolo, it plays parts of the row in a sequential rotation (b. 18 - 19). After the last note of every row a gradual half step ascending transposition of the row takes place. This process is repeated after the end of every transposition. Finally, the violins create a contrapuntal exchange of row material among themselves with fast rising or falling gestures. Up to bar 24 there is a non-standard use of the row transpositions. A common practice - applied in this work - is to transpose only a part of the row, or start playing from the middle of a transposition:

First violins

bar 18: P₀ from the beginning

bar 19: continue with P₁

bar 20: P₁₁ from the 12th note

bar 21: P₉ from the beginning

bar 22: P₉ from the 10th note

Second violins

bar 19: P₅ from the seventh note, then P₂

bar 20: continue P₂, then P₄ from the 15th note

bar 21: P₉ from the sixth note

bar 22 - 23: P₉ from the 15th note, then P₈

In bars 24 - 30 there is a constant cycle of row transpositions played by the first violins, with their retrograde forms in the second violins. This process starts with P7 and has a descending direction (P7, P6, etc).

In the remainder of the orchestra every instrument follows a different strand of repetition, with local accumulations of grace note and repetitive patterns forming a link with subsection *A1*. The pitch material is organized in semitone constructions that are distributed in larger spans to form configurations of sevenths and ninths (b. 22 - 23).

From bar 24 onwards the woodwind block of sound thins as the piccolo, the second oboe and the Bb clarinet start to create interconnected melodic shapes as an augmentation of the intervals used in the main sound mass. The percussion groups continue with their polyrhythmic combinations while the timpani create continuous transformations in the sonic texture, blurred with *tremolos* and semitone movements. In bars 29 - 30 a gradual dissolution of the accumulated density takes place, while the woodwind mass gradually fades out. The contrapuntal activity of the violins is resolved into clustered strands of sound that move via narrow *glissandi* movements (first violins: C - B, second violins: E - F).

A3 (b. 31 - 38)

Entering the third subsection of the *A* section we can see small remnants of the earlier grace-note formal patterns that are now contrapuntally distributed, creating a new polyphonic textural construction, while the violins continue their *glissandi* gestures alongside the dense percussion activity. The harmonic context at the end of section *A* is still based on permutations and transformations of tone and semitone intervals, with the resulting sonorities based on the manipulation of these intervals (b. 35 - 37). The cluster sonority of bars 37 - 38 leads to an abrupt change in the timbral balance of the passage with the piano, xylophone and violins entering in bar 38.

Section B (b. 46 - 68)

After the repetitive patterns of bar 45 in the cellos (A - Eb) and contrabassoon (D) and tuba there is an imperceptible shift into the second section of the piece (b. 46 - 68), while grace note figures hang over from the previous section in the trombones. Gradually, an evolving sound mass played by the bass instruments starts to emerge, adopting a leading role for a while. This low-range sound mass lasts for 21 bars (b. 46 - 67). Every instrument involved in it moves within a restricted registral space, creating a static effect. Contrapuntal lines move rather slowly and in complementary recurring rhythmical patterns, largely based on pre-constructed rhythmic rows. These rows are repeated many times in a cyclic pattern, while at the same time a different row is employed for the pitch material. The first trombone, bass clarinet and tuba play a different role, having free melodic and rhythmic shapes. In these bars, the spatial distribution of the pitch material covers the whole octave, creating a twelve-tone cluster. Every instrument moves within the following pitch limits:

Pitch range (b. 46 - 67)

Row-based material

bassoon: D to F

contrabassoon: C to Eb

second horn: A to C

cellos: G to B

double basses: F# to A#

Free melodic material

bass clarinet: G to B

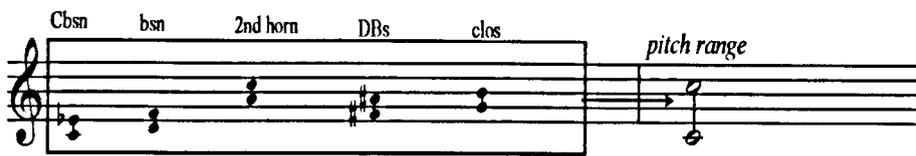
first trombone: E to Ab

tuba: G to C

The harmonic goal of section *B* is to create a low-register orchestral cluster that has a static quality. This creates a strong contrast to the character of the previous section. The following chart shows in detail the pitch and rhythm system employed. There is a correspondence between numbers (from one to four), specific pitches and rhythms, as

well as a free mixture of groups of other numbers, as shown below in example 7.4. Brief rests interrupt the musical flow in order to avoid monotony and give the players of bass instruments enough space to breath. Brief pauses are also used when high-registered instruments come into play. In this manner a dialectical phase between the two instrumental groups is created. The most vivid way to document the operation of this system is the following table (Ex. 7.4):

Ex.7.4



Bassoon: 1. D, 2. D #, 3. E, 4. F ----- 1. ♩ 2. ♩ 3. ♩+♩ 4. ♩

Pitch: 3214 - Rhythm: 4132, 4132, 1234321, 1324 etc

Contrabassoon: 1. C, 2. C #, 3. D, 4. Eb ----- 1. ♩ 2. ♩ 3. ♩+♩ 4. ♩

Pitch: 434324321212321234321 - Rhythm: 3142, 432123, 4123 etc

Second horn: 1. A, 2. A #, 3. B, 4. C ----- 1. ♩ 2. ♩ 3. ♩+♩ 4. ♩

Pitch: 12321234321324321234321 - Rhythm: 4132, 4321, 24321 etc

Cellos: 1. G, 2. G #, 3. A, 4. A# 5. B ----- 1. ♩ 2. ♩ 3. ♩+♩ 4. ♩

Pitch: 1213212324321234354321 - Rhythm: 3121, 321, 1234321 etc

Double basses: 1. F# 2. G, 3. G#, 4. A 5. A# ----- 1. ♩ 2. ♩ 3. ♩+♩ 4. ♩

Pitch: 1213212324321234354321 - Rhythm: 1234321, 4321 etc

From bar 51 onwards we can see that trills play a more important role, creating strands of sound in many timbral combinations. Grace-note configurations - spread across the winds and timpani - act as a reminder of the main motivic idea of the work. Percussion

outbursts of dense activity, together with abrupt *sfz* piano phrases (b. 56, b. 59, b. 68 - 70), open the way for an increase in density, focused on the repeated-note idea. This reaches its high point of culmination in bars 63 - 67. Most of the time the pitch material of this unit is based on semitone and tone configurations spaced across a wide orchestral range. Here are some of the pivotal configurations around which the harmonic progression is built:

bars 54: B diminished chord

bars 56 - 57: E diminished chord

bar 59: G diminished chord

bar 62: C# diminished chord

It is useful to note that from bar 54 onwards a dense contrapuntal process starts to unfold between the violins, violas and woodwinds, creating corresponding interrelationships. The piano gestures of bars 56 - 60 continue to carry the development of the series (Ex. 7.1) by excluding the two external semitone intervals and using the *a* and *b* parts of the row simultaneously as follows (P0 - P6, P1 - P7, P2 - P8 etc) (Ex. 7.5):

Ex. 7.5



Section C - Cadenza (b. 69 - 87)

In the *cadenza* (b. 69 - 87), percussion gestures derived from the work's basic formal elements are developed in detail. Grace-note patterns, rolls and *tremolo* figures - together with special playing techniques in the percussion - are all employed so as to create a wide variety of colours. As for the rotating piano gestures of bar 69, these are

based on the sequence of row forms P₀, R₁, P₂. From bar 77 onwards the bass clarinet, contrabassoon, cellos, and double basses, start to generate a *substratum*, creating narrow cluster aggregates based on the two following augmented aggregates: Eb - G - B and Bb - D - F# (completed by the violas and the horn in the following bar). The piano enters with a decisive pattern based on the main characteristic elements of the work (rhythmically augmented repetitive gestures, with intervals of a ninth in E - F# and F - F#). In bar 79 a *tutti* accented *staccato* chord from the violins and high-range woodwinds (D - Eb - F - F# - G - Ab - A) stops the instrumental flow and the percussion regain the predominant role.

From this point onwards (b. 79) a dialectical ascending phase takes place, between the percussion and the orchestra. Here, a cluster of sound covering a range from D to Bb starts to change positions within the registral space. Thus, the pitch material undergoes the following transformations (Ex. 7.6, b. 81 - 87):

Ex. 7.6

Cluster chords

bar 81: D to Bb

bar 82: D to G#, C - C# - E - G# - A

bar 83: Bb to G

bar 87: Eb to B



In bars 85 - 86 the timpani are occupied by a variation of the initial formal pattern of the piece, just before the massive outburst in bars 88 - 89 which functions as a link to the next section starting in bar 90. The resulting phase of this connecting passage

resembles to that of the sound mass in the *B* section, although in this case the instruments repeat the same notes within a narrow register in a rotating manner, creating a sparkling surface. The exact intervallic distribution is as shown below. Every instrument moves within the following pitch limits:

Pitch range (b. 88)

Oboes: D to F, A to C

Trumpets: successive augmented fourths

First violins: E to G#, C# to E

Second violins: Ab to C, B to D

As one can conclude from the above, there are two parallel clusters that lead to the resulting blocks of sound. The first one covers an octave (Ab₄ - Ab₅) and the second a smaller range from A₃ to F₄. There is also a rich strand of interconnected augmented fourths, played by the trumpets, which start to rise in bar 89 up to their highest pitch range. This dense net of micro-polyphony is accompanied by another open cluster sonority played by the rest of the orchestra.

Section D (b. 90 - 98)

Section *D* (b. 90 - 98) functions rather as a brief recapitulation of what came before. In bar 90 a stepwise ascending *tremolo* gesture act as the beginning of a cumulative rising process divided between the flutes, oboe, clarinet and violas. This ends in the middle of bar 92, concluding on the note F. In bars 94 - 95 the low registered instruments are build a sonority based on a G - B - D# augmented aggregate. The oboe, and the trumpets start playing grace-note repetitive gestures based on a G - G# - A harmonic aggregate in bar 95. Polyphonic writing in the percussion creates a dense web of sound in these bars, and *tremolo* figures fill the gaps between *fp* accented figures.

In bars 95 - 98 a contrapuntal development of the previous sonority takes place. The strings play recurring pitch groups based on the augmented chord D - F# - Bb, now expanded in range. Then a four-bar polyphonic passage, ornamented with grace-note figures, and the polyrhythmic string formations, closes the fourth section of the piece.

The harmonic basis of these bars consists of intervallic formations of tone and semitone intervals as well as augmented chords. The piano plays an oscillating stream of pitches accompanying the sound mass in the violins up to bar 94. This passage is based on the technique previously followed in bars 54 - 60 (an amalgamation of *a* and *b* row components), now interchanging with the following series: P4 - P10, P5 - P11, P6 - P0, P7 - P1 etc.

A two-bar connecting bridge passage (b. 99 - 100) follows immediately after the end of the *D* section and just before the beginning of the last section in the piece. A dense micro-polyphonic descent is constructed from intervals of a second, third, and augmented fourth, performed by the violins. The range covered by this falling passage is from G2 to C6. The timpani play repetitive gestures that are also present in section *E*, together with grace-notes in snare drum that are based on the main motivic idea of the piece (the repeated-note idea). These gestures end in bar 113, three bars before the end of the work.

Section E (b. 101 - 116)

After the end of their descending gesture the mass violins freeze into a web of repetitive intervallic patterns up to bar 104. They move within the following pitch limits:

First violins: A to C#, G to C

Second violins: F# to C, Ab to E

As a result, the string sound block covers a range from E₃ to C#₄. Half of the second violins double the G₃ - C₄ registral area an octave lower.

From this point onwards to the end of the *concerto*, the low-register sound mass is recalled, slightly altered this time in terms of its pitch structure and instrumentation. In contrast to the previous low register sound mass (b. 46 - 67), there are now two horns instead of one in the moving cluster sonority. Additionally, the external boundaries of this sonority are now closer. The way that this bass sound block is constructed is similar to its predecessor in terms of pitch, and with regard to rhythmic construction, there is no use of serial technique. The rhythmic sequence is staggered by the incorporation of triplets, quintuplets and other rhythmic combinations that give a swinging motion to the pitch material. There are also duplications or subdivisions of the rhythmic values involved where required (b. 103). Additionally, there are no instruments with free melodic material like in the previous mass (trombone, bass clarinet and tuba in bars 46 - 66).

In general, during this final phase of the work, the row material used is different for every instrument and is interrupted by brief rests (ex. 7.7). The system employed has as a point of departure the following structure:

Ex.7.7

The musical notation for Ex. 7.7 is presented on a single staff with a treble clef and a key signature of one sharp (F#). Above the staff, instruments are grouped into three columns: the first column lists BCl, Bsn, and Cbsn; the second column lists Hn, Tbn, and Tba; the third column lists Clos and Cbs. A rectangular box encloses the first two columns of instruments. To the right of this box, a horizontal line with a downward-pointing arrow is labeled 'pitch range'. Below this line, a musical note with a sharp sign (F#) is shown, indicating the starting pitch of the range.

Bass clarinet, bassoon, contrabassoon

1.A, 2.A#, 3.B, 4.C ----- 1. ♩ 2. ♩ 3. ♩+ ♩ 4. ♩

Horn, trombone, tuba

1.G#, 2.A, 3.A#, 4.B ----- 1. ♩ 2. ♩ 3. ♩+ ♩ 4. ♩

Cello, contrabass

1.F#, 2.G, 3.G#, 4.A ----- 1. ♩ 2. ♩ 3. ♩+ ♩ 4. ♩

<u>Bass clarinet</u> Pitch: 422343221234...	Rhythm: 214323432... →
<u>Horn</u> Pitch: 214323432...	Rhythm: 1321323... →
<u>Bassoon</u> Pitch: 1321323...	Rhythm: 1423432132.. →
<u>Contrabassoon</u> Pitch: 14234321321...	Rhythm: 12132143213.. →
<u>Trombone</u> Pitch: 12132143213...	Rhythm: 1243214321.. →
<u>Tuba</u> Pitch 1243214321...	Rhythm: 132432132432 →
<u>Cello</u> Pitch 132432...	Rhythm: 12123212343... →
<u>Contrabass</u> Pitch: 12123212343...	Rhythm: 24313424312...

As one can observe from the above table, the rhythmic row of one instrument becomes the pitch row of the next instrument.

With regard to the internal structure of the last section of the piece, *tremolo* strands of sound (up to b. 109) intersect with the low-range sound block, thus creating overlapping formal patterns. The harmonic environment of this last phase of the *concerto* is based on narrow cluster configurations spread across the orchestral range.

Apart from the pitch construction of the sound mass, the pitch material of bars 102 - 109 is based on the following symmetrical pattern:

bars 102 - 104: Eb - F - F# - G# - A - B (tone - semitone..)

bars 105: F - F# - G - B - C - C# (semitones - major third - semitones)

bars 106: A - A# - C - C# - D - Eb - E (semitone - tone..)

bars 107 - 108: C - E - F - A - Bb - D (major third-semitone...)

bars 109: Violins Ab to C, F to Ab, C to E, Ab to C (pitch limits)

Winds and Violas Bb to G (cluster)

In bar 109 the violins play a brief micro-polyphonic net of clusters that act as a remnant of what preceded in bars 101 - 104, and the work comes to an end seven bars later, with a gradual fade out of the low-register sound mass.

CONCLUSION

After a thorough examination of these seven pieces, one can trace two alternative levels of musical thought in action. The first level is concerned with a theoretical physical dimension, and involves the creation of imaginary acoustic fields in an effort to incorporate and explore elements borrowed from different scientific views of how to represent or understand the physical world.

The advantage of this first approach is that the acoustic depictions of phenomena such as echo have very strong roots in normal human perception, since physics is ever-present force in everyday life. For example, the repetition of a sound wave that fades away or the envelope of a sound are both immediately recognizable phenomena - therefore the acoustic representation and elaboration of these phenomena creates the feeling of intimacy in the listener. After all, this way of conceptualizing the process of musical creation is just a source of inspiration to help in the stabilization of a clear relationship between the organization of material and the genesis of a musical form. They are two different ways of reaching the same point.

The second level of musical perception in operation is focused on experimental techniques that were widely employed during the avant-garde period after 1945 (see *Suspension* and *Balance* for example), and on a partially serial approach (mainly found in *Six Sketches*). These pieces were composed in an effort to achieve the highest degree of unity and consistency. Some examples of the techniques applied are the diffusion of multiphonic sounds from the oboe into the string quartet (*Suspension*), the amalgamation of conventional and non-conventional sounds (*Balance*), and the dismantling of serial forms into a fragmentary web of pitch aggregates (*Six Sketches*).

With respect to the organization of material, it is important to note that a flexible interpretation has been made of the restrictions imposed by the systems found in these pieces (serial, chromatic, modal or exotic - see for example *Atoma* and *Six Sketches*). It

is also interesting to note one feature concerning to the organization of material that is found throughout the works in my thesis. At all times the organization of material in a piece is always related to the number of formal possibilities that my aesthetic judgment led me to employ in that piece. The number and nature of these formal possibilities give rise to the piece's overall structure and duration.

We could try to compare the results derived from my dual need to create works based on two alternative musical perceptual levels – on the one hand working with the representation of physical phenomena and on the other exploring the experimental world of musical ideas – without of course excluding their co-existence in a single piece. However one could hardly be able to reach a safe conclusion, because the charm of the contemporary art of sounds is that it can captivate the listener without them having knowledge of its inner constructive substance.

Bibliography

- Audi, Robert, 1999, *The Cambridge Dictionary of Philosophy* 2nd edn. (Cambridge University Press)
- Bernard, Jonathan.W., 1987, *The music of Edgard Varese* (Yale University Press, New Haven and London)
- Burgess, Geoffrey and Haynes, Bruce, 2004, *The oboe* (Yale University Press. New Haven and London)
- Cope, David, 1977, *New Music Composition* (Schirmer Books Collier Macmillan Publishers London)
- Darwin, Charles, 1859, *The Origin of Species* ed. Gillian Beer 1996 (Oxford, New York, Oxford University Press)
- Dobson, Richard, 1992, *A Dictionary of Electronic and Computer Music Technology* (Oxford, New York, Oxford University Press)
- Karolyi, Otto, 1995, *Introducing Modern Music* (Penguin books)
- Lester, Joel, 1989, *Analytic Approaches to Twentieth-Century Music* (W.W. Norton & Company, London)
- Ligeti Gyorgy, 1984, *Gyorgy Ligeti in Conversation* (Eulenburg Books, London)
- Morgan, Robert. P., 1993, *Modern Times From World War to the Present* (Granada Group and The Macmillan Press Ltd)
- Schott, 1989, *Krzysztof Penderecki, his life and work. Encounters Biography and Musical Commentary* (London, Mainz, New York, Tokyo, Schott &Co. Ltd. London)
- Stronge, Patrizia and Allen, 2001, *New Techniques on Violin* (University of California Press)
- Varese, Edgard, 1967, *Contemporary Composers on Contemporary Music* ed. Elliot Schwartz and Barney Childs (New York: Holt, Rinehart, and Winston)
- Webern, Anton, 1960 *The Path to the New Music* (Theodore Presser Co. in association with Universal Edition)
- Xenakis, Iannis, 1967, *Iannis Xenakis The Man and the Music* (Boosey & Hawkes Music Publishers Limited London)