University of Huddersfield Repository

Haley, Margaret Anne

Drawing Sound in Time: A Commentary on my Recent Music

Original Citation

Haley, Margaret Anne (2010) Drawing Sound in Time: A Commentary on my Recent Music. Doctoral thesis, University of Huddersfield.

This version is available at http://eprints.hud.ac.uk/id/eprint/9088/

The University Repository is a digital collection of the research output of the University, available on Open Access. Copyright and Moral Rights for the items on this site are retained by the individual author and/or other copyright owners. Users may access full items free of charge; copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational or not-for-profit purposes without prior permission or charge, provided:

- The authors, title and full bibliographic details is credited in any copy;
- A hyperlink and/or URL is included for the original metadata page; and
- The content is not changed in any way.

For more information, including our policy and submission procedure, please contact the Repository Team at: E.mailbox@hud.ac.uk.

http://eprints.hud.ac.uk/

Drawing Sound in Time:
A Commentary on my Recent Music

Margaret Anne Haley

A portfolio of original compositions and commentary submitted to the University of Huddersfield in partial fulfilment of the requirements for the Doctor of Philosophy

May 2010

Contents

Word count (including footnotes): 18,570

Illustration Index

Acknowledgements

I would like to thank Dr. Monty Adkins and Dr. Bryn Harrison for their help and encouragement towards the completion of this commentary. I would also like to extend thanks to Prof. Christopher Fox and Dr. James Saunders for their supervision and inspiration early on in my studies, and to other members of staff at the University of Huddersfield who have offered invaluable advice and support throughout my research. Thanks go to all those performers involved in a realisation of my music and to all those colleagues and friends who have my trust.

Special thanks go to my family for their unflagging support and patience.

Copyright Credits

Every effort has been made to obtain copyright permission to use extracts from published works this includes scores and other sources. Those used are credited beneath the illustrations in this document, or in the footnotes of the relevant page as requested by those publishers concerned with the exception of one - *Illustration 3* (p.14) 'Paul Klee – pictorial example after a three part passage by J. S. Bach'. This particular illustration is declared an 'Orphan work' under the guidelines by the Publishers Association.

Abstract

Drawing Sound in Time reflects on how I have attempted, in the music written over the period of my doctoral studies (2004-2010) to use time as a basis for the mapping of sonic activity and how this aesthetical concern has helped me develop a teleological approach to form and structure. The shaping of time in my work often has its origins in the visual, either from my own drawings or from other visual stimuli. As well as considering the visual appearance of my music, I will draw on the correlation of music and art by abstract painters (most notably Paul Klee) alongside composers Iannis Xenakis and John Cage whose philosophy represent for me a way forward, not only aesthetically but also on a technical level. Additionally, the discussion will refer to astronomy as certain aspects of the subject relate to the development of techniques in my compositional language, and furthermore will often draw on the titles of the pieces (stars and constellations) as a basis for generating materials. I will address in particular the use of coding in my music that is an integral part of the way I work. My commentary will examine the main aspects of my musical language using examples from selected works in the accompanying portfolio.

Margaret Haley – list of works presented for PhD

Cloud (2004) 8′
- saxophone quartet – soprano, alto, tenor, baritone
First performance – Mars Saxophone Quartet, 9 February 2006,
St. Paul's Hall, the University of Huddersfield.

Tau 1 Gruis (2005) 9′
- quarter tone alto flute
First performance (alto flute) – Richard Craig, 12 March 2009,
St. Paul's Hall, the University of Huddersfield.

Boötes (2006) 10′
- ten miniatures for solo piano
#1, *2*, *4*, *5*, and *9* commissioned by Stephen Crowe
First performance – Paul Cassidy, 9 March 2007,
The Space, London.
Complete edition first performance – Philip Thomas, 7 June 2007,
St. Paul's Hall, the University of Huddersfield.

Winter Triangle Series

Betelgeuse (2006) 7½′
- piccolo, clarinet, glockenspiel, piano, violoncello
First performance – Firebird Ensemble c. Barrie Webb, 17 May 2007,
St. Paul's Hall, the University of Huddersfield.

Procyon (2006) 6½′
- flute, oboe, clarinet, alto saxophone, trumpet, trombone, piano
Commissioned by David Sutton-Anderson
First performance – Sounds Positive c. David Sutton-Anderson, 10 February 2007,
The Warehouse, London.

Sirius (2007) 6½′
- flute, oboe, clarinet, bassoon, horn, trumpet, trombone, piano, acoustic guitar, vibraphone, violin, viola, violoncello

Black Hole (2007) 13½′
- 6 violins, 2 violas, 2 violoncellos, 1 double bass
First performance – Goldberg Ensemble c. Malcolm Layfield, 12 May 2007,
St. Paul's Hall, the University of Huddersfield.

Gemini (2007) 2½′ +
- guitar duet
Commissioned by Stephen Crowe
First performance – Abigail James & Chris Bundhun, 10 August 2007,
The Space, London.

Chapter 1: Context

> Art does not reproduce the visible; rather it makes visible.[1]
> - Paul Klee

1.1: Introduction

The following commentary relates to the selected works submitted in the accompanying portfolio and written between the years 2004 and 2007. The main purpose of those works under discussion in Chapter 3 serves to illustrate a central line of enquiry. The focus is on the interaction of sounds through time. I will attempt to demonstrate how mapping, the main impetus in my work, affects the visual appearance of the musical scores.

Klee's dictum cited above seems relevant since it suggests similarities with my own aesthetic stance. My compositional approach is more concerned with creating music in a visual way from the mind's eye, consequently, a visually orientated approach attempts to define aspects of structure graphically and prior to staff notation. Generally this involves creating the overall layout of a project, which facilitates the measurement of time and the space the music will occupy. As a general rule this is achieved by drawing an outline of structural activity, such as the handling of blocks of material in the vertical and horizontal planes. What I am aiming to achieve in my music is a balance of process and intuition since one is reliant on the other. The general discussion attempts to ascertain the advantages of a visually orientated approach. What happens when visual ideas are tested sonically? How might this affect change? Are the mapping techniques that I use sufficiently strong to support my approach to musical language, form, and structure?

The commentary will also demonstrate how my concern for even the simplest note gesture, I would argue, informs the development of my music from a global point of view; how, for example, articulation, dynamics, and tessitura affect the sound of my music.

[1] Klee, Paul, '*Creative Credo*', cited in Chipp, Herschel, B., *Theories of Modern Art* (Berkeley; London: University of California Press, 1968), 182.

1.2: Artistic Connections

My music is composed with shape very much in mind. The processes that I make use of are primed to express visual art in a musical way. My work is also informed by my ten years of experience as a professional graphic artist. These skills in visual art manifest themselves as an instinctive approach to form, balance, and musical structure as visualised in the musical score. The music need not necessarily be recognised as a representation of artwork by other artists but can be understood as my perception of the subject, which stems from a long standing interest in abstract forms. The block paintings of Paul Klee are of particular appeal to me. Both Klee and fellow artist Wassily Kandinsky expressed a keen interest in music. Kandinsky believed that:

> With few exceptions music has been for some centuries the art which has devoted itself not to the reproduction of natural phenomena, but rather to the expression of the artist's soul, in musical sound.[2]

Drawing is the way in which my musical thoughts are first expressed, quite often resulting in a simple pencilled sketch. The sketch below bears no resemblance to musical notation in the traditional sense. What it does allow is the fleeting presence of music in the mind to take shape on a blank sheet of paper. I find documenting spontaneous ideas graphically is useful compositional practise. Regrettably some of my sketches are lost, however, a number remain intact – some of which still lay idle – and they provide visual reference as well as a bountiful source of inspiration.

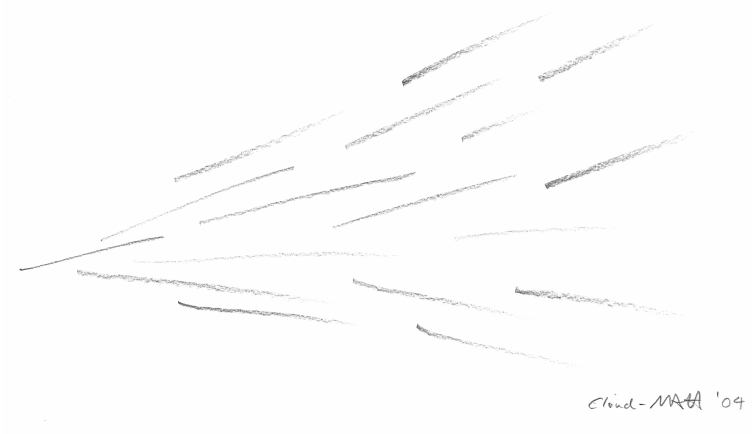


Illustration 1: *Cloud* – first sketch

Illustration 1 shows a structural shape, this being individual tapered lines emanating from a central point. For me, these lines embody a potential sound mass decelerating through time. How such a sketch might materialise as notated music is of prime concern to me. How, for instance, could I set about orchestrating this image so as to

[2] Kandinsky, Wassily, *Concerning the spiritual in art* (London: Tate, 2006), 41.

maintain the originality of its vision? It was discovering in 1997 as a first year undergraduate music student how Iannis Xenakis managed to forge a link between music and architecture that had a significant impact on my compositional approach. For example, there is a connection to be acknowledged between *Metastaseis* (1954)[3] and the Philips Pavilion.[4] As Xenakis said:

> In the Philips Pavilion I realized the basic ideas of *Metastasis* (sic): as in the music, here too I was interested in the question of whether it is possible to get from one point to another without breaking the continuity. In *Metastasis* this problem led to glissandos, while in the pavilion it resulted in the hyperbolic parabola shapes.[5]

What Xenakis's visual approach suggested for me, was one which frees the composer from the difficulties of fixing structure directly onto the musical stave. *Illustration 2* below shows how Xenakis assigned each of forty-six lines to a separate string instrument. I am not an architect but my experiences in graphics allow a sense of visual perspective and so drawing addresses that problem. My own aesthetic stance echoes the thoughts of Xenakis:

> It was natural for me and my advantage over other composers was that I could design. It was much easier for me to use a graphic approach to music than the classical notation with which I had never been able to see everything at the same time, as you do on a graph...[6]

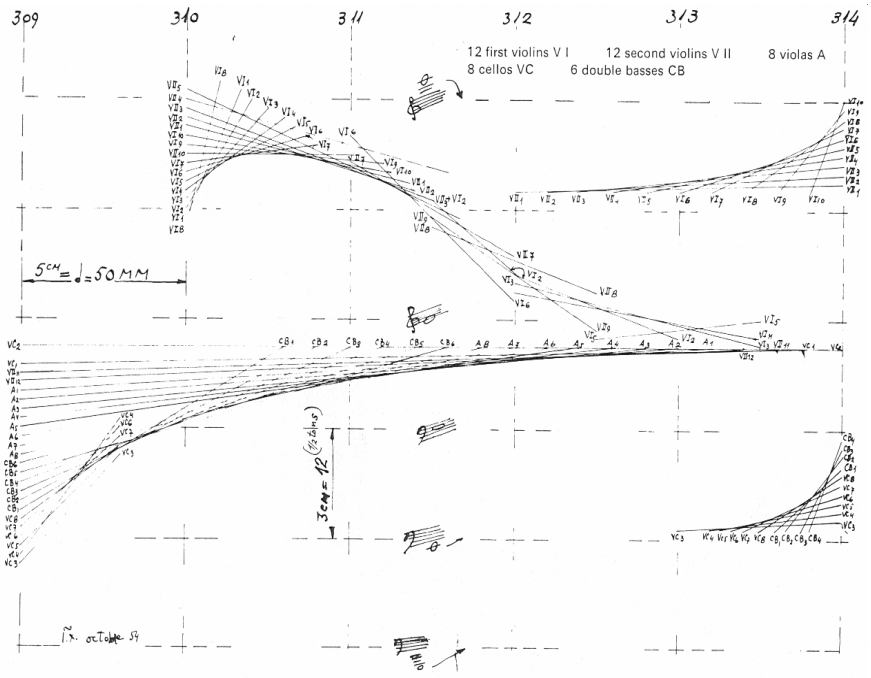


Illustration 2: Iannis Xenakis, *Metastaseis* – String Glissandi, Bars 309 (mm.309-314)[7]

[3] Xenakis, Iannis, *Metastaseis* (London: Boosey and Hawkes, 1967).
[4] Philips Pavilion was created as part of the World's Fair, scheduled for 1958 in Brussels.
[5] Xenakis, Iannis, *Music and Architecture: architectural projects, texts and realizations*, compilation, translation, and commentary by Sharon Kanach (Hillsdale, NY: Pendragon Press, c2008), 99.
[6] Ibid., xii.
[7] Xenakis, Iannis, *Formalized Music: thought and mathematics in composition* (Stuyvesant, NY: Pendragon Press, c1992), 3.

Sharon Kanach discusses Xenakis's aesthetic approach in her essay, *Music to be seen*: Tracing Xenakis's Creative Processes:[8]

> Xenakis's preparatory sketches for his architectural as well as his musical works bear witness to his constant preoccupation with the overall form. In the same manner that a blueprint enables the eye to capture the layout of any surface at a glance, Xenakis's graphic renderings of a musical work allowed him to judge its global form in an instant, using a similar plastic and aesthetical approach.[9]

John Cage's passion for drawing is often manifested in the visual appearance of his music, particularly his graphic scores, as for example, *Concert for Piano and Orchestra* (1957/58).[10] For some of his scores, Cage traced objects. That concept suggests a way of creating music from a global standpoint. As Kathan Brown says, 'The *Ryoanji* prints [1983][11] have dimensions proportionate to those of the Ryoanji Garden in Kyoto, Japan.'[12] Using co-ordinates on a grid Cage drew around fifteen selected stones – representing the irregular shaped rocks in the Ryoanji garden – each two to three inches across. Cage traced parts of the perimeters of these stones for *Ryoanji* music (1983-1985).[13] *Atlas Eclipticalis* (1961)[14] takes said approach:

> Star maps[15] provide the material for the notations of *Atlas*. Cage traced the constellations on tracing paper and then used chance methods to decide some aspects of how they are translated into sound.'[16]

The pitch material in *Atlas Eclipticalis* contains one to ten notes which Cage divided randomly into two groups between long and short durations. Whereas the 'size' of the notes translates the brightness of the stars, and this process determines their amplitude.

My musical thinking has a correlation with aforementioned artist Paul Klee for whom music is expressed through several of his paintings. Klee identified a meaningful and methodical approach which enabled him to develop his artwork influenced by music, whereas, I attempt to structure music from an artistic standpoint. The block structure

---

[8] Xenakis, Iannis, *Architect, Composer, Visionary, Drawing Papers 88*, Essays by Ivan Hewett, Carey Lovelace, Sharon Kanach, and Mâkhi Xenakis (The Drawing Center, 35 Wooster Street, New York, NY 10013, 2010), 95-127.
[9] Ibid., 96.
[10] Cage, John, *Concert for Piano and Orchestra* (New York: Henmar Press, 1960).
[11] Several examples are cited in: Brown, Kathan, *John Cage Visual Art*: *To Sober and Quiet the Mind* (Crown Point Press, 2000).
[12] Ibid, 87.
[13] 'a series of graphic scores for solo instruments, or orchestral obbligato of indeterminate duration, (double bass, oboe, voice, trombone); New York City, 1985 (trombone); Banff, December 1983-January 27, 1984, Taipei (flute); New York City, July 18, 1992 (cello, unfinished)' cited: n.a., 'Ryoanji' (n.d.) <http://www.johncage.info/workscage/ryoanji.html> accessed 11/03/2010
[14] Cage, John, *Atlas Eclipticalis* (Edition Peters, 1961).
[15] Becvár, Antonin, *Atlas Eclipticalis 1950.0* (Prague: Czechoslovakian Academy of Sciences, 1958).
[16] Cardew, Cornelius, 'Wiggly Lines and Wobbly Music' *Studio International*, Art and Experimental Music, 192 No. 984 (November/December, 1976), 251.

of Klee's work has a clear analogy with my own compositional practice. This is the handling of block materials, particularly observable in three chamber ensemble works collectively titled *Winter Triangle Series* discussed in Chapter 3. Moreover, Klee's theoretical ideas of proportionate line and structure (discussed in 1.3 below), I would argue, are highly relevant to my own compositional approach.

Evidently Klee investigated the structure of musical compositions. *Illustration 3* (p.14) below shows Klee's treatment of *Bach's Sonata no. 6 in G* for violin and piano.[17] Firstly, Hajo Düchting says of it:

> [...] Klee focuses on two bars' [...] Below the musical notes, he mapped out a graphical system for registering the pitch of the notes over three octaves. Underneath this system, he set out schematically the qualitative (rhythmic groupings and dynamics) and the quantitative (the measured rhythm) structure of the bar, whereby the former varies as the dynamics change and the latter marks the regular structure (metre) of the piece.[18]

Secondly, Klee's thoughts affirm his own intentions on the matter:

> On this foundation [Düchting's description above] I can now try to execute a musical theme pictorially, whether in one voice or polyphonically. I choose two bars of a three-part passage by Bach, [Klee does not specify which two] and micro-copy it according to the following scheme [*Illustration 3* diagram1].
>
> Since music without dynamics sound mechanical and expressionless, I select qualitative representation C and give the line more or less weight according to the tone quality, while quantitative representation in B expresses itself in the vertical lines for bars and parts of bars.[19]

The results of Klee's mapping process serves to illustrate a fusion of art and music, as Kandinsky says, 'borrowing of method by one art from another.'[20] I would suggest this particular approach had an effect on Klee's block paintings created during his time spent teaching and painting at the Bauhaus (1921-31). *Highways and Byways* (1929), p.15 below, appears to be a case in point. Like several of Klee's block paintings, this particular work exhibits the juxtaposition of panels in both the vertical and horizontal planes. From a musical perspective *Highways and Byways* is indicative of rhythm through the horizontal – often gradient – uneven lines, interrupted by what appear to be bars with slanted sides. The structured layers filled with colour suggest instrumental timbre of symphonic proportions.

---

[17] Bach, Johann Sebastian, *Sonata no. 6 in G: for violin and piano [BWV1019]* (New York: Schirmer, 1929).
[18] Düchting, Hajo, *Paul Klee – Painting Music* (Munich; London: Prestel, 2004), 35.
[19] Klee, Paul, *Notebooks of Paul Klee, vol. 1- the thinking eye* (Lund Humphries: London, 1961), 285.
[20] Kandinsky, Wassily, *Concerning the spiritual in art* (London: Tate, 2006), 41.

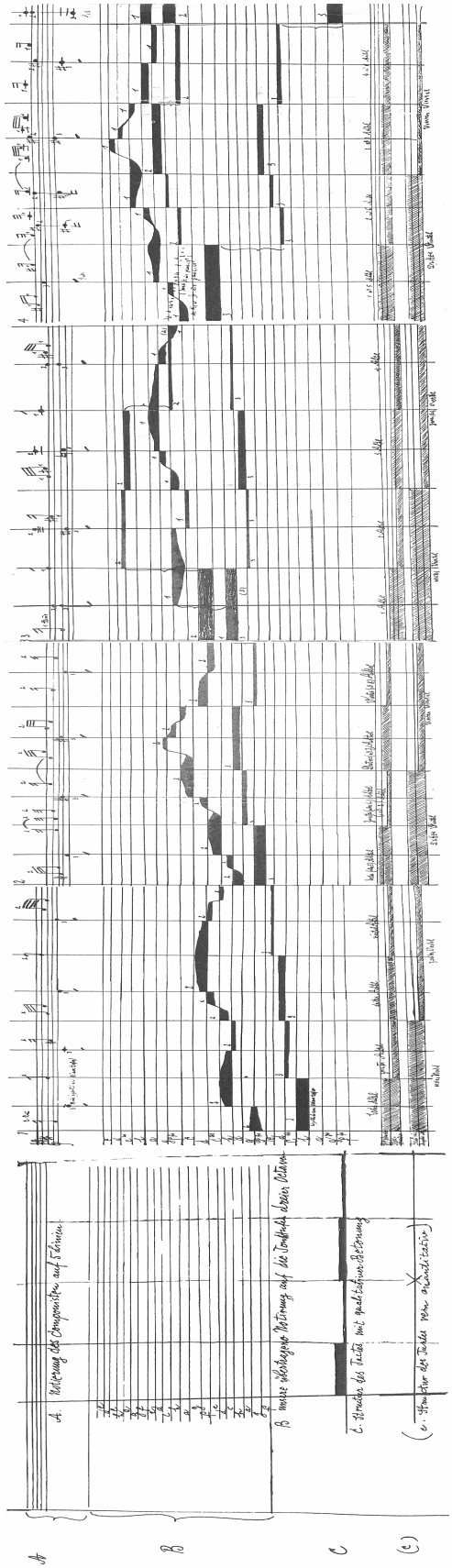
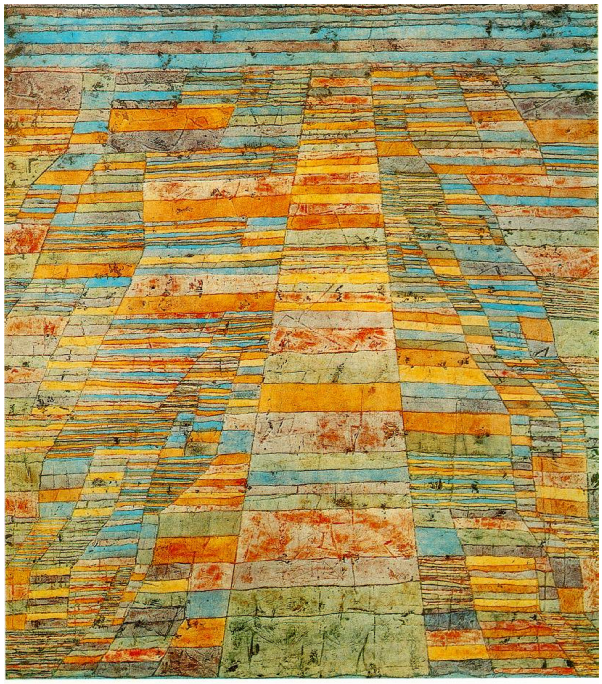


Illustration 3: Paul Klee – pictorial example after a three part passage by J. S. Bach[21]

[21] Klee, Paul, *Notebooks of Paul Klee, vol. 1- the thinking eye* (Lund Humphries: London, 1961), 285-6.



© DACS 2010

Illustration 4: Paul Klee – *Highways and Byways* (1929)[22] 90, Oil with a plaster ground on canvas

1.3: Proportionate Line and Structure

Paul Klee describes:

> An **active** line on a walk moving freely, without goal. A walk for a walk's sake. The mobility agent is a point, shifting its position forward.[23]

Klee is suggesting that a freely drawn active line (*Illustration 5* below) is not intended to demonstrate aspects of structure in a visual sense as would an active line, limited in its movement by fixed points (*Illustration 6* below). Or that a visual representation of a walk bares little reference to time, because how long is a walk? Furthermore, what pace is one to take on this walk?

Illustration 5: Freely drawn active line

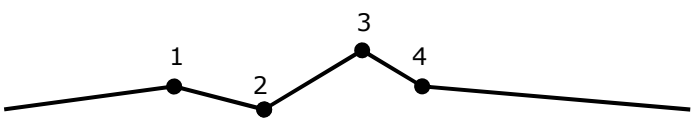


Illustration 6: Drawing of an active line, limited in its movement by fixed points

[22] Pioch, Nicholas,'WebMuseum, Paris Klee, Paul,' *Highways and Byways* photograph by Mark Harden (1 Jan 1996) <http://www.sai.msu.su/wm/paint/auth/klee/> accessed 28/12/09.
[23] Klee, Paul, *Pedagogical Sketchbook* (Faber and Faber, London, 1968), 16.

From a teleological standpoint, a freely drawn active line (according to Klee's thinking quoted above), creates directed motion. From a visual perspective this is from left to right or vice versa, and as we see, this is a curved line showing undulation, which allows the observer some sense of direction as one would discern on an ordinance survey map. If the viewer is able to see this active line relative to the space it occupies, even without a grid reference, there would be a real sense of proportionate line and structure. Klee's fundamental idea of an active line as a means of developing visual form is what I propose to address in the planning stages of my music.

I have found mapping enables proportionate line and structure in my music: how, for instance, the structural elements of pitch and duration enable a visual representation of directionality. An example of this strategy is used to create the macro-structure of *Cloud* shown (p.43) below. The shape in my music, in this context, is viewed in its skeletal form.

Placing even a single static dot on graph paper has a definite meaning for me, as this implies a structural point of reference. The very fact that the dot exists in relation to the space it occupies is highly significant to the decisions I will make. Fixing an active line to that dot implies directionality and one which might move from its point of conception at any angle or curvature. These two simple steps – dot and line – allow me to consider the motion and growth processes in my music. Visual imagery is therefore my point of departure.

As a composer interested in a visual approach, *this interest* does not negate the purpose of the music, which is inevitably bound up with time. As Susanne Langer has said 'music makes time audible'.[24] I have developed compositional strategies whereby working drawings define my objectives graphically. I prefer to think of these drawings as a structural blueprint. As will be demonstrated below and in Chapter 3, the use of a graph allows the eye a means of charting a proportionate visual representation of sounds. I find a two dimensional grid system is most useful which facilitates – number of beats x MM ÷ 60 = time – a composite outline of pitch and duration. The placement of fixed points defines the onset of sonic activity and is underpinned by measured time in the horizontal plane (see *illustration 7-Fig 1*, p.18 below). Mapping is not only applicable to the development of a macro-structure but is useful for defining aspects of micro-structure as well.

[24] Kramer, Jonathan D. *The Time of Music* (New York: Schirmer Books, 1988), 1.

Of note, John Cage experimented with point systems. In the graphic score *Music for Carillon No. 1* (1952),[25] Cage used quarter-inch quadrille graph paper. Each eighth inch of the graph vertically would represent one pitch and the horizontal dimension (one inch equalling one second) represents time. James Pritchett writes:

> The process of composition in *Music for Carillon No. 1* consisted simply of plotting points directly into this space, each point then being interpreted as a musical event in terms of a pitch and a time of attack.[26]

Cage's point systems determine pitch and time of attack, whereas, I am interested in a visual representation of pitch and measured time of attack as well as subsequent duration in the horizontal plane. *Illustration 7* below shows three preparatory drawings of the same musical extract. At this stage the placement of pitch material is shown in a fixed time space. In these drawings that is: 110 quaver beats x MM 72 ÷ 60 = 1'32''. Furthermore, drawing horizontal active lines (*Fig 3*) allows a realisation of dilation and contraction in my music. Drawing using a grid system helps me to visualise the shape of my music. It is, however, a by-product of the end result evident in the scores themselves. For instance, the outcome of *illustration 7* does not show changes in metre and rhythmic complexity. These component parts shown in *Tau 1 Gruis* are written directly into the score.

Whilst my starting point is concerned with the creation of a skeletal framework, there are other ways in which mapping and other preparatory sketches help me visualise the music. Klee's interpretation of dynamics and tone quality in music seemingly affected his approach to the block paintings, whereas, I would argue, drawing becomes a necessary medium to interpret my thoughts. For me, the hand that rules the pen marries the eye of the artist and the ear of the composer. Mapping in particular enables me to envisage not only the position of a note but also to consider the character of the sound. How, for example, instrumentation, dynamics, and articulation can affect the tone quality in my music. Consequently, my musical perception moves away from what appears to be a simple process of pitch and duration rendered by dot and line. Additionally, drawing a proportionate active line in the horizontal plane enables me to anticipate not only the duration of a particular pitch but one that is shaped through time, this is addressed in 1.5.

[25] Cage, John, *Music for Carillon No. 1:* graph version (New York: Henmar/Peters, 1961).
[26] Pritchett, James, *The Music of John Cage* (Cambridge: Cambridge University Press, 1996), 92.

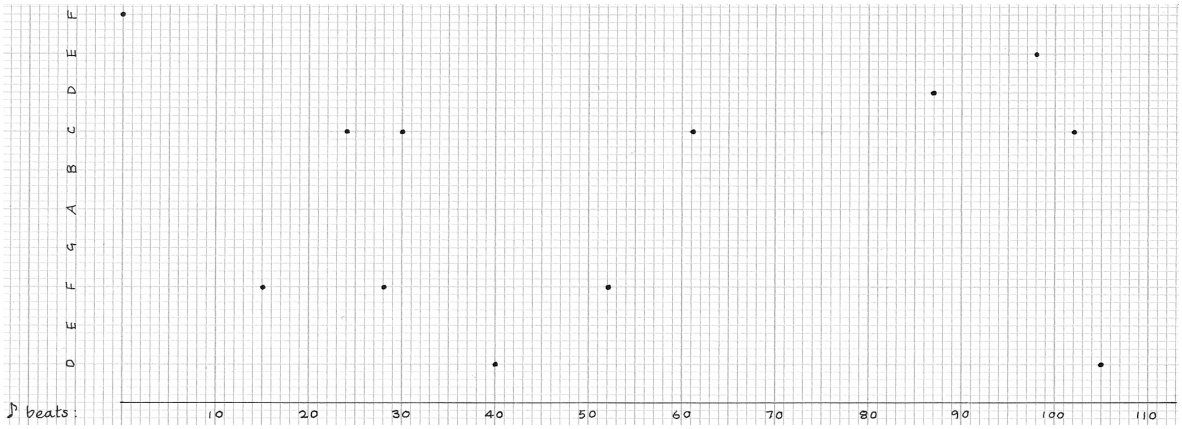


Fig 1: showing (pitch) onset points

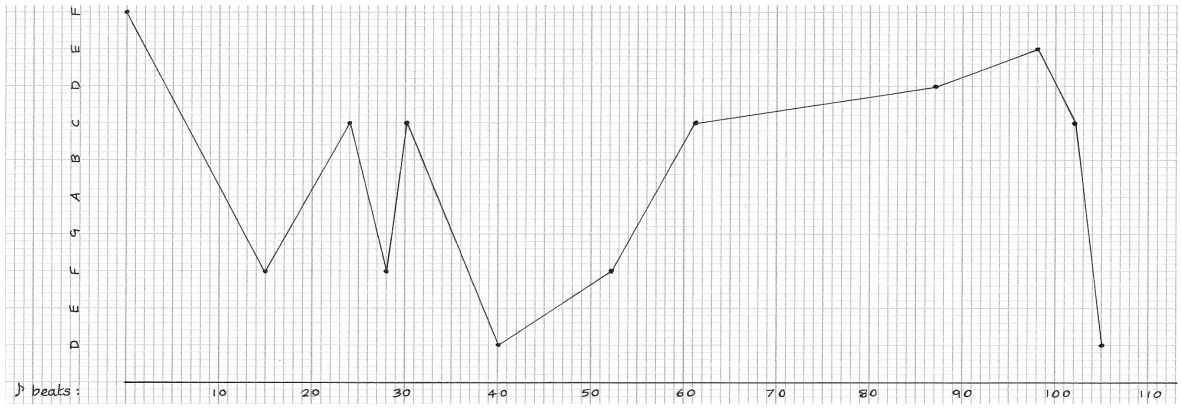


Fig 2: showing (connecting onset points) angular active line

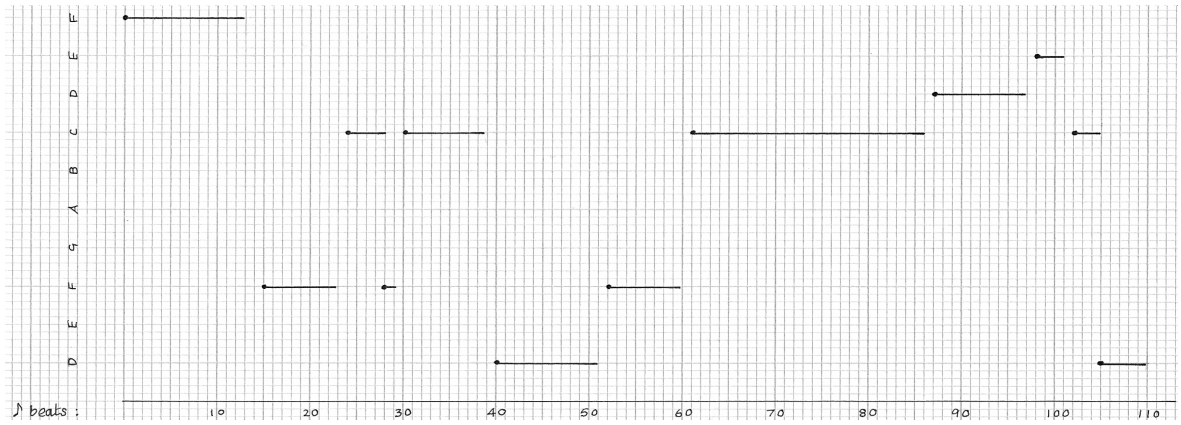


Fig 3: showing (pitch duration) active lines

Illustration 7: *Tau 1 Gruis*, panel 1 – preparatory drawings, (transposed pitch, measures 1-29)

1.4: <u>Dimension and balance</u>

As with Cage and the abovementioned *Atlas Eclipticalis* (p.12), the subject of astronomy informs my music. In particular observations of the night sky feed my imagination. There appears to me a balance between the vastness of space and the intermittent flickering light source of star systems that I perceive as mobile sounding

objects. How, for example, the periodic cycles of stars wobble and thus create a wave of light, like the swing of a pendulum. Furthermore, the visual appearance of the stars themselves suggests spectral sound qualities to me. Pierre Schaeffer had the notion of orchestrating sound objects, and described the composer of *music concrète*[27] as one who:

> …Takes his point of departure the *objets sonore*, the sound objects, which are the equivalent of visual images, and which therefore alter the procedures of musical composition completely…The *Concrète* experiment in music consists of building sonorous objects, not with the play of numbers and seconds of the metronome, but with pieces of time torn from the cosmos.[28]

Whilst I am interested in exploring ways to project sound in time, silence is also considered. Morton Feldman said, 'silence is my substitute for counterpoint. It's nothing against something.'[29] Feldman's late works portray this philosophical approach e.g. *Piano and String Quartet*.[30] What Feldman suggests to me is akin to the desire to achieve an intuitive balance between the two musical elements in my work. For example, *Black Hole* viewed the blackness of the night sky as a canvas of silence. The placement of each note represents a solar object painted on this canvas. The sound object, which Schaeffer describes above, is therefore of concern to me. How, for example, the spectral energy of a particular note gesture generates motion activated by the performer, see 1.5. Moreover, *Black Hole* attempts to portray music unfettered by regular pulse and metre. At the same time, I want the listener to trace sound objects extracted from a temporal flow. It is articulation as well as dynamics that allow these moments to play on the ear.

Although *Cloud* is of textural contrast to that shown in *Black Hole*, the sensation of isolated sounds is also audible because the dynamic strategy attempts to push sounding materials into the foreground periodically. The presence of dynamics in *Cloud* will often begin from barely audible and crescendo, and then diminish, or start from a specific dynamic level and diminish, and vice versa, see 3.1. *Cloud* attempts to create a fusion of overlapping sounds shifting through time. Therefore dynamic modulation is in place to assimilate the visual motion of a stratocumulus mass in a musical way. Partial outcome of this activity is evident in *illustration 18* (p.27) below.

---

[27] Pierre Schaeffer produced the first piece of *music concrète – Etude aux chemins de fer* (1948) – by recording, manipulating, and arranging a variety of sounds produced by locomotives.
[28] Snyder, Jeff, 'Pierre Schaeffer', – Snyder cited: Russcol, Herbert, *The Liberation of Sound*: *An Introduction to Electronic Music*, (Englewood Cliffs, NJ, Prentice-Hall, 1972), 85 – <http://csunixl.lvc.edu/~snyder/em/shaef.html.> accessed 21/01/09.
[29] Feldman, Morton, ed. Zimmermann, Walter, *Essays: XXI* (Kerpen: Beginners Press, 1985), 166.
[30] Feldman, Morton, *Piano and String Quartet* (London: Universal Edition, 1985).

Other examples of dynamic modulation can be found in my music; *Tau 1 Gruis* for instance. The dynamic strategy attempts to propel the music so the listener can experience the linearity of the work coming to the foreground and then retreating, back and forth over time. *Illustration 8* below shows a visualisation of a sound object. The dot (onset point) and active line (duration) are in the horizontal plane, whilst the mirrored shape constructed of angular lines assimilates a sound-shape emanating from the centre of gravity. *Illustration 10* (p.22) below shows the fully notated outcome.

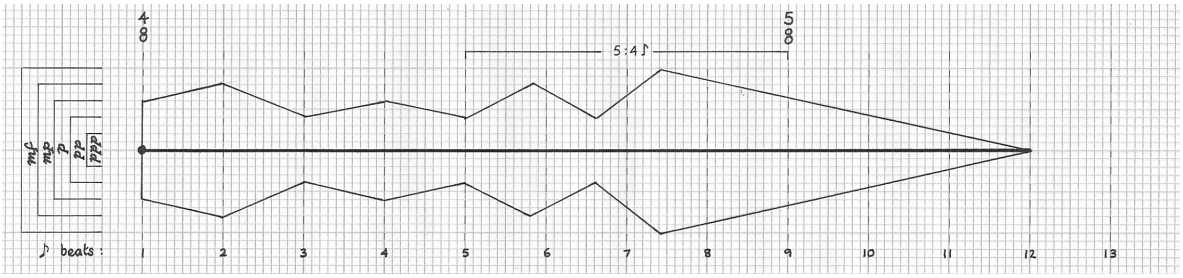


Illustration 8: *Tau 1 Gruis* – showing superposition of dynamics over an active line

1.5: Spectromorphology

As I suggested in 1.4 above, instrumental music need not be restricted to phraseological styles[31] – e.g. antecedent and consequent – but shaped through time. My compositional aesthetic proposes temporal processes as the basis for musical structure which has a kinship with Kaija Saariaho's *Lichtbogen* (1985/86).[32] The shaping of sound finds ways to develop the gestural implications of traditional instrumentation in a spatio-temporal language. My music takes into consideration, firstly, the spectral and textural qualities of sound objects, and secondly, the energy motion of gesture to shape the texture. Finding ways of describing what that entails are best expressed using the theory of spectromorphology developed by Denis Smalley. *Spectromorphology: explaining sound-shapes*[33] is a study of:

> […] concepts and terminology of *spectromorphology* as tools for describing and analysing listening experience. The two parts of the term refer to the interaction between sound spectra *(spectro-*) and the ways they change and are shaped through time (*morphology*). The spectro- cannot exist without the -morphology and *vice versa*: something has to be shaped, and a shape must have sonic content.[34]

[31] For further discussion about phraseological styles, see p.25.
[32] Saariaho, Kaija, *Lichtbogen* (Helsinki: Edition Wilhelm Hansen, 1992).
[33] Smalley, Denis, 'Spectromorphology: explaining sound-shapes' *Organised Sound* ***2*** (*2*) (Cambridge University Press, 1997), 107-126.
[34] Ibid., 107.

Although the terminology of spectromorphology relates to the listening experience, spectromorphological awareness is useful to convey ways in which my music is notated. Smalley suggests 'descriptive and conceptual tools which classify and relate sounds and structures can be valuable compositional aids.'[35] Smalley also claims: 'Every note-gesture, however short, has a spectral history – the energy-motion trajectory of its spectromorphology.'[36] An examination of Smalley's model below demonstrates three temporal phases, they are: *onsets,* how a sound can start – *continuants*, how it is sustained or prolonged for a time – and finally *terminations*, how it stops.

onsets	***continuants***	***terminations***
departure	passage	arrival
emergence	transition	disappearance
anacrusis	prolongation	closure
attack	maintenance	release
upbeat	statement	resolution
downbeat		plane

Illustration 9: *Smalley's model* – three temporal phases[37]

Of course it would be difficult to measure precisely when an onset shifts into a continuant phase and similarly when the continuant moves into a terminal phase. What is the interesting part of this hypothesis is that any combination of the three temporal phases is possible.

Smalley proposes three spectromorphological models which could also relate to instrumental music, they are: the *graduated continuant*, the *attack – decay* and the *attack* alone. *Illustration 10* (p.22) below could be described as the graduated continuant because all three temporal phases are present; they are departure – prolongation – disappearance. The graduated continuant in *illustration 10* compresses the onset so that it swells the sound. The pressured energy through the change in the flute aperture combined with the molto vibrato departure creates a pushing effect. The

[35] Ibid., 107.
[36] Ibid., 112.
[37] Ibid., 115.

lengthening of the continuant which not only bends away from the initial onset in a microtonal arc but the rhythmic momentum is counterbalanced by dynamic flux. The adjustment in the embouchure draws the listener away from the onset by increasing the spectral energy of the note gesture. At mezzo forte, in this instance just after the flute aperture is as open as possible the sound drifts towards a termination.

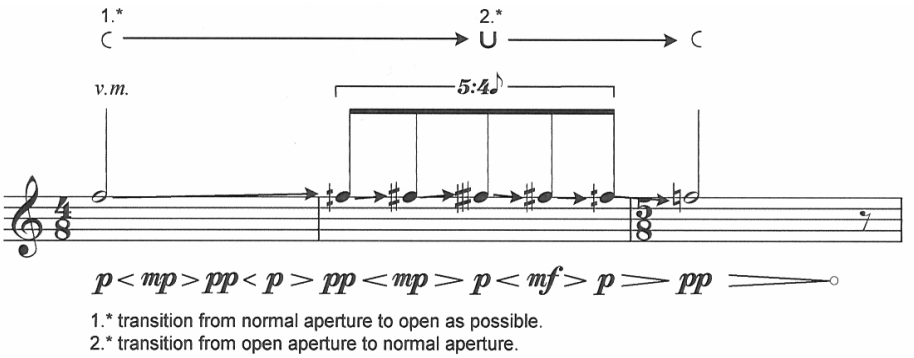


Illustration 10: *Tau 1 Gruis*, quarter tone alto flute (measures 1-3) – graduate continuant

It is not necessary to combine all three temporal phases. The attack-decay claims the presence of the onset and termination. A continuant can be suggested if the initial gesture is sufficiently forced. *Illustration 11* below demonstrates an accented pizzicato attack and, in this instance, is held momentarily before the left hand must release. Therefore the hint of a continuant is likely. The length of decay is dependent on the dynamic level. The angle and position of attack on the string length, (e.g. sul tastiera or sul ponticello) further accentuates this particular archetype.

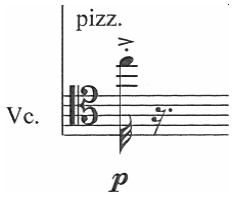


Illustration 11: *Betelgeuse*, violoncello (measure 161) – attack-decay

Another example in this category which Smalley proposed is a bell. Spectromorphological change is dependent on the size of a bell and how the performer creates the initial motion. A handbell for example is swung for the clapper to strike inside the bell. The attack need not be forced so the residual sound can resonate for a short time before the bell is swung again, or held.

The attack-decay gesture in the opening two measures of *Boötes*, *#5 Mufrid* (p.23) below suggests a possible continuant if a note is held or sustained by pedal action.

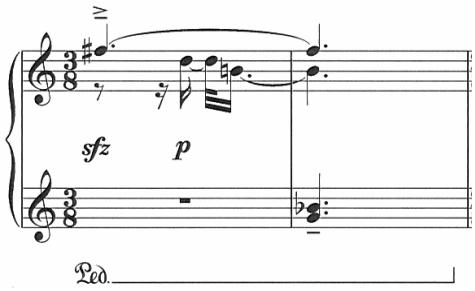


Illustration 12: *Boötes #5 Mufrid*, piano (measures 1-2) – attack-decay

The consequential sound-shape (*Illustration 13*) below is what I perceive to be a graphic representation of this extract. My drawing resembles a constellation map, each dot emphasises the position of each onset. The presence of a continuant following the *sforzando* pedalled attack of the first onset carries sufficient prolongation over subsequent onsets (carrying less weight of attack) which follow in a gradual descent, before the inevitable decay. So shape in this context is viewed from the perspective of how the attack-decay can produce overlapping sounds sieved through time.

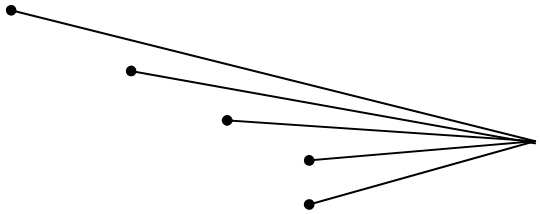


Illustration 13: *Boötes #5 Mufrid* – sound-shape

Finally, the *attack* alone which merges two temporal phases, those being the onset and termination. *Illustration 14* below (wedge shaped note head) is a violent percussive sound by closing off the flute aperture with the tongue. No air is applied so the attack does not resonate. Since this is a momentary impulse, other than possible acoustic feedback of a venue such as concert hall, there is no continuant. Another example such as a dry percussive attack on a wood block would produce a similar result, e.g. James Dillon's, *East 11th St NY 10003*.[38]

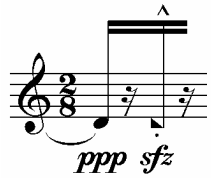


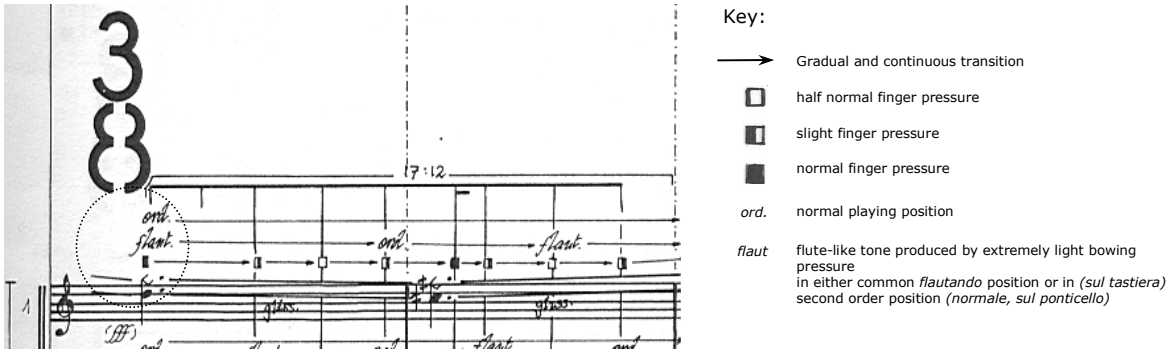
Illustration 14: *Tau 1 Gruis* (measure 28.$\mathfrak{z}_3$) – attack

[38] Dillon, James, *East 11th St NY 10003* (London: Edition Peters, 1983).

James Dillon's concern for the inner life of a single sound seems to intensify Smalley's theory, he says:

> One just has to examine the complexity of a single sound, the extraordinary complexity that's going on in terms of amplitude, time, frequency, phase relationships, spectral relationships: all these things which are internal to the sound are vectorial qualities, not scalar, qualities. One can breakdown the individual bits into scalar qualities, and when one is talking in terms of man-made system it's a purely practical solution to dealing with the whole complex of things that are going on in a piece. So that if you're working, as I do, essentially as an instrumental composer, we're talking about combining the internal qualities of sound with action, and so the vector takes on a sort of higher-level application. If you like, it's an easier way of keeping track of a very rich methodology.[39]

Dillon's standpoint is identified in *illustration 15* below; an extract from *Windows and Canopies* (1988)[40] shows the intricate detail of a specific sound object. The harmonic glissando descent of this particular onset (encircled) is strengthened dynamically. The complex layering of performance action is in place to shape the sound so that the notated dynamic (*fff*) is unstable, continuously fluctuating. Firstly, the glissando movement underpins a transition of the bow action shifting from flautando towards ordinary bow position and secondly, changes to left hand finger pressure are rhythmically placed. The action of the player intensifies the gestural moment thus articulating a spectromorphological change.



© Copyright 1985 by Hinrichsen Edition, Peters Edition Limited, London. Reproduced by kind permission of Peters Edition Limited.

Illustration 15: James Dillon, *Windows and Canopies*, sound object – violin 1 (measures 5-6)

Smalley's models of temporal phases are not restricted to note gestures but are a suitable reference for describing structural frameworks. Such a mode of thinking can be found in Varèse's *Ionisation* (1929-1931).[41] Jean-Charles François said of this work:

[39] Toop, Richard, 'Four Facets of 'The New Complexity', *Contact,* 32 (1988), 39.
[40] Dillon, James, *Windows and Canopies* (London: Edition Peters, 1988).
[41] Varèse, Edgard, *Ionisation* (New York: Colfranc, 1967).

> In *Ionisation*, the idea of superimposing timbral identities in different densities seems to imply a concept of polyphony that differs slightly from the traditional one. Rather, it suggests a global concept of hearing, in which the attacks of each separate identity merge to create a new, composite timbral entity, a wall of sound.[42]

Varèse himself, when writing *Ionisation* said, 'I was interested in the sonorous aspects of percussion as structural, architectonic elements.'[43] *Ionisation* sounds like a macro-dynamic arch shape which can be described as a graduate continuant: emergence – transition – disappearance. This is because there are three different percussion groupings that converge and diverge during the course of the work. They are: 1: indefinite pitch, e.g. wood blocks, 2: relatively definite musical pitch, e.g. piano, and 3: those capable of continually moving pitch, e.g. sirens.

Whilst in my own work, the structural framework of *Black Hole* demonstrates the attack-decay gesture. *Illustration 16* below identifies the onset of sixteen pitches reduced to one pitch (E) over the duration period of thirteen minutes and thirty seconds.

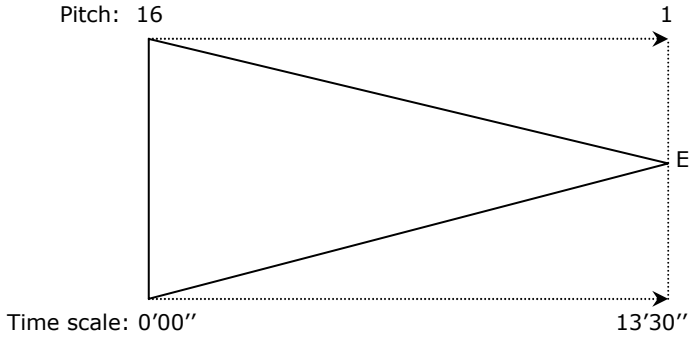


Illustration 16: *Black Hole* – attack-decay gesture

Smalley also argues that when a temporal phase is applied to a note gesture, the resultant sound is prone to a short life span. Smalley says:

> 'In tonal music notes form a consistent low-level unit, and are grouped into higher levelled gestural contours, into phraseological styles which traditionally have been based on breath-groups.'[44]

This assumption is applicable to singers and wind players who have to breathe. The spectral and morphological change in *Cloud* is not overly concerned with the limitations

[42] François, Jean-Charles, 'Organization of Scattered Timbral Qualities: A Look at Edgard Varèse's Ionisation' *Perspectives of New Music*, Vol. 29, No. 1 (Winter, 1991), 62.
[43] Schuller, Gunther, and Varèse, Edgard, 'Conversation with Edgard Varèse' *Perspectives of New Music*, Vol. 3, No. 2 (Spring-Summer, 1965), 35.
[44] Smalley, Denis, 'Spectromorphology: explaining sound-shapes' *Organised Sound* ***2*** *(2)* (Cambridge University Press, 1997), 113.

of breath control but uses the layering techniques of polyphony to shape the *texture motion*. Smalley's term refers to internal textural change. *Cloud* uses the motion processes which Smalley also identified (*Illustration 17*) below, particularly unidirectional motion processes: ascent – plane – descent. The four independent parts trace their own path moving away from a central pitch towards registral extremes.

Smalley predominantly applies the metaphors of motion and growth in relation to a time-based art like electro-acoustic music. An examination of these processes can also express structural functions in traditional instrumentation. They are:

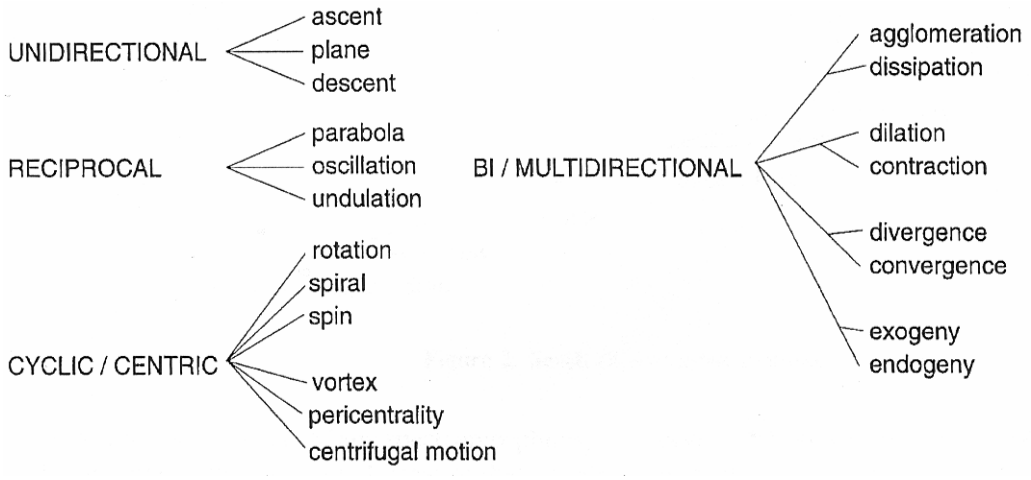


Illustration 17: *Smalley's model* – motion and growth processes[45]

Smalley divided these spectromorphological models into specific groups. Unidirectional, reciprocal and cyclic/centric groups are regarded as motions, whilst bi/multidirectionality is concerned with growth processes.

Unidirectional motion processes: ascent – plane – descent suggest a variety of potential growth areas in relation to *Cloud*, see *illustration 18* (p.27) below. The direction of the soprano saxophone part moves in ascent and the alto saxophone part changes direction (ascent and descent) before the continuing plane. *Tau 1 Gruis* is also concerned with the ascent and descent motions of rhythmic scale patterns, which at various points do one of three things: change direction, follow a plane, or stop.

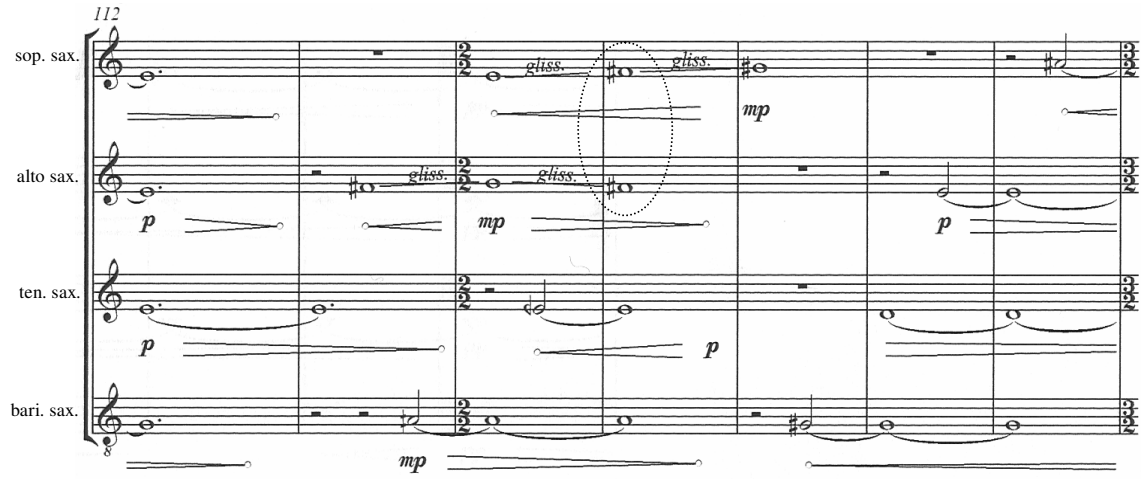
In *reciprocal motion* the metaphors of oscillation and undulation imply that a movement in one direction is balanced by a return movement. Both forms of movement are present in *Tau 1 Gruis* shown in *illustration 10* (p.22) above. The

[45] Ibid., 116.

undulation of dynamic flux underpinning pitch curvature is counterbalanced by the oscillation resulting from the molto vibrato technique.

Cyclic/Centric motion relates to the recycling properties in my music. In particular I use rotation or spiral techniques enabling rotation of pitch materials as exampled in *Boötes*, *#9 Alkalurops*, see 3.3. Another example is the spatial motion used in *Procyon* which applies rotation to seven independent panels of different duration, which are recycled in a calculated order, see 3.4.2.

Bi/multidirectional growth processes in my music address, in particular, models of dilation and contraction, see Chapter 2. Other areas of concern in this category are divergence and convergence. Both of these models are strongly directional and have a connection with the linear approach adopted in *Cloud* as demonstrated (*Illustration 18*) below. This extract highlights two saxophone parts (soprano and alto) converging on pitch F# (encircled) at measure 115. Divergence pulls the tenor and baritone saxophone parts away in a gradual descent.



N.B: extract at sounding pitch

Illustration 18: *Cloud* – showing divergence and convergence (measures 112-118)

As Smalley suggests most of the bi/multidirectional growth processes imply internal textural change but we cannot rule out the other motion-groups. Cluster pieces in the 1950s/60s suggest texture motion through their organisation of temporal phasing at a micro-level. Examples are: Ligeti, *Atmosphères* (1961),[46] Penderecki, *Threnody to the Victims of Hiroshima* (1960),[47] and Xenakis, *Metastaseis* (1953/54).[48]

[46] Ligeti, György, *Atmosphères* (Wien: Universal, 1963).
[47] Penderecki, Krzysztof, *Threnody to the Victims of Hiroshima* (Melville (N.Y): Belwin Mills, 1961).
[48] Xenakis, Iannis, *Metastaseis* (London: Boosey and Hawkes, 1967).

There are clearly a number of instrumental composers whose work exhibits spectromorphological qualities. The discussion concludes with a brief examination of Rebecca Saunders' work. Saunders describes her concerns in an interview with fellow composer James Saunders:

> When composing, each note or gesture is sifted again and again, weighed against it's surrounding framework of ''silence''. It feels like a very physical process – sound as a material which one moulds in space and time.[49]

In Saunders' *Quartet* (1998),[50] not only is the first sonic gesture so abrupt, it ruptures the silent anticipation of the listener through the slamming of the piano lid shut. We can describe this particular gesture as the attack-decay, a sudden impulse of spectral energy which is extended before the final decay. The resultant amplitude of sound spectra resonates to such intensity that the simultaneous sforzando attack, a dyad chord from the de-tuned double bass is masked. This action is immediately followed by a very fast ascending glissandi caused by a metal object striking in front of the dampers between the first section inside the piano frame. What emerges from this sound mix is firstly the onset of the accordion, a chromatic cluster in a sforzando attack triggers the steep ascending chromatic glissando thinning out to a single tone. The prolongation is the addition of a minor seventh interval above, building intensity prior to the release. Secondly, the double bass moves away from the initial attack freely bowing (sul. ponticello) through a transition of two independent dyad chords with such intensity, thereby causing distortion. Dynamic flux underpins this action before the release.

[49] Saunders, James, 'Interview with Rebecca Saunders' (unpublished) by kind permission of the author.
[50] Saunders, Rebecca, *Quartet* (London: Edition Peters, 1998).

Chapter 2: The music: general considerations

2.1: Dilation and Contraction

Spatio-temporal language in my music is bound up with the simultaneous use of processes. As outlined in 1.5, the discussion of Smalley's models of motion and growth processes (*Illustration 17*, p.26 above) identified several facets of my compositional tool kit and this includes dilation and contraction. The following discussion of these specific growth processes also takes into account James Dillon's *Windows and Canopies*. Dillon's handling of block structures in this one work demonstrates affinities with my own compositional strategies. This is the organisation of sonic activity in a measured time space. As Xenakis said:

> Without separability, there is no extension, no distance. […] if events were absolutely smooth, without beginning or end, and even without modification or "perceptible" internal roughness, time would find itself abolished.[51]

Quite often my music uses a panel approach that allows a framework of time in which to organise sonic activity as *illustration 7* shows (p.18) above. The functionality of dilation and contraction is a useful tool to determine the duration of such structures. A brief summary below will identify how these particular growth processes operate at a macro-level.

In *Tau 1 Gruis*, I chose to juxtapose nine measured panels of contrasting tempi, see 3.2. The *Winter Triangle Series*, for instance, *Betelgeuse* relies solely on dilation of eleven consecutive panels, see 3.4.1. Whereas the panel approach of *Procyon* explores dilation and contraction but in a cyclical form, see 3.4.2. Whilst *Sirius*, the third work in that series, can be viewed as one continuous panel of block materials dilating and contracting in both the horizontal and vertical planes, thus shaping a landscape of sonic activity, see 3.4.3. Indeterminacy of *Gemini* uses these particular growth processes in such a way as to deliberately alter the – angle of descent followed by angle of accent – trajectory of its core material. The performers must agree on the overall duration of the work, by calculating specified prime numbers, see 3.6.

Whilst these particular growth processes offer ways of ensuring a macro-structure, the texture motion[52] of those works outlined above consider subtle changes to the placement of block materials. What I attempt to do is keep a tight check on temporal

[51] Xenakis, Iannis, 'Concerning Time' *Perspectives of New Music*, 27 (Winter, 1989), 87-88.
[52] Smalley's term refers to internal textural change.

organisation within a larger framework of time by calculating dilation or contraction between one sonic event and the next. This allows the macro-rhythm of my music to move away from the aforementioned phraseological styles, especially where there is repetition of one specific rhythmic model *per se*. An example of this approach is used in *Sirius*. *Illustration 28* (p.37) below shows a process of calculated dilation between a repeating rhythmic model, there is, in this instance, an increment of one quaver beat in the horizontal plane. In addition, both *Cloud* and *Black Hole* can be viewed as continuums of dilation and contraction.

As part of my research I prepared a study of Dillon's *Windows and Canopies*,[53] which examined structural aspects from a visual standpoint. The functionality of dilation and contraction of this remarkable hand written chamber ensemble work serves to juxtapose contrasting sonic activity. Of notable interest is Dillon's own description of this material, quoted in full since it so eloquently describes the music:

> In sections marked [α], the string sound is continuous; all articulations are superimposed upon a constantly moving (left-hand) glissando harmonic. The harmonic position at the beginning of each measure should be strictly observed; these harmonics locate a position in time and define the boundaries of a harmonic space (outside time). In general these sections should sound constrained and delicately compressed, like the effect of soft light through a screen. The woodwind and percussion should seem distant; a residual play of difference like the momentary appearance of pale shadows on a screen.
>
> Sections marked [β] should be more lucid, as if the screen which veils the landscape during the [α] sections is gradually drawn back.
>
> The overall from may be seen as a series of traces panning slowly back and forth.[54]

Illustration 19 (p.31) shows a table plan of twenty six independent sections alternating contrasting materials (α and β). By calculating the number of beats assigned to each section, Dillon's scheme depicts a juxtaposition of contraction using (α) odd numbered sections; whilst (β) even numbered sections dilate. What struck me as possibly a preconceived strategy is the configuration assigned to the number of beats in the (β) odd numbered sections. This shows a decreasing sequence of prime numbers, the exception to the rule is section α3 allotting 48 quaver beats. In a consecutive prime number scheme this should read 47. Sections α13 and β14 show Metronome marks with an asterisk (69* and 76*), these are pivotal sections. The table plan enabled the proportional tempo scheme (*Illustration 20*) also (p.31) below. Additionally, a skeletal representation of *Windows and Canopies* (*Illustration 21*) is shown on page 32. The layout is drawn in four horizontal (continuous) columns showing the instrumentation to the left of the page in alignment with the areas of sonic activity drawn as abstract

[53] The results were presented as part of a research forum at the University of Huddersfield, 14/03/06.
[54] Dillon, James, *Windows and Canopies* (London: Edition Peters, 1988), 4.

lozenge shapes. Directly above these shapes duration is shown in minutes dividing the space at one minute intervals. The markings of alternate sections (α1, β2, etc.) show the onset of each panel. Clearly the proportions demonstrate dilation and contraction of block materials.

Sections	α1	β2	α3	β4	α5	β6	α7	β8	α9	β10	α11	β12	α13
No. of ♪ beats	53	9	48	18	43	24.5	41	39	37	45	31	54	29
MM ♪ =	48	104	52	100	54	92	56	88	60	84	63	80	69*
duration	1′06″	5″	55″	11″	49″	16″	44″	26.5″	39″	32″	29′5″	40′5″	25″

Sections	β14	α15	β16	α17	β18	α19	β20	α21	β22	α23	β24	α25	β26
No. of ♪ beats	63	23	76.5	19	78	17	87.5	13	104	11	106.5	7	101
MM ♪ =	76*	80	63	84	60	88	56	92	54	100	52	104	48
duration	50″	17″	1′14″	13.5″	1′18″	11′5″	1′33″	8″	1′55″	6.5″	2′00″	4″	2′06″

N.B. Total score duration as it appears in the score: 'ca 25 minutes'. There are rallentando accelerando and fermata which separate each section; any attempt to make diagrammatic accuracy is conjectured.

Illustration 19: James Dillon, *Windows and Canopies* – showing table plan

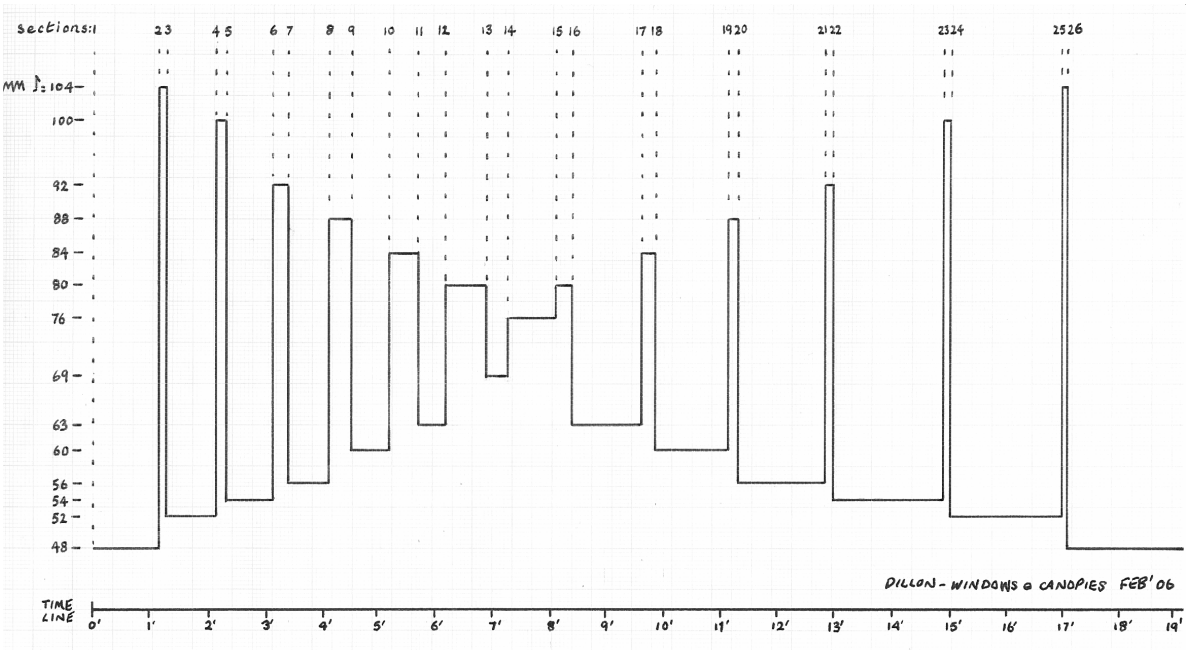


Illustration 20: James Dillon, *Windows and Canopies* – showing proportional tempo scheme

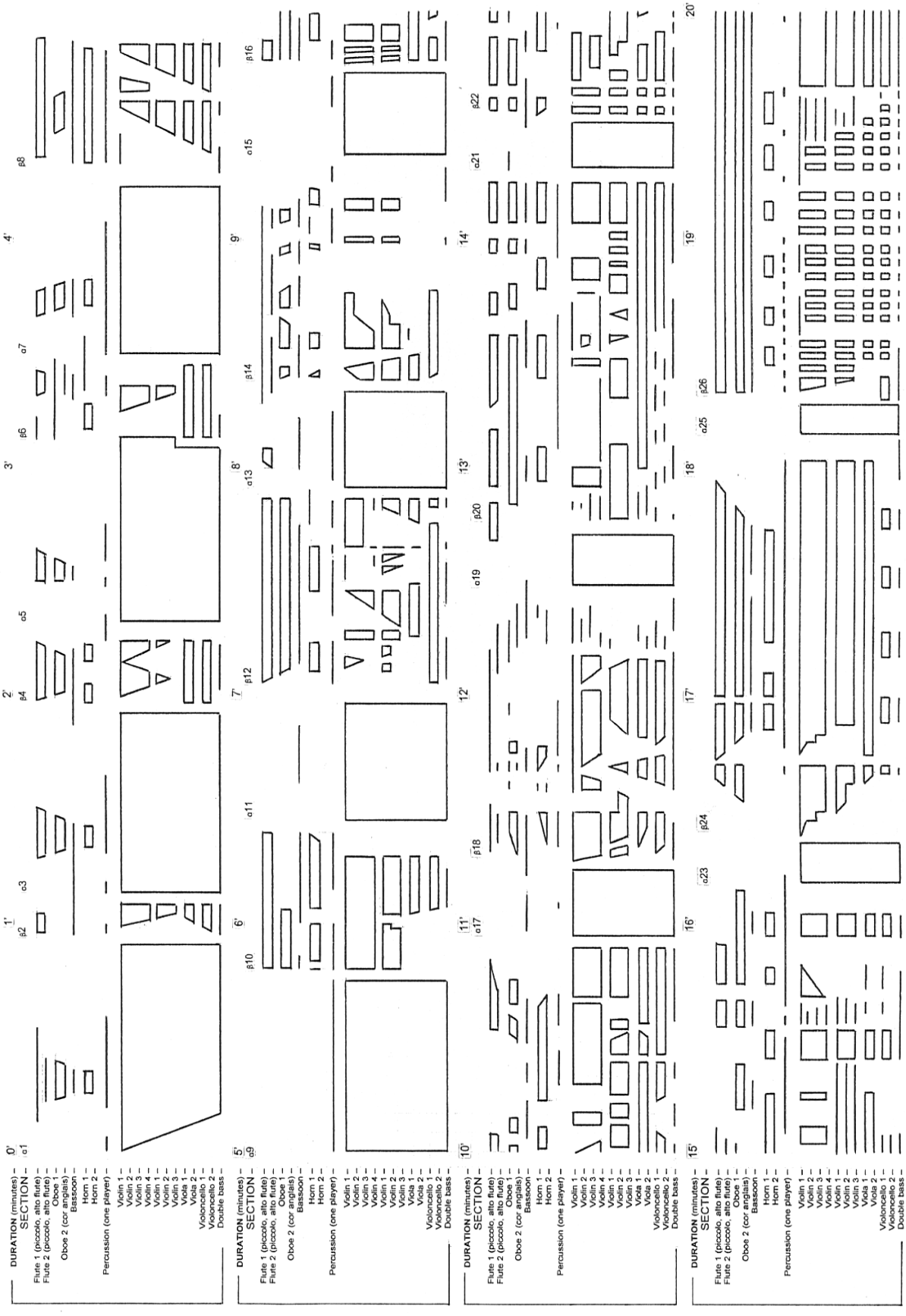


Illustration 21: James Dillon, *Windows and Canopies* – drawing, showing dilation and contraction of block structures

2.2: Encoding

What I intend to demonstrate in this section is how encoding operates in my music. In several of the pieces it is the title which is encoded by means of pitch, as exemplified through the core pitch material of *Cloud*, or by a hint of rhythmic translation using Morse code in *Tau 1 Gruis*, and especially so in the *Winter Triangle Series*. In some instances, encoding involves both pitch and rhythm, as in, for example *Boötes*. I will attempt to show how encoding functions in two ways. Subsection 2.2.1 examines how the translation of Morse code signals generates rhythmic materials and ways in which this operates, whilst subsection 2.2.2 discusses how pitch materials shape the pieces.

As will be evident in *Cloud* (3.1) and *Boötes* (3.3), I encode note names from the title of a work. Numerous composers have based compositions on note names. For instance, Shostakovich's motto theme D-Eb-C-B derived from the German form of his Russian initials DSCH appears in the third movement of *Symphony No. 10, Op.93* (1953),[55] and in several other pieces, including *String quartet no. 8* (1960).[56] Stephen C. Brown said, 'Bach himself uses his own motif [Bb-A-C-B] in Contrapunctus XIV of *The Art of Fugue*.'[57] Other composers have used Bach's motif, e.g., Webern created a 28 tone row in *String Quartet* (1905).[58] *Illustration 22* below shows how I encode Bach's motif in the opening measures of *Enigma*, and subtitled, *Bach in the 21st Century* (2002) for solo piano, which pre-dates this period of study.[59] Of note, *Enigma* translates BACH as Morse code 'rhythmic models' (identified in 2.2.1). We can view the characters B (𝅗𝅥. 𝅗𝅥 𝅗𝅥 𝅗𝅥) and A (𝅗𝅥 𝅗𝅥.) in the left hand part below.

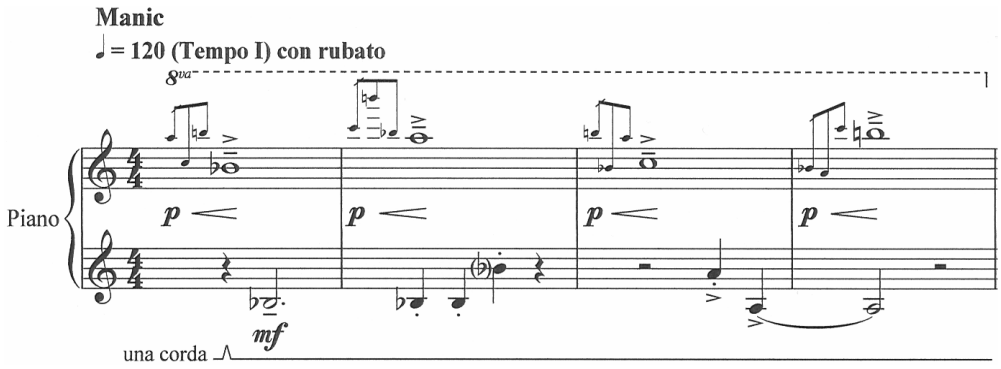


Illustration 22: *Enigma* – showing BACH motif (right hand, measures 1-4)

[55] Shostakovich, Dmitrıı Dmitrievich, *Symphony No. 10, Op.93* (New York: MCA Music, 1955).
[56] Shostakovich, Dmitrıı Dmitrievich, *String quartet no. 8: op.110* (London: Anglo-Soviet Music, 1961).
[57] Brown, Stephen C, 'Tracing the Origins of Shostakovich's Musical Motto' *Intégral*, 20 (2006), 90.
[58] Webern, Anton von, *String quartet* (London: Boosey and Hawkes, 1965).
[59] The title came from an opportunity to compose a work marking 250 years after the death of Bach. Philip Thomas presented the first performance of *Enigma*, May 2002, St. Paul's Hall, the University of Huddersfield.

Cellist Mstislav Rostropovich commissioned ten composers to write a solo violoncello piece in celebration of the 70th birthday of conductor Paul Sacher.[60] They are:

Conrad Beck	*Three Epigrams*
Luciano Berio	*''Le mots sont alles…''*
Benjamin Britten	*Theme ''SACHER''*
Henri Dutilleux	**Hommage a Paul Sacher***
William Fortner	*Theme and Variations*
Alberto Ginastera	**Homage a Paul Sacher: Punena No, 2 op. 45*
Cristobal Halffter	*Variations on the Theme of ''SACHER''*
Heinz Holliger	*Chaconne*
Klaus Huber	*''Transpositio ad infinitum''*
Witold Lutoslawski	*Sacher Variations*

N.B.*Dedicated to Rostropovich. **Dutilleux later added two more movements.

The brief for those composers (listed above) expressed the use of six pitches constructed from the letters of Sacher's name:

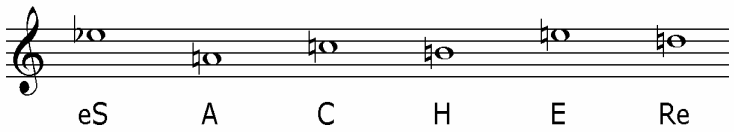


Illustration 23: showing SACHER pitches[61]

Pierre Boulez dedicated *Messagesquisse* (1976)[62] for solo violoncello and six violoncellos to Sacher. Deruchie's informative description below identifies the key components:

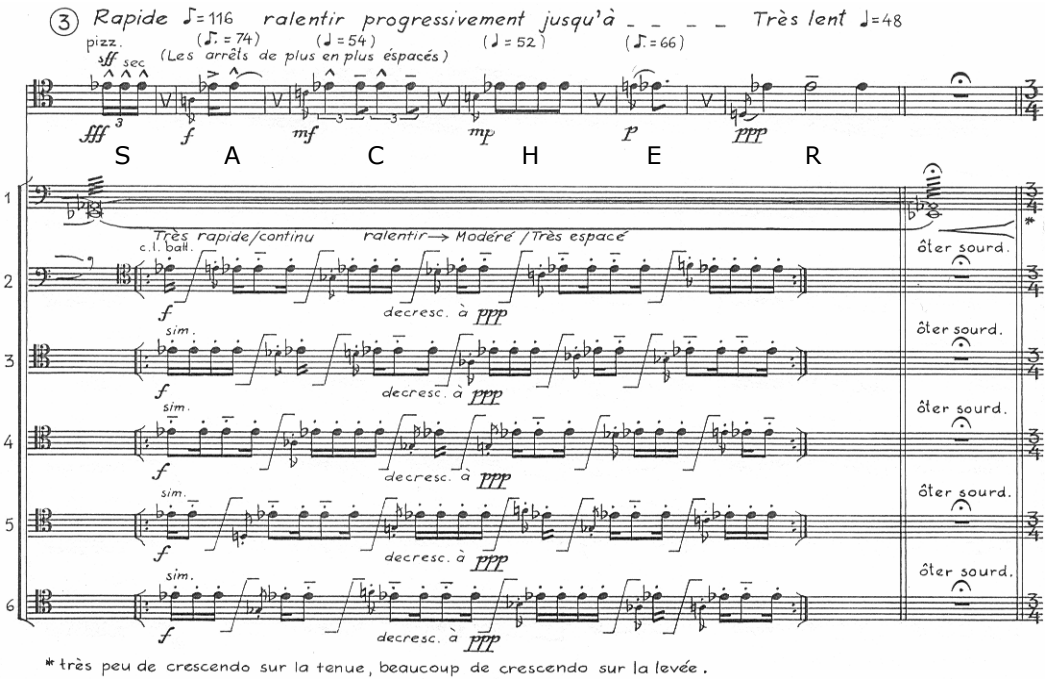
> Sacher is – quite literally woven into the piece in several ways [...] his name generates the work's referential collection of pitches. This collection provides a succession of intervals which are inflected by transposition and inversion to generate further pitch materials. The morse code for each letter of ''Sacher'' provides a series of rhythmic figures (of between one and four pulses, in some combination of long and short). Finally, the number of letters in Sacher's name – six – corresponds to the number of ensemble cellos for which *Messagesquisse* is scored. It also corresponds to the number of formal sections that constitute the work.[63]

The use of Morse code in *Messagesquisse* appears to be based on the assumption that a note value longer than the shortest note (equivalent of a dot) of a rhythmic figure constitutes a dash, e.g. principle violoncello letter R (♩ ♩ ♩) shown in *illustration 24* (p.35) below. Whilst SACHER letters as 'rhythmic figures' are identified directly beneath the principal violoncello. Violoncellos 2-6 shows permutation of SACHER letters (rhythmic figures) in the following presentation:

[60] n.a., 'The list' (n.d.), <http://www.cello.org/Libraries/reference/rostropovich.html>, accessed 19/03/09.
[61] Cited: Dutilleux, Henri, *3 strophes sur nom de Sacher* (Paris: Heugel & Cle, c.1982) prefixed at page 2.
[62] Boulez, Pierre, *Messagesquisse* (London: Universal, 1977) for the 1977 La Rochelle cello competition.
[63] Deruchie, A 'Messagesquisse (1976-77)', page oeuvre@22301 (18/03/09) <http://www.smcq.qc.ca/smcq/en/ouvres/223/01.php> accessed 22/03/09.

Vc2. ERSACH
Vc3. HERSAC
Vc4. CHERSA
Vc5. ACHERS
Vc6. SACHER

Of particular note, *Boulez's* order of rhythmic figures in *Messagesquisse* (violoncello's 2-6, *Illustration 24*) is comparable to the macro-structure of *Procyon*, see *illustration 73* (p.73) below.



© Copyright 1977 by Universal Edition (London) Ltd., London/UE 16678. Reproduced by permission. All rights reserved.

Illustration 24: Pierre Boulez, *Messagesquisse* – encoding SACHER as rhythmic figures (rehearsal mark 3)

Finally, Dmitri Smirnov discusses the use of Morse code in his music. Smirnov's essay, 'Music and Morse Code'[64] cites extracts from four works. They are: *Elegy, Op.74* (1997) for cello solo, and three pieces for solo piano, *Metaplasm 1 Op. 135* (2002), *Morse Bach* (2005), and *Music* (2005). In these works Smirnov rhythmically encodes names. *Metaplasm 1 Op. 135*, for instance, is dedicated to pianist Sharon Anderson. The letters of her name use a single pitch of F# and this is presented as rhythmic figures passing over bar lines.

[64] Smirnov, N. Dmitri, 'Music and Morse code', (12/01/05) <http://homepage.ntlworld.com/dmitrismirnov/MorseMusic.html> accessed 19/03/09.

2.2.1: Rhythmic models

My music will often change metre to accommodate what I will refer to as 'rhythmic models'. They are regarded as building blocks and commonplace in my music. It is the translation of Morse code signals which creates this material. *Illustration 25* below is useful to see how this operates. As we can see, Morse code uses two states, short (dot) and long (dash). As a general rule, translation of the dot (**.**), one unit, is equal to one quaver, and the dash (**–**), three units, equal to a dotted crotchet, e.g., letter B: ♩. ♪♪♪ = 6 quaver beats. For me, each letter equates to a measurement of time governed by the metronome mark using the quaver beat as the basis for calculating time signatures.

A	. – ♪♩.	4♪	**J**	. – – – ♪♩. ♩. ♩.	10♪	**S**	. . . ♪♪♪	3♪
B	– . . . ♩. ♪♪♪	6♪	**K**	– . – ♩. ♪♩.	7♪	**T**	– ♩.	3♪
C	– . – . ♩. ♪♩. ♪	8♪	**L**	. – . . ♪♩. ♪♪	6♪	**U**	. . – ♪♪ ♩.	5♪
D	– . . ♩. ♪♪	5♪	**M**	– – ♩. ♩.	6♪	**V**	. . . – ♪♪♪ ♩.	6♪
E	. ♪	1♪	**N**	– . ♩. ♪	4♪	**W**	. – – ♪♩. ♩.	7♪
F	. . – . ♪♪♩. ♪	6♪	**O**	– – – ♩. ♩. ♩.	9♪	**X**	– . . – ♩. ♪♪♩.	8♪
G	– – . ♩. ♩. ♪	7♪	**P**	. – – . ♪♩. ♩. ♪	8♪	**Y**	– . – – ♩. ♪♩. ♩.	10♪
H	. . . . ♪♪♪♪	4♪	**Q**	– – . – ♩. ♩. ♪♩.	10♪	**Z**	– – . . ♩. ♩. ♪♪	8♪
I	. . ♪♪	2♪	**R**	. – . ♪♩. ♪	5♪	**1**	. – – – – ♪♩. ♩. ♩. ♩.	13♪

Illustration 25: showing Morse code as rhythmic models

The rhythmic models that I use need not be restricted to note values of quaver and dotted crotchet. They are presented in diminution and augmentation in both *Boötes* and *Betelgeuse*. It is also the space between the placements of rhythmic models which can take into account the methodology used in Morse code signal practice. Quite simply, the space between characters (signal) is three units, and between words, seven units. The inner parts of *Boötes*, *#1 Arcturus*, used this mode of practice. This can be described as a symmetrical approach, see *illustration 47* (p.56) below. As will be noticeable in *Sirius*, repetition of specific rhythmic models is often treated to dilation and contraction. This entails not only the space between models but in the way a rhythmic model can use these growth processes.

As will be discernable, the rhythmic models in *illustration 25* (above) shows that no two models are alike, and this presents interesting questions from a structural perspective. How, for example, the selection of certain models results in the creation of metre problems, particularly when one considers onsets of the upbeat and downbeat caused by these models. Once again, I will refer to Paul Klee's theories of proportionate line and structure which also addressed – 'divisional articulation' – structure.[65] For Klee this could be used in a quantitative way, from left to right (horizontal plane), as well as from top to bottom (vertical plane). In the horizontal plane (shown below), Klee treats one plus two (1+2) as follows:

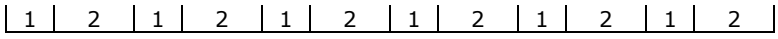


Illustration 26: showing divisional articulation – 1+2 etc., in metric presentation

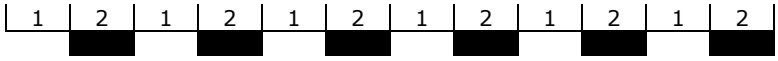


Illustration 27: showing divisional articulation – 1+2 etc., in stress presentation

Divisional articulation (Klee's term) is useful to describe ways in which rhythmic models operate in my music. As shown in *illustration 25*, p.36 above, apart from the letter E (1♪) and T (3♪) which cannot be divisional, the remainder can. For example, rhythmic models constructed from two states, e.g. letter A (♪.) 4♪ is 1+3 (1+1+1) = 4. This model is regarded as asymmetrical metric presentation because the 3 cannot be divided. In stress presentation, articulation naturally falls on a down beat, the dotted crotchet. Other models present several possibilities of divisional articulation. For instance, where there is the presence of more than one single quaver beat, e.g., letter S (♪♪♪) 3♪, this in metric presentation is 1+1+1 = 3. Stress presentation in this example can be variable as the stress can occur on any one of three pulses, e.g., <u>1</u>+1+1, 1+<u>1</u>+1, and 1+1+<u>1</u>. *Illustration 28* below shows a shift of divisional articulation using this particular model. Of note, metre organisation in *illustration 28* is governed by note placement in the woodwinds evident in the score.

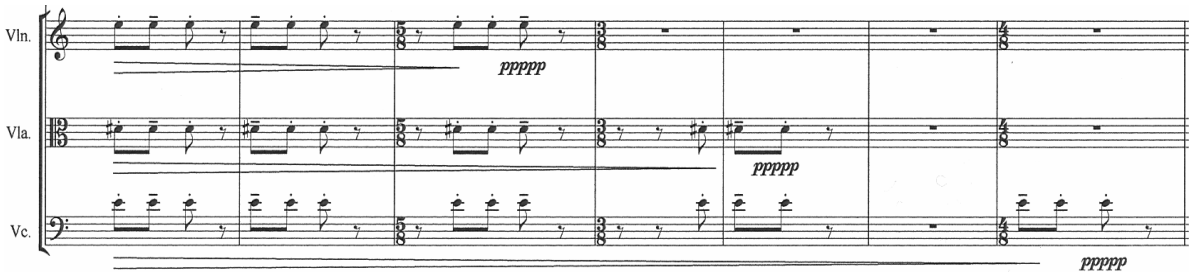


Illustration 28: Sirius – showing stress presentation of rhythmic model S (measures 36-42)

[65] Klee, Paul, *Pedagogical Sketchbook* (Faber and Faber, London, 1968), 22.

Whilst the discussion refers to divisional articulation of rhythmic models, in the context of the metre, this provides interesting ways of presenting block materials. Stress presentation at the start of a measure is not always possible, particularly as the use of dilation and contraction in my work is concerned with the overall form. Inevitably there are several instances in my music where rhythmic models will pass over bar lines. We can see a positional shift in relation to the metre in *illustration 28* (p.37) above. This is partially governed by dilation between one model and the next and of note placement in other instruments (not shown). What is important to me is presenting pre-selected rhythmic models within a delineated field of organic growth.

In a commentary of this size it is only possible to give a brief description of my approach to rhythmic organisation. The commentary on the works themselves serves to illustrate the spatial organisation of both rhythm and pitch materials. Although created separately the combination of the two is essential to the result. What should be apparent is that my concern for shaping the music, particularly the placement of sonic activity – in measured time – is usually deduced from my use of point systems described in 1.3.

2.2.2: Pitch organisation and points of orientation

My schematic approach to pitch organisation considers central pitches as a way of shaping the music like a journey through successive fields of gravitation. For me, certain pitches initially serve to create structural reference points. Once these are in place, I begin to flesh out my work using a balance of process and intuition. This for me, produces a satisfying situation and one in which the combination of pitch and rhythmic processes is goal orientated, in the sense that I have structure in mind at the outset. For example in *Black Hole*, I wanted to use E as a point of orientation, therefore the reductive organisation of pitch material is based on an overtone series. I stripped away microtones before the remaining pitches are whittled down to one central pitch, see 3.5. In essence this is rotation of one single chord. One might describe this approach as a kind of overall sonic field that contains a lack of harmonic differentiation. The notion of central pitches invites the listener to experience what I perceive to be a state of equilibrium between stasis and motion. In *Sirius*, for instance, E is the central pitch. As discussed in 3.4.3, the limitations of just five pitches – E F# G# B D# suggest Mixolydian mode – inevitably led to rotation.

I work with pre-selected pitches in order to attain some form of organisational consistency and in several of my compositions have chosen to use the title as a source of pitch material. *Illustration 7* (p.18) is useful once again to show how three pitches (F C D) encode (TAU) the first three letters in *Tau 1 Gruis*. In this example, these pitches are considered as points of orientation, which, as demonstrated in the score, withstand microtonal flux sieved through complex rhythmic figures. In this one panel the longer-term end or goal is the creation of narrow pitch bands emanating from central pitches.

Quite often I use modality in my music as exemplified in the reference to Mixolydian mode in *Sirius* (p.38) above. Modality is used in such a way that any transpositions I choose to use, move away from modulation in the context of traditional Western Music, where one senses key changes. This is the case of *Cloud*. As discussed in 3.1, there are five transpositions of a modally orientated scale. One does not perceive modulation but a linear flow moving away from a central starting point through time. In *Boötes*, I chose a form of modulation using pre-selected modes. As discussed in 3.3, I attempt to create a common pitch centre, that of D, which facilitates a central point of modal orientation. As in all the works discussed in Chapter 3, it is my intention to shape self-contained sound worlds.

2.3: Notation

Drawing for me, as with other composers whom I admire, for instance, Cage, Dillon, and Xenakis, becomes part of a process of moving from generalisation to something more specific. Xenakis, in an interview with Anne Rey and Pascal Dusapin, said:

> 'Sometimes, I would draw and my drawings represented musical symbols. I knew traditional solfège, but a certain freedom of thought could not occur that way. I was convinced that one could invent another way of writing music. I started imagining sound phenomena with the help of drawings […].'[66]

Therefore for Xenakis drawing could be a way of embodying sound. Carey Lovelace said of his graphic notations: 'As with *Metastaseis*, and nearly all subsequent compositions, Xenakis would translate such visual plotting into musical notation.'[67] Furthermore, Sharon Kanach claims: 'Xenakis always established a final manuscript score, readable –

[66] "Si Dieu existait, il serait bricoleur," *Le Monde la musique,* no. 11 (1979). Cited: Xenakis, Iannis, *Architect, Composer, Visionary, Drawing Papers 88*, Essays by Ivan Hewett, Carey Lovelace, Sharon Kanach, and Mâkhi Xenakis (The drawing center, 35 Wooster Street, New York, NY 10013, 2010), 96.
[67] Ibid., 48.

and universally performable – by other musicians, indicating what *must* be played.'[68] Notably, there are the graphic scores, e.g., the percussion solo *Psappha* (1975)[69] and *Mycenae-Alpha* (1978) the first piece created using the UPIC system.[70]

It is worth noting that I was fortunate enough to have a brief private audience with James Dillon in 2003.[71] At that time, Dillon, while reluctant to engage in conversation about his music, particularly his structural approach which is of interest to me – as I later discovered in my study of *Windows and Canopies* shown in 2.1 above – did offer a brief glimpse of his working methods. Dillon uses a grid placed over a light box, which for him is an essential tool. A grid system, as Dillon implied, helps one calculate the structural outcome of one's music in relation to time. Furthermore, it alleviates the difficulties of working directly with a music software programme where it becomes difficult to see what one is doing in terms of viewing the entire image.

For me, beginning with a spatially organised grid system allows one to envisage sonic activity in a measured time space. What this has provided me with is a notational strategy, a way of shaping the music. As James Ingram suggests:

> All music notations must work in two domains: space – involving the relations between the symbols on the paper; and time – involving the relations of the symbols to real events.[72]

What I feel to have gained from drawing is a clear structural outline. On the other hand my calculated dot and line drawings lack the ability to deal with notational intricacies. Therefore, the translation process to a more conventional form of notation becomes necessary. For me, staff notation as Cardew believes (contrary to his use of graphic notation), 'shows the shape of the music as it is to be heard.'[73] Conversely, from the viewpoint of a performer, as Philip Thomas asserts, 'all notation serves as a prescription for action rather than a description of sound.'[74] What Thomas is proposing is an approach where action is ultimately going to shape the sound. For instance, how one applies touch in order to attain a prescribed dynamic level. Both points of view are of concern to me, therefore, it is important to make my intentions clear.

---

[68] Ibid., 105.
[69] Xenakis, Iannis, *Psappha* (Paris: Salabert, 1976).
[70] The first UPIC machine (1977) a digitized "musical drawing board" with a built in stylus enabled drawn shapes translated into electronic generated sound.
[71] An informal conversation with James Dillon in November 2003 followed the award ceremony at the University of Huddersfield, Dillon was presented with an honorary doctorate.
[72] Ingram, James, 'The Notation of Time', *Contact*, *29* (Spring, 1985) 20-27, 22.
[73] Cardew, Cornelius, 'Wiggly Lines and Wobbly Music' *Studio International*, Art and Experimental Music, 192 No. 984 (November/December, 1976), 249-255, 250.
[74] Clarke, Eric, Cook, Nicholas, Harrison, Bryn & Thomas, Philip, (2005) 'Interpretation and performance in Bryn Harrison's être-temps' *Musicae Scientiae*, 19, (1), 31-74, 39.

Whilst I regard notating and composing as inseparable, there comes a point where a decision has to be made as to how one wishes to present the music. Although, part of the translation process involves using a printed grid on manuscript paper for hand written notation – e.g. *illustration 67*, p.68 below – consistency of presentation is lost. I chose the convenience of a music software program which, for me, is a drawing tool that allows one to control the visual appearance of the music as well as having the obvious advantage of creating parts. As discussed in the commentary of the works in Chapter 3, the visual appearance of my music is partly dependent on interpretation of a particular subject matter. For me, as is the case with a number of other composers, Cage for example, each compositional project brings its own form of notation in order to attain the desired outcome.

The translation process itself, I believe for the most part, is successful. Inevitably one is bound to make adjustments as a composition develops. For me, the whole process from the moment of conception to a completed visual representation of one's music becomes a creative act, a way of documenting one's intentions. As Malcolm Layfield pointed out after conducting the first performance of *Black Hole*, 'it is incredibly clearly written'.[75] What I hope to achieve through notation is preserving the originality of thought and one which must have a clear purpose: that of sonic realisation.

[75] A discussion about *Black Hole* between composer, conductor and members of Goldberg Ensemble, as well as members in the audience, followed a workshop performance and recording of *Black Hole*, 12 May 2007.

Chapter 3 – Commentary on the Works

3.1: ***Cloud* (2004)**

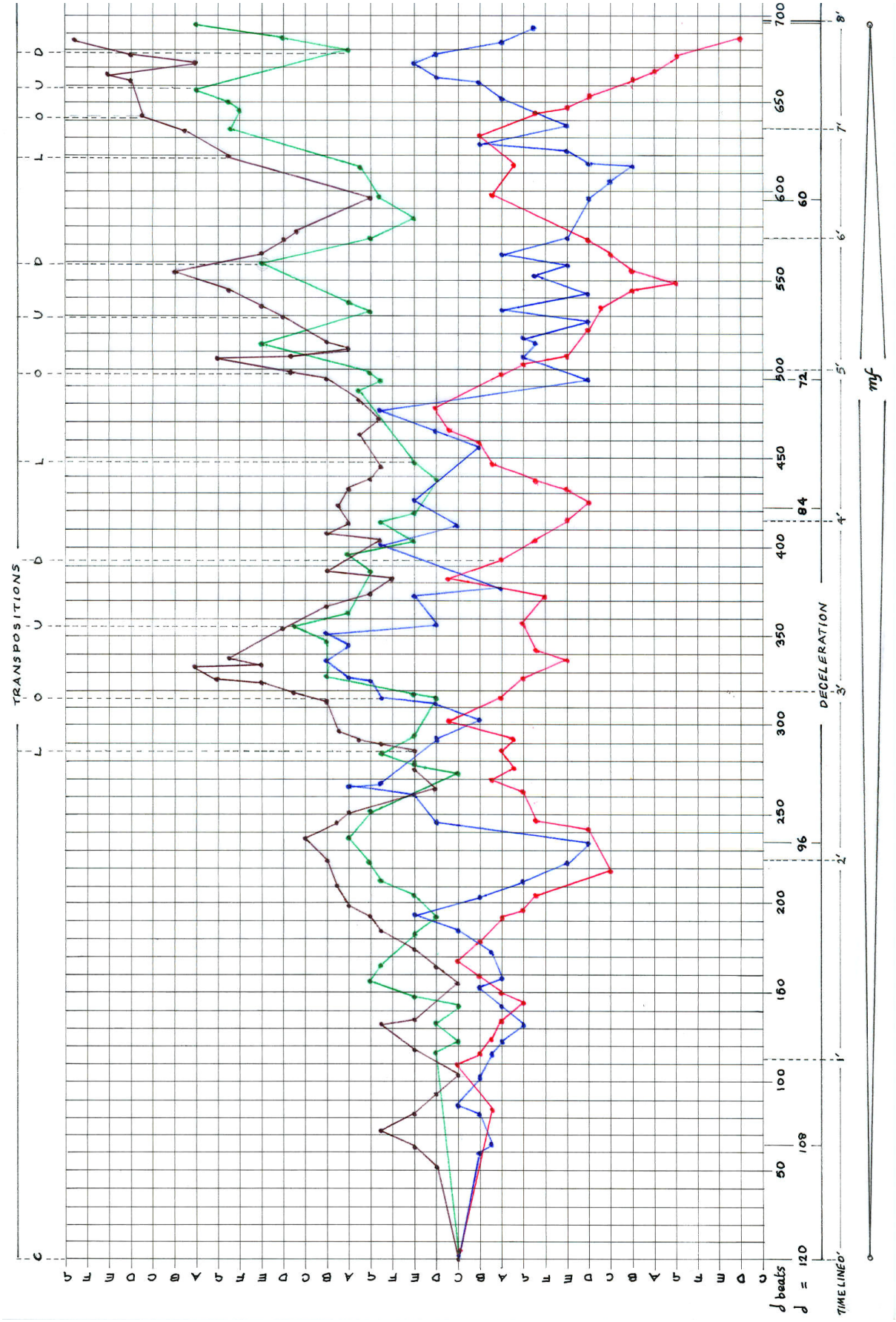
- saxophone quartet – soprano, alto, tenor, baritone: 8 minutes

As will be demonstrated in all of the works under discussion in this chapter, the starting point for this work came from a visual rather than a musical source. The title refers to a visible floating mass of water droplets suspended in the atmosphere. As I wished to interpret that phenomenon visually as well as sonically I designated the minim as the shortest note value to represent water droplets as translucent spheres.

I chose to map sonic activity by way of dot and line. Using a grid, the placement of dots would predetermine the positioning of pitch material and their subsequent duration. This intuitive process towards the creation of the piece enabled a composite outline of directionality by tracking the architectural progression of these dots. The proportionate length of any one line between two adjacent static dots might move in one of three directions, horizontal, ascent, or descent, thus making a connection between one event and another. *Illustration 29* (p.43) below demonstrates the juxtaposition of four separate pathways each one of which fixed two points: a common departure point (sounding pitch middle C) and four separate termination points. I then marked transposition points based on my core pitch material, before adding the subsequent pitch indicators. The points shown in *illustration 29* are by no means conclusive of all the notes evident in the score, but for me this drawing provided a working plan. Each independent pathway governed by the placement of static dots created as Paul Klee describes, 'an active line, limited in its movement by fixed points'.[76] My approach to this composition was therefore concerned with developing the unidirectional motions of independent saxophone parts. The resultant harmony, on a moment-to-moment basis is not predetermined but the result of the incidental lines.

Visual representation provides both a means of mapping, i.e. organisation, but also represents a distancing/stepping back from the sonic results. For instance my working plan did not fully account for the contoured linearity I desired and so my intuitive reaction was to add more notes to the actual score. Shifting the position of existing dots would not solve the idea of a smoother contour. For example the first minute (measures 1-26) integrated microtonal intervals around the central tone of C.

[76] Klee, Paul, *Pedagogical Sketchbook* (Faber and Faber, London, 1968), 18



Coloured lines indicate instrumental parts: soprano sax., (black), alto sax., (green), tenor sax., (blue), baritone sax., (red).

Illustration 29: *Cloud*, working plan – showing unidirectional motion of four independent parts

I decided to use the letters of the title as a starting point for the various subsequent transpositions of pitch material. *Illustration 30* below demonstrates how a configuration of seven pitches link the twenty six letters of the alphabet. *Illustration 31* shows the resultant core pitch material used in *Cloud*.

Pitch:	**A**	**B**	**C**	**D**	**E**	**F**	**G**
Letter:	a	b	c	d	e	f	g
	h	i	j	k	l	m	n
	o	p	q	r	s	t	u
	v	w	x	y	z		

Illustration 30: showing pitch conversion chart

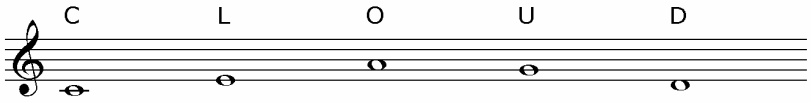


Illustration 31: *Cloud* – showing core pitch material

I selected an eight note pitch class set (C D E F# G A Bb B) whose intervallic relations suggest modality, as my pitch material.

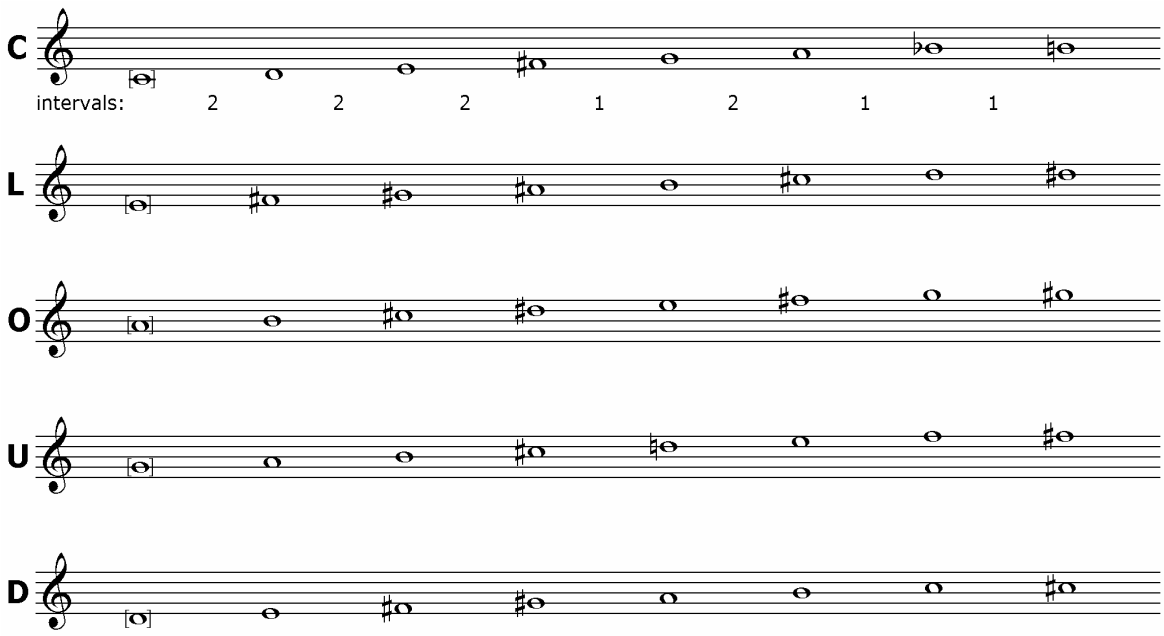
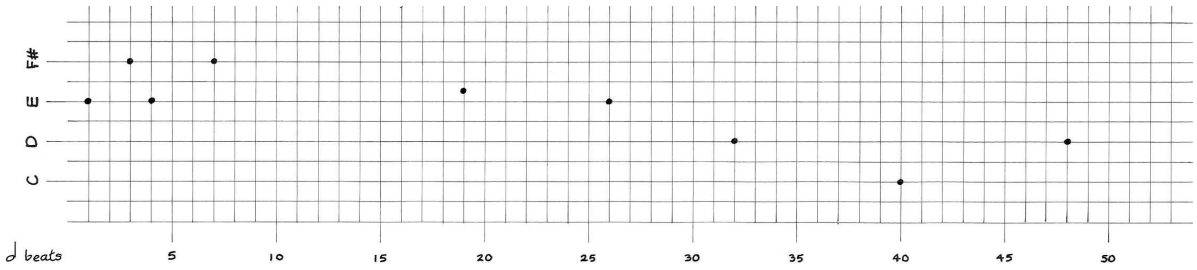


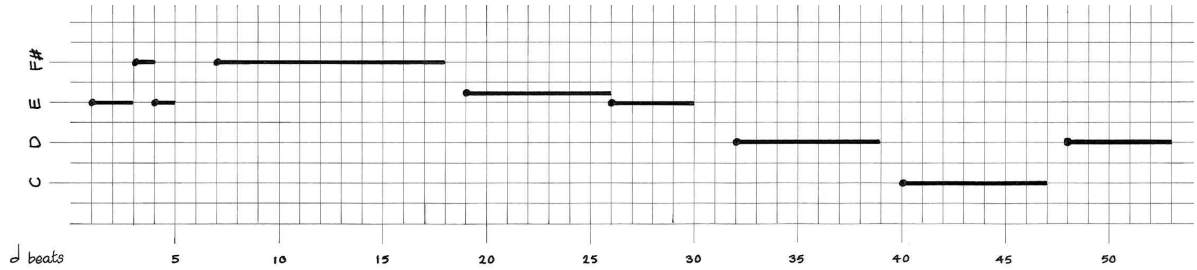
Illustration 32: *Cloud* – showing eight note pitch class and transpositions

It will be immediately obvious in the score that I used microtones as well as the prescribed pitch material. As described in paragraph 3 (p.42) above, the texture motion of the opening material is enriched through the use of narrow pitch bands.

On a localised level I wanted to focus on shaping sonic activity and began to assemble my materials. *Illustration 33* below shows two stages for what eventually became the soprano saxophone part (measures 27-49) of the finished piece.



Stage 1: Accurate placement of static dots



Stage 2: Duration (active lines) of each temporal phase

Illustration 33: *Cloud* – showing working methods, soprano saxophone part (measures 27-49)

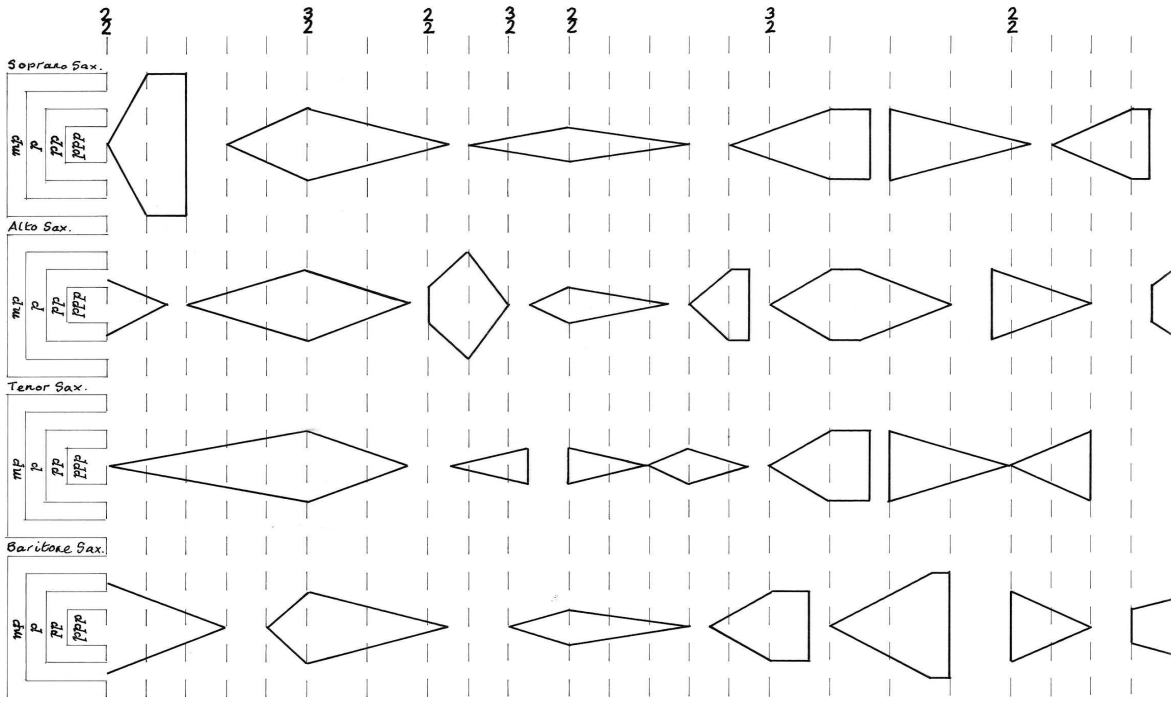


Illustration 34: *Cloud* – showing dynamics in all four parts (measures 27-49)

The articulation of each note is dependent on the players' ability to vary embouchure because a network of dynamic flux underpins note placement. *Illustration 34* above

shows how dynamics ebb and flow. Like Zen painting, I imagined the placement of each dynamic marking akin to the application of a singular brush stroke. Slight of hand moving across the paper might pause momentarily to allow for a change in pressure, thus ensuring variable sound-shapes. The outcome is governed by the dynamic macro-structure supporting a possible Golden Section shown beneath my working plan (*Illustration 29*, p.43 above). This is demonstrated by a crescendo from barely audible to mezzo forte at approximately five minutes, before moving towards barely audible at the close of play.

My performance notes advise: 'Bar lines serve mostly as points of reference (bar lines and beats never mean accentuation).' Rhythm is not the issue here rather the sound world is more concerned with the continuum of overlapping sound-shapes. I used changing time signatures (limited to two or three minim beats) because there are places in the score suggestive of moments which might break away from an otherwise dynamic equilibrium. For example, at measures 27-28 in the soprano saxophone part there is a crescendo to mezzo piano whilst the remaining parts show lesser dynamic levels. Mostly, a change of time signature is in alignment with dynamic synchronicity, such as all parts (*pp*) at measure 32, and (*ppp*) measure 37, both are evident in *illustration 34* (p.45) above.

The tempo scheme which underpins my working plan (p.43) above shows division of the proposed eight minutes duration. Whilst decelerating tempi exhibit a calculated subtraction of twelve in each subsequent tempo, they are: 120, 108, 96, 84, 72, and 60 minim beats. Although on hearing the audio recording of the first performance[77] (11½ minutes) which accompanies this piece, deceleration is not so obvious, rather it is very gradual. This is due to the similarity of material using longer durations at – e.g. minim = 120 – a faster tempo. Nonetheless, the sonic result is an aesthetically pleasing interpretation. In conclusion, the architectural shape of *Cloud* pushes sonic materials outwards from a central point towards registral extremes over time. In so doing a sonorous sound world indicative of centrifugal deceleration is created.

[77] *Cloud*: first performance - Mars Saxophone Quartet, 9th February, 2006, St. Paul's Hall, University of Huddersfield.

3.2: ***Tau 1 Gruis*** **(2005)**

- quarter tone alto flute: 9 minutes

I have used astronomy as a point of reference since it also alludes to the mapping of points. This solo work and the subsequent compositions presented in my portfolio acknowledge the subject by way of their titles. My approach here relates to a report by the Anglo-Australian Planet Search Team claiming: 'Detection of a new candidate exoplanet around the metal-rich star τ^1 Gruis'.[78] The search team refer to the curiously named star Tau 1 Gruis found in the southern constellation Grus (the crane). The unseen planet exerts a gravitational pull on its parent star causing the star to wobble. Chris Tinney explains this type of behaviour:

> […] its velocity will be continually varying as it repeatedly moves away from, and back towards, the Earth. Such velocity changes can be detected via the Doppler Effect.
>
> When the unseen planet is moving away from the Earth, the star will move towards the Earth. The light emitted by a star when it is doing this is Doppler shifted to shorter (bluer) wavelengths. The reverse happens when the unseen planet is moving towards the Earth – the star moves away, and the light it emits is shifted to longer (redder) wavelengths.[79]

The 'wobble' phenomenon described above is of interest to me, as that implied a number of musical possibilities that I intended to explore thoroughly, for instance, reciprocal motion. Dynamic flux in *Tau 1 Gruis* facilitates oscillation by pulling the musical material towards and away from the listener. Varying rhythmic duration, through changing ratios, enables acceleration and deceleration over time and suggests shifting wavelengths. A clear example of this archetypal behaviour, shown below, identifies density transition. The listener is not aware of a regular pulse as the flow of space and time is distorted.

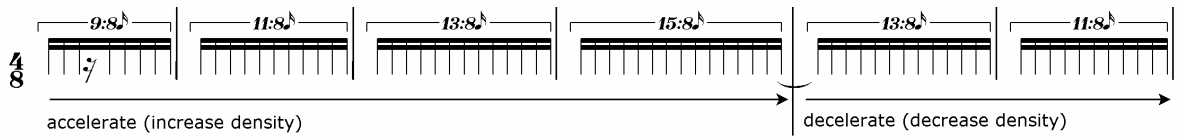


Illustration 35: *Tau 1 Gruis* – showing a transition of rhythmic density (measures 162-167)

[78] Jones Hugh R. A.; Butler, R. Paul; Tinney, Chris G.; Marcy, Geoff W.; Penny, Alan J.; McCarthy, Chris; Carter, Brad D. (Anglo-Australian Planet Search Team), 'An exoplanet in orbit around tau 1 Gruis' (16/09/2002) <http://arxiv.org/abs/astro-ph/0209302> accessed 12/03/05.
The actual paper appeared in *The Monthly Notice of the Royal Astronomical Society,* (2003) Vol. 341, Issue 3, 948-952.

[79] Tinney, Chris G, The Anglo-Australian Planet Search 'How our planet search works' (n.d.) <http://www.phys.unsw.edu.au/~cgt/planets/AAP_Home.html> accessed 12/03/05.

While considering various ways of organising rhythmic materials, my starting point used the number of letters in the title (nine) as the basis for a panel approach. My immediate concern established duration by dividing the total number of quaver beats (525) proportionately, i.e. panel 8 calculated 96 beats ÷ MM 120 x 60 = 48”.

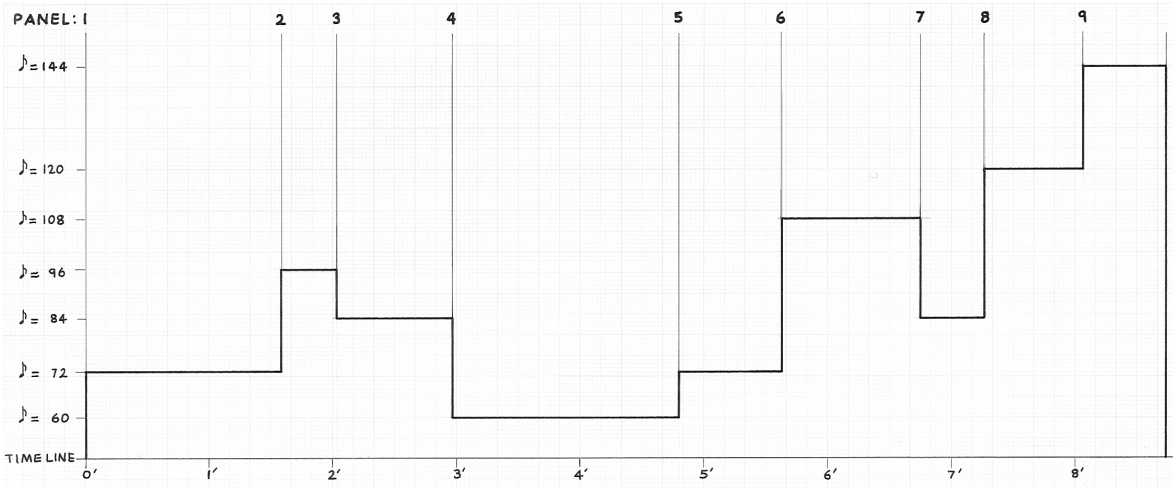


Illustration 36: *Tau 1 Gruis*, graph – showing proportional tempo scheme

Each panel is treated as a time frame further subdivided using measures of differing duration, which I perceived as a way of achieving variable levels of rhythmic density. *Illustration 37* below demonstrates those used in panel 2, moreover, showing note placement and their subsequent duration using dots and horizontal lines. Angular lines illustrate planar effect – direction between one pitch and the next.

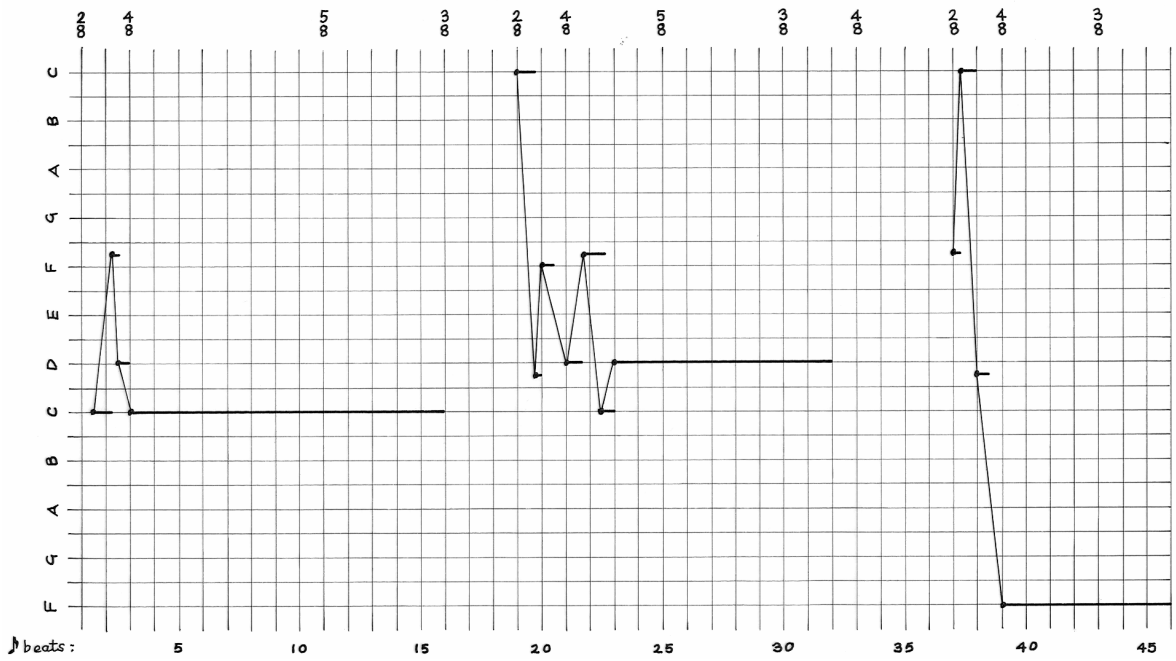


Illustration 37: *Tau 1 Gruis* – mapping of panel 2 (transposed pitch)

The resultant outcome below demonstrates three sonic periods, each in turn becoming progressively shorter in duration. The onset of each period (measures 30, 35, and 40), show rhythmic models of three note values subjected to rotation. Notably, there are subtle differences in the placement of these models within the specified measures. Rotation is also relatable to the pitch material, i.e.: measure 30 - C F# D, measure 35 - C Db F, measure 36 - D F# C, and measure 40 – F# C Db.

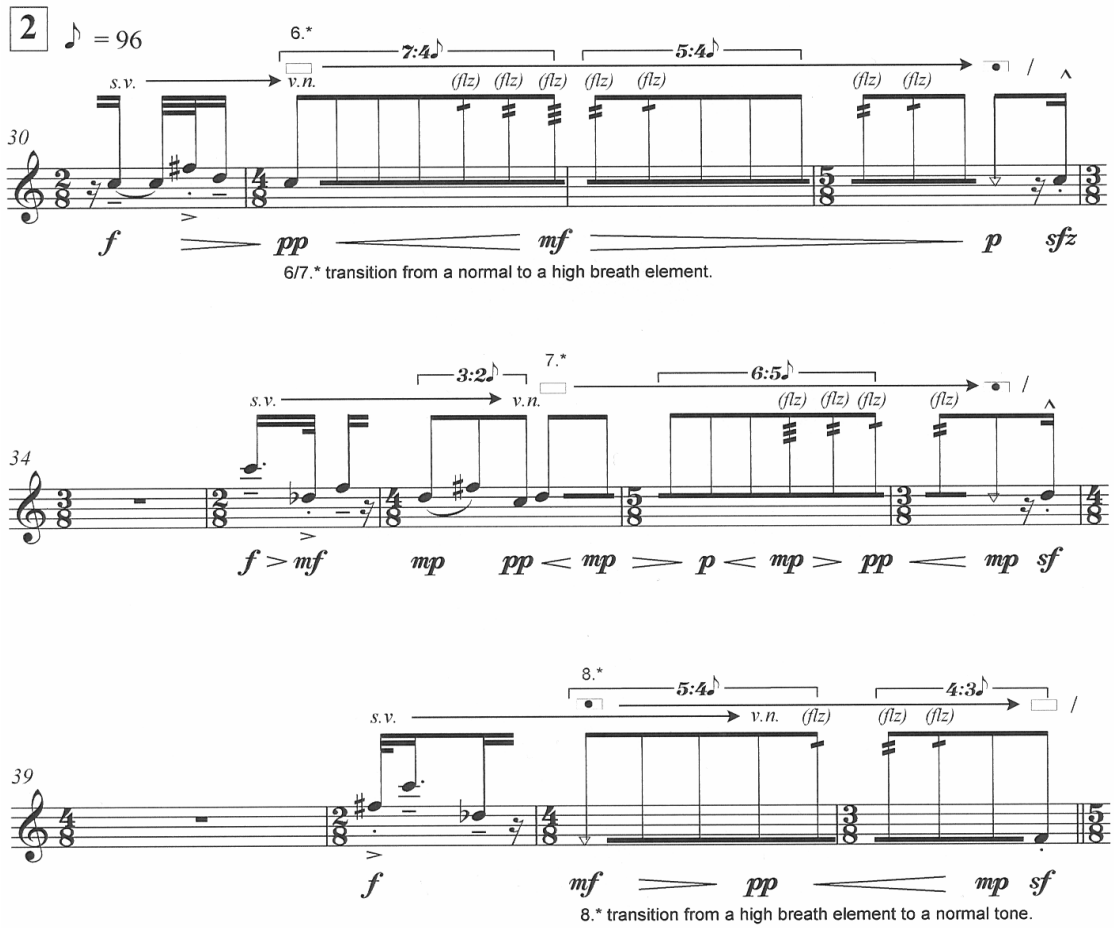


Illustration 38: *Tau 1 Gruis* – showing panel 2 (transposed)

I was drawn to the idea of controlled articulation of a single pitch subjected to repetitive attacks. Measures 31-33♪$_4$ and 36♪$_3$-38♪$_2$ demonstrate transitions from a normal tone to a high breath element. At the same time, transitions from the mouth and flute aperture in normal playing position to the aperture blocked with the lips. In measures 41-42 a transition from a high breath element and back to a normal tone conjoins a transition of the aperture blocked with the lips, to the mouth and flute aperture in normal playing position. All three periods show a transition from senza vibrato to normal vibrato using intermittent flutter tonguing, thus affecting acceleration and deceleration motions.

My intention was to withhold the source of rhythmic variation until the final panel, visible in *illustration 39* below. I simply translated the characters TAU 1 GRUIS using Morse code.

T ♪. (_ .)
A 𝅘𝅥𝅯𝅘𝅥𝅯. (. _)
U 𝅘𝅥𝅰𝅘𝅥𝅰𝅘𝅥𝅰. (. . _)
1 𝅘𝅥𝅯𝅘𝅥𝅯. ♪. ♪. ♪. (. _ _ _ _)
G ♪. ♪. 𝅘𝅥𝅯 (_ _ .)
R 𝅘𝅥𝅯𝅘𝅥𝅯. 𝅘𝅥𝅯 (. _ .)
U 𝅘𝅥𝅰𝅘𝅥𝅰𝅘𝅥𝅰. (. . _)
I 𝅘𝅥𝅯𝅘𝅥𝅯 (. .)
S 𝅘𝅥𝅰𝅘𝅥𝅰𝅘𝅥𝅰 (. . .)

Illustration 39: *Tau 1 Gruis* – showing rhythmic models used in panel 9

Whilst *Tau 1 Gruis* is fundamentally concerned with dynamic and rhythmic flux, there is a gradual development of unidirectional motions. As *illustration 7* (p.18) indicates, panel 1 used three core pitches (F C D) subjected to microtonal inflection which creates a sense of transition, whereas in panel 4, ascents and descents vary over a wider pitch range.

Panel 9 attempts to make a further connection with the title by marrying the Morse code rhythms shown (*Illustration 39*) above with the pitch row shown (*Illustration 40*) below. This row (measures 177-187) is subjected to microtonal inflections.

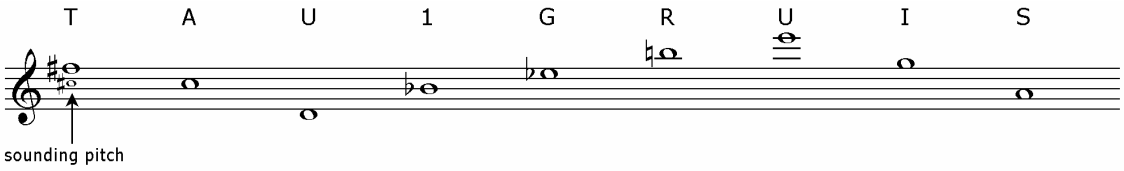


Illustration 40: *Tau 1 Gruis* – showing pitch encoding, panel 9 (measures 177-187)

I wanted to create a work that conveyed density and needed to include an abundance of information on several levels, particularly as attention to detailed articulation further exemplifies my concern with sonic variance epitomised in panel 2 above. *Tau 1 Gruis* demonstrates a concentration of *pitch* – register and duration, *noise* – how a note should be articulated, and *action* – what the performer needs to do in order to achieve that. Brian Ferneyhough's standpoint regarding his own earlier flute pieces, *Cassandra's Dream Song*[80] and *Unity Capsule*[81] said:

[80] Ferneyhough, Brian, *Cassandra's Dream Song* (London: Edition Peters, 1975).
[81] Ferneyhough, Brian, *Unity Capsule* (London: Edition Peters, 1975).

> In both **Unity Capsule** and **Cassandra's Dream Song**, the accent is on the instrument's ability to offer a high density of information on a certain number of levels *simultaneously*, while filtering through the highest degree of *unity* imaginable – that of a single, monodic instrument.[82]

James Dillon, whose own flute piece *Sgothan*[83] used a panel approach as *illustration 41* below shows. There are 24 panels limited to seven tempi and no time signatures through panel 16 which stipulates senza misura.

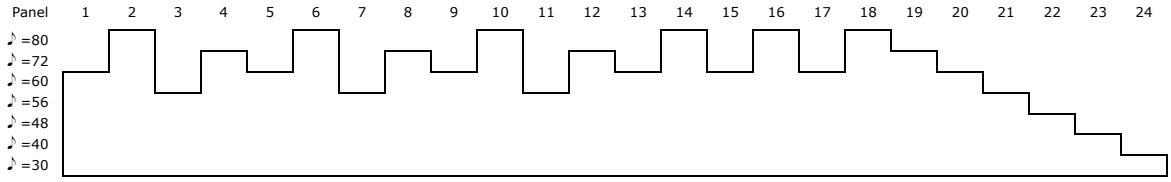


Illustration 41: James Dillon, *Sgothan* – graph, showing tempi scheme of 24 panels

Tau 1 Gruis was written specifically for Rarescale[84] using a Kingma quarter tone alto flute, although as yet, I have not received a performance on that instrument. Carla Rees says:

> Eva Kingma's design uses a patented 'key on key' system, which adds levers and keys to the basic alto flute, along with open holes. This enables the player to control a small central hole in each key (similar to that created by the open hole of a standard open-holed flute) in addition to the larger hole covered by the entire key. The smaller holes create quarter tone pitches, while the larger outer holes create semitones.[85]

In other words microtonal pitches can be achieved with certain accuracy. Nevertheless, the first performance (on a conventional alto flute)[86] enabled a sonic realisation of the piece. The workshop I had with Richard Craig prior to that first performance proved useful. Our discussion solved the issue of key clicks (note heads notated as a cross) in measures 114 and 130-134 (panel 6), and measure 166 (panel 8), which we both agreed interrupt the fluidity of the music. These are played as sounded attacks in the actual performance. I had also pointed out tempo markings which Richard demonstrated, yet his final interpretation is somewhat hurried.

---

[82] Ferneyhough, Brian, ed. James Boros and Richard Toop, '*Unity Capsule: An Instant Diary*' *Collected Writings* (Netherlands: Overseas Publishers Association 1995), 98-99.
[83] Dillon, James, *Sgothan* (London: Edition Peters, c1985).
[84] Rarescale is an anagram of Carla Rees who as Richard Craig reliably informs me at the time of writing is the only person in the UK in possession of a Kingma quarter tone alto flute. Rarescale's Multimedia CD ROM: Rees, Carla, & Burnand, David, 'Composing for Quarter Tone Alto Flute', Royal College of Music (2003) has been a most useful resource whist writing this piece.
[85] Ibid., 'RCM e-learning zone' The quarter-tone alto flute, 1.
[86] *Tau 1 Gruis*: first performance – Richard Craig, 12 March 2009, St. Paul's Hall, the University of Huddersfield.

3.3: ***Boötes* (2006)**

- ten miniatures for solo piano: 10 minutes

Initially this project consisted of five miniatures commissioned by Stephen Crowe[87]:

> Living Composers: 60 miniatures […] 12 avant-garde composers are given a platform to exhibit their wares in an unusual form. They are commissioned to write five piano pieces with the stipulation they can't be longer than one minute each. From the delicately simple to the ferociously complex, the evening will showcase contemporary music at its most provocative.[88]

As there are ten named stars in the constellation of Boötes, the complete edition[89] presents ten miniatures. The map below indicates the position of these named stars. They are: 1-Arcturus, 2-Nekkar, 3-Seginus, 4-Izar, 5-Mufrid, 6-Asellus Primus, 7-Asellus Secondus, 8-Asellus Tertius, 9-Alkalurops, and 10-Merga.

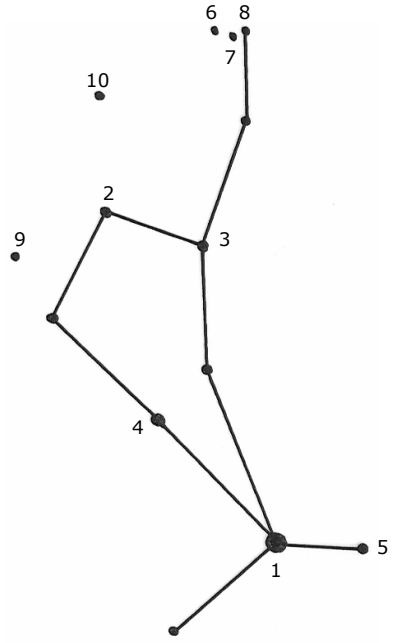


Illustration 42: Constellation map of Boötes[90]

The known meanings behind the names of five of these miniatures[91] – *#1 #2 #4 #5* and *#9* (written for Crowe's commission) – helped me develop their individuality. For instance, *#1 Arcturus* 'bear guard' (the brightest star in Boötes) used weighted attacks spanning the keyboard. The spectromorphological results of each note gesture

[87] *Boötes #1*, *#2*, *#4*, *#5*, and *#9* – first performance: Paul Cassidy 9 March, 2007, The Space, West Ferry Road, London.
[88] Posted by the arts council <http://www.artsjobs@listmail.artsfb.org.uk> accessed 08/12/06.
[89] *Boötes* the complete edition – first performance: Philip Thomas, 7 June, 2007. St. Paul's Hall, University of Huddersfield.
[90] 'Boötes' (n.a.) <http://www.seasky.org/pictures/sky7b04.html> accessed 12/12/06.
[91] Translation of stars 1, 2, 4, 5, and 9 courtesy of Chris Dolan, <http://www.astro.wisc.edu/~dolan/constellations/constellations/Bootes.html> accessed 12/12/06.

considered articulation as well as dynamics. This testing of sound-shapes, using my own piano, would ascertain the character of each miniature. At the same time I searched for some unity. I realised that encoding the title of a work could be a useful compositional resource as exemplified in *Cloud* and *Tau 1 Gruis*. *Boötes*, however, is the first work in which encoding is used more thoroughly – since my experiments in the aforementioned earlier work *Enigma* (2002). This involves generating both rhythm and pitch materials from the title. I used Morse code to translate letters as my rhythmic material derived from the title of each miniature shown below. *#10 Merga* is exempt from this strategy, yet it belongs in this collection because of the way I decided to formulate the pitch material. Any of the models created through this process may implement augmentation or diminution as exampled in the four-part writing of *#1 Arcturus*.

𝅗𝅥𝅮. A	𝅗𝅥𝅮.𝅘𝅥𝅯 R	𝅗𝅥.𝅗𝅥𝅮.𝅘𝅥𝅯 C	𝅗𝅥. T	𝅗𝅥𝅗𝅥𝅮. U	𝅗𝅥𝅮.𝅘𝅥𝅯 R	𝅗𝅥𝅗𝅥𝅮. U	𝅗𝅥𝅗𝅥𝅗𝅥 S		
𝅗𝅥.𝅘𝅥𝅯 N	𝅘𝅥𝅯 E	𝅗𝅥.𝅗𝅥𝅮. K	𝅗𝅥.𝅗𝅥𝅮. K	𝅗𝅥𝅮. A	𝅗𝅥𝅮.𝅘𝅥𝅯 R				
𝅗𝅥𝅗𝅥𝅗𝅥 S	𝅘𝅥𝅯 E	𝅗𝅥.𝅗𝅥.𝅘𝅥𝅯 G	𝅘𝅥𝅯𝅘𝅥𝅯 I	𝅗𝅥.𝅘𝅥𝅯 N	𝅗𝅥𝅗𝅥𝅮. U	𝅗𝅥𝅗𝅥𝅗𝅥 S			
𝅘𝅥𝅯𝅘𝅥𝅯 I	𝅗𝅥.𝅗𝅥.𝅘𝅥𝅯𝅘𝅥𝅯 Z	𝅗𝅥𝅮. A	𝅗𝅥𝅮.𝅘𝅥𝅯 R						
𝅗𝅥.𝅗𝅥. M	𝅗𝅥𝅗𝅥𝅮. U	𝅗𝅥𝅗𝅥𝅮.𝅘𝅥𝅯 F	𝅗𝅥𝅮. 𝅘𝅥𝅯 R	𝅗𝅥𝅗𝅥𝅮. I	𝅗𝅥.𝅗𝅥𝅯 D				
𝅗𝅥𝅮.𝅗𝅥.𝅘𝅥𝅯 P	𝅗𝅥𝅮.𝅘𝅥𝅯 R	𝅘𝅥𝅯𝅘𝅥𝅯 I	𝅗𝅥.𝅗𝅥. M	𝅗𝅥𝅗𝅥𝅮. U	𝅗𝅥𝅗𝅥𝅗𝅥 S				
𝅗𝅥𝅗𝅥𝅗𝅥 S	𝅘𝅥𝅯 E	𝅗𝅥.𝅗𝅥𝅮.𝅘𝅥𝅯 C	𝅗𝅥.𝅗𝅥.𝅗𝅥. O	𝅗𝅥.𝅘𝅥𝅯 N	𝅗𝅥.𝅗𝅥𝅯 D	𝅗𝅥𝅗𝅥𝅮. U	𝅗𝅥𝅗𝅥𝅗𝅥 S		
𝅗𝅥. T	𝅘𝅥𝅯 E	𝅗𝅥𝅮.𝅘𝅥𝅯 R	𝅗𝅥. T	𝅘𝅥𝅯𝅘𝅥𝅯 I	𝅗𝅥𝅗𝅥𝅮. U	𝅗𝅥𝅗𝅥𝅗𝅥 S			
𝅗𝅥𝅮. A	𝅗𝅥𝅮.𝅘𝅥𝅯𝅘𝅥𝅯 L	𝅗𝅥.𝅗𝅥𝅮. K	𝅗𝅥𝅮. A	𝅗𝅥𝅮.𝅘𝅥𝅯𝅘𝅥𝅯 L	𝅗𝅥.𝅗𝅥𝅯 U	𝅗𝅥𝅮.𝅘𝅥𝅯 R	𝅗𝅥.𝅗𝅥.𝅗𝅥. O	𝅗𝅥𝅮.𝅗𝅥.𝅘𝅥𝅯 P	𝅘𝅥𝅯𝅘𝅥𝅯𝅘𝅥𝅯 S

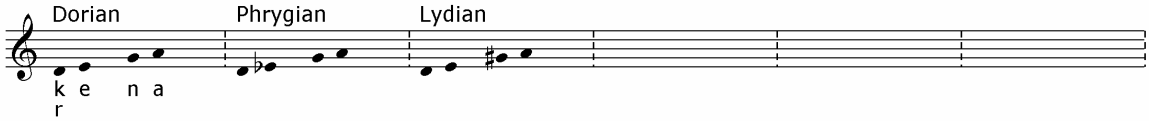
N.B. titles preceded with (Asellus) e.g. *#6*, *#7*, and *#8* do not constitute part of the rhythmic models.

Illustration 43: *Boötes* – showing rhythmic models

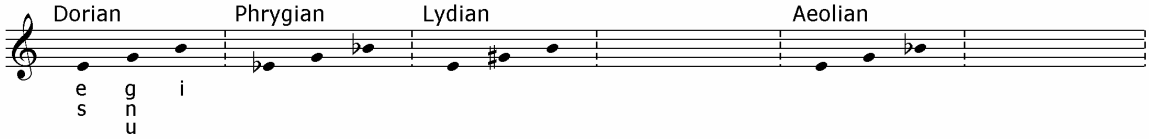
My pitch material encodes all of the ten named stars. I used the pitch conversion chart (*Illustration 30*) p.44 above as a basis for generating pitch material but subject to permutation. I chose to access six modes which comply with the number of letters in Boötes, they are: Dorian, Phrygian, Lydian, Mixolydian, Aeolian, and Locrian. *Illustration 44* (p.54) below demonstrates how those modes used pitch D as the pitch centre. For instance the first miniature *#1 Arcturus* used two modes in ABA form, i.e. Dorian, measures 1-5, Phrygian measures 9-10, and Dorian measures 11-21.

#1 Arcturus

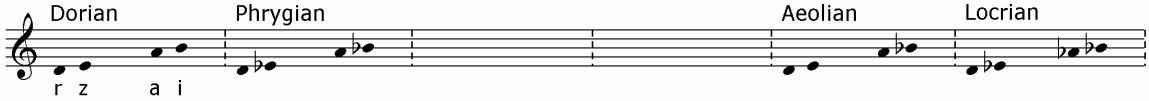
#2 Nekkar



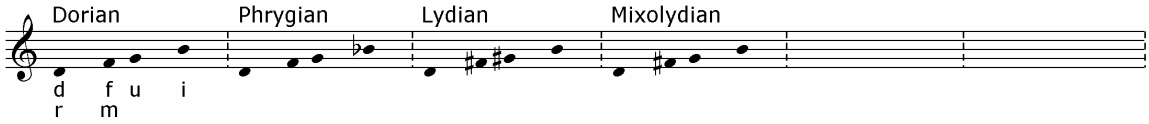
#3 Seginus



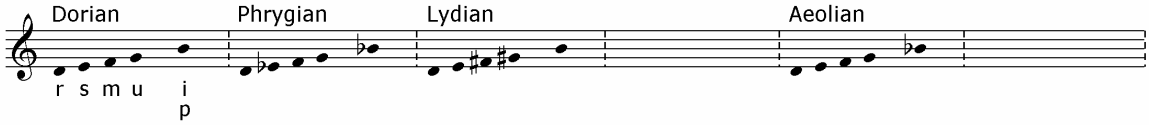
#4 Izar



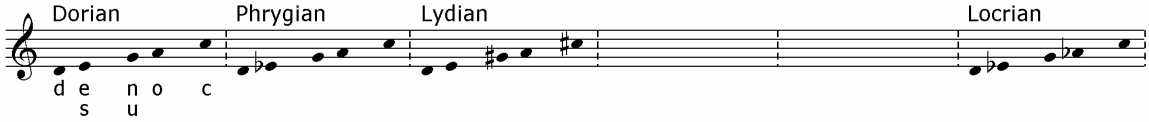
#5 Mufrid



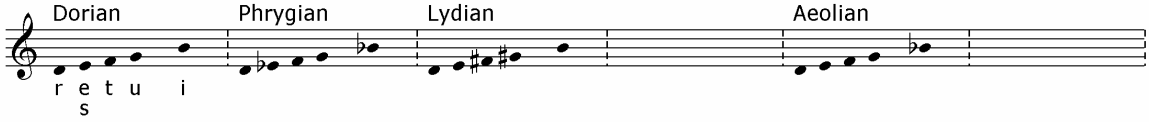
#6 (Asellus) Primus



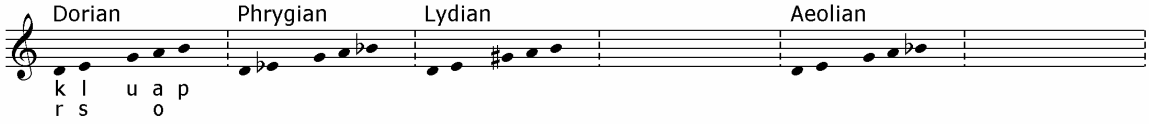
#7 (Asellus) Secondus



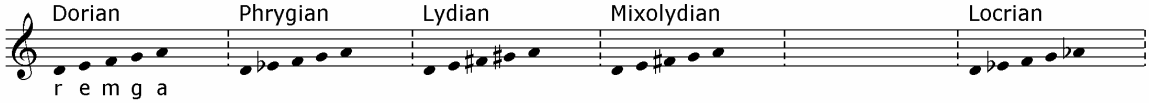
#8 (Asellus) Tertius



#9 Alkalurops



#10 Merga



N.B. titles preceded with (Asellus) e.g. *#6*, *#7*, and *#8* do not constitute part of the pitch sets.

Illustration 44: *Boötes* – showing pitch classes

It is the placement of predetermined rhythmic models and the pitch classes which link the variable forms of these miniatures. My preparatory drawings used a grid as a time frame by calculating the number of quaver beats (common to all the miniatures) e.g.: *#1 Arcturus* used 66 quaver beats ÷ MM 72 x 60 = 55". Superimposing a keyboard to the left of these grids enabled exact pitch placement, as shown below. As will be demonstrated through similar illustrations on the following pages, *illustration 45* below shows dots (onset points) and horizontal lines (duration), whilst angular lines (planar effect) link the pitch order of any one particular rhythmic model. For example, the first four quaver beats use rhythmic model A (♪♩.) augmented in the high register: pitch A_7 and D_7. Model S (♪♪♪) is shown in diminution in the low register: pitch E_1, G_1, and E_1. Superimposition of these particular models (encircled) is realised as staff notation in *illustration 46*.

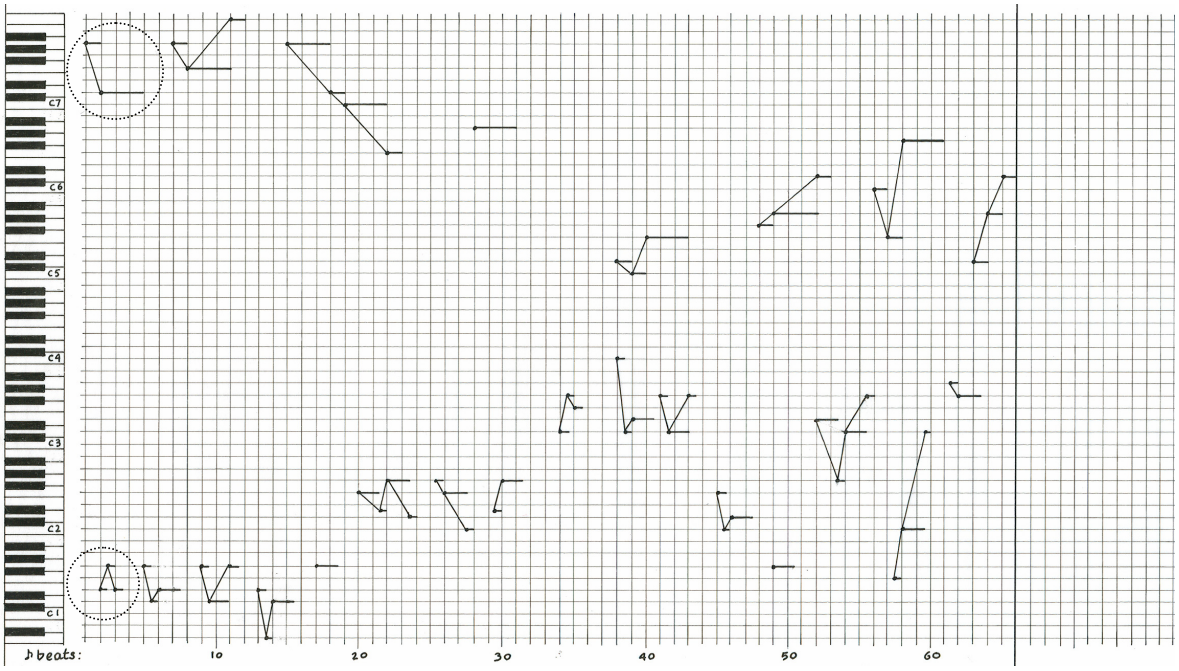


Illustration 45: *#1 Arcturus* – mapping (outer parts)

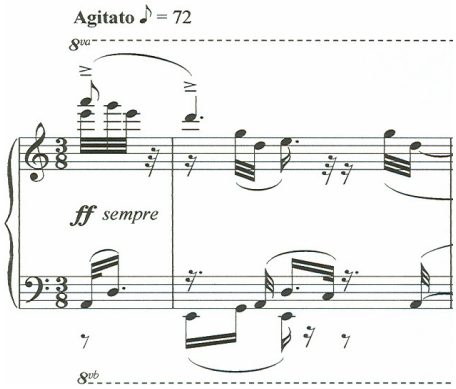


Illustration 46: *#1 Arcturus* – opening material, showing four part writing

Since I regard the entire collection as individual works of merit, the following discussion illustrates structural aspects of each miniature. A close examination of the opening material of *#1 Arcturus* (*Illustration 46*) above typifies the textural behaviour of this miniature. The challenge for the performer is handling four parts in a constant state of flux. As demonstrated in *illustration 45* (p.55) above, directionality of note placement moves from the outer registers towards a central register. *Illustration 47* below shows an outline of the four independent parts. The rectangular shapes show the strategic ordering of the rhythmic models identified by letters. In an attempt to embrace fully the Morse code rules discussed in 2.2.1, the inner parts show symmetrical spacing between one model and the next. This is scored as an equidistance of three (demisemiquaver rests) spaces and seven (demisemiquaver rests) spaces between each subsequent grouping. This configuration offsets asymmetrical spacing of the outer parts.

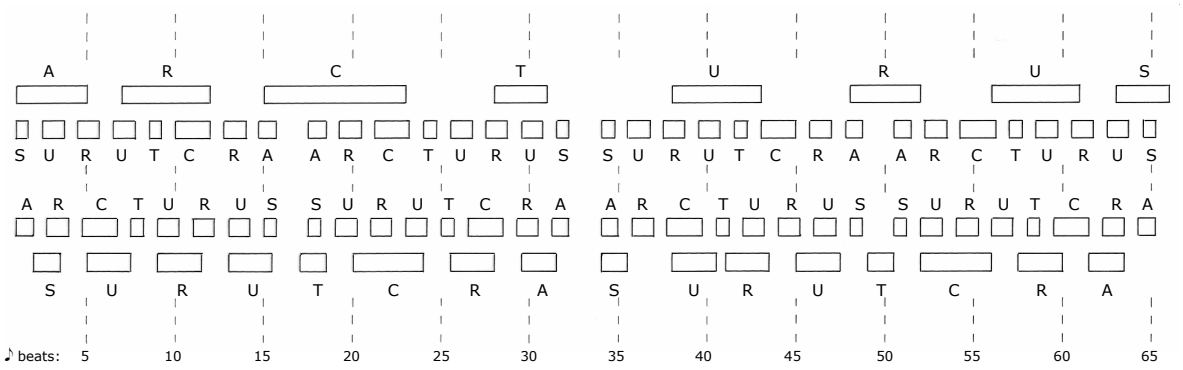


Illustration 47: *#1 Arcturus* – showing organisation of rhythmic models

In *#2 Nekkar*, there is an attempt to encode rhythmic models by superimposing augmented and diminutive forms evident in *illustration 48* (p.57) below. I chose repetition of specific rhythmic models, to suggest a sense of order, as though Nekkar, meaning 'the cattleman', is herding beasts. *Illustration 49* (p.57) shows model N in repetition using dyads in the right hand and in Dorian mode, whilst the juxtaposition of rhythmic models in the left hand part is in Phrygian mode.

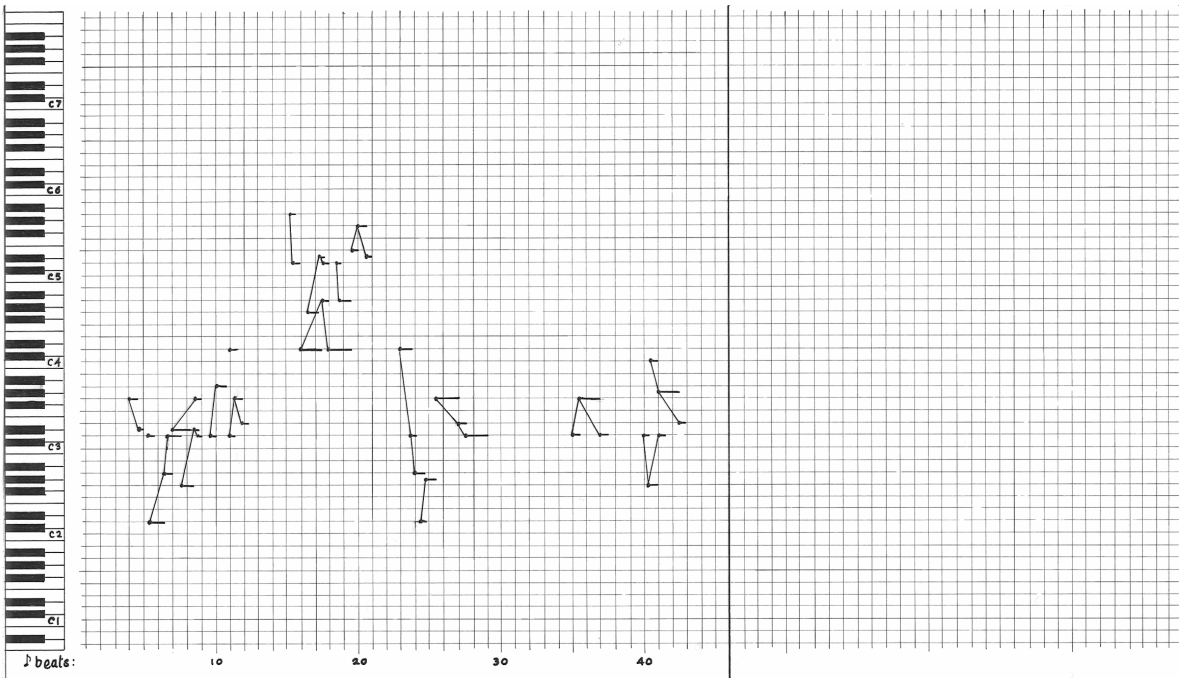


Illustration 48: *#2 Nekkar* – mapping (core material)

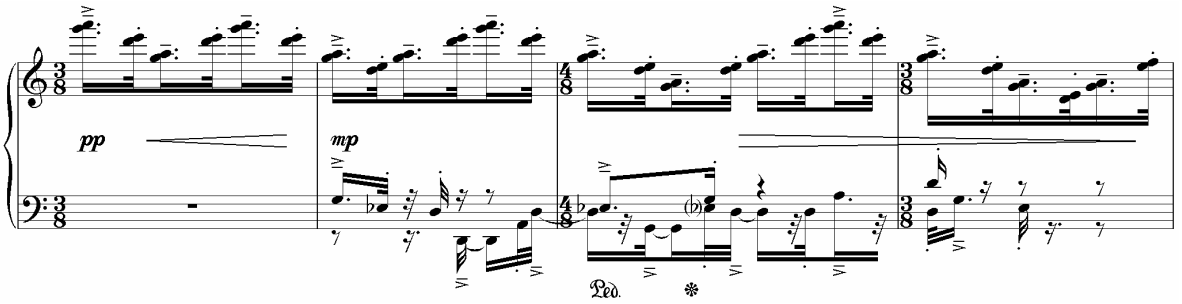


Illustration 49: *#2 Nekkar* – showing rhythmic model N in repetition (measures 1-4)

One member of the audience described Philip Thomas during his performance of the third miniature as 'the typewriter'. *#3 Seginus* demands that the player must hammer the keys in fortissimo attacks, as note placement is in the highest octave, this activity produces a percussive effect. *Illustration 50* below shows superimposition of rhythmic models, SEGINUS (right hand) and S and E augmented (left hand).

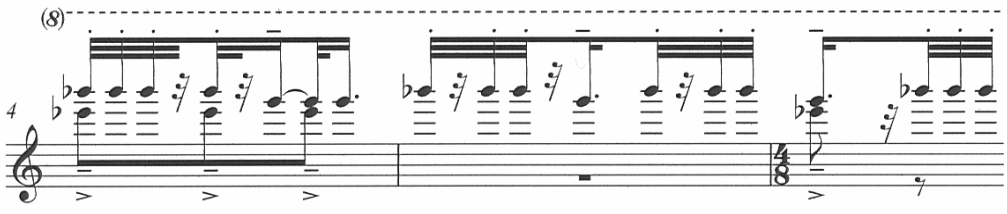


Illustration 50: *#3 Seginus* – showing juxtaposition of rhythmic models (measures 4-6♪$_2$)

#4 Izar requires a delicate touch using the sustain pedal. As with all miniatures I began by mapping my predetermined materials. *Illustration 51* below shows note placement (onset points and duration) allocated to the left hand part. *Illustration 52* clearly demonstrates superimposition of four rhythmic models, augmented and in diminution.

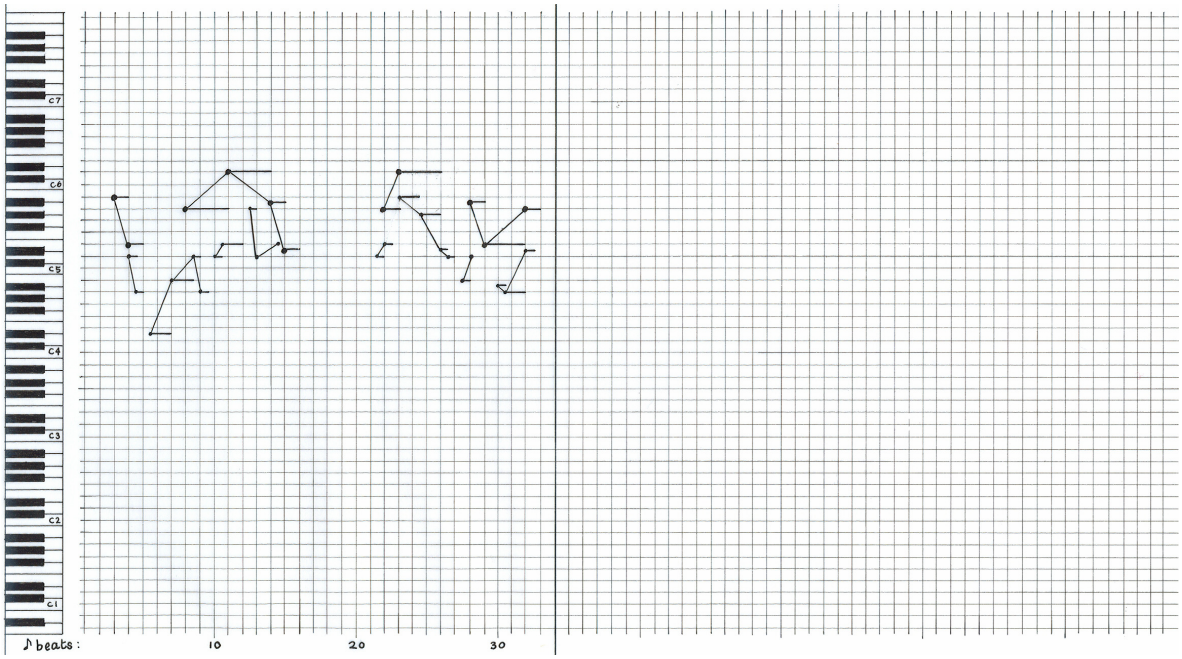


Illustration 51: *#4 Izar* – mapping (left hand)

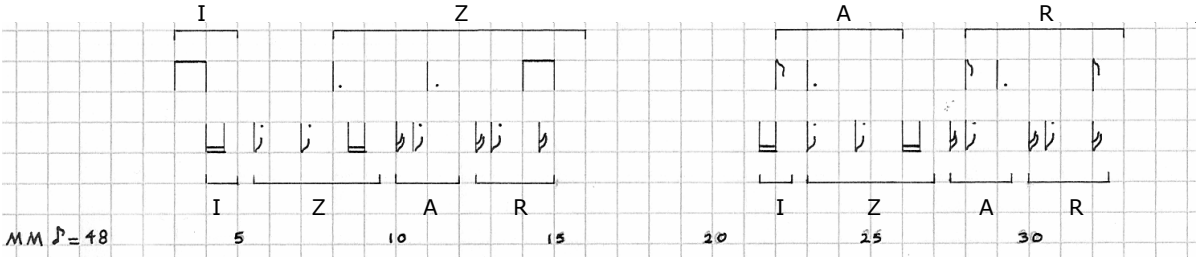


Illustration 52: *#4 Izar* – showing juxtaposition of rhythmic models (left hand)

The name Izar translates as 'loins or loincloth' so the material in the right hand part is like a layer of skin placed over this skeletal framework. *Illustration 53* (p.59) below shows a table of pitch rotation using four modes through contiguous demisemiquavers. As demonstrated in *illustration 54* (p.59) I chose to implement accents on the central pitch D thus counter-pointing the rhythmic models planned for the left hand part.

Measure	Mode	Pitch			
1♪1	Dorian	B	E	A	D
1♪2	Phrygian	Eb	A	D	Bb
1♪3	Dorian	A	D	B	E
1♪4	Aeolian	D	Bb	E	A
2♪1	Dorian	B	E	A	D
2♪2	Locrian	Eb	Ab	D	Bb
2♪3	Aeolian	A	D	Bb	E
3♪1	Phrygian	D	Bb	Eb	A
3♪2	Dorian	B	E	A	D
3♪3	Aeolian	E	A	D	Bb
4♪1	Dorian	A	D	B	E
4♪2	Phrygian	D	Bb	Eb	Ab
4♪3	Dorian	B	E	A	D
5♪1	Phrygian	Eb	A	D	Bb
5♪2	Dorian	A	D	B	E
5♪3	Aeolian	D	Bb	E	A
6♪1	Dorian	B	E	A	D
6♪2	Locrian	Eb	Ab	D	Bb
6♪3	Dorian	A	D	B	E
7♪1	Phrygian	D	Bb	Eb	A
7♪2	Dorian	B	E	A	D
7♪3	Aeolian	E	A	D	Bb
8♪1	Dorian	A	D	B	E
8♪2	Locrian	D	Bb	Eb	Ab
8♪3	Dorian	B	E	A	D
9♪1	Phrygian	Eb	A	D	Bb
9♪2	Dorian	A	D	B	E
9♪3	Aeolian	D	Bb	E	A
10♪1	Locrian	Bb	Eb	Ab	D
10♪2	Dorian	E	A	D	B
10♪3	Phrygian	A	D	Bb	Eb
11♪1		D			

Illustration 53: *#4 Izar* – showing pitch rotation (right hand)

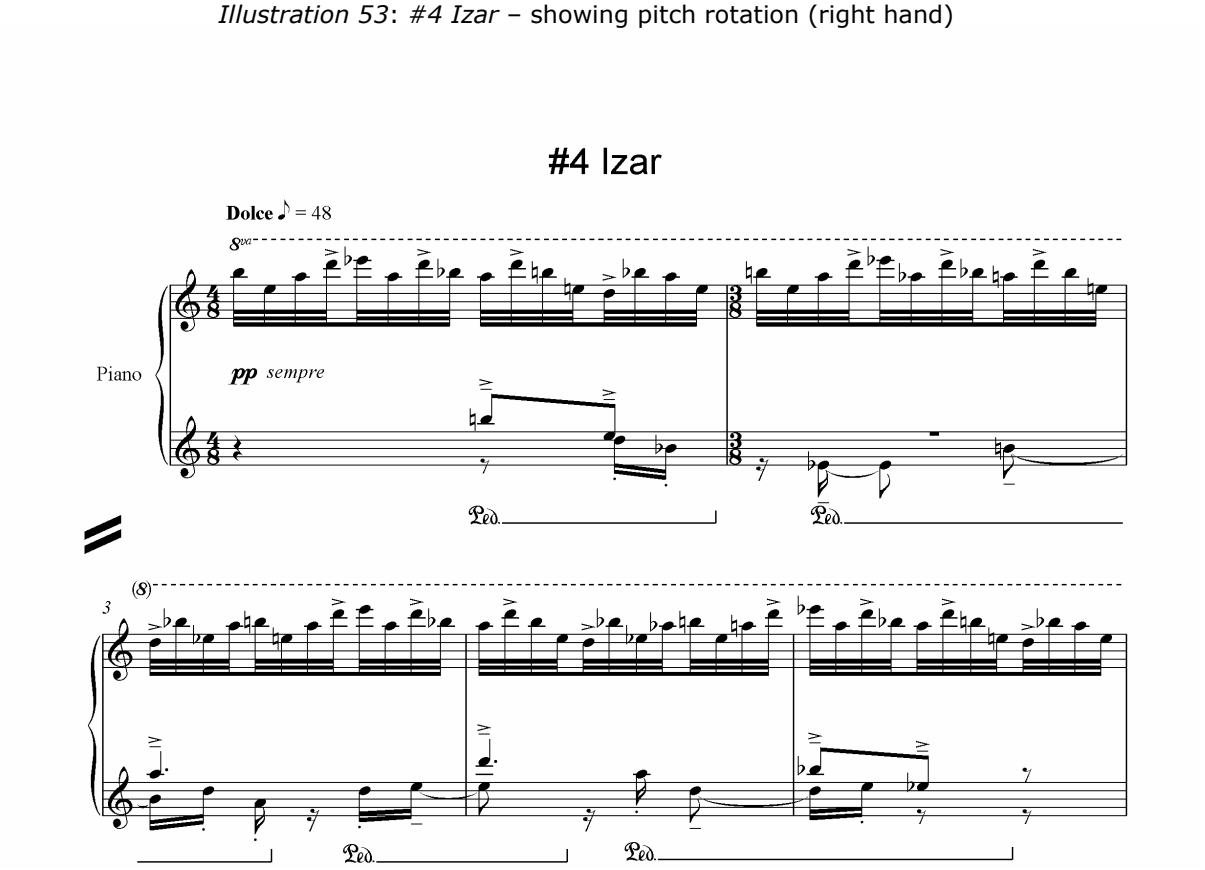


Illustration 54: *#4 Izar* – showing measures 1-5

#5 Mufrid, which translates as 'the solitary one', attempts to create an ethereal sound world. This involved mixing predetermined pitch classes (Dorian, Phrygian, Lydian and Mixolydian) shown in *illustration 44* (p.54) above. I had seven pitches at my disposal. They are: D F F# G G# Bb and B. *Illustration 55* shows the right hand upper part in Dorian mode, whilst the lower part in diminution ascends chromatically (F-G#).

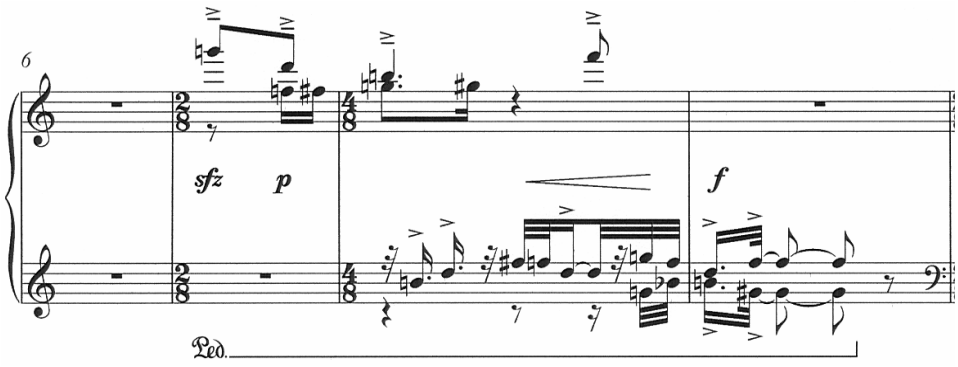


Illustration 55: *#5 Mufrid* – showing measures 7-9

Illustration 55 is again useful to demonstrate dynamic contrast. Moreover, my attention to detailed articulation enhanced by the sustain pedal. *Illustration 56* provides a spectromorphological analysis based on my perception of Philip Thomas's interpretation of these measures.

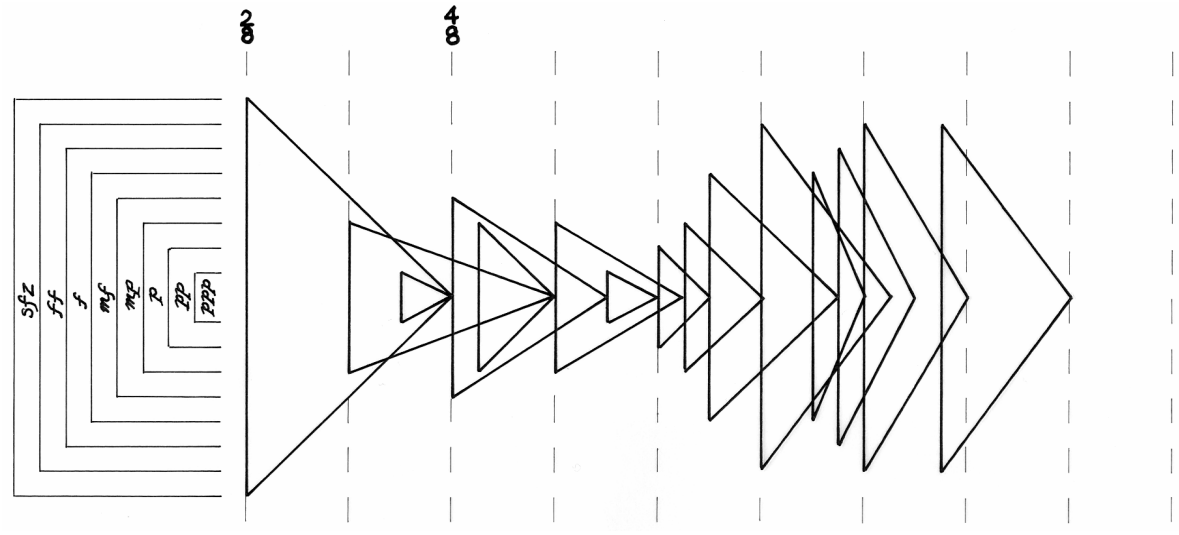


Illustration 56: *#5 Mufrid* – showing overlapping sound-shapes (measures 7-9)

I envisaged that the next three dynamically contrasting miniatures (*#6 #7* and *#8*) might have another common rationale besides using predetermined rhythmic models as their structural foundation. This is the handling of pitch material. I divided the proposed time zone into areas whereby one pitch class relates to one specific measured area. *Illustration 57* below shows rhythmic model P in Phrygian mode.

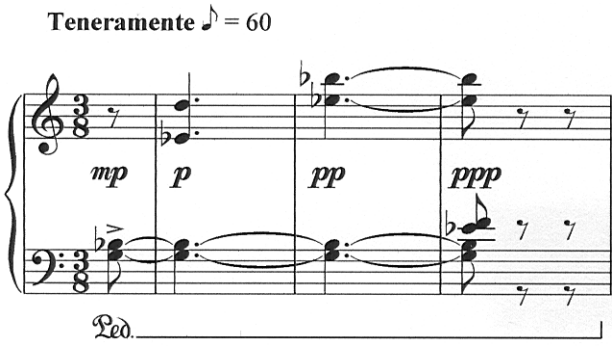


Illustration 57: *#6 Asellus Primus* – showing opening measures

Whilst mapping relating to these miniatures (*#6-8*) below identifies modality, rhythmic models underpin each grid.

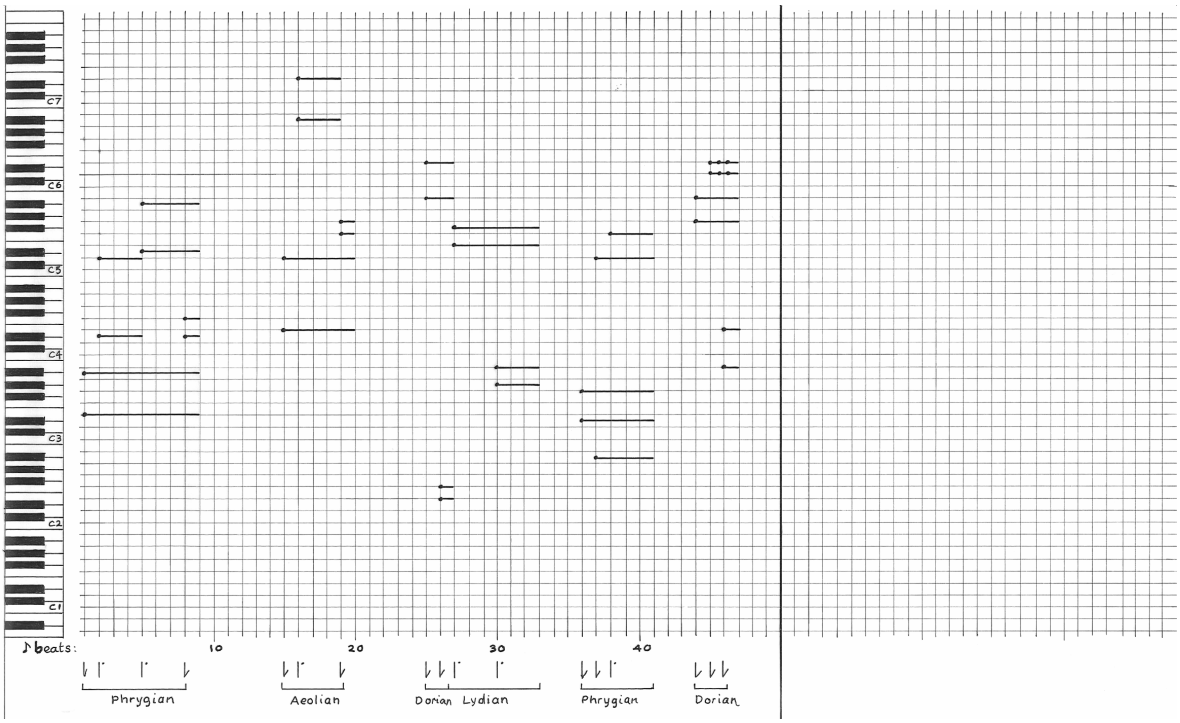


Illustration 58: *#6 Asellus Primus* – mapping

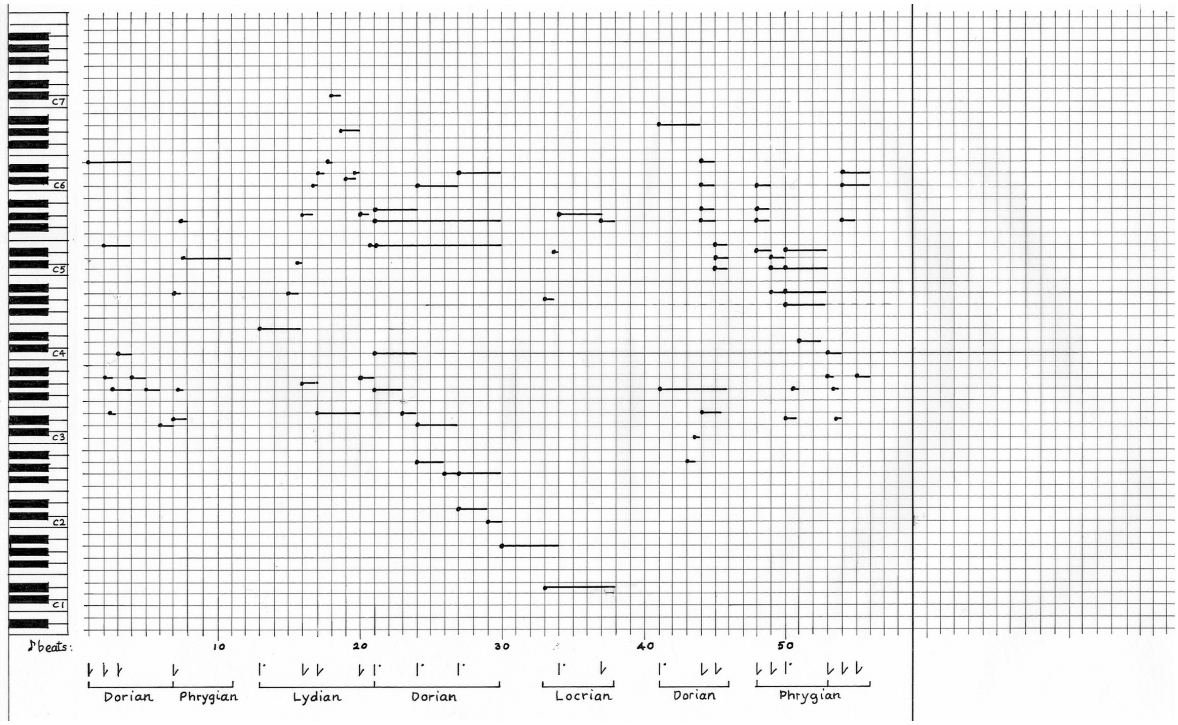


Illustration 59: *#7 Asellus Secondus* – mapping

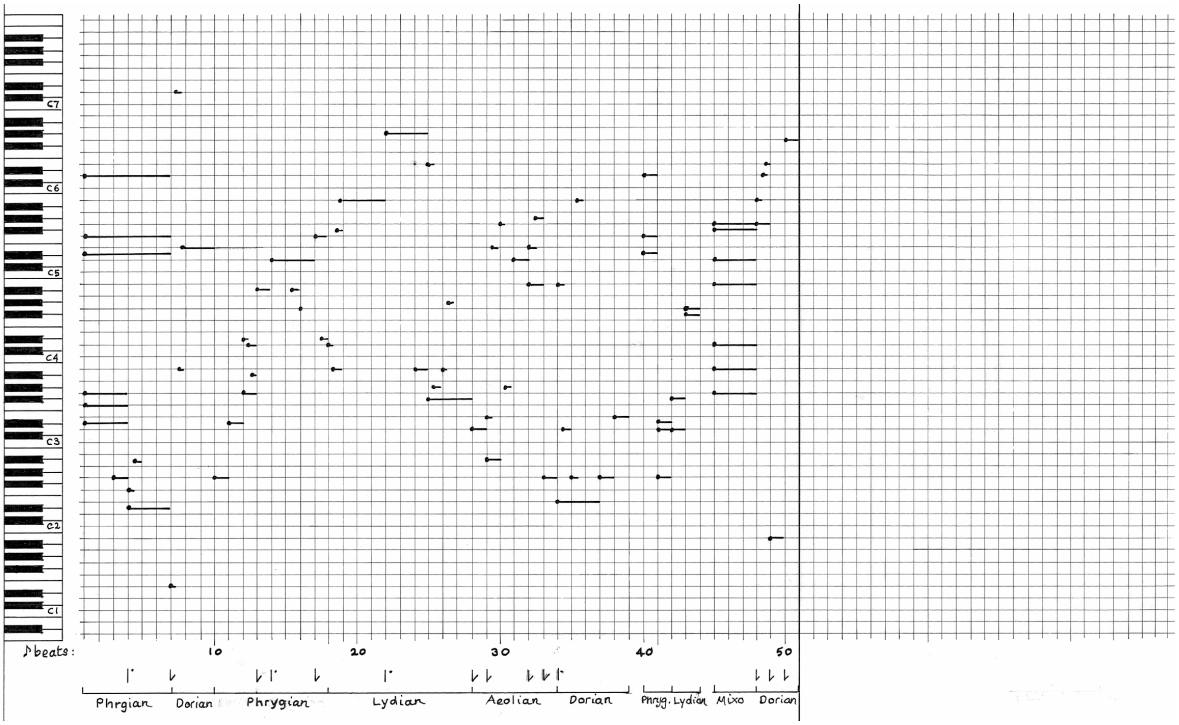


Illustration 60: *#8 Asellus Tertius* – mapping

#9 Alkalurops translates as a 'shepherds crook', this suggested a structure whereby predetermined rhythmic models form two pathways shared between the outer parts, one augmented and the other in diminution. *Illustration 61* (p.63) below shows note placement of both pathways using the following pitch row: A E D A E G D A B and E.

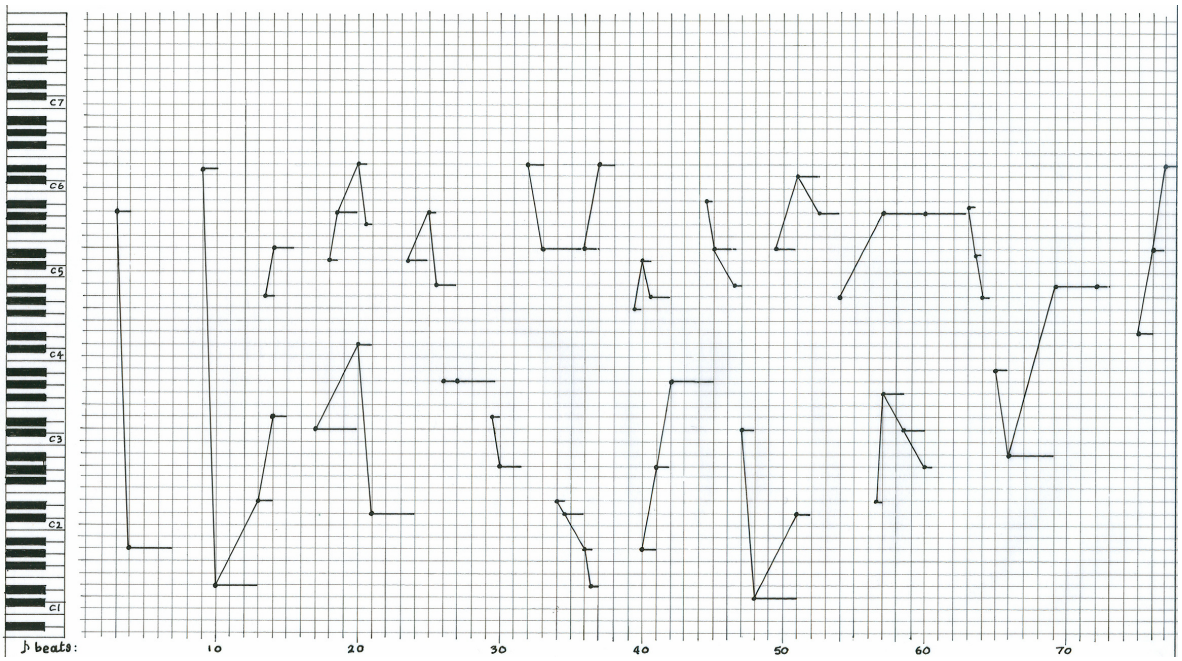


Illustration 61: *#9 Alkalurops* – mapping (outer parts)

The augmented pathway uses one pitch for each rhythmic model, in some instances subjected to octave displacement, whilst the pathway in diminution changed pitch for each subsequent note placement. I modified some of the pitches to compliment modal orientation already planned for the inner part. For example, Eb upper right hand measure 3♪$_3$, see *illustration 63* (p.64) below. *Illustration 62* below shows how I generate my pitch row for the inner part. This spiral technique uses A, the dominant pitch of my four pitch classes, as a point of orientation. *Illustration 63* shows this as continuous demisemiquavers passing between right and left hand.

Measure	Mode	Hand	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Dorian	L	A	E																	
1	Phrygian	R	A	Eb	D																
1	Dorian	L	A	E	D	A															
1-2	Dorian	R	A	E	D	A	E														
2	Dorian	L	A	E	D	A	E	G													
2-3	Dorian	R	A	E	D	A	E	G	D												
3	Phrygian	L	A	Eb	D	A	Eb	G	D	A											
3-4	Lydian	R	A	E	D	A	E	G#	D	A	B										
4-5	Dorian	L	A	E	D	A	E	G	D	A	B	E									
5-6	Aeolian	R	A	E	D	A	E	G	D	A	Bb	E	A								
6	Dorian	L	A	E	D	A	E	G	D	A	B	E	A	E							
6-7	Phrygian	R	A	Eb	D	A	Eb	G	D	A	B	Eb	A	Eb	D						
7-8	Lydian	L	A	E	D	A	E	G#	D	A	B	E	A	E	D	A					
9-10	Dorian	R	A	E	D	A	E	G	D	A	B	E	A	E	D	A	E				
10-11	Aeolian	L	A	E	D	A	E	G	D	A	Bb	E	A	E	D	A	E	G			
11-12	Dorian	R	A	E	D	A	E	G	D	A	B	E	A	E	D	A	E	G	D		
12-14	Phrygian	L/R	A	Eb	D	A	Eb	G	D	A	Bb	Eb	A	E	D	A	Eb	G	D	A	
14-16	Lydian	L	A	E	D	A	E	G#	D	A	B	E	A	E	D	A	E	G#	D	A	B
16-17	Dorian	R	A	E	D	A	E	G	D	A	B	E	A	E	D	A	E	G	D	A	
17-18	Aeolian	L	A	E	D	A	E	G	D	A	Bb	E	A	E	D	A	E	G	D		
19-20	Dorian	R	A	E	D	A	E	G	D	A	B	E	A	E	D	A	E	G			
20-21	Phrygian	L	A	Eb	D	A	Eb	G	D	A	Bb	Eb	A	Eb	D	A	Eb				
21-22	Lydian	R	A	E	D	A	E	G#	D	A	B	E	A	E	D	A					
22-23	Dorian	L	A	E	D	A	E	G	D	A	B	E	A	E	D						
23-24	Aeolian	R	A	E	D	A	E	G	D	A	Bb	E	A	E							
24-25	Dorian	L	A	E	D	A	E	G	D	A	B	E	A								

Illustration 62: *#9 Alkalurops* – showing pitch rotation (inner part)

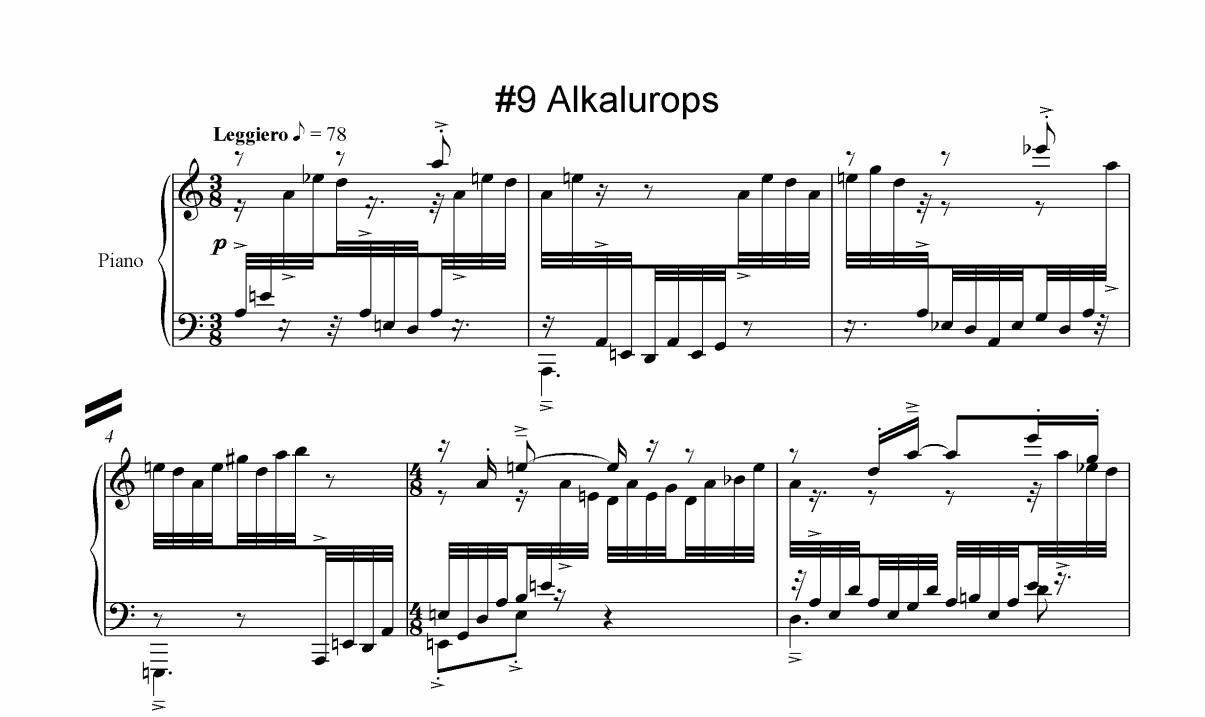


Illustration 63: *#9 Alkalurops* – showing measures 1-6

For the final miniature *#10 Merga*, I chose to rotate the pitch material. *Illustration 64* below highlights five blocks, namely original micro-structure and permutations 1, 2, 3, and 4. Each of the five blocks shows unison attacks moving one step to the right in each consecutive block. Permutation 4 completes the cycle. This block material configured as two-part writing – inclusive of the highest pitch F in the upper part and D in the lower part – must be played in one hand.

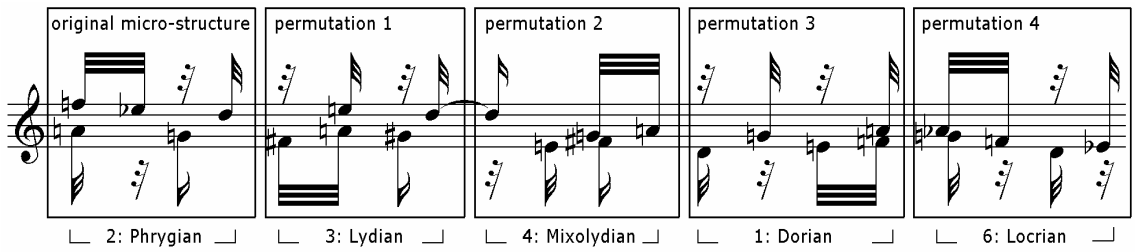


Illustration 64: *#10 Merga* – showing block materials

Illustration 65 (p.65) below shows repetition of this material placed at variable octaves. This demonstrates interaction between right and left hand attacks which alternate until both hands merge in unison at the close of play.

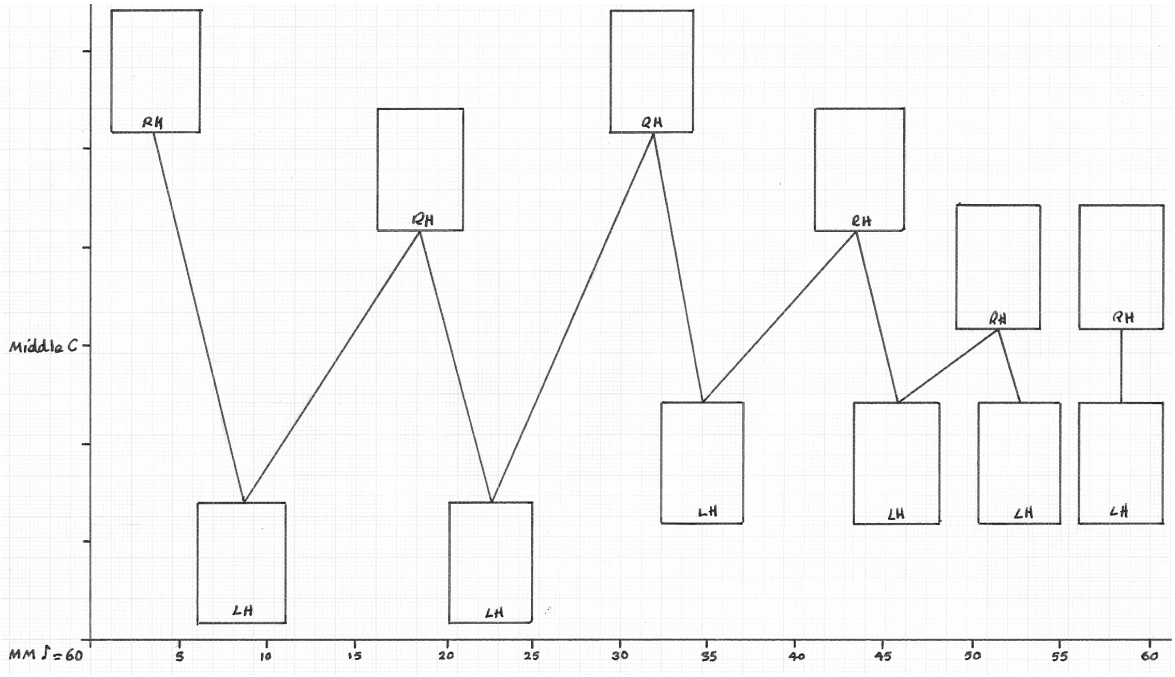


Illustration 65: *#10 Merga* – diagram showing placement of block materials

3.4: ***Winter Triangle Series***

The following chamber ensemble pieces take descriptive text as their inspiration relating to three stars – Betelgeuse, Procyon, and Sirius – known as the Winter Triangle, and most visible in the winter night sky. These three entirely separate pieces utilise a progression of different sized instrumental groups. There are, however, elements which connect *Betelgeuse, Procyon,* and *Sirius*. This is the handling of block materials using cyclic/centric motions and bi/multidirectional growth processes. Moreover, each of these compositions exhibits similarities in their use of rhythmic models. Again, – as was demonstrated in *Boötes* – the letters in the title of each piece translates into Morse code signals.

3.4.1: ***Betelgeuse* (2006)**

- piccolo, clarinet, glockenspiel, piano, cello: 7½ minutes

> 'Although Betelgeuse is a supergiant amongst stars, it is ejecting part of itself through a strong wind, and is surrounded by a huge shell of dust of its own making.'[92]

Betelgeuse is about disintegration. Stimulated by Jim Kaler's description above, I aimed to achieve a sound world indicative of the star's fragile state that theoretically will implode. I decided at quite an early pre-compositional stage that *Betelgeuse* would attempt to delineate an uneven surface layer created by its independent parts. Writing for the *Firebird Ensemble*[93] presented an opportunity to focus on the given instrumentation in such a way that the music generates subtle nuances predominantly in the higher registers of all instruments. Consequently, dynamic flux which underpins sonic activity uses the boundaries of extremely soft (*pppp*) to mezzo piano (*mp*).

There is a deliberate attempt to establish instability as suggested through the generally erratic rhythmic behaviour. This activity is due to the placement of block materials that I used, constructed from two sets of rhythmic models. There are seven primary models rhythmically encoding the letters: B E T L G U S. These models are shared between the inner parts, namely piano and glockenspiel, whilst piccolo and clarinet use them mostly in diminution. There are also six hybrids used for piano and glockenspiel – 2, 3, 4, and 5 have alternative pitches. My annotations (p.67) below indicate how those materials would be dispersed amongst the panels. What I find particularly interesting with both sets of rhythmic models is their durational proportions. For example, primary model U – in metric presentation is 5 quaver beats (1+1+3) – suggests rhythmic instability through its stress presentation (1+1+<u>3</u>).

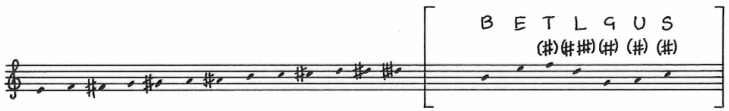
My starting point, comparable to *Tau 1 Gruis*, used a panel approach, however, with *Betelgeuse* there are eleven contiguous panels which dilate using a fixed Metronome mark (♪ = 104). The time scale – 7½ minutes – is divisible by consecutive prime numbers as shown in my preparatory annotations below. The duration of each panel enabled a way of organising my primary models in the piano and glockenspiel parts using my dot and line method.

---

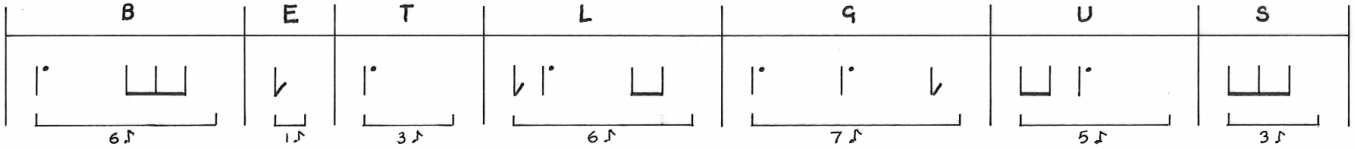
[92] Kaler, Jim, 'Betelgeuse' (n.d) <http://www.astro.uiuc.edu/~kaler/sow/betelgeuse.html> accessed 15/02/06.

[93] *Betelgeuse*: first performance – Firebird Ensemble, c. Barrie Webb, 17 May 2007, St. Paul's Hall, University of Huddersfield.

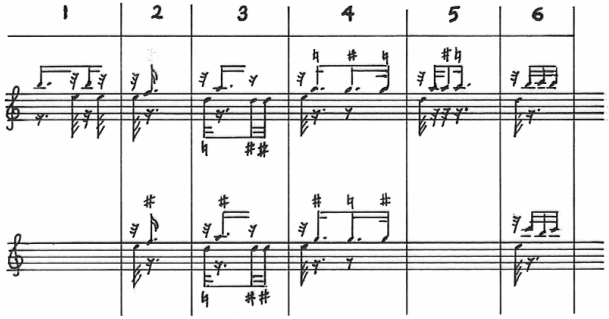
PANEL	1	2	3	4	5	6	7	8	9	10	11
Piccolo	PRIMARY MODELS (DIMINUTION)	PRIMARY MODELS GLISS	AS PANEL 1	REPETITION PRIMARY MODEL G	REPETITION MODEL B + G	REPETITION MODEL B + G	REPETITION MODEL G (DIMINUTION)	REPETITION MODEL B + G	REPETITION MODEL B + V	REPETITION OF MODELS (SPORADIC)	REPETITION OF MODELS (SPORADIC)
Clarinet	PRIMARY MODELS (DIMINUTION)	PRIMARY MODELS GLISS	AS PANEL 1	" (DIMINUTION) MODEL L	REPETITION MODEL G	REPETITION MODEL T	REPETITION MODEL G	REPETITION MODEL B + T	REPETITION MODEL B + S	REPETITION OF MODELS (SPORADIC)	REPETITION OF MODELS (SPORADIC)
Glock	PRIMARY MODELS	PRIMARY MODELS	CANON PRIMARY MODELS	CANON PRIMARY MODELS	CANON PRIMARY MODELS	CANON PRIMARY MODELS	CANON PRIMARY MODELS	CHORDS OF PRIMARY MODELS	PRIMARY MODELS	HYBRIDS 1-6 IN PROGRESSIVE ORDER REP	2 PART CANON
Piano	ENCODE TITLE 2 PART CANON	ENCODE TITLE 2 part RETRO CANON	CHORDS, PRIMARY MODS	HYBRID 1 REPETITION	HYBRID 2 REPETITION	HYBRID 3 REPETITION	HYBRID 4 REPETITION	HYBRID 5 REPETITION	HYBRID 6 REPETITION	CHORDS OF PRIMARY MODELS	HYBRIDS 1-6 IN PROGRESIVE ORDER REP
Cello	UNIDIRECTIONAL GLISS.	UNIDIRECTIONAL GLISS	UNIDIRECTIONAL GLISS	HYBRID 1 LOWER PART + GLISS.	HYBRID 2 LOWER PART + GLISS	HYBRID 3 LOWER PART + GLISS	HYBRID 4 LOWER PART + GLISS	HYBRID 5 LOWER PART + GLISS	UNIDERCTIONAL GLISS	UNIDIRECTIONAL GLISS	UNIDIRECTIONAL GLISS HYBRIDS LOWER PART. Pizz
TIMELINE	47♪	53♪	59♪	61♪	67♪	71♪	73♪	79♪	83♪	89♪	97♪
	0"	27"	37"	1'32"	2'07"	2'45"	3'16"	4'08"	4'54"	5'42"	6'33"	7'30



PRIMARY MODELS - use in Glockenspiel and Piano, use diminution for Piccolo and Clarinet. Aim for symetrical division between models.



HYBRID MODELS - use in Glockenspiel and Piano only, (Cello may reflect these models). Glock/Piano fix in the highest octave, use repetition.



Fixed tempo ♩ = 104 duration 7'30"
The overall dynamic range should stay within pppp - mp

MAH. 2006

Illustration 66: Betelgeuse – preparatory annotations

My annotations (p.67) show thirteen pitches inclusive of D three-quarter tone sharp. Other than B, and E, the remaining pitches (F D G A and C) may use sharps. As a general rule each primary model encodes note names. *Illustration 67* (below) shows this in two canons used in panels 1 and 2 (retrograde). They encode the title rhythmically as well as through their pitch order. At this stage I am more concerned with spacing materials rather than fixing bar lines which would indicate stress presentation.

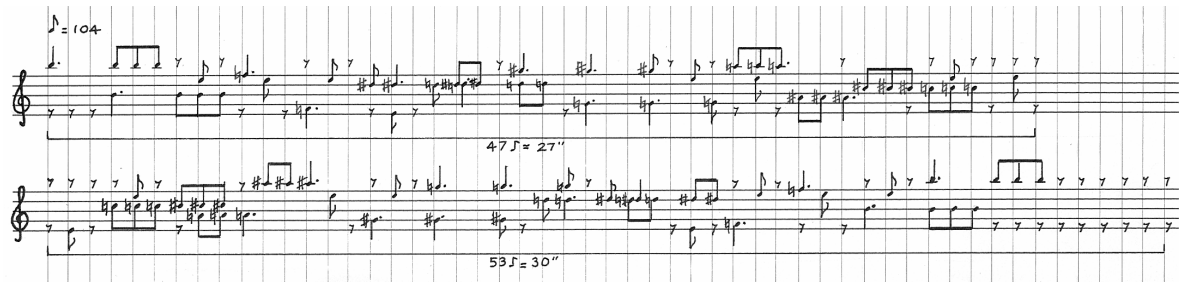
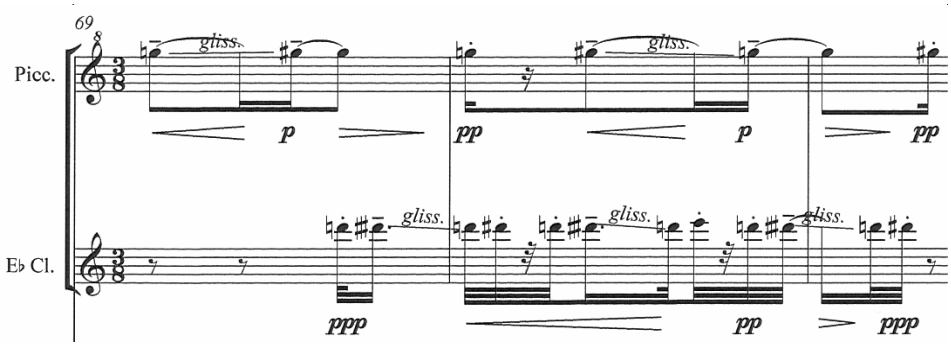


Illustration 67: *Betelgeuse* – showing canons of piano part in panels 1 and 2

Whilst the writing of *Betelgeuse* focuses on the placement of materials in the inner parts (piano and glockenspiel) it in no way negates the purpose of woodwinds and cello. Rather, the shaping of material in piano and glockenspiel provides the backbone for sonic activity in those instruments. Starting with piccolo and clarinet, primary models are placed in counterpoint with one another, and with the inner parts, which produces a rhythmic instability.

As demonstrated in *illustrations 68* and *69* (p.69) below, instrumentation uses central pitches.



N.B: extract at sounding pitch

Illustration 68: *Betelgeuse* – showing glissandi (measures 69-71)

One function of woodwinds is the execution of glissandi using unidirectional motions. This technique operates mostly in semitone intervals. *Illustration 68* shows piccolo

using repetition of primary model G alternating glissandi in ascent (G-G#) then descend (G#-G). Clarinet shows repetition of primary model L in a descent of D three-quarter tone sharp to D natural. It is also notable that the behaviour of this material creates oscillation. Again dynamics suggests instability, by pushing and pulling the material towards and away from the listener.

The cello supports activity in the inner parts. *Illustration 69* below shows the intermittent use of pizzicato attacks which underpin hybrid models. The cello's main function reflects unidirectional glissandi used in the woodwinds, yet all are rhythmically bowed. Moreover, the use of ratios which vary acceleration/deceleration motion, shown in *illustration 70*, upsets the periodicity of regular measures.

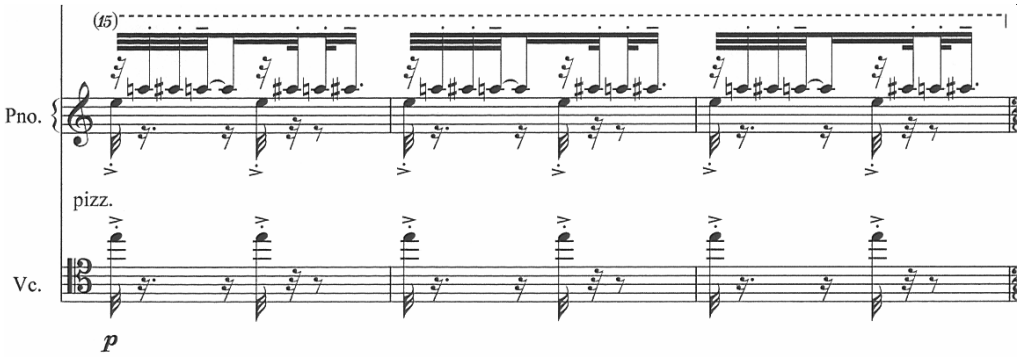


Illustration 69: *Betelgeuse* – showing cello supporting hybrid model 5 (measures 57-59)

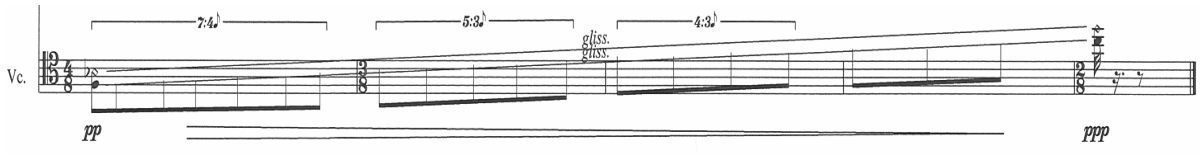


Illustration 70: *Betelgeuse* – showing cello glissandi using ratios (measures 257-261)

To sum up, the sound world of *Betelgeuse*, which shimmers through its glassy timbre, has a correlation with the artwork of Paul Klee. I am referring particularly to Klee's layered block painting, *Highways and Byways* (p.15) above 'whose glorious colours glow in a fine network of prolific fields.'[94] Hajo Düchting's analytical description encapsulates this painting. Whilst I aimed to create a fragile sound world reliant on the placement of block materials, the dividual structure of Klee's block painting demonstrates rhythmic instability.

[94] Klee, Paul, *Highways and Byways* cited: Düchting, Hajo, *Paul Klee – Painting Music* (Munich; London: Prestel, 2004), 45.

3.4.2: ***Procyon* (2006)**

- flute, oboe, clarinet, alto saxophone, trumpet, trombone, piano: 6½ minutes

'Procyon, the smallest star in the Winter Triangle has a single rotational period which could be as long as 33 days.'[95] Jim Kaler's informative description suggests that Procyon's orbital period may vary over the course of time. In an attempt to represent that concept sonically, *Procyon* draws on cyclic/centric motions in both the horizontal and vertical planes.

The sound world of *Procyon* relies on seven pitches as a representational force of the letters in the title. They are based on an overtone series, low E partial (41.2Hz) as follows: E (1), B (3), D sixth tone below (7), D natural, F# (9), D# (15) and C.[96] Again, the number of letters in the title is of structural significance using seven independent panels. *Illustration 71* (p.71) demonstrates how those panels encode rhythmic models. Using a tempo marking of ♪ = 60 enabled (quaver = one second) measured time, each model demonstrates actual duration of a particular panel shown in a boxed outline, for instance, the first panel P, is 8" duration.

The materials contained within each of those seven panels implement a number of extended performance techniques. For me, articulation in *Procyon* represents the flickering light source that a star will emit through rotation. Firstly, woodwinds used short, dry attacks (triangular headed notes) in panels P, R, O, and O_1. Players must stop air at the end of the attack with the tongue. Secondly, woodwinds (excluding oboe) and brass create transitions from normal tone to air tone. Meanwhile, in panels P and R the pianist depresses the third pedal whilst silently holding the prescribed chord in the left hand. Panels C and Y demand a similar action but holding a chromatic cluster. This action brings additional sustain to the melodic material in panel P, and to the chords using right hand inside palm in block R and C. There are notable differences between panel O and O^1. The order of alto saxophone attacks and dynamics in panel O are placed in retrograde order using oboe and clarinet in O_1. Note placements in the piano are treated in a similar way, e.g. panel O shows semiquavers grouped 1, 2, 3 and in retrograde order in panel O_1.

[95] Kaler, Jim, 'Procyon' (n.d) <http://www.astro.uiuc.edu/%7Ekaler/sow/procyon.html> accessed 13/08/06.
[96] *Illustration 83* (p.80) provides suitable reference of these numbered partials.

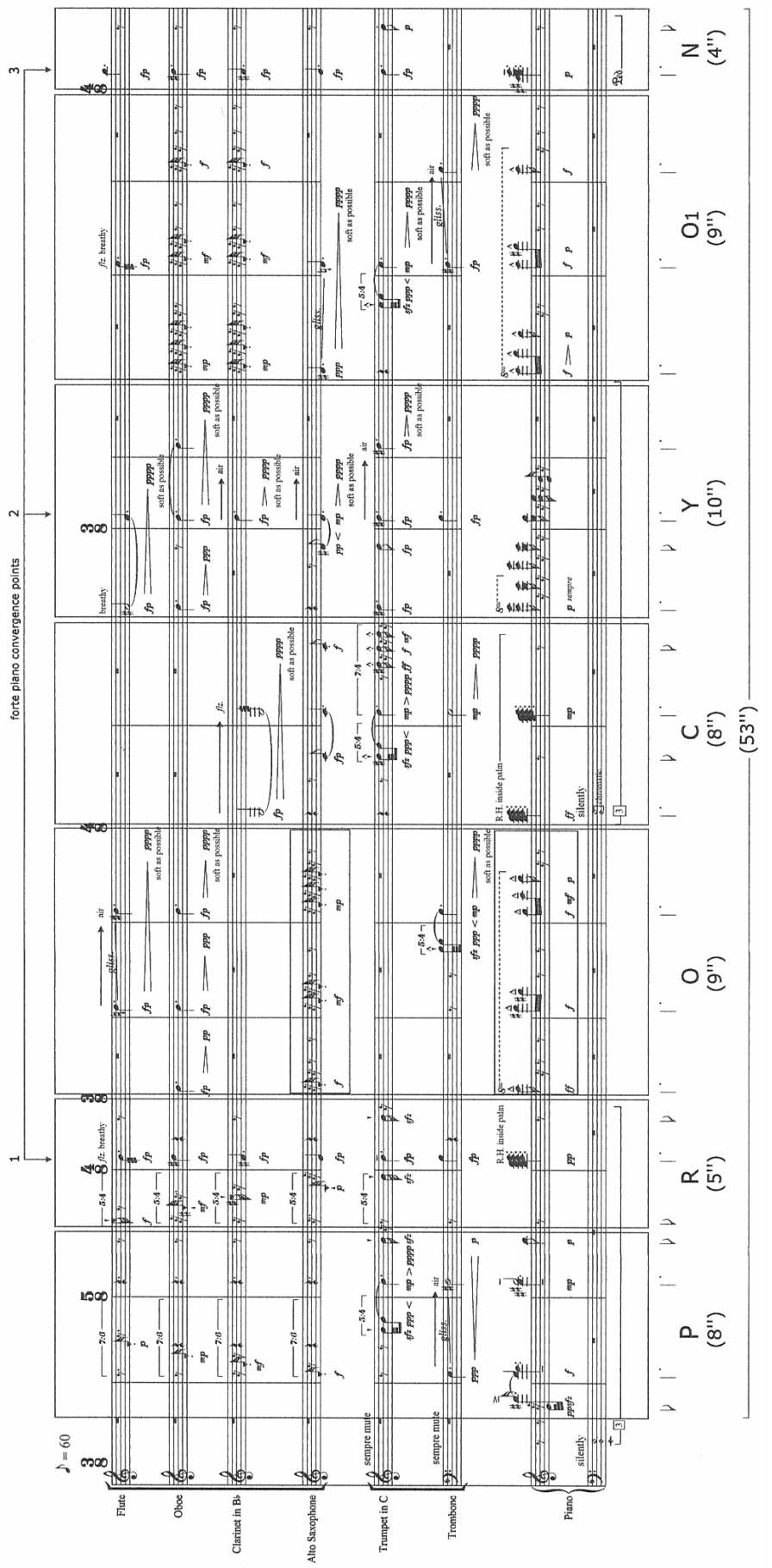


Illustration 71: *Procyon* – showing seven panels

Illustration 71 (p.71) above highlights three strategically placed convergence points (CP) at forte piano (*fp*) over panels R, Y, and N. These sonic gestures provide explosive moments in contrast to more subtle sound-shapes which blossom periodically. *Illustration 72* shows the timings of these particular events throughout the entire piece.

	Rotation 1			Rotation 2			Rotation 3			Rotation 4			Rotation 5			Rotation 6			Rotation 7		
CP	1	2	3	1	2	3	2	3	1	2	3	1	2	3	1	3	2	1	3	2	1
Measure	4	11	16	18	25	30	40	45	48	53	58	61	67	72	75	85	88	95	98	101	108
Time	11″	36″	51″	57″	1'22″	1'37″	2'12″	2'27″	2'40″	2'59″	3'14″	3'27″	3'48″	4'03″	4'16″	4'51″	5'04″	5'29″	5'41″	5'54″	6'19″

Illustration 72: *Procyon* – showing timings of convergence points

The rhythmic models shown beneath the panels in *illustration 71* ensure dilation and contraction on subsequent rotations because of their variable measured duration. *Illustration 73* (p.73) below demonstrates how rotation affects the time line. I added one quaver beat rest on completion of rotation 1, and 2 quaver beat rests after rotation 2 and so on up to 7 quaver beats rest in the final measure. These progressive increments allow dilation between each rotation. The interesting part of using variable rotation means that each individual panel after its first appearance does not return for some considerable time. For example the material contained in panel P at the start of rotation 1 is not heard again until the end of rotation 2 at 1'40''.

While the cyclic/centric motions of these panels are looped in the horizontal plane there are subtle changes in the vertical plane relating to woodwinds, specifically in R and P panels. *Illustration 74* (p.73) below shows rotation in R panels. There is rotation, using four pitches (E F# D# and B) in 5:4 ratios, as well as a shift in the order of instrumental attacks. Notably four dynamic levels which underpin this activity also rotate. Meanwhile, the subsequent (*fp*) chords (convergence point 1) rotate the same four pitches. Brackets and dotted brackets indicate the same inversion.

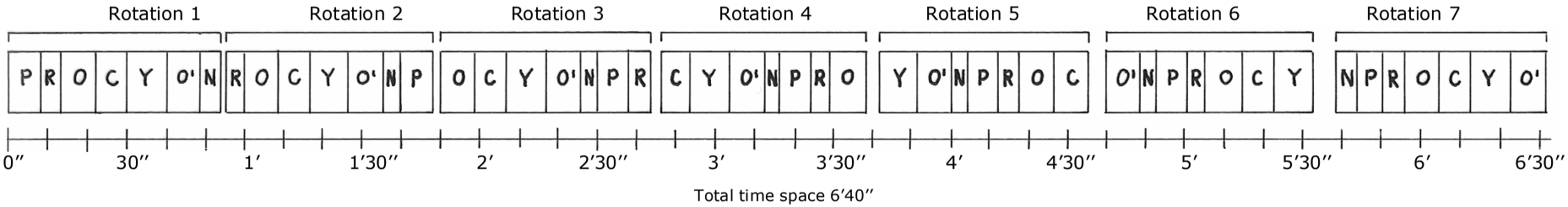
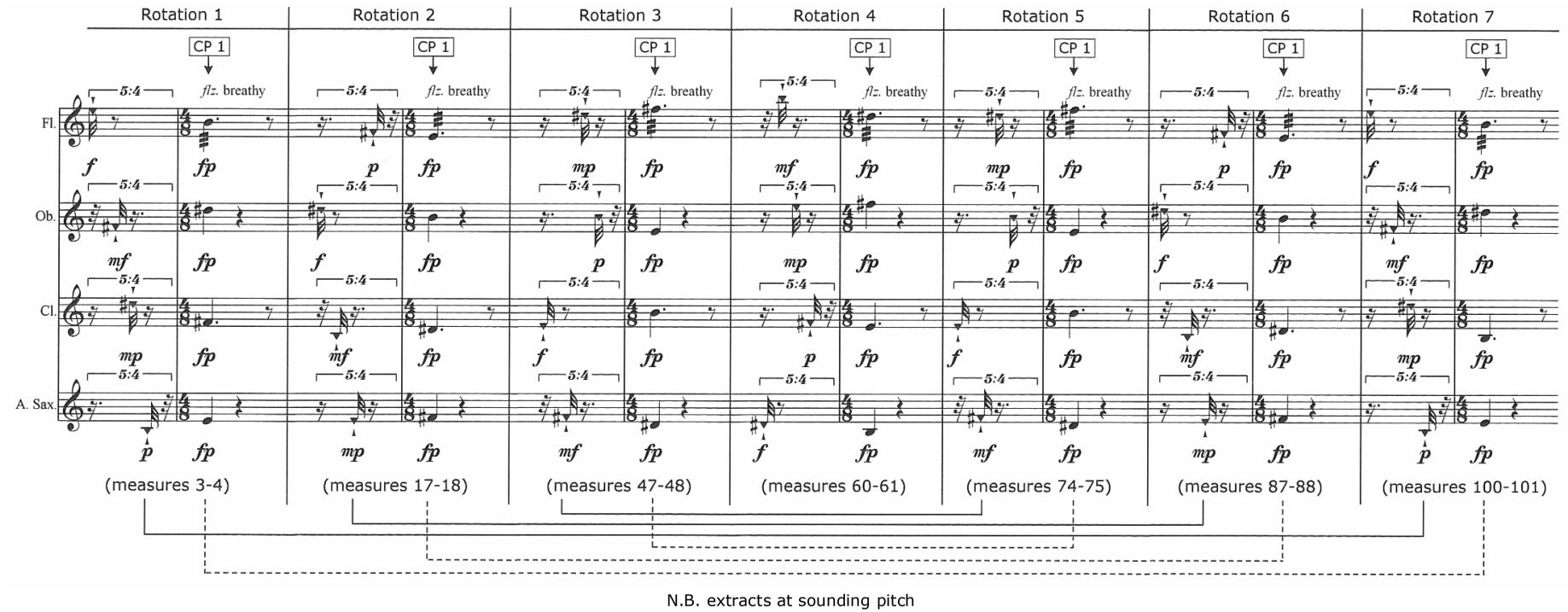


Illustration 73: *Procyon* – showing rotational order of panels over time



N.B. extracts at sounding pitch

Illustration 74: *Procyon* – showing modifications to woodwinds (R panels)

Illustration 75 (below) relates to the sonic activity in P panels using 7:6 ratios over the value of a dotted crotchet beat. This shows mapping of note placement (dots) using the same sounding pitch (E). There is a shift in the order of instrumental attack as well as the time space on each subsequent rotation. Rhythmic framing shown also in 5:4 ratios (*illustration 74*, p.73) above demonstrates my concern for absolute placement of pitch material. Therefore from a musical point of view articulation is even more poignant. The function of muted brass instruments and piano which underpin these modifications remain unchanged thus providing some consistency to cyclical events.

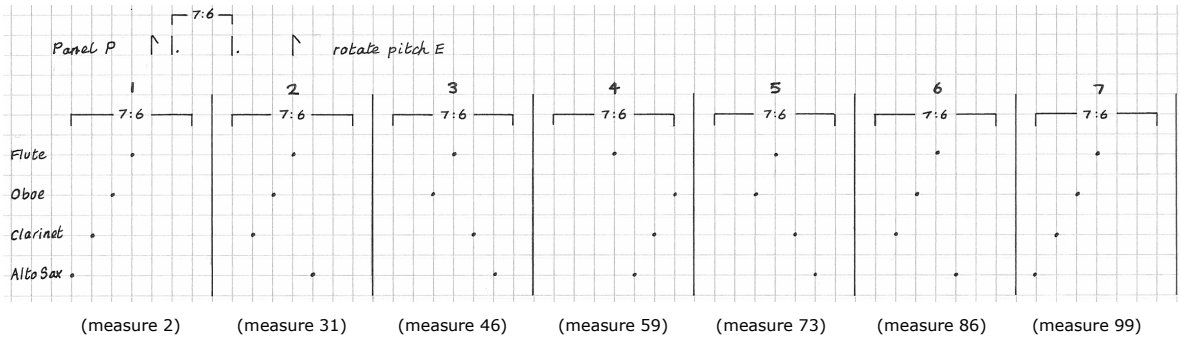


Illustration 75: *Procyon* – showing mapping of woodwinds (P panels)

Of note, *Procyon*, commissioned by Sounds Positive[97] has been performed on two occasions. During rehearsal prior to the first performance there was a problem relating to the dry attacks[98] used in woodwinds, this technique does not respond well on double reed instruments. Oboist Paul Goodey found an easy yet effective solution, inhaling rather than exhaling air as was demonstrated to me.

3.4.3: ***Sirius* (2007)**

- flute, oboe, Bb clarinet, bassoon, horn, trumpet, trombone, piano, acoustic guitar, vibraphone, violin, viola, violoncello: 6½ minutes

'Sirius is the champion of all twinklers, the effect caused by variable refraction in the Earth's atmosphere.'[99] This phenomenon prompted a compositional structure whereby four rhythmic models generate block materials. *Illustration 76* (p.75) below shows the way in which these models encode the letters in the title.

[97] Sounds Positive c. David Sutton Anderson, 10/02/08. The Warehouse, London. *Procyon* formed part of Parallel Lines, three consecutive Sunday events celebrating Sounds Positive's twentieth year of commissioning and performing new British music. Unfortunately no recording was made of this performance. The second and recorded performance by a student group is available on the CD which accompanies my portfolio.
[98] Explanation of dry attacks, p.70 paragraph 3.
[99] Kaler, Jim, 'Sirius' (n.d) <http://www.astro.uiuc.edu/%7Ekaler/sow/sirius.html> accessed 22/11/06.

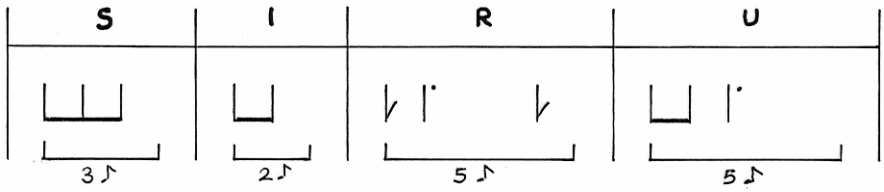


Illustration 76: *Sirius* – showing rhythmic models

Organisation of block materials in *Sirius* relies on dilation and contraction. *Illustration 77* (below) shows gesture motion using rhythmic model R, which gradually dominates contrasting textural motion shown as continuous dotted lines. Repetition of rhythmic model R is subjected to contraction in the horizontal plane and dilation in the vertical plane. The outcome of this particular drawing is realised as measures 139-177.

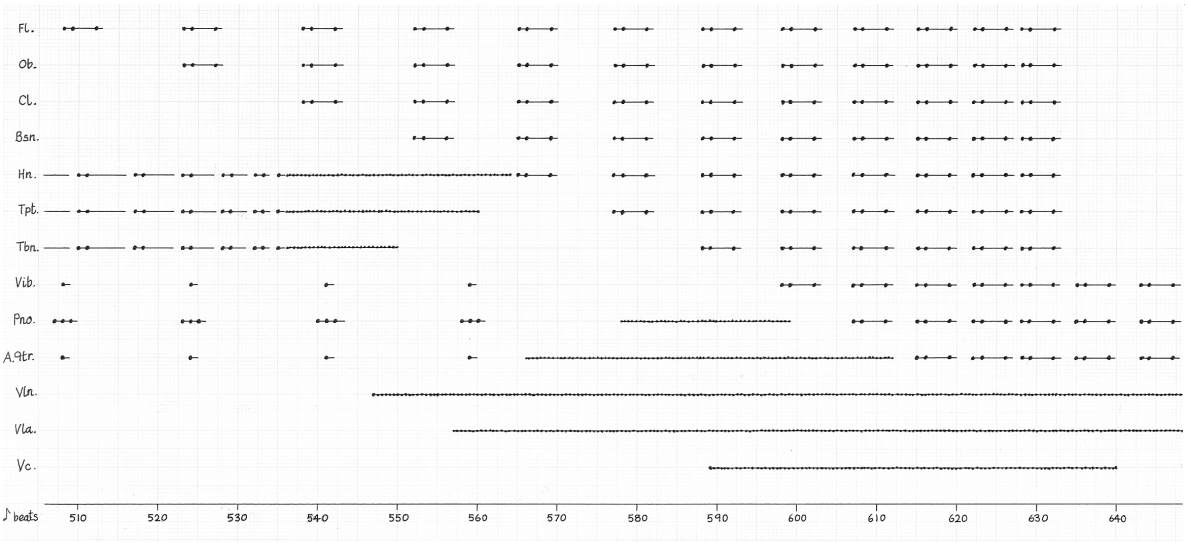
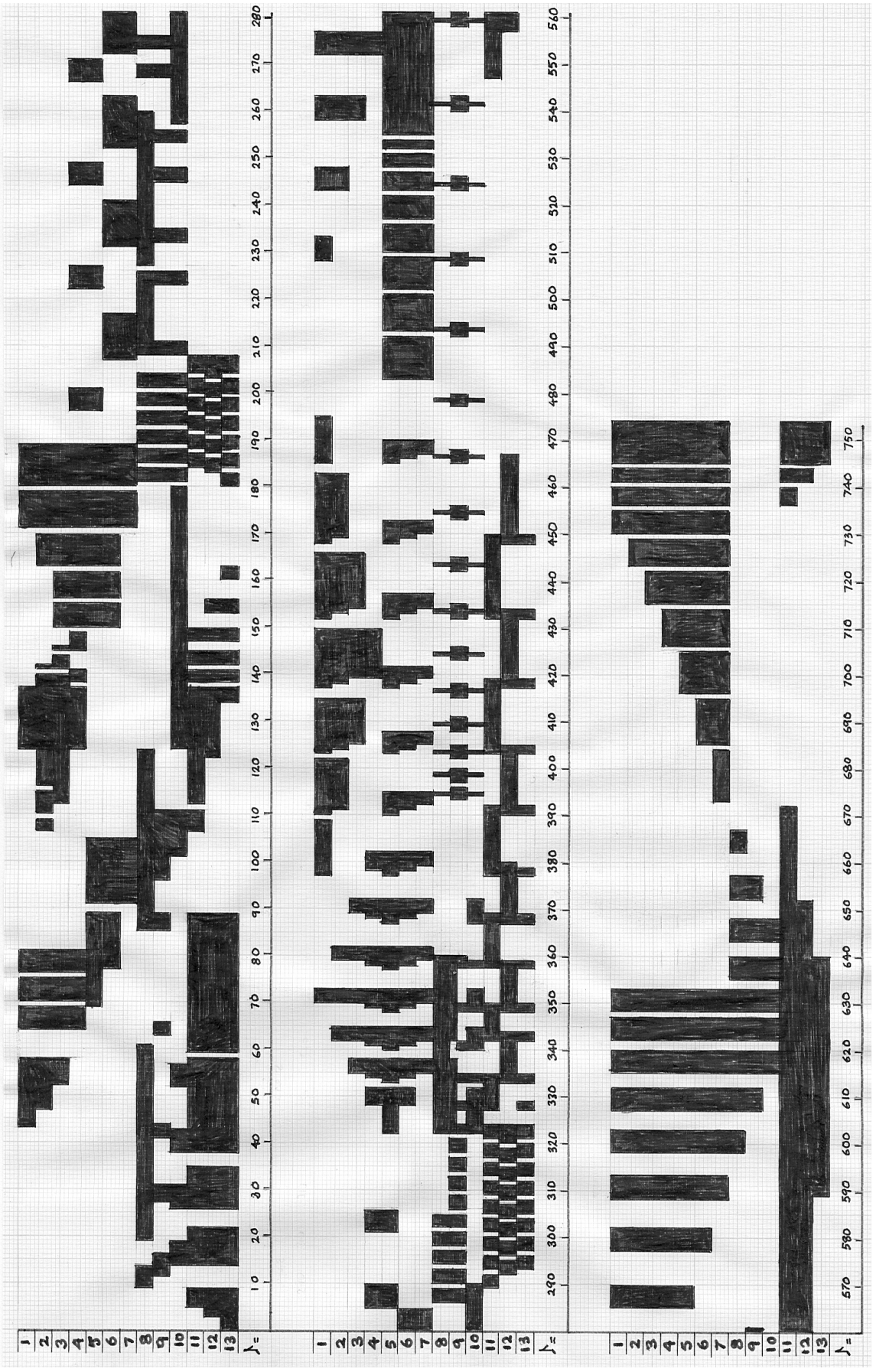


Illustration 77: *Sirius* – showing skeletal framework (extract)

The spatio-temporal language of *Sirius* is not overly concerned with the regularity of beats but the creation of a field condition. My diagrammatic silhouette drawing (p.76) below represents the macro-structure of *Sirius* using a constant pulse of ♪ =120. This shows dilation and contraction of block materials filling and emptying the canvas like an abstract painting.



Key: 1-flute, 2-oboe, 3-clarinet, 4-bassoon, 5-horn, 6-trumpet, 7-trombone, 8-vibraphone, 9-piano, 10-guitar, 11-violin, 12-viola, 13-violoncello

Illustration 78: *Sirius* – showing macro-structure

Whilst *Sirius* investigates the development of four rhythmic models, its pitch material is of structural importance. Pitch material is deliberately restrained allowing for a single pitch (E) to oscillate throughout all instruments and long before other pitch material provides harmonic possibilities. *Illustration 79* below demonstrates the order in which just five pitch classes first appear.

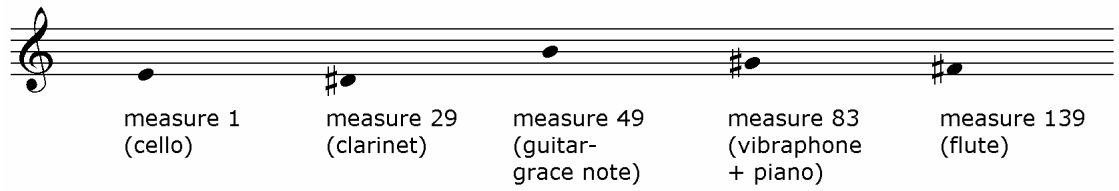


Illustration 79: *Sirius* – showing macro-structure of pitch material

Sirius is reliant on both its rhythm and pitch material as shown in two extracts below. Firstly, *illustration 80* demonstrates a period of dilation in the piano part.

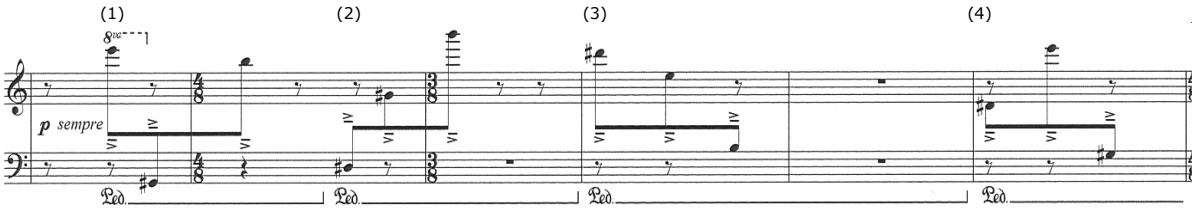
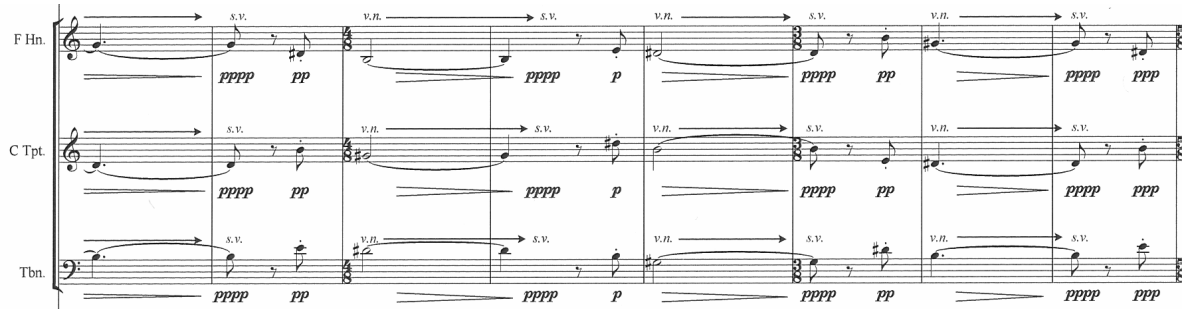


Illustration 80: *Sirius* – showing dilation, piano part (measures 105-110)

The metric scheme is governed by activities in other instruments (not shown) and so rhythmic models (1) (2) are placed over bar lines, measures 105-106. Space between repetitions of rhythmic model S dilates by an increment of one quaver beat rest until this activity terminates at measure 154. The limitation of five pitches inevitably led to pitch rotation. Here I used four notes in rotation shared between two hands, they are: E G#, B and D#. This led to a three note rotation as follows: Rotation (1) – E G# B, rotation (2) – D# G# B, rotation (3) – D# E B, and rotation (4) – D# E G#.

Illustration 81 (p.78) below demonstrates a period of contraction in the brass instruments using model I. This shows rhythmic unison, whereby, each subsequent sustained attack contracts by one quaver beat. The onset of this activity at measure 131 terminates at measure 146. Evidently pitch material used the same four notes shown in *illustration 80* above but subjected to harmonic rotation. Furthermore, this extract demonstrates wedged sound-shapes underpinning each sustained attack.



N.B: extract at sounding pitch

Illustration 81: *Sirius* – showing contraction, brass (measures 136-143)

Scordatura is used for the acoustic guitar which enabled *étouffé*: damping four open strings with the left hand at the nut (measures 156-167). The technique simulates pizzicato attacks used in the textural motion of stringed instruments inclusive of measures 151-185.

What I hope to achieve is a sound world rich in colour through my use of instrumentation. *Illustration 82* (p.78) below provides a view of all thirteen instruments in play. Firstly, this shows woodwind and brass instruments in rhythmic and dynamic unison. The onset of flutter tonguing (measure 47) shows a transition to ordinary sustain via the graduate continuant before termination. Meanwhile the onset of vibraphone and piano express pedalled notes and merge with the continuation of the guitar part which shows three strummed attacks using sul ponticello (*s.p.*), ordinary playing position (*ord.*), and sul tastiera (*s.t.*). Notably, the first attack (encircled) used E on the top three strings for additional resonance. Similarly the subsequent minor second chord placed E on string 3 as well as string one. Collectively these pitched percussion instruments implement a gradual dynamic reduction in their successive sustained attacks. While the onset of string parts bow transitions from senza vibrato to vibrato molto or visa versa. The dynamics here underpin violin and violoncello in unison whereas viola is in contrary motion.

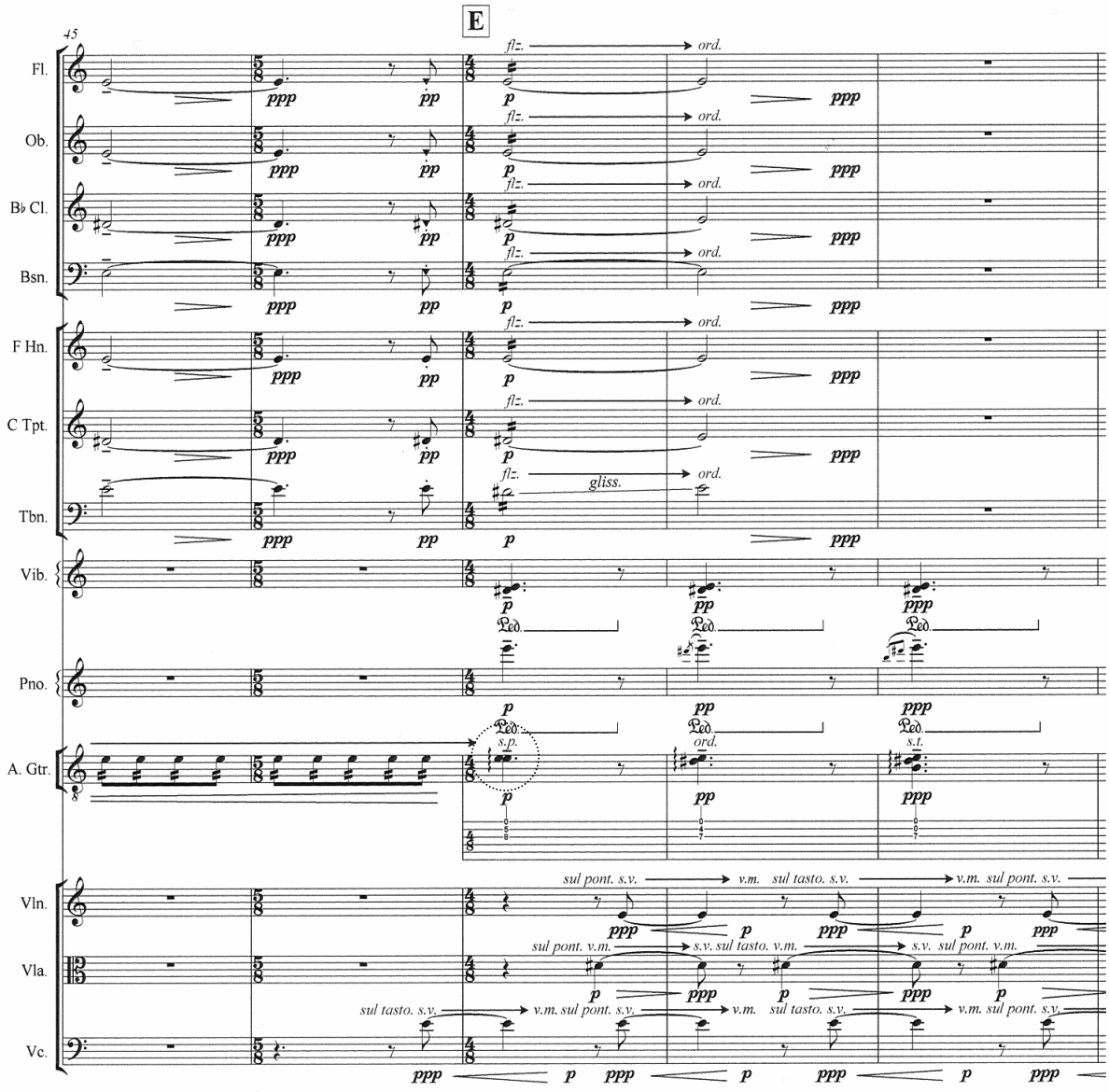


Illustration 82: *Sirius* – showing a cross section of all thirteen instruments (measures 45-49)

As it stands at present this single movement work remains unperformed. While *Sirius* must be regarded as complete, I can envisage returning to work on the piece at a future date. Firstly, it seems perfectly feasible that the structure could withstand larger instrumental forces that would trigger dilation and contraction on a grander scale, and secondly, at least an additional movement.

3.5: ***Black Hole* (2007)**

- 6 violins, 2 violas, 2 violoncellos, 1 double bass: 13½ minutes

> A black hole is a region of spacetime from which nothing can escape, even light.[100]

Sonic activity in *Black Hole* represents solar objects dragged towards infinity. The approach to architectural form here shows a reverse transition to that demonstrated in *Cloud*. This is the onset of registral extremes moving towards a central termination point of E, shown as an attack-decay gesture (*Illustration 16*, p.25) above.

As I wanted to create a spectral sound world I decided to draw on an overtone series – low E1 (41.2Hz)[101] – as my pitch class shown below. This particular series, used in Gérard Grisey's *Modulations*,[102] is highly practical for my purposes. Fundamental E1, the lowest note of the double bass anchors a wide pitch range in the opening measure of *Black Hole*.

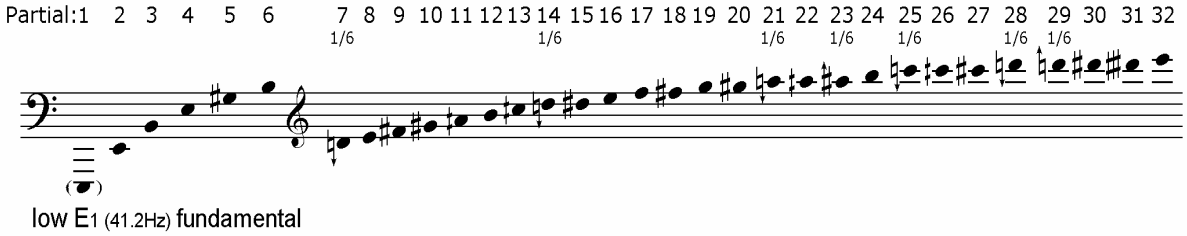


Illustration 83: *Black Hole* – 32 note overtone series

My preliminary annotations *illustration 84* (p.81) below identified sixteen pitches because several of the partials in the 32 note overtone series (above) repeat at variable octaves, e.g.: pitch E (partials 1, 2, 4, 8, 16, 32). As suggested by the invitation to write for the Goldberg Ensemble, the order in which those 16 pitches reduce to one (E8) over the course of the time period is c.13 minutes. Whilst there is a gradual reduction of pitch material over time using a fixed tempo marking (♪ =76), the dynamic macro-structure moves in the opposite direction from extremely soft (*pppp*) to fortissimo (*ff*), thus emphasising the gravitational force of a black hole.

---

[100] n.a. 'Introduction to Black Holes', <http://www.dampt.cam.ac.uk/user/gr/public/bh_intro.html> accessed 16/02/07.
[101] Rose, François, 'Introduction to the Pitch Organization of French Spectral Music' *Perspectives of New Music*, 34 No. 2 (Summer, 1996), 6-39, 7.
[102] Grisey, Gérard, *Modulations* (Paris: Ricordi, 1978).

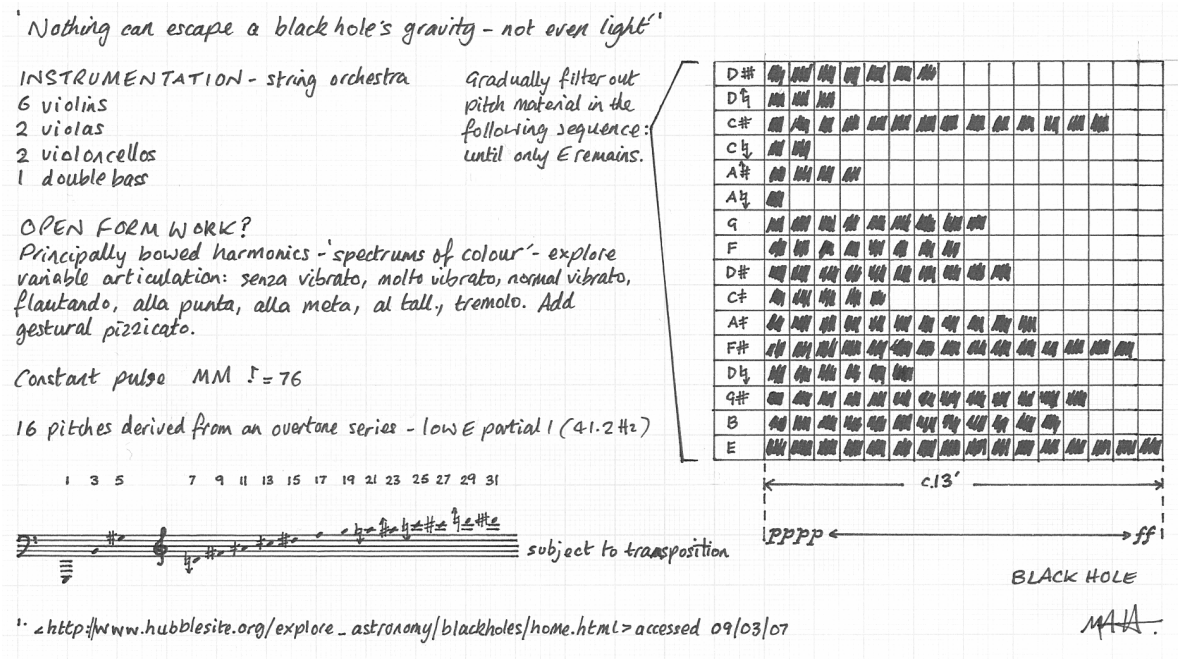


Illustration 84: *Black Hole* – preparatory annotations

Cornelius Cardew claimed, 'Anything in the universe that has been or can be given a graphic representation is a possible notation for musical activity.'[103] My preparatory drawing, an extract (p.82) below is a graphic representation of *Black Hole*. Measured quaver beats underpin this drawing while the left column defines the pitch range. Small dots – pizzicato – suggest fragmented material at some distance from the gravitational force of a black hole. Large dots – harmonics – indicate solar objects in time-space which can move in any direction, therefore, horizontal lines show the temporal phase of a sound object and similarly diagonal lines necessitate the trajectory of glissandi. From this drawing I could then orchestrate the work and explore articulation in a more detailed way.

Illustration 86, (p.83) below shows the first eight measures of the work. The numberings above each note demonstrate partial mapping of the harmonic structure. There are two rotations here. Rotation one (measures 1-3) shows harmonic notes numbered in a downward direction starting from pitch 32 (violin 2), whilst pizzicato attacks are numbered in an upward direction and commenced from the fundamental E_1 (double bass). The continuing numbering system (encircled) highlights the move from violoncello 2 (24) to violin 3 (23), similarly the continuation of pizzicato attacks from violin 3 (10) to violoncello (11).

[103] Cornelius Cardew, 'Wiggly Lines and Wobbly Music' *Studio International*, Art and Experimental Music, 192 No. 984 (November/December, 1976), 251.

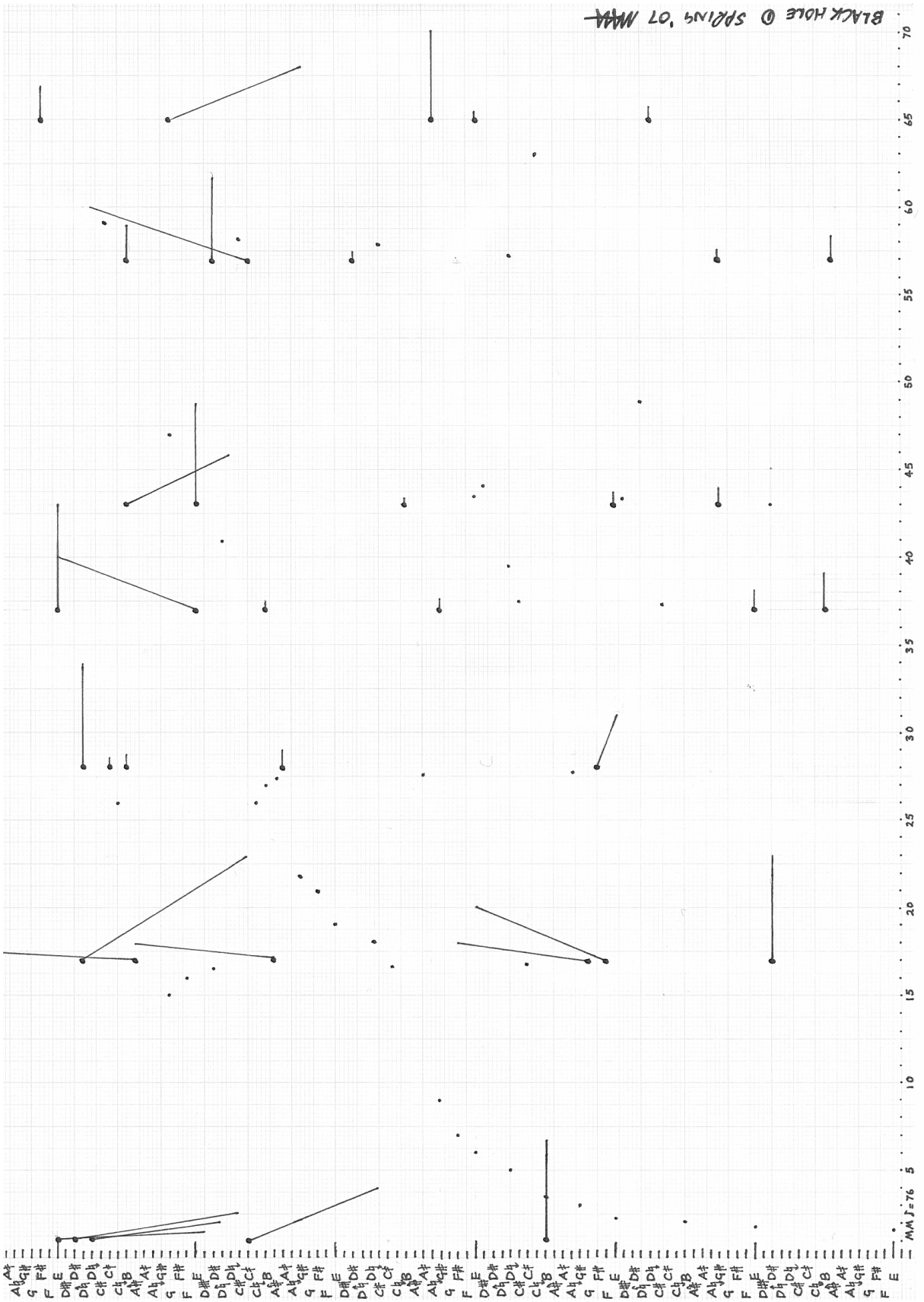


Illustration 85: *Black Hole* – graphic representation (first minute)

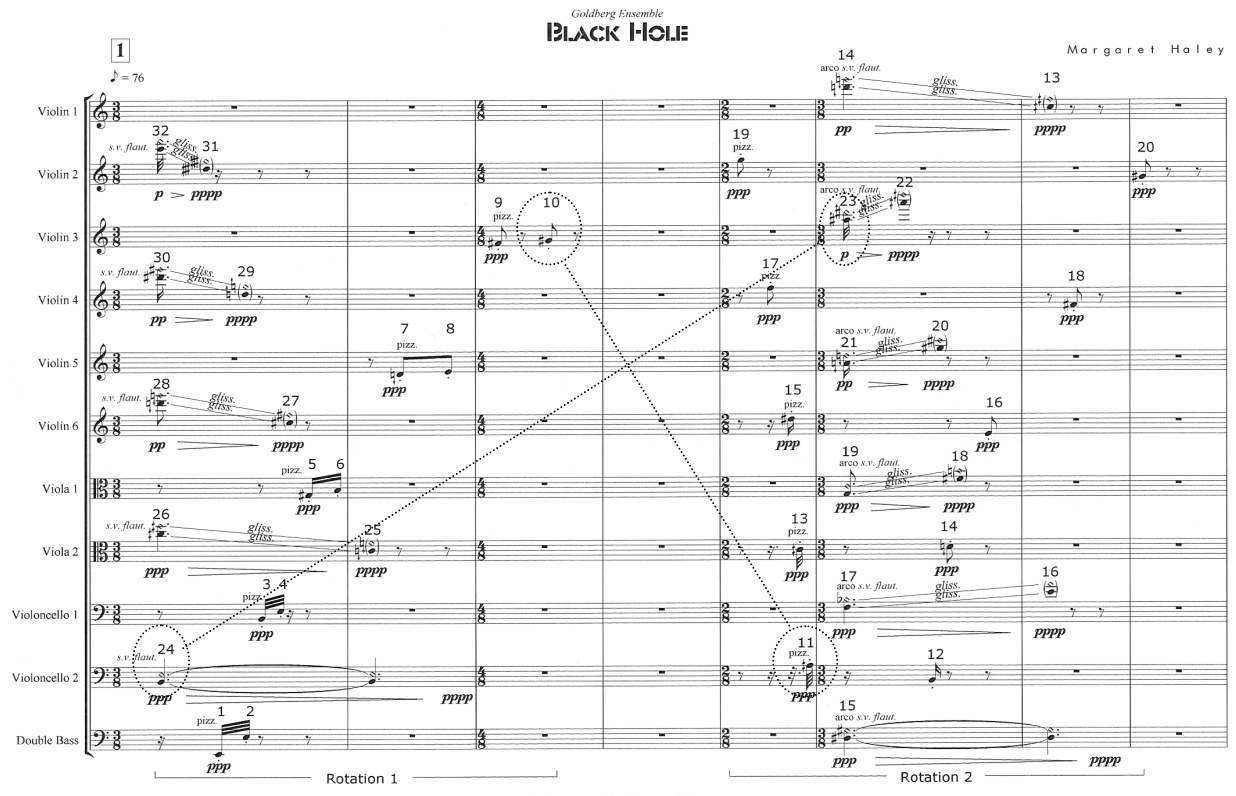


Illustration 86: *Black Hole* – showing pitch organisation (measures 1-8)

Whilst writing *Black Hole* I became more familiar with the music of Salvatore Sciarrino, in particular *Codex purpureus*[104] written for a string trio. In *Codex purpureus*, Sciarrino applied glissandi to natural harmonics, whereas, my own work investigated the sound production of bowed harmonics in numerous ways. I wanted to investigate right hand action using plucked and bowed attacks. These two forms of attack symbolise my own observations of solar objects. Each note gesture in *Black Hole* is treated on a moment-to-moment basis. In his essay '*Crippled Symmetry*' Morton Feldman referred to Mondrian 'not wanting to paint bouquets but a single flower at a time.'[105]

The following discussion examines the relationship of sound and action. *Illustration 86* (above) demonstrates the unidirectional motions of material. There is clearly a wide pitch range, in one instance way beyond the natural tessitura; this is violin 3 (22), measure 6. The ascending glissando here pushes the sound material so high that it becomes white noise, this is intentional. The harmonics in these opening measures demonstrate *flautando*, a flute-like tone produced by extremely light bowing. Unidirectional glissandi indicate the departure of a particular sound, however, termination can be described as a disappearance because of no definite duration.

[104] Sciarrino, Salvatore, *Codex purpureus: per trio d'archi* (Milano: Ricordi, 1983).
[105] Feldman, Morton, *Give my Regards to Eighth Street*, ed. B.H. Friedman (Cambridge, Mass.: Exact Change, 2000), 135.

As I wanted to add colour, bowed harmonics demonstrate variable intonation by using different bow positions. *Illustration 87* below shows three different approaches, firstly fig a): senza vibrato tremolo *al punto*, secondly fig b): vibrato tremolo *alla meta*, and finally fig c): vibrato.

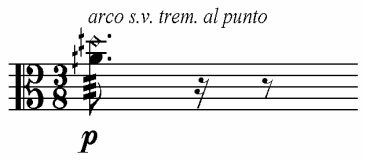


fig. a) viola 2 - measure 10

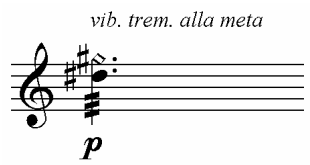


fig. b) violin 3 - measure 110

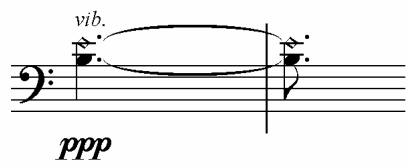


fig. c) violoncello 2 - measures 205-6

Illustration 87: *Black Hole* – showing three approaches of bowed harmonics

Illustration 88 demonstrates a sound-shape underpinning a transition, the departure at vibrato molto is released at senza vibrato.

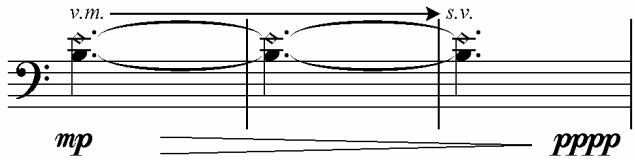


Illustration 88: *Black Hole* – showing bow transition (violoncello 1, measures 278-280)

The workshop discussion which followed the first performance of *Black Hole*[106] led by Malcolm Layfield resulted in a lengthy debate about the use of harmonics. There was a challenge relating specifically to the application of vibrato as demonstrated in *illustration 87* figs b and c, and *illustration 88*. While the players of the upper strings were able to execute this technique, the lower strings claimed vibrato was much more difficult but possible. More importantly the resultant distortion brought a further dimension to the spectral sound world I had created.

[106] *Black Hole* first performance 12 May 2007 formed part of event celebrating Barry Guys 60th birthday in St. Paul's Hall, the University of Huddersfield.

3.6: ***Gemini*** **(2007)**

- guitar duet: 2½ minutes or more

My portfolio of compositions would not be complete without a piece written for the standard classical guitar as this is my own instrument. How fortunate that the second commission of Stephen Crowe's living composers' concert series should present such an opportunity. The commission stipulated a short duration, circa 2-4 minutes. However, inspired by a faint image of a spiral galaxy[107] found in the constellation of Gemini, I envisaged a longer time period. I chose to treat time as a flexible entity. Therefore, the discussion addresses a move towards indeterminacy.

My preparatory drawing below, shows a dynamic macro-structure from barely audible to fortissimo underpinning two curved lines (onset and termination points) over a pitch range of two octaves (E-E). The performers may choose to alter the trajectory of events represented by these active lines. This is dependent on how many repetitions of 41 independent block materials are played in a fixed order. The number of repetitions of any one block is determined by the players. They are to select: two, three, five, seven or eleven repetitions.

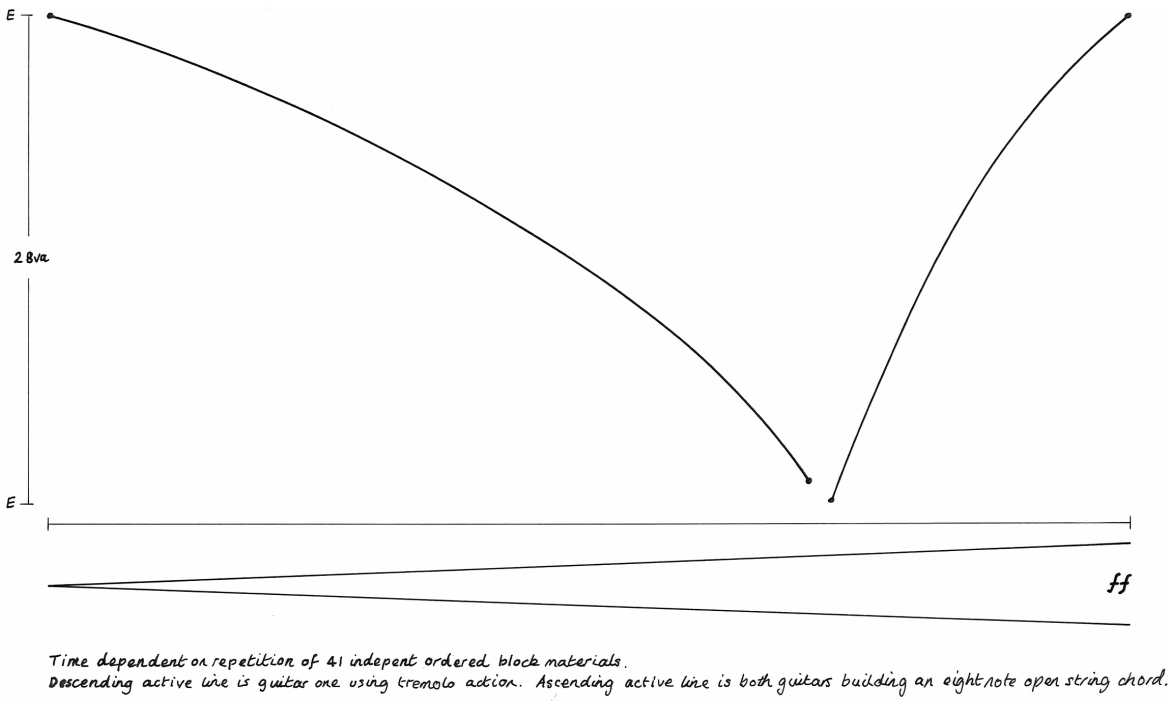


Illustration 89: *Gemini* – showing initial plan

[107] n.a. 'NGC 2357' (n.d.) cited, <www.spiral-galaxies.com/Galaxies-Gemini.html> accessed 05/02/05.

As *illustration 90* (below) demonstrates the two guitars move away from conventional tuning. Scordatura would allow a gradual build up of a modally orientated eight note chord on the open strings. This is shared between the two players when the two parts must converge at block 31.

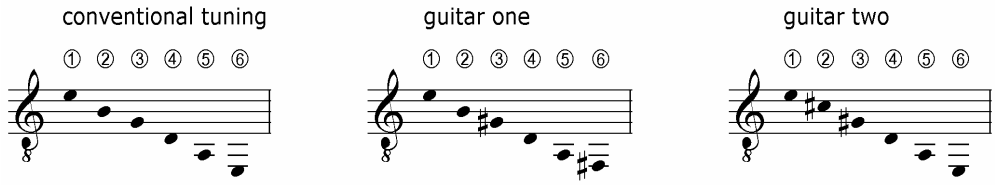


Illustration 90: *Gemini* – showing scordatura

Of the two parts it is guitar one which provides the controlling element using a constant tremolo action. There is no tempo marking because not all performers are able to maintain a rapid tremolo action. The block materials in *Gemini* revolve around the opening string tunings bringing further oscillation to the inevitable attack-decay of plucked strings. Like the guitar part in *Sirius*, *Gemini* used guitar tablature in addition to staff notation. This is in place to instruct positions and fingerings. *Illustration 91* demonstrates tremolo in the first block using pitch E on the top three strings.

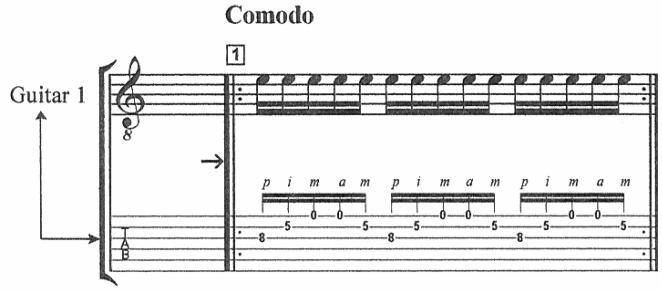


Illustration 91: *Gemini* – showing block one

There is a gradual reduction to the number of attacks grouped together in any one block, these are shown in *illustration 92* (p.87) below. This activity not only changes the right hand action but creates a reduction in the underlying pulse.

Guitar two may implement extended techniques as shown in my notes which accompany the score. Guidelines for improvisation in *Gemini* indicate a glass bottleneck slide compatible with classical acoustic strings. As renowned guitarist Tom Kerstens said of the bottleneck slide, 'it allows a smooth glissando involving all pitches, unhindered by the semi-tone stops dictated by the guitar's frets.' [108] The player may

[108] Kerstens, Tom, 'The New Orchestra No. 14 The Guitar. Part 1. Tom Kerstens looks at techniques for the guitar.' *New Notes* spnm (London: March, 2005) 4-5. Part 2. (London: April, 2005), 3-4.

use this implement to produce glissandi on string one and six using variable pressure as well as isolated attacks, or series of attacks. Other techniques suggest natural harmonics using single, double, or triple stops.

Illustration 92 below shows the statistics between two performances of the work.[109] Performance 1 used two, three, and five repetitions, reserving seven repetitions for the final block. Performance 2 used all five optional repetitions.

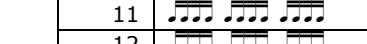
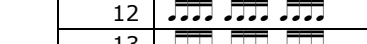
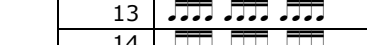
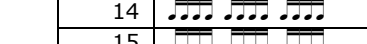
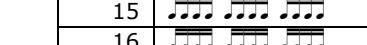
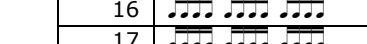
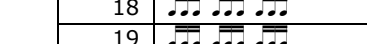
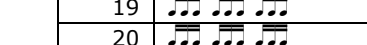
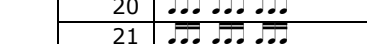
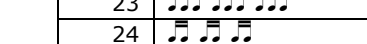
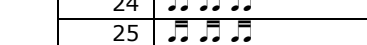
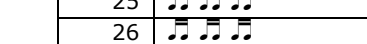
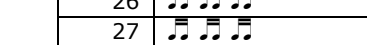
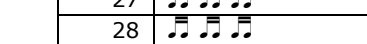
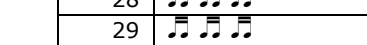
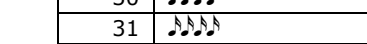
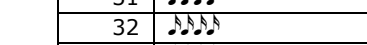
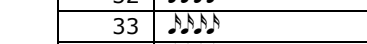
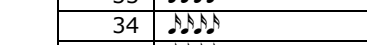
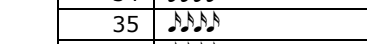
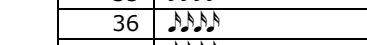
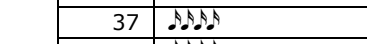
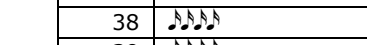
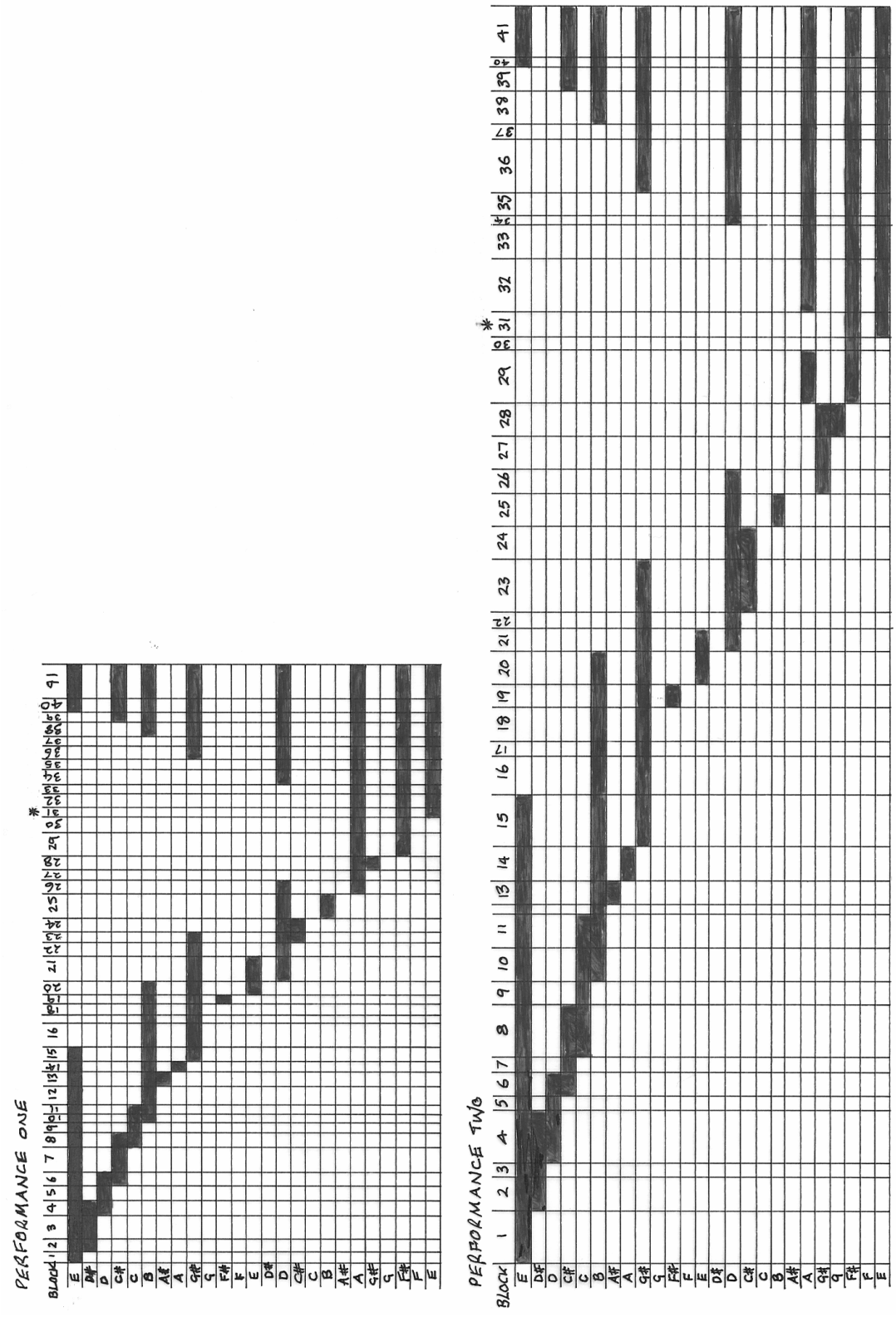
Block	No. of semiquaver beats per block	Performance 1 No. of repeats	Performance 2 No. of repeats
1		2	11
2		3	7
3		5	3
4		3	11
5		2	3
6		3	5
7		5	3
8		3	11
9		2	5
10		2	7
11		2	7
12		5	2
13		3	5
14		2	7
15		3	11
16		5	5
17		2	3
18		2	7
19		2	5
20		3	7
21		5	5
22		3	3
23		2	11
24		3	7
25		5	7
26		3	5
27		2	7
28		3	7
29		5	11
30		3	3
31		2	5
32		3	11
33		2	7
34		3	2
35		2	5
36		3	11
37		2	3
38		3	7
39		2	5
40		3	2
41		7	11

Illustration 92: Gemini – showing statistics between two performances

[109] First performance: Chris Bundhun and Abigail James 10 August, 2007,The Space, London.
Second performance: Scott McLaughlin and Jess Baker 4 June, 2008, St. Paul's Hall, The University of Huddersfield.

Illustration 93 below is a visual comparison between those two performances. This graph shows the proportional number of repeats of each block. Clearly there is a difference in spatial awareness shown by the diagonal planes.



N.B. * indicates when the two guitars converge

Illustration 93: *Gemini* – visual comparison of two performances

There are further comparisons to be made between the aforementioned performances. Of the first performance Chris Bundhun (guitar 1) executed a fast tremolo speed. This is partly due to the compositional brief advertising an evening of fast music. This pairing tailored repetitions to meet durational requirements. On hearing and watching playback of the DVD which supports this performance. I would suggest a more controlled interpretation was demonstrated by this pairing.

The second performance allowed the work to evolve over a longer time period (6’40’’) as shown by the proportions of repetition in *illustration 92* (p.87). This version proved very effective because the players and I were able to discuss the piece at length. The overall improvisation here accommodated a sense of spatial awareness and of registral extremes revolving as intended around the core material of guitar one.

Indeterminacy in *Gemini* has the advantage of changing the outcome, as well as programming duration. Whilst this work shows chance methods as opposed to the fixed organisation of sonic activity over time shown in the preceding works, as verified in the score, it is not without its rules.

Chapter 4: Conclusion

The works commented on in Chapter 3 serve to illustrate the main aspects of the compositional technique outlined in 1.5 and more so in Chapter 2 and, in particular, my aesthetic approach to the interaction of sound and time both on a macro- and a micro-level. What I have shown through the works presented here, is the way in which drawing has helped me deal with a teleological approach towards the creation of a unique portfolio of musical compositions. In general this involved the use of a two dimensional grid system predominantly that of pitch and duration, which has for me, enabled a working method whereby mapping provides a composite structural outline as demonstrated in 3.1: *Cloud*.

I have found the discipline of mapping highly stimulating, as well as positively creative. Using this method and other preparatory annotations/diagrams is clearly evident in planning the works, for example *Boötes* and the *Winter Triangle Series – Betelgeuse*, *Procyon*, and *Sirius* – especially on a micro-level. As illustrated in all my works discussed in Chapter 3, the mapping of materials enables structural development in the vertical and diagonal planes. A visual approach therefore provides a means of assembling the main components (pitch and duration), whilst working towards notation and finally sonic realisation. In all the works presented for PhD supported by audio recordings (excluding *Sirius*), the sonic results communicate for the listener a generally hushed/static aesthetic sound world.

My music is inspired by natural elements which form the universe around us. This has involved references to the subject of astronomy which holds for me an interest from a visual standpoint as illustrated through the graphic representations' of *Black Hole*. There are no really strong or dramatic transformations/breaks in the works presented here. In general my music demonstrates rotation of materials subtly changing over time. I have attempted to make connections between what are in essence individual projects. On a macro-level for instance, *Cloud* used centrifugal deceleration emanating from a central starting point and moving towards registral extremes over time as shown in my preparatory drawings for this project shown in 3.1. In *Black Hole* there is a clear link with *Cloud*, where the materials are propelled in the opposite direction. This is the rotation of pitch material using registral extremes as its starting point and is gradually reduced to a single pitch over time. The teleology here is bound up with the behavioural forces of Black Holes in general. *Tau 1 Gruis*, *Betelgeuse*, *Procyon*, and *Gemini* used a panel approach and this structural tool also forms a link with the organisation of materials on a micro-level as demonstrated in *Procyon*.

There are other works written during this period of study and listed in Appendix 1, which could be seen as a connection to the main body of work. For example *Pegasus*, a multifunctional chamber ensemble work for variable instrumental combinations and *Triangulum*, a wind trio (written in 2008 and 2009 respectively) utilised those techniques illustrated above. I have chosen not to submit the said works for PhD, as they would have made this survey too extensive. For similar reasons I chose not to include two earlier works for saxophone quartet, *Sea* (2004) and *Rain* (2005). These works, like *Cloud*, attempt to interpret the elements of water visually as well as sonically through their use of notation. There is one other commissioned work not included here. *The Poppy Field* (2008) written for a cappella voices and a collaborative project with poet Elizabeth Jane Noble, could be seen as an anomaly or departure.

In all of the works presented here there is a sense of control. Even in *Gemini* which shows indeterminacy, there is control. I believe my aesthetic has developed from learning how to manage materials more effectively and is partly due to an appreciation of the graphic artist M.C. Escher who demonstrates control in his work. As Doris Schattschnieder said of Escher, 'ultimately, his quest would result in his own systematic organization of the discoveries he made.'[110] For me, there is a deliberate attempt to create self contained sound worlds, and as a result, a need to apply certain rules. A number of the works in my portfolio used rhythmic models – encoding the titles of my compositions derived from Morse code signals described in chapter 2 – as a tool for building block materials as demonstrate in the *Winter Triangle Series*. Making this connection with the title of a work is particularly significant as I am able to embrace the subjects which inspire my music in a meaningful as well as structural way. Similarly, the idea of encoding pitch material tested in the early works, e.g., *Cloud* and particularly so as shown in *Boötes*, is for me an area of research ripe for future development.

Plans are already underway for several abstract ideas and the pages of my sketchbook are filling once again. It is my observations of the working drawings by abstract artist Paul Klee, and of other composers' strategies as exemplified through the references to Iannis Xenakis (1.2 and 2.3) and John Cage (1.2 and 1.3), that have led me to a conclusion where the future of my musical compositions will continue to involve a visual approach. Appendix 2 includes annotations for a possible series of chamber ensemble pieces. These will draw on the names of constellations as a basis for generating rhythmic models as well as pitch classes that will hold my interest long into the future.

[110] Schattschnieder, Doris, *M.C. Escher: Visions of Symmetry* (London: Thames & Hudson, 2004), 36.

This includes a preparatory drawing referencing the constellation Chamaleon and aims to bring together the essential elements that I have demonstrated in this commentary. This is an amalgamation of music and art in my work.

Sources Consulted:

Bibliography

Adlington, Robert, 'The Music of Rebecca Saunders' *The Musical Times*, 140 No. 1868 (Autumn, 1999), 48-56.

Bach, Johann Sebastian, *Sonata no. 6 in G: for violin and piano [BWV1019]* (New York: Schirmer, 1929).

Bernard, Jonathan W, *The Music of Edgard Varèse* (New Haven; London: Yale University Press, 1987).

Boulez, Pierre, *Messagesquisse* (London: Universal, 1977).

Brown, Kathan, *John Cage Visual Art*: *To Sober and Quiet the Mind* (Crown Point Press, 2000).

Brown, Stephen C, 'Tracing the Origins of Shostakovich's Musical Motto' *Intégral*, 20 (2006), 69-103.

Cage, John, *Atlas Eclipticalis* (New York: Peters, 1961).

_____, *Concert for Piano and Orchestra* (New York: Henmar Press, 1960).

_____, *Notations* (Something Else Press, 1969).

_____, *Music for Carillon No.1:* graph version (New York: Henmar/Peters, 1961).

_____, *Ryoanji* for flute with percussion or orchestral obbligato and ad libitum with other pieces of the same title. (New York: Henmar, 1984).

Cardew, Cornelius, 'Wiggly Lines and Wobbly Music' *Studio International*, Art and Experimental Music, 192 No. 984 (November/December, 1976), 249-255.

Chipp, Herschel, B., *Theories of Modern Art* (Berkeley; London: University of California Press, 1968).

Clarke, Eric, Cook, Nicholas, Harrison, Bryn & Thomas, Philips (2005) 'Interpretation and performance in Bryn Harrison's être-temps' *Musicae Scientiae*, 19, (1), 31-74.

Cope, David, *Techniques of the Contemporary Composer* (United Kingdom: Schirmer/Thomson Learning, 1997).

Dick, Robert, *The Other Flute* (London: Oxford University Press, 1975).

Dick, Robert, *Tone Development through Extended Techniques*
(St Louis: Multiple Breath Company 1986).

Dillon, James, *East 11th St NY 10003* (London: Edition Peters, 1983).

_____, *Sgothan* (London: Edition Peters, c1985).

_____, *Windows and Canopies* (London: Edition Peters, 1988).

Düchting, Hajo, *Paul Klee – Painting Music* (Munich; London: Prestel, 2004).

Dutilleux, Henri, *3 strophes sur nom de Sacher* (Paris: Heugel & Cle, c.1982).

Escher, M.C., *The Magic of M.C. Escher* (London: Thames & Hudson, 2000).

Feldman, Morton, ed. Zimmermann, Walter, *Essays* (Kerpen: Beginners Press, 1985).

_____, *Give my Regards to Eighth Street*, ed. B.H. Friedman (Cambridge, Mass.: Exact Change, 2000).

_____, *Piano and String Quartet* (London: Universal Edition, 1985).

Ferneyhough, Brian, *Collected Writings*, ed. James Boros and Richard Toop (London: Harwood, 1996).

_____, *Cassandra's Dream Song* (London: Edition Peters, 1975).

_____, *Unity Capsule* (London: Edition Peters, 1975).

François, Jean-Charles, 'Organization of Scattered Timbral Qualities: A Look at Edgard Varèse's Ionisation' *Perspectives of New Music*, Vol. 29, No. 1 (Winter, 1991), 48-79.

Griffiths, Paul. *Modern Music and After* (Oxford: Oxford University Press, 1995).

Grisey, Gérard, *Modulations* (Paris: Ricordi, 1978).

Ingram, James, 'The Notation of Time', *Contact*, *29* (Spring, 1985) 20-27.

Kandinsky, Wassily, *Concerning the spiritual in art* (London: Tate, 2006).

Kerstens, Tom, 'The New Orchestra No. 14 The Guitar. Part 1. Tom Kerstens looks at techniques for the guitar.' *New Notes* spnm (London: March, 2005) 4-5. Part 2. (London: April, 2005)

Klee, Paul, *Notebooks. Vol 1: the thinking eye* (Lund Humphries: London, 1961).

_____, *Pedagogical Sketchbook* (Faber and Faber, London, 1968).

Kramer, Jonathan D. *The Time of Music* (New York: Schirmer Books, 1988).

Levine, Carin. *The Techniques of Flute* Playing (Kassel: Bärenreiter, 2002).

Ligeti, György, *Atmosphères* (Wien: Universal, 1963).

Penderecki, Krzysztof, *Threnody to the Victims of Hiroshima* (Melville (N.Y): Belwin Mills, 1961).

Pritchett, James, *The Music of John Cage* (Cambridge: Cambridge University Press, 1996).

Rees, Carla, & Burnand, David, 'Composing for Quarter Tone Alto Flute', RCM London [CD-ROM]*,* (London, 2003).

Rose, François, 'Introduction to the Pitch Organization of French Spectral Music' *Perspectives of New Music*, 34 No. 2 (Summer, 1996), 6-39.

Saariaho, Kaija, *Lichtbogen* (Helsinki: Edition Wilhelm Hansen, 1992).

Saunders, James, Interview with Rebecca Saunders (unpublished).

Saunders, Rebecca, *Quartet* (London: Edition Peters, 1998).

Schattschnieder, Doris. *M.C. Escher: Visions of Symmetry* (London: Thames & Hudson, 2004).

Shostakovich, Dmitrıı Dmitrievich, *String quartet no. 8: op.110* (London: Anglo-Soviet Music, 1961).

_____, *Symphony No. 10, Op.93* (New York: MCA Music, 1955).

Schuller, Gunther and Varèse Edgard, 'Conversation with Edgard Varèse' *Perspectives of New Music*, Vol. 3, No. 2 (Spring-Summer, 1965), 32-37.

Sciarrino, Salvatore, *Codex Purpureus* (Milano: Ricordi 1983).

Smalley, Denis, 'Spectromorphology: explaining sound-shapes' *Organised Sound* ***2*** (*2*) (Cambridge University Press, 1997), 107-126.

Toop, Richard, 'Four Facets of 'The New Complexity' *Contact*, 32 No. 1 (Spring, 1993), 4-50.

Varèse Edgard, *Ionisation* (New York: Colfranc, 1967).

ed. Villars, Chris, *Morton Feldman says: selected interviews and lectures 1964-1987* (London: Hyphen, 2006).

Webern, Anton von, *String quartet* (London: Boosey and Hawkes, 1965).

Wright, Roger, 'James Dillon' *Contact*, 24 (Spring, 1982), 20-23.

Xenakis, Iannis, *Architect, Composer, Visionary, Drawing Papers 88*, Essays by Ivan Hewitt, Carey Lovelace, Sharon Kanach, and Mâkhi Xenakis (The drawing center, 35 Wooster Street, New York, NY 10013, 2010).

_____, 'Concerning Time' *Perspectives of New Music*, 27 No. 1 (Winter, 1989), 84-92.

_____, *Formalized Music: thought and mathematics in composition* (Stuyvesant, NY: Pendragon Press, c1992).

_____, *Metastaseis* (London: Boosey and Hawkes, 1967).

_____, *Music and Architecture: architectural projects, texts and realizations*, compilation, translation, and commentary by Sharon Kanach (Hillsdale, NY: Pendragon Press, c2008).

Webography

Cage, John, *Atlas Eclipticalis* <http://www.johncage.info/index2.html>
accessed 23/01/09.

Deruchie, A 'Messagesquisse (1976-77)', page oeuvre@22301, 18/03/09,
<http://www.smcq.qc.ca/smcq/en/ouvres/223/01.php>
accessed 22/03/09.

Dolan, Chris, 'Boötes' (n.d.)
<http://www.astro.wisc.edu/~dolan/constellations/constellations/Bootes.html>
accessed 15/07/06.

_____, 'The Constellations and their Stars' (n.d.)
<http://www.astro.wisc.edu/~dolan/constellations/>
accessed 30/01/09.

Jones Hugh R. A.; Butler, R. Paul; Tinney, Chris G. Marcy, Geoff W.; Penny, Alan J.; McCarthy, Chris;Carter, Brad D. (Anglo-Australian Planet Search Team), 'An exoplanet in orbit around tau 1 Gruis' (16/09/2002) <http://arxiv.org/abs/astro-ph/0209302>
accessed 12/03/05.

Kaler, Jim, 'Betelgeuse' (n.d)
<http://www.astro.uiuc. edu/~kaler/sow/betelgeuse.html>
accessed 15/02/06.

_____, 'Constellation Maps'<http://www.astro.uiuc.edu/~kaler/sow/cm.html>
accessed 30/01/09.

_____, 'Procyon' (n.d) <http://www.astro.uiuc.edu/%7Ekaler/sow/procyon.html>
accessed 13/08/06.

_____, 'Sirius' (n.d) <http://www.astro.uiuc.edu/%7Ekaler/sow/procyon.html>
accessed 22/11/06.

n.a. 'Introduction to Black Holes',
<http://www.dampt.cam.ac.uk/user/gr/public/bh_intro.html>
accessed 16/03/07.

'Boötes' (n.a.) <http://www.seasky.org/pictures/sky7b04.html>
accessed 12/01/2007.

n.a., 'Spiral Galaxies' (n.d) <http://www.spiral-galaxies.com>
accessed 05/02/05.

n.a., 'Ryoanji' (n.d.) <http://www.johncage.info/workscage/ryoanji.html>
accessed 11/03/2010.

n.a., 'The list' (n.d.) <http://www.cello.org/Libraries/reference/rostropovich.html>
accessed 19/03/09.

Pioch, Nicholas,'WebMuseum, Paris Klee, Paul,' *Highways and Byways* photograph by Mark Harden (1 Jan 1996) <http://www.sai.msu.su/wm/paint/auth/klee/>
accessed 28/12/09.

Smirnov, N. Dmitri, 'Music and Morse code', (12/01/05)
<http://homepage.ntlworld.com/dmitrismirnov/MorseMusic.html>
accessed 19/03/09.

Snyder. Jeff, 'Pierre Schaeffer' <http://csunixl.lvc.edu/~snyder/em/shaef.html.>
accessed 21/01/09.

Tinney, Chris, The Anglo-Australian Planet Search 'How our planet search works' (n.d.)
<http://www.phys.unsw.edu.au/~cgt/planets/AAP_Home.html>
accessed 12/03/05.

Appendix 1:

Margaret Haley – selected works list not included in portfolio

Sea (2004) 6'
- saxophone quartet – soprano, alto, tenor, baritone

Rain (2005) 7'
- saxophone quartet – soprano, alto, tenor, baritone

Pegasus (2008) 7'
- flute, oboe, clarinet, bassoon, horn, trumpet, trombone 2 violins, viola, cello

The Poppy Field (2008) 12'
- a cappella choir – SATB

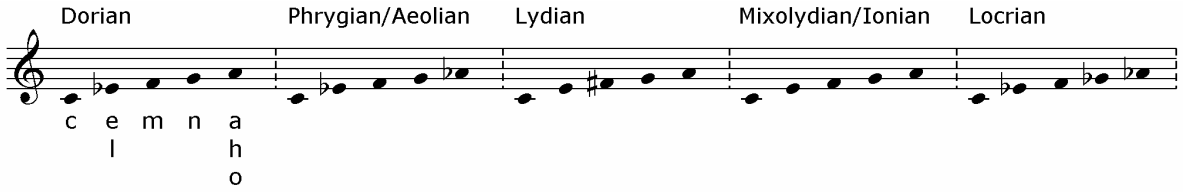
This work was developed for the Aire Valley Singers as part of the Adopt-a-Composer scheme, funded by the PRSF and run by spnm in association with Making Music.
First performance – The Aire Valley Singers, c. Doreen Anderson, 28 June 2008, St Paul's Church, Shipley, Bradford

Triangulum (2009) 20'
- flute, clarinet, soprano saxophone

Appendix 2:

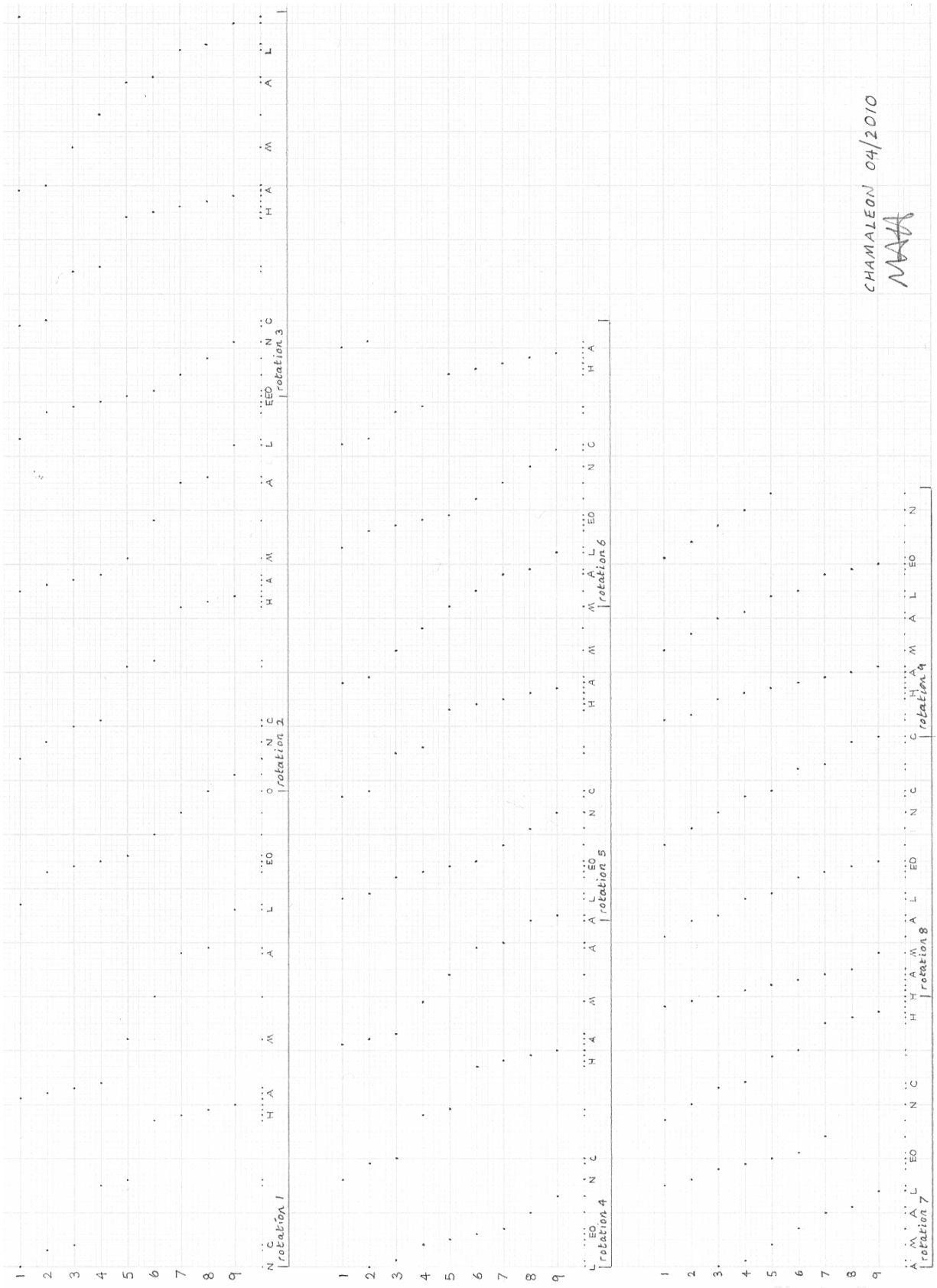
Future Plans

Using in particular, the names of constellations is going to be a means of generating pitch class and rhythmic models for several chamber ensemble projects. As demonstrated in 3.1: *Cloud* and 3.3: *Boötes*, the methodology used to generate pitch classes will provide modally orientated pitch material in these projects. As shown below, the letters C H A M L E O use a central pitch of C.



Chamaleon – pitch classes

As I found in 3.4.3: *Procyon*, I plan to use the number of letters in a title as the basis for instrumentation and of duration. For instance, the constellation of CHAMALEON plans nine minutes duration using the quaver beat as the basis of calculation, this is MM ♪ = 60. As my preparatory drawing shows over the page, there is translation of Morse code signals for my rhythmic models using the letters C H A M E L O N. They provide a structural framework contracting over time using rotation. The onset points (static dots) at this stage show only the instrumental order of (as yet undetermined) sustaining instruments.



Chamaleon – skeletal outline