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ON THE NATURE OF FIELDWORK A COMPOSER'S INTERDISCIPLINARY THEORY AND PRACTICE

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**ON THE NATURE OF FIELDWORK
A COMPOSER'S INTERDISCIPLINARY THEORY AND PRACTICE**

by

MATTHEW THOMAS MARTIN

**A thesis submitted to the University of Plymouth
In partial fulfilment of**

DOCTOR OF PHILOSOPHY

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ABSTRACT

The following text serves to accompany a body of practical work in music (composing) and mark-making. The two elements, when taken together, are an illustration of the role which certain types of fieldwork developed by the author may offer the composer if adopted into the process of acoustic invention.

The introduction sets forth the conditions in which such an approach to the relationship between the natural, the sonic and the visual becomes relevant and important. Ideas of interconnectivity are introduced and terms are defined.

Chapter two deals with the ideas of connecting patterns and sets of relationships in more detail, exploring the concepts of implicate order and recurring natural patterns. In chapter three we enter into discussion of fieldwork as a practice, encompassing theory and practical application.

Chapters four to seven concern themselves with the analysis of the compositions borne of the fieldwork in question, and enter into more detail about any fieldwork specific to the pieces themselves. The relationships between the pages of sketches and the written music is considered here from the musical point of view.

Finally, chapter eight acts as a brief conclusion to the study, in which we not only consider the results of the application of the fieldwork practice but also seek to identify which paths the continuation of this practice would benefit from and where we might take this work in the future.

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Acknowledgment

This research was undertaken, with the assistance of a part-time half fee bursary from Dartington College of Arts, as a personal exploration of alternative methods of acoustic invention, through relating my practice in this field to my interests and skills in others, principally visual art (mark-making) and the natural sciences. It has long been my conviction that there is a strong link between the natural world and the nature of music, and the opportunity to immerse myself in research in this area at Dartington has allowed me to make a genuine practice of this belief which will doubtless continue beyond the work presented here.

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I am also particularly grateful to Professor Cowie, whose practice as a composer and painter is closely related to my own, and precedes it in many areas. I wish to

acknowledge his global influence upon my work and my thinking, and thank him for the access he has generously given me to his own sketches and fieldwork, along with his explanations and illustrations of the processes involved in his work, and the relevance of certain key terms/ideas such as that of re-placement. Although only one specific reference is made to his thinking in the body of the thesis it is important to state that much of my work on the influence and process of fieldwork has been influenced by his own. Although I was already mark-making with a view to musical ends on beginning this research, and have ultimately taken the relationship between the natural, the visual and the sonic in a different direction to Prof. Cowie, it is important to point out that my starting point in this area was very much developed and nurtured under his influence.

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M T MARTIN

ON THE NATURE OF FIELDWORK:

A COMPOSER'S INTERDISCIPLINARY THEORY AND PRACTICE

DECLARATION

At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other University award.

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Part One

The Nature of Fieldwork

Chapter 1

Introduction

The work which accompanies this text, and is referred to throughout it, represents the result of a period of research into the nature of the sonic and the visual, referring specifically to the connectivity between the arts and the natural sciences. This work takes various forms: there are pieces of visual art, there are small sketches which use various mark-making and notational techniques, and principally there is music in the form of scores and recordings. Despite the diversity of media, this text seeks to illustrate that this is all work of a single type, unified at a deeper level by its fundamental concern with questions of interconnectivity within the arts and the natural sciences.

The connections between all things lie in the nature of their interstices. The character of any phenomenon, be it the work of an artist or the forces of nature, is communicated to us not only via the relationships between its constituent parts, but also the relationships between these relationships, and of these to the whole (including its surrounding silence in space and time). As artists, if we are to truly discover and express deep connections between all things, it is the nature of these connections which we must study and which must form the principal elements of our work – not the resultant behaviour of individual phenomena, no matter how evocative these may be. These external manifestations of connecting patterns are our only link to the deeper connections we seek, and thus our objective requires us to study them *implicitly*. This study must by its very nature be forced to take on several differing notational and exploratory disciplines, as it is only through viewing the same pattern through different media that we may distil its *explicit* inner nature.

This way we may note the common factors shared by different expressions of the subject of our study, and thus accord them particular significance.

That all things *are* connected has been the fundamental and personal notion which has underpinned this research from the very start. It is not an idea without precedent; philosophers and scientists, as well as artists, have taken this view, dating in some cases back hundreds of years. Leibnitz wrote, in the Philosophical Investigations of 1670, that he did 'not conceive of any reality at all as without genuine unity.' The one thing that connected all for Leibnitz was God, from which everything came. This 'truth' clearly explained the nature of all the connecting patterns Leibnitz observed in his work as a scientist and mathematician.

If the acceptance of God is removed from the equation, however, the connecting patterns do not disappear, and as science divorced itself from religion other explanations were sought for the observable connections of form and behavior between seemingly unrelated phenomena. The work of many scientists in this field has moved further and further towards the recognition of the importance of archetypal patterns to our understanding of forming and growing behaviors. The Victorian botanist, D'Arcy Wentworth Thompson, first published 'On Growth and Form' in 1917, in which he organized his study not by the genus or type of his subjects (which is a classification based entirely on the *explicit*) but by the formal properties they share. In other words he was concerned with what was *implicit* in his subject over the surface qualities of individual phenomena. Consequently his chapter on (for example) the spiral talks about horns, shells and plant stems in equal measure, each with reference to the theme of the energy or growth pattern which governs its behavior. In the last century many more scientists such as David Bohm and Gregory Bateson have taken this view, and written on what has been called 'the implicate order' or 'the pattern which connects'. More recently still, biologists have been concerned with theories of evolutionary development which

seek to understand the formative processes of nature according to the rules of taxonomy which appear to link so many diverse phenomena.

The idea of the same pattern appearing in various (and apparently unrelated) locations is crucial for an artist who seeks to incorporate the dynamic processes he observes in the natural world into abstract work. The important point here is that the work itself may remain entirely abstract in its content, while the disposition and interaction of the elements used therein can behave in a manner analogous to these processes. The potential analogy to natural processes lies in the *internal* makeup (or composition) of the work, rather than in its gestures. For this to happen, the work must remain centered on the spaces between its constituent parts. This approach also necessitates careful study of the natural patterns and forming behaviors in question (and here the work of scientists such as Thompson and Bohm is of great value). Always, we should be looking for evidence of the implicit in the explicit examples we study from nature.

The potential benefit of this approach in composing music is clear. The intention is to create a kind of 'nature-music' which seeks its generative impulses from outside the domain of music itself (it is *about* something non-musical). An awareness of the implicit characteristics of natural behaviors allows analogous sets of relationships to be *re-placed* into musical contexts, across scale and medium. This means that as composers who wish to incorporate the expressive and moving qualities of nature to music, we are no longer tied to simple re-creation of natural sounds (mimicry). Our work can remain sonically abstract, yet the disposition and behavior of the elements of which it is composed can display sets of relationships analogous to those we have studied in nature. Thus we do not expect the listener to recognize in the music the various explicit natural instances of these patterns that we may have studied. Rather their overall sense of the music may share certain qualities with that which they experience when in the presence of one of those natural forms. The

music becomes no more or less than another example of the natural forming processes at work, but it is no longer an imitation or reflection of one.

The painter, musician and art theorist Paul Klee writes in his Bauhaus notebooks on this precise subject: the importance of the forming energies over that of fully formed phenomena:

'Form is set by the process of giving form, which is more important than form itself...

'What is good is form as movement, as action, as active form. What is bad is form as immobility, as an end... Form is the end, death. Form-giving is movement, action. Form-giving is life. These sentences constitute the gist of the elementary theory of creativity.'

Klee clearly stresses, from the outset, that the reason *why* things take on their shape is more important than the shape itself. An awareness of evidence of implicit dynamic processes of formation, visible in explicit examples, is again not a recent phenomenon. In fact, it seems clear that the ancient Chinese philosophers of the twelfth century were already speaking of *li*, a term which David Wade in his small book of the same name translates as a concept which 'falls between our notions of pattern and principle'.²:

*'What we are dealing with here then are graphic expressions of a great range of archetypal modes of action, the traces of which may be found throughout the natural world. They present, in a traditional Chinese view at least, an order that arises directly out of the nature of the universe.'*³

It is important to note that the expressions of archetypal modes of action are *graphic*; that is, we see them in markings and shapes etc. The possibility of an important presence of a strong and fertile link between the sonic and the visual is impossible to ignore here. The visual nature of the subject also suggests methods of

¹ Klee, Paul – Notebooks, vol. 2, The Nature of Nature – Overlook Press, 1973, p. 269

² Wade, David – Li, Dynamic Form in Nature – Wooden Books, 2003 – p. 1

³ Wade, David – Li, Dynamic Form in Nature – Wooden Books, 2003 – pp. 1-2

study which concentrate upon this aspect, notably a mark-making fieldwork which isolates the various patterns found in each subject. We remember here that at the outset of this text we asserted the importance of using 'several differing notational and exploratory disciplines' in our fieldwork, 'as it is only through viewing the same pattern through different media that we may distil its *explicit* inner nature' (p. 14).

The musical reaction to this has been to explore the creation of a 'music of relationships', in which the spaces and relationships (interstices) between events (on all scales) take precedence at the point of composition. If we accept that the character of a work lies in these interstices, we can conclude that to accord them such importance when composing is to accept the possibility that music may begin to express deeper patterns present in the natural world. We may remember here Messiaen's observations on Stravinsky's rhythmic material in moments of 'Le Sacre du Printemps', which hint at fundamental patterns deep within the mathematical processes of his work. Messiaen makes the important point that the power in Stravinsky's work at these points is present because of these patterns *regardless of whether or not Stravinsky was aware of using them*.

*'...a music more or less "ametical", necessitating precise rhythmic rules. Recalling that Igor Stravinsky, consciously or unconsciously, drew one of his most striking rhythmic procedures, the augmentation and diminution of one rhythm out of two... from the Hindu rhythm simhavikrīdita...'*⁴

In other words, the fundamental patterns that parts of the piece tap into transcend the immediate qualities of the individual work (or 'external manifestation'), and appeal directly to a deeper (unconscious) sense of natural energy.

These considerations lead to a re-balancing of the importance of space and time in our sense of music. What has generally been accepted as a primarily temporal art begins to take on a more spatial, pictorial quality, as we think less of detail and

⁴ Messiaen, Olivier – 'Technique de mon Langage Musical' (2 volumes), Éditions A Leduc, Paris, 1944, p. 9

more of the distribution of events. Naturally the temporal aspect of music cannot be removed (always, one element of music must follow another, and each element must have the quality of duration), yet it is possible to see the passage of time in much the same way as a picture plane, the relationship between sound and silence analogous to that between the blank plane and the point or line. The American composer Morton Feldman was very interested in the time/space relationship in the abstraction practiced by his contemporaries in the fields of visual art and literature. He cited Samuel Beckett on this aspect of abstraction:

*'Time has turned into space and there will be no more time.'*⁵

When considering music in these terms, notions of detail in harmony (pitch content) and melodic contour become secondary to larger scale ideas of balance and placement of elements, and the process of composing becomes more akin to the distribution of points upon a picture plane, taking into account the tensions created by their position. The possibility therefore exists to create music which does not proscribe input from the composer at a level based on intuition or taste in favour of detail based on natural models. Rather the music may still welcome individual generation of abstract material (pitch and rhythm generation, for example) from a purely musical perspective, taking account of the composer's intuition and taste, and yet allowing the music to behave according to natural models as discussed. In other words, it is not the point or line itself which acts isomorphically to nature, but the way in which it is treated in the process of composing.

The composite 'sound' of pictorial elements is in fact something on which both Wassily Kandinsky and Paul Klee wrote as part of their Bauhaus work (during the 1920s), in which they were exploring the abstraction of pictorial elements. Kandinsky writes, with specific reference to the sound of pictorial elements as set against the blank picture plane, as follows:

⁵ Quoted in essay on Feldman's early piano music by Art Lange, reproduced in Feldman – The Early Piano Works', Hat Recordings, 2003

'Purely theoretically, the point... should in certain cases constitute a sufficient means of expression by being juxtaposed with the surface...

'If, then, one is to judge a work of art on a qualitative basis, a composition requires a minimum of two sounds'⁶

He goes on to describe the changing of the tension created by the position of the point on the plane – from the 'unison' of the central position ('the relative portion emanating from the surface cannot be calculated... Tracing composition back to the single, primordial element'⁷) to the '*Zweiklänge*' of an acentric composition.

'the dual nature of the sound becomes audible:

1. The absolute sound of the point,

2. The sound of its given position on the plane.

This second sound, which is almost completely drowned in the case of a centralised structure, is clearly heard again, transforming the absolute sound into a relative one.'⁸

Kandinsky is clearly writing about the 'sounds' of relationships between elements in space as well as time: the movement of the point from the centre of the plane causes a distinct change in 'sound'.

The music that has been produced through the course of this research reflects this shift from conventionally accepted musical concepts towards spatial ideas, by displaying a marked change from complex music to work of increasing simplicity. It is upon removing levels of complex activity within music that the interstices contained within it have been permitted to display themselves more fully, and their qualities have been given the necessary space to sound effectively. John Cage has compared the musical concern with the careful placement of a few elements to the

⁶ Kandinsky, Wassily – Point and Line to Plane, in 'Kandinsky – Complete Writings on Art', Lindsay & Vergo (eds), da Capo Press, 1994 – p.550-553

⁷ Kandinsky, Wassily – Point and Line to Plane, in 'Kandinsky – Complete Writings on Art', Lindsay & Vergo (eds), da Capo Press, 1994 – p.552

⁸ Kandinsky, Wassily – Point and Line to Plane, in 'Kandinsky – Complete Writings on Art', Lindsay & Vergo (eds), da Capo Press, 1994 – p.552

Japanese practice of making stone gardens, stressing the importance of the surrounding silence:

*'Not the stones – thinking of a Japanese stone garden – or their relationships but the emptiness of the sand which needs the stones anywhere in the space in order to be empty'*⁹

It is of course true that without the stones the relative notion of empty space disappears (Kandinsky – 'a composition requires a minimum of two sounds'). Equally, however, if the empty spaces which represent the relationships between the elements of a work are filled in, those interstices are lost, replaced by many, much smaller interstices which fundamentally alter the character of the work beyond recognition.

For this reason, the musician interested in an abstract 'music of relationships' must come to regard silence as an integral part of his work, and of equal importance to sound. The spaces between events in music give a very real sense of building or relaxing of tensions which have a 'sound' of their own, as in a painting. That the composer can use these spaces in a manner similar to the way he can use harmonic or melodic devices – to deliberately control the character of a work – is clear. One only needs to listen (for example) to the early piano works of Morton Feldman to hear this internal pattern formation at work. The distribution of points in space, be they simple or complex in their inner nature, is never clearer or more literal in music than in these small, quiet pieces. They are the sonic equivalent of the Japanese stone garden mentioned by Cage, and represent an absolute submission to the nature of the point on the plane as described by Kandinsky. These pieces of Feldman's are so abstracted that we have nothing left but the interstices he has produced to which we can attach our understanding, and having accepted this we find ourselves thrown into a world of tensions and connections, devoid of evocation

⁹ Cage, John – History of Experimental Music in the United States, reproduced in 'Silence', Marion Boyars, 1995 – p. 70

and sentiment. Although it was not Feldman's intention to explore scientific models in his work, it is clear that this stark level of simplicity in music holds great potential for the expression of fundamental time-space relationships.¹⁰

The importance of space in music, and the consequent re-assessment of the hierarchy of elements in the art is considered in John Cage's writing too. In his case he is concerned with the nature of sound itself, although we may find his conclusions to be in accordance with those which we are drawing with regard to simplicity and silence here:

*"The opposite and necessary co-existent of sound is silence. Of the four characteristics of sound [pitch, timbre, loudness and duration], only duration involves both sound and silence. Therefore, a structure based on durations (rhythmic: phrase, time lengths) is correct (corresponds with the nature of the material), whereas harmonic structure is incorrect (derived from pitch, which has no being in silence)."*¹¹

The preference for simplicity in a music that seeks to explore relationships must also consider our perception of these relationships. We have stated already that our perception of all things is dependent on our assessment of the relationships of which they are composed, but Cage also quotes Eckhart in relation to this:

*"Is counterpoint good? "The soul itself is so simple that it cannot have more than one idea at a time of anything... A person cannot be more than single in attention"*¹²

¹⁰ Feldman's compositional choices of sonic elements reveal 'not only pitch, but gesture, shape, density, resonance. These are, primarily, sparse, transparent, considered aural objects, and the silences between the sounds are not empty space, but indicate the environment in which these self sustaining tones emerge, flourish, and recede.' Again we are reminded of Cage's analogy with the Japanese stone garden.

- From an essay on Feldman's early piano music by Art Lange, reproduced in Feldman - The Early Piano Works', Hat Recordings, 2003

¹¹ Cage, John - Forerunners of Modern Music, reproduced in 'Silence', Marion Boyars, 1995 - p. 63

¹² Cage, John - Forerunners of Modern Music, reproduced in 'Silence', Marion Boyars, 1995 - p. 64

What Cage does not touch on here is the implication of his reading of Eckhart. If indeed we are unable to pay attention to more than one thing, how do we perceive (e.g.) harmony and counterpoint (for there can be no doubt that we do)? The question suggests once again the importance of relationships in space and time. Remembering that we can only receive news of *difference*, our attention (or perception) should in any case be focused upon the *space between* any elements which make up a complex. The idea that only one relationship may hold our attention is compatible with this, and gives rise to the following schematic diagram, where A = the focus of our attention:

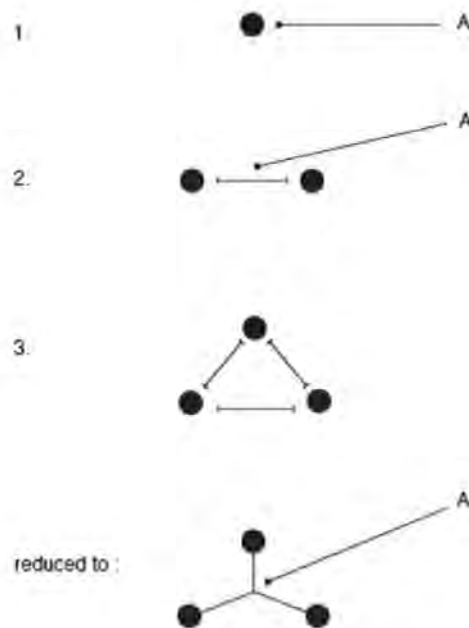


Fig. 1 – The focus of attention in relation to interstices

We see then that even in complexes of more than one interstice the set of relationships can be reduced to a single point – the point at which our attention must focus (or in some complex cases a single interstice between two reduced points

– the result is always a reduction to the state depicted in 1 or 2 above).¹³ Naturally, the perception of the individual sounds of particular interstices is impoverished each time a new relationship is added to the complex. We begin to hear a *composite* sound, which we accept may in some cases be useful and desirable to the composer. The illustration does, however, serve to show the value of music as divested as that of Feldman in the exploration of fundamental bipolar energies. It would be easy to forget the next level of complexity, which explores the relationships between such forms as 3 and as 1 above – relationships do not confine themselves to existing between two or more events of the same type. Kandinsky touches upon the acceleration of complexity beyond the constituent parts of a work when he speaks of the distinct sound of the *Zweiklänge*.

The importance of first-hand fieldwork in observing the explicit manifestations of implicit patterns is difficult to ignore. It is natural that due to the references to art theory, to which we have already had recourse in exploring the nature of our subject, we should turn to mark-making as a primary methodology for notating the interstices we can observe in nature. Of course, as was stated at the outset, mark-making alone is likely to have the same limitations as music alone when searching for deeper-level connecting patterns, although the very act of turning to a medium other than that for which the research is intended (in this case music) widens the angle from which the subject is seen.

A varied notational practice is likely to produce the fullest results and allow the composer the most possibility to select those elements which appear to offer most to his intuitive sense of musical construction. As notators we have several possibilities at our disposal. In addition to mark-making or sketching, we are able to make notes in both the written word and in some cases directly into musical notation. This

¹³ Incidentally, it is interesting to note that the behaviour of the focal point in the diagram is directly analogous to behaviour noted in complexes of bubbles, which will always re-adjust to allow for the minimum number of flat surfaces between them when they join in a foam. This area-minimisation pattern is discussed and illustrated in excellent detail by Philip Ball in 'The Self-Made Tapestry'. OUP, 1999, pp. 16-25

latter practice is especially revealing when notating the non-sonic, as is the use of abstract mark-making when notating sound (see chapter 3). Whilst developing the work that accompanies this text it has been useful to keep extensive notational documents using all three of these methods in note- and sketchbooks which will be looked at more closely in chapter three. These documents in themselves chart a progression both from complexity to simplicity and from a representational to an abstract approach in mark-making. The approach, particularly to this latter practice, requires some careful thought with regard to the balance of accuracy and perceptibility in documentation, to arrive at the most appropriate method(s) of notation for further study which may lead to genuine artistic ends (be these musical or otherwise). It is interesting to note that Klee also was aware of this compromise which is to be made between accuracy and perceptibility, and reference to his notebooks on the subject is of great value in defining mark-making techniques which can be used to good effect. He writes on notions of a scale between points, measurable in clear divisions not unlike those of a musical scale, applied to light and shade, to intensity of colour or to linear movement:

'The natural unarticulated crescendo or diminuendo must be exchanged for an articulation of the up and down, for a ladder or scale. We thus obtain distinguishable points of special appearance. In so doing we should keep the points far enough apart, while the tonal intervals should be the same throughout.'



this balance in nature.

*this balance synthetic, impoverished,
but clarified in perceptibility.*

Fig. 2 – From the notebooks of Paul Klee¹⁴

¹⁴ Klee, Paul – Notebooks, vol. 2, The Nature of Nature – Overlook Press, 1973, p. 313

Any point on this scale displays an inherent tension, the result of its position between the poles and the pull that each exerts upon it (cf. Kandinsky's point on the *Zweiklänge* of an acentric relationship between point and plane). The application of a synthetic scale allows these tensions to be measured, calculated and studied. Klee refers to 'the structured division of tones we find in musical scales.'¹⁵ and his illustrations in his notebooks of how this works by using the stepwise divisions to transcribe music are clear and accurate, and show a distinct analogue between the two disciplines.

Klee also explored the mathematical qualities of such an approach. He writes on the definite qualities contained within the relationships between the point on the scale and the two poles, here concerned with the scale from black to white. His conclusions have the ring of scientific thought:

'Pricking our ears upwards, we hear the white hiss in the distance, which we estimate at five miles. Harkening down below, we perceive a muffled thundering in the depths, the distance of which we also put a five miles.

'Next other points pique our curiosity. We move up a bit, to assess the new effect. At this new point above the middle the sound of white has grown much louder, while black has slipped back to half strength, a very low sound indeed. This is the point at which the effect of white is doubled while that of black is halved.

'The distances are in inverse proportion to the effect. When the distances from white and black are as 1:2, the effects of white and black are as 2:1...'¹⁶

Klee's careful balancing of polarities is at once poetic and mathematical, and is made explicitly clear by his diagrams (hand drawn in the original). It has direct bearing on his artistic practice also, and relates particularly to his technique of mixing black and white watercolours in carefully calculated parts (five parts black to five parts white, or seven parts black to three parts white, etc.), so as to control and

¹⁵ Klee, Paul – Notebooks, vol. 2, *The Nature of Nature* – Overlook Press, 1973, p. 347

¹⁶ Klee, Paul – Notebooks, vol. 2, *The Nature of Nature* – Overlook Press, 1973, p. 311

exploit the various relationships available within the medium. A large proportion of his work also clearly shows this approach in the mixing and application of coloured paints.

Thus we can see that the point may be plunged into a set of relationships by considering its position between the poles of various scales; light and dark, colour, distance etc. The single entity, alone in chaos, becomes ordered and its qualities abstracted. Again Klee notes this with the following diagram:

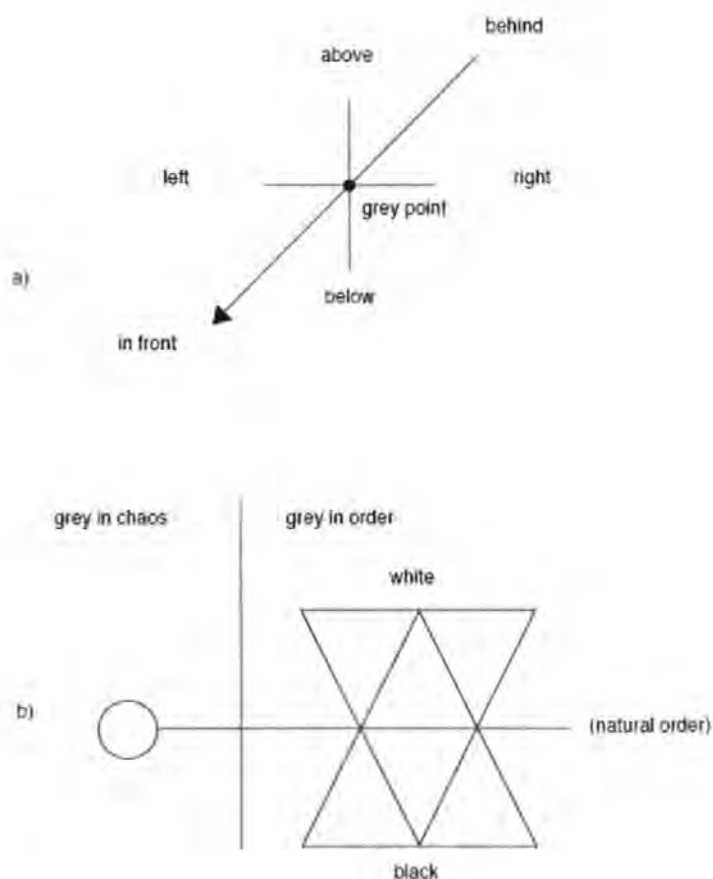


Fig. 3 – From the notebooks of Paul Klee¹⁷

¹⁷ Transcribed from Klee, Paul – Notebooks, vol. 1, The Thinking Eye – Overlook Press, 1961, p. 4

Mark-making is an extremely effective form of expression, which offers solutions to notational problems encountered when attempting to describe or analyse something using only written language. It has an instinctive quality which can be revealing and informative. Often we do not know what we realise about something until we have drawn that aspect of it and can look upon it in isolation. We can see this in the cave art of the Upper Palaeolithic period, in which certain vital aspects of survival (such as food sources) were 'fixed' upon walls in an attempt to better understand them (see chapter 3). Not dissimilarly, Klee resorts instinctively to mark-making as part of his notational process, as is shown by the quality of the drawing reproduced on page 25. The work is clearly a reaction to a thought or observation, expressed more concisely in this manner than it would be possible to achieve with another medium or language. It is also likely that this form of notation is quicker than any other (again suggested by the qualities exhibited in Klee's drawing), offering an opportunity to capture an instinctive reaction to the subject.

Perhaps, then, it is natural that mark-making should suggest itself as an appropriate method of conducting fieldwork when dealing with observations on the natural world, and we will explore this in more detail in chapter 3. The quick and expressive insight offered by sketching not only 'fixes' the very qualities of a phenomenon which are relevant to the work in hand but causes the observer to consider which elements of the subject give it its defining characteristics – in this case we refer to sets of relationships which imply underlying patterns. Alongside this we may employ the direct links between theories of music and visual art to replace the information collected through mark making into musical contexts which remain abstract and do not become loaded with either mimicry or symbolism. In this way we may carry through our work, from observation to analysis to composition, those aspects of our subject(s) hold the potential to be truly expressive of their *implicate order*.

Chapter 2

Interstices: Approaches in mark-making and the study of connecting patterns

As has been stated, it is not the intention of this text to attempt to explain and justify the imitative re-creation of natural sound or even of subjective impressions of landscape in musical terms, albeit that these are valid musical idioms which have a rich heritage and may offer insight along the course of our study. Rather, it is (as we have seen) to explore the possibilities associated with the isolation and application of natural formal principles – both sonic and otherwise – to abstract, and intuitively generated, musical ideas. In other words, rather than attempting to ‘paint a picture in sound’, our interest lies with a hypothesis which states that music as a language may be able to express formal/harmonic states and energies present in nature through abstraction, juxtaposition, concurrence, isolation *etc.* The intention is to create a music which we hope may provoke in the listener an unconscious sensuous reception similar to that which they may receive from nature itself, grasping the patterns and forms which create our sense of order, yet making direct reference to no explicit separate phenomena at the finished stage. To quote Victor Weisskopf, physicist and pianist, “What is beautiful in science is the same thing that is beautiful in Beethoven. There’s a fog of events and suddenly you see a connection. It expresses a complex of human concerns that goes deeply to you, that connects things that were always in you that were never put together before.”¹⁸ Again, we are faced with the identification of a relationship as the source of a thing’s quality – the value of interstices is clearly stressed.

The essential notion, then, is one of a musical language made up of various approaches and techniques – methodologies which consider the evolution and presentation of sonic material in response to diverse observations of nature. Existing

¹⁸ Quoted in Carroll, Sean B. – *Endless Forms most Beautiful* – Norton, 2005, p.14

musical languages may offer different perspectives, both alone and in conjunction with one another, and several of the important aspects of other linguistic areas are to be considered and drawn upon at later stages. The languages of visual art, mathematics and the written word may offer considerable insight when considering the development of a musical vocabulary. Music itself is often referred to as a language; it has been developed over centuries through the refinement of techniques still in use today. As such it already offers many solutions to the problems inherent in such a hypothesis as ours. We may see that many ancient musical techniques already reflect certain natural energies (knowingly or otherwise), and offer not only possibilities for the creation of music in this manner but also examples of how natural patterns can be re-placed into musical contexts.

To compose (music, or indeed visual art, literature etc.) is undoubtedly to *put in order*. The arrangement of the elements which make up any whole are, if we accept the importance of interstices, the seat of that whole's identity, both in terms of style and idea. As a species, our understanding of our surroundings is borne of an innate curiosity which is driven by a fascination with perceptible order visible in most of our scientific and artistic practices. We have developed methods of notating and studying elements of the order we discover which have deepened our understanding of their subjects to an extraordinary degree, and continue to expand our methods and languages for this purpose. The love of order which allows us to grasp what we consider to be the primary aspects of nature and of life is of course the origin of analytical thought, dating famously back to the ancient Greek thinkers, mathematicians and artists, but in fact extending as far as we have been able to trace the history of human behaviour. The desire to grasp more fully the insight that the perception of order hints at, has necessitated the development of languages which express what is, at least to begin with, fundamentally unknown, for it is through notation and examination of any new subject that our knowledge of it can grow.

But from where does this order which fascinates us originate? The natural world is constantly in a state of flux, yet within this there is a consistent quality to which we can adhere and upon which we can base our understanding of it. There is a reliable consistency in the apparent force or energy which causes (for instance) all plants to grow according to the way they, as a species, have grown previously, or in the invisible rule which ensures all butterflies retain their defined shape and symmetry. The taxonomy and formative principles of everything nature manifests seems in some way determined by an overarching sense of pattern, individual expressions of that pattern simply 'falling into place' as they form. We cannot, however, know these patterns first hand, or truly grasp how the connections they produce can be defined, because they represent the formative energies *behind* what we see, and as such our knowledge of such causes can only be gained by inference – through careful observation of the individual instances of these patterns, following Thompson's model (p. 15).

Imagine, if you will, an unseen stock of primary, archetypal patterns – simple patterns that we see everywhere such as regular repetition, formal symmetry, logarithmic growth, period doubling, spiral movement and the like – most likely a stock comprising a relatively small number of patterns, from which all natural phenomena are generated. Just as we may see in a kaleidoscope, where the tiny coloured particles seem to 'fall into place' as the device is turned, each time creating a different expression of the same type of 'snowflake' symmetry (due to its adherence to an overarching pattern on a higher level, which is in itself a fundamental part of the thing's design), it would appear that natural forms, despite being individual, relate to a higher archetypal pattern or combination of patterns 'present' somewhere behind the visible world. For instance, in the forming of a galaxy or of a snail's shell, somehow the spiral 'template' imposes its precise and definite structure upon the process and thus advises us of its existence. In the words of scientist and philosopher David Bohm:

*Not only is everything changing, but all is flux. That is to say, what is is the process of becoming itself, while all objects, events, entities, conditions, structures, etc., are forms that can be abstracted from this process.*¹⁹

That certain patterns dominate the formative processes of the natural world in such a way, is indeed an intriguing possibility. Certain shapes or methods of growth have doubtless proved themselves to be stronger; have more longevity or be more appropriate for certain purposes according to Darwin's notion of natural selection, and become dominant in their role. But what is truly fascinating here is that the same patterns seem to appear in disparate places and at extremes of scale, and that wherever we look we can see still only a small number of different patterns which connect various phenomena at various levels. In addition to this, it would appear that there is little pull away from the conformity to fundamental simple patterns in any aspect of nature. The rigidity of this notion is reminiscent of the classroom experiment in which a magnet is placed under a sheet of paper supporting a dust of iron filings. Although it is impossible to predict the exact point at which each piece of metal will find itself as a result of the magnetic force, a few repetitions of the experiment will show that we can reasonably expect the filings to assemble in a certain shape and orientation. This is also true of, for instance, an oak tree, which we know will grow in a certain way (e.g. upwards from the ground, branching at relatively regular intervals) but which we would not be able to describe in detail before the individual tree had formed. The direction and shape of the branching, for example, differs from tree to tree; the act of branching itself, however, is consistent. It is also far from irrelevant to note that many of these consistencies in observable 'rules' of nature adhere very strictly to behavioural patterns which can be repeatedly expressed by certain 'golden' numbers such as *pi* or *phi*, which have held great importance in mathematics for centuries.

Bohm begins his book *Wholeness and the Implicate Order* with a hypothesis which draws upon this idea of individual instances in nature being indicative of the more

¹⁹ Bohm, David – *Wholeness and the Implicate Order* – Routledge, 1980, p. 61

general patterns behind them. They are, however, the only explicit expression of these patterns available to our senses:

The proposal for a new general form of insight is that all matter is of this nature: That is, there is a universal flux that cannot be defined explicitly but which can be known only implicitly, as indicated by the explicitly definable forms and shapes, some stable and some unstable, that can be abstracted from the universal flux...

...in spite of the undivided wholeness in flowing movement, the various patterns that can be abstracted from it have a certain relative autonomy and stability.²⁰

Thus for art to relate directly to the fundamental patterns which govern the formation of everything in nature, we must turn again to study, and to fieldwork, for the purpose of abstracting these patterns from definable forms.

We are aware of the power of images to help explain and understand difficult or unknown quantities – consider the inadequacy of spoken language when trying to explain the irregular shape of a cloud or the trajectory of a body in motion: how quickly these descriptions are made clear and understandable by the simple application of paper and pencil, or making shapes in the air with one's hands. Looking at any number of scientific texts will show how often authors need to resort to simple visual imagery in order to make clear their point. The essential notion here is that it appears to be necessary for the human mind to 'fix' the subject of its curiosity down upon some surface and investigate it at length through a process of observation. These processes of 'fixing', such as pictorial representation or distillation into eloquent equations by their very nature reduce the amount of variables the subject can exhibit, and deny it the possibility of changing over time – we, figuratively speaking at least, seem to need to reduce the amount of information to fewer dimensions, fewer details, in order to concentrate in particular on the

²⁰ Bohm, David – *Wholeness and the Implicate Order* – Routledge, 1980, p. 14

elements of the subject which are of interest to us. As is noted by Anthony Storr in *The Dynamics of Creation*, 'the power of abstraction is the beginning of wisdom.'²¹

Our ability to make these transitions in observational practice depends very much on our powers of perception. Our sense of order, it is generally accepted, relies upon our knowledge of disorder to make our observations clear, and in fact all qualitative or quantitative judgements we make through observation seem to be based upon relationships between opposite factors, be these order and disorder, dark and light or any other of the infinite polarities between which our senses oscillate. Gregory Bateson in *Mind and Nature* goes so far as to state that:

*Human sense organs can receive only news of difference, and the differences must be coded into events in time (i.e. into changes) in order to be perceptible. Ordinary static differences that remain constant for more than a few seconds become perceptible only by scanning. Similarly, very slow changes become perceptible only by a combination of scanning and bringing together observations from separated moments in the continuum of time.'*²²

We note once more that it is actually *the relationships between* different explicit expressions of implicit patterns which reveal the most about those patterns. Bateson refers to the comparison of comparisons in this way as 'third order connections' (see p. 48). Bohm writes in a similar vein, and puts the idea very clearly indeed:

*The essential reason or ratio of a thing is then the totality of inner proportions in its structure, and in the process in which it forms, maintains itself, and ultimately dissolves. In this view, to understand such ratio is to understand the 'innermost being' of that thing.'*²³

If it is relationships which allow us to perceive the natural world, then the same holds true of music, which, in the words of the American composer George Crumb .

²¹ Storr, Anthony – *The Dynamics of Creation* – Penguin, 1972, p. 181

²² Bateson, Gregory, – *Mind and Nature, a Necessary Unity* – OUP, 2002, p. 66

²³ Bohm, David – *Wholeness and the Implicate Order* – Routledge, 1980, p. 27

'might be defined as a system of proportions in the service of a spiritual impulse.'²⁴ Certainly, our perception of sound in general is based upon the sense of dynamic, register, timbre, proximity etc., all of which can be defined as points on a scale between polarities, and all of which take place within a temporal framework. This of course means that certain qualities that are crucial to the way we understand are exhibited by everything we sense as humans – including both music and nature – thus allowing certain relationships to be directly transposed, or *re-placed* between one and the other. However, as these relationships which define the character of phenomena are internal, they do not necessarily define the detail of any specific manifestation of their explicit expressions. The implication for the composer is, again, one of a certain freedom in detail, quite opposed to the constraints imposed by ideas such as direct sonic mimicry of nature.

* * * * *

The contemporary climate of artistic thought, one in which abstraction is accorded as much importance (if not more) as figurative depiction of external form, lends itself particularly well to this approach to understanding. A shift in emphasis is noted, particularly in the work of certain visual artists, from representation of the single, formed instance, to the abstract phenomenon that is the process of *form-ing*. We are reminded especially of Klee's emphasis of the importance of the 'way-to-form' over form itself, noted in chapter 1 (p. 17).

The importance, then, shifts from the expression of an energy (already formed) to the energy itself (that which does the forming) and this train of thought leads to the identification of connecting patterns and laws – or *energies* – which govern and shape our natural surroundings. There may be an infinite number of examples of an energy. Take as an example the idea – already mentioned – that no two trees are identical. Although they share certain elemental qualities, each has defining

²⁴ Gillespie, Don (Ed.) – *George Crumb, Profile of a composer* – Peters Edition, 1986, p.77

characteristics, shaped by the way in which they have grown (formed over time) and continue to do so. Despite this, all share a common denominator – a basic ‘treeishness’ – which means we are unable to mistake any example of tree-energy for another plant or animal, or in fact for anything other than that which it undoubtedly is.

Taking this view is not unlike searching for mathematical proofs. To a mathematician, any number of examples which collate with one another (in this case any number of trees exhibiting ‘treeishness’) are worth far less than a simple formula which guarantees that even if calculations are continued into infinity, a contradiction to the rule will never arise (‘it can be proved that we will never find a tree which does not fit our current definition of a tree’). In fact, to a mathematician, ‘proof’ of a theorem is not achieved until such a statement is discovered, no matter how many calculations are performed. At this point we stop looking for individual instances and begin looking at the patterns behind – or more accurately *the connecting patterns between* – the examples. The analogy may be extended to the replacement of numbers by letters in algebraic equations. In the tree equation, any particular tree can be replaced by the symbol *t*: therefore anything that can be applied to *t* can safely be assumed to apply to any actual tree. In this case we may define *t* as fulfilling certain criteria such as being made of wood, or forming according to a branching structure. The power of abstraction lies in that we are able to see beyond the singular instances into the overarching structures.

The identification of patterns occurs in many areas of thought, but it is my belief that despite this diversity these discoveries are made by a process of *fixing* by means of *notational practices* of varying types. The concept and purpose of fixing in this way has been put forward by David Lewis-Williams in his work on the cave artists of the Upper Palaeolithic. He proposes that these artists were part of a larger Shamanic culture in which altered states of consciousness played an important role. His interpretation of the images on cave walls, in particular the ‘abstract’ (or non-

representational) examples to be found in more remote parts of caves, is one which identifies them as an attempt to 'fix' what was experienced by the senses under altered consciousness upon a veil between internal and external worlds, or an effort to capture the nature of the experience. He adds the following with reference to the paintings of the South African San tribe:

*The painted images of another world made sense because of their location on the 'veil', the interface between materiality and spirituality. The rock wall on which paintings were placed was not a tabula rasa but a part of the images; in some ways, it was the support that made sense of the images. Art and cosmos united in a mutual statement about the complex nature of reality. The walls of the caves thus became gateways that afforded access to realms that ordinary people could not visit...*²⁵

The 'veil' is as important as the art in this case. It allows the essence of the subject to be fixed upon it for later study of its energies. We see, then, one of the earliest forms of art concerning itself not with the tree but with the t, or in Klee's terms with way-to-form over form itself. Even the representational art of the Upper Palaeolithic people may demonstrate this, according to Lewis-Williams, if he is correct in drawing the parallel between them and the San people. He argues that symbols stand for more than their representational value alone, albeit (in this case) due to a specific predefined codification of imagery:

*I realised that the ethnography – the San myths and their own explanations of specific images – did not explain the art in any direct sense. Even San people's comments on specific rock paintings [...] did not provide the simple answers for which researchers were hoping. On the contrary, both the ethnography and the art require explanation because both are permeated and structured by a set of metaphors and by San notions of the cosmos... Much of the painted and engraved imagery, even that which appears most 'realistic', is shot through with these metaphors and shows signs of having been 'processed' by the human mind as it shifted back and forth along the spectrum of consciousness.*²⁶

²⁵ Lewis Williams, David – *The Mind in the Cave* – Thames & Hudson, 2002, p. 149

²⁶ Lewis Williams, David – *The Mind in the Cave* – Thames & Hudson, 2002, p. 144

So the earliest known minds to have used notation-based procedures in their exploration of nature seem already to have been concerned with the notion of connecting patterns. These images – limited in vocabulary but with a host of symbolic attributes borne of observation – are presented devoid of any context. Often the feet of animals depicted upon Palaeolithic cave walls are missing, or appear to rest on nothing, causing the subject to ‘float’ in isolation, and thus giving even a representational image abstract qualities. The abstraction from such constraining frames as scale, gravity, context or depth found in these instances allows the symbols to be used solely in relation to each other, focusing the attention on the defining energies that the image is an example of. Thus the bison on a cave wall is not an actual bison rather than an image which evokes bison-like qualities.²⁷ It constitutes a *re-placement*, using an existing phenomenon to notate a certain bison-ness, or, to continue the analogy to algebraic formulae, it is an expression of *b*, shown in terms of an image which is in this case accepted as representing this expression.

* * * * *

Of course, connecting patterns do not simply connect bison with bison, or tree with tree, but interesting and enlightening connections are often visible between different expressions of a pattern. Naturally, something of *b* connects all mammals of bovine race, and on a looser level still, all four legged creatures, all creatures with horns, all mammals, all vertebrates, *etc.* until we are faced with all living and breathing organisms. The same is true of *t*, which connects ash and beech to palm, but also to any other branching structure. On some level *t* is expressed as effectively by the network of the human circulatory system, or by a definition such as:

²⁷ This notion of abstract symbols which depict the qualities of the subject rather than the subject itself is captured in a concise manner in the ancient runic alphabets of the Nordic people, which depict extremely stylised elements from natural forms such as animals and plants. As well as being used as an alphabet, these symbols were used individually or in groups as powerful talismans which invoked the qualities associated with the notated pattern. The Anglo-Saxon rune poem gives detailed examples of extractions of natural patterns as sources of energy, and exists in many forms. A concise and clear annotated translation exists in Paul, Jim – *The Rune Poem* – Chronicle, 1996.

$$G(n) = n - G(G(n-1)) \quad \text{for } n > 0$$

$$G(0) = 0$$

This definition, given by Douglas R. Hofstadter in his remarkable book *Gödel, Escher, Bach*, when plotted upon a plane shows a regularly branching structure which Hofstadter indeed refers to as a 'tree structure'. 'Quite simply,' he states 'if you construct a tree by placing $G(n)$ below n , for all values of n , you will recreate [the tree diagram.]'²⁸

Hofstadter's definition is also *recursive*, meaning that it refers to and relies upon itself on several levels, or that it is an example of nesting (not unlike a series of Russian dolls one inside the other). This is an example of one of the ideas at the core of his book, that of the *strange loop*, itself a natural pattern or energy exposed by a process of notation on several levels (in this case definitions, equations, graphs, dialogues...). The definition of tree-diagram G is recursive because inside each single expression of the diagram are two more instructions to carry out the same definition, each of which will contain two more instructions, *ad infinitum*. The sequence does not only continue infinitely, it descends through scales, too, becoming smaller with each new expression. Hofstadter's diagram (fig. 4) makes this clearer.

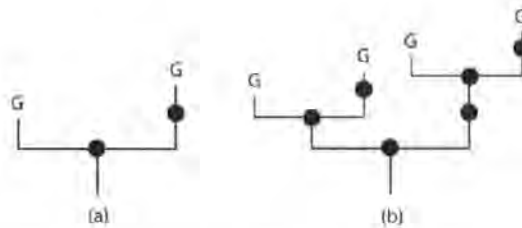


Fig. 4: a) tree diagram G , unexpanded; b) tree diagram G , expanded once. Inside each diagram representing G is the call to represent G two more times. The process 'grows' on into infinity. The black points represent 'nodes', or sets of instructions to follow as you proceed through the system. Nodes marked G are instructions to 'carry out' G before proceeding.²⁹

²⁸ Hofstadter, Douglas R. – *Gödel, Escher, Bach: an Eternal Golden Braid* – Penguin, 1979, p. 137

²⁹ Transcribed from Hofstadter, Douglas R. – *Gödel, Escher, Bach: an Eternal Golden Braid* – Penguin, 1979, p. 135)

As well as demonstrating the notion of the strange loop and providing possible insight into certain growth patterns, the diagram and definition also illustrate certain other patterns which occur surprisingly often in the natural world. Principally, the reduction in scale each time the diagram is expanded creates a *fractal symmetry*; the repetition of a pattern inside itself, and an important part of the wider scientific thought behind Chaos theory. Benoit Mandelbrot is widely recognised as having performed the most important research in the field of fractals, although the concept is perhaps most easily grasped through the work of two earlier mathematicians: Georg Cantor and Helge von Koch. In the book *Chaos*, James Gleick explains simply how to create the 'Cantor dust':

Begin with a line; remove the middle third; then remove the middle third of the remaining segments and so on. The cantor set is the dust of points that remains. They are infinitely many, but their total length is 0.³⁰

Drawn out, or notated, the Cantor set shows a reductive fractal symmetry not unlike that of the tree-diagram above. The set paradoxically diminishes into infinity. As does the Koch curve, which behaves in a similar way but forms outwards from a point rather than in the strict linear fashion of the other two examples. Mandelbrot described it as "a rough but vigorous model of a coastline."³¹ Gleick again describes the process well:

To construct a Koch curve, begin with a triangle with sides of length 1. At the middle of each side, add a new triangle one-third the size, and so on. The length of the boundary is $3 \times \frac{4}{3} \times \frac{4}{3} \times \frac{4}{3} \dots$ infinity. Yet the area remains less than the area of a circle drawn around the original triangle. Thus an infinitely long line surrounds a finite area.³²

³⁰ Gleick, James – *Chaos: making a new science* – Vintage, 1998, p. 93

³¹ Gleick, James – *Chaos: making a new science* – Vintage, 1998, p. 99

³² Gleick, James – *Chaos: making a new science* – Vintage, 1998, p. 99

These two processes are themselves recursive, in that each subsequent part of the diagram relies upon the previous one, just as the two new expansions of G in the tree-diagram are only called into being by the previous one.

The 'final' diagram borne of the Koch curve process resembles an infinitely complex snowflake pattern, although Mandelbrot's analogy to a coastline is far from inaccurate. In fact, it is in using this process of thought that he came to ask, in a now famous paper: "How long is the coast line of Britain?". The question seems simple enough but Mandelbrot's thinking led him to believe that the coastline could in fact be shown to be infinitely long:

Consider one plausible method of measuring, A surveyor takes a set of dividers, opens them to a length of one yard, and walks them along the coastline. The resulting number of yards is just an approximation of the true length, because the dividers skip over twists and turns smaller than one yard, but the surveyor writes the number down anyway. Then he sets the dividers to a smaller length – say, one foot – and repeats the process. He arrives at a somewhat greater length, because the dividers will capture more of the detail and it will take more than three one-foot steps to cover the distance previously covered by a one-yard step... Mandelbrot found that as the scale of measurement becomes smaller, the measured length of a coastline rises without limit...³³

This is so because a coastline is not a plain and simple Euclidian shape. It is irregular, full of coves and indentations which are visible at all levels. In fact, the 'magic' of a fractal diagram of this type is that when confronted with a series of pictures of it, taken at different levels of magnification, it is impossible for one to tell the difference between them. Computer generated 'coastlines' illustrate this very well, but it can be seen even by looking at our tree-diagram in fig. 4. How can we tell that figure 4(a) is in fact an unexpanded expression of G, and therefore begins at

³³ Gleick, James – *Chaos: making a new science* – Vintage, 1998, p. 96

G(0)? It could just as easily be an image taken from further up the tree, isolated and enlarged.³⁴

A selection from an early sketchbook of my own (plate 1) illustrates the Cantor set and the tree diagram through notational approaches to find some common ground with music.

One other pattern which permeates nature in many places and can be made visible in tree-diagram G is that of structure according to the Fibonacci sequence of numbers discovered by Leonardo of Pisa (son of Bonaccio, thus 'Fillius Bonacci', and hence 'Fibonacci') in the early part of the 13th Century. This is a sequence of numbers which is itself recursive, in that to obtain the next number in the sequence one must add together the previous two:

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, ...

Hofstadter points out that if the nodes in his tree-diagram are numbered in the order in which they are created then one can read the Fibonacci sequence upwards along the right hand edge of the diagram.

These numbers are important because of the fact that so many living and growing organisms seem to adhere to their pattern of gradual expansion or contraction by an amount constantly relative to their previous state. More often than not, this constant ratio represents what has come to be known as the *golden section*, namely the ratio of approximately 2:3, which is the proportional essence of the Fibonacci numbers (the higher up the sequence you are, the closer the ratios come to the 'true' *golden section*). This is referred to in D'Arcy Wentworth Thompson's *On Growth and*

³⁴ Further discussions of these patterns are to be found in Gleick, James – *Chaos: Making a New Science* (Vintage, 1998), and excellent pictures of fractal sets to be found in Benoit Mandelbrot – *Fractals: Form, Chance and Dimension* (W. H. Freeman, 1977).

Form, in connection with the growth of plants and of various equiangular spirals in nature:

Starting with the conception of a growing curve which should cut each radius vector at a constant angle – just as a circle does – Descartes showed how it would necessarily follow that radii at equal angles to one another at the pole would be in continued proportion; that the same is therefore true of the parts cut off from a common radius vector by successive whorls or convolutions of the spire; and furthermore, that distances measured along the curve from its origin and intercepted by any radii are proportional to the length of these radii. It follows that the sectors cut off by successive radii, at equal vectorial angles, are similar to one another in every respect; and it further follows that the figure may be conceived as growing continuously without ever changing its shape the while.³⁵

The implication of a form 'growing continuously without ever changing' is of course fractal, in that we will find smaller copies of the whole within itself, or at earlier stages in its formal process. This is also true of non-spiral forms such as trees (to continue our example) or other plants. Thompson describes this as the theory of gnomons:

There are certain things, says Aristotle, which suffer no alteration (save of magnitude) when they grow. Thus if we add to a square an L-shaped portion, shaped like a carpenter's square, the resulting figure is still a square; and the portion which we have so added, with this singular result, is called in Greek a 'gnomon'... Included in this important definition is the case of numbers, considered geometrically... which can be translated into form, by means of rows of dots or other signs... The square numbers have the successive odd numbers for their gnomons, as follows:

$$0 + 1 = 1$$

$$1 + 3 = 4$$

$$4 + 5 = 9$$

$$9 + 7 = 16 \quad \text{etc.}$$

And this gnomonic relation we may illustrate graphically by the dots whose addition keeps the annexed figures perfect squares:

³⁵ Thompson, D'Arcy Wentworth – *On Growth and Form* – Cambridge University Press, 1961, p. 177



Thompson notes one thing more which is of relevance to our investigation of the artistic value of Hofstadter's tree-diagram as a remarkable example of expression of energy over instance. His observation is more directly aimed at the similarity of gnomon theory to actual plant growth:

The cymose inflorescences of the botanists are analogous in a curious and instructive way to the equiangular spiral. [In such cases] we begin with a primary shoot from which is given off, at a certain definite angle, a secondary shoot: and from that in turn, on the same side and at the same angle, another shoot, and so on... The whole system is symmetrical: the angles at which the successive shoots are given off being all equal, and the lengths of the shoots diminishing in constant ratio.³⁶

Thompson's diagram (fig. 5) shows this (that is, the constancy of angles and ratios) to be true not only for spiral growing plants such as the borage, but also for the more common scorpioid branching pattern which balances secondary shoots on opposite sides of the principal stem. This creates a mirror image symmetry as opposed to the rotational symmetry inherent in a spiral helicoid form:

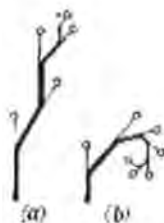


Fig. 5: a) a scorpioid; b) a helicoid cyme³⁸

³⁶ Thompson, D'arcy Wentworth – *On Growth and Form* – Cambridge University Press, 1961, pp. 181-18

³⁷ Thompson, D'arcy Wentworth – *On Growth and Form* – Cambridge University Press, 1961, p. 187

³⁸ Reproduced from Thompson, D'arcy Wentworth – *On Growth and Form* – Cambridge University Press, 1961, p. 187

So we see that what begins as a relatively simple notion and example thereof (namely that energies take the form of connecting patterns, using the example of the tree, or more precisely the acceptance of the notion that all trees share some level of distinct energy known here as *t*) can very quickly run through the strands which connect areas of thought as diverse as art theory, anthropology, science and mathematics. This is because the notion of connecting patterns is universally important – inescapable to a certain kind of mind in any area. As was mentioned in the last chapter, Leibnitz famously went so far as to assert that *all* things were connected in his theoretical thought, and that each represents the amalgamation of all things in some way:

Now this connection of all created things with each, and of each with all the rest, means that each simple substance has relations which express all the others, each created monad represents the whole universe.³⁹

One other such mind is that of Gregory Bateson, who actually offers his phrase *the pattern which connects* as an alternative title for his book *Mind and Nature*, in which he sets out to investigate the nature of such connecting energies. He begins his insightful thesis with an interesting and apposite anecdote in which he remembers being employed to teach a short course in biological scientific thought to a group of sceptical Californian art students:

I had two paper bags, and the first of these I opened, producing a freshly cooked crab, which I placed on the table. I then challenged the class somewhat as follows: "I want you to produce arguments which will convince me that this object is the remains of a living thing. You may imagine, if you will, that you are Martians and that on Mars you are familiar with living things, being indeed yourselves alive. But of course, you have never seen crabs or lobsters... I faced them with what was (though I knew it not) an æsthetic question: How are you related to this creature? What pattern connects you to it? So they looked at the crab. And first of all, they came up with the observation that it is symmetrical; that is, the right side resembles the left.

³⁹ Leibnitz, Gottfried, 1670 – source:

<http://www.spaceandmotion.com/Philosophy-Gottfried-Liebnitz-Philosopher.htm>

"Very good. You mean it's composed, like a painting?" (No response.)

Then they observed that one claw was bigger than the other. So it was not symmetrical...

Going back to symmetry, somebody said that "yes, one claw is bigger than the other, but both claws are made of the same parts."

Ah! What a beautiful and noble statement that is, how the speaker politely flung into the trash can the idea that size could be of primary or profound importance and went after the pattern which connects. He discarded an asymmetry in size in favor of a deeper symmetry in formal relations.⁴⁰

With this in mind, and knowing it would be simply wrong to assume that all expressions of a given energy were the same as one another, we are driven to ask where the identity of the individual begins, and to what level can the notion of shared, identifying energies be taken? Turning again to Hofstadter, we see the delineation made clearer by way of an example similar to Bateson's:

What is there that is the 'same' about all butterflies? The mapping from one butterfly to another does not map cell onto cell; rather, it maps functional part onto functional part, and this may be partially on a macroscopic scale, partially on a microscopic scale. The exact proportions of parts are not preserved, just the functional relationships between parts.⁴¹

Returning to Paul Klee's driving notion regarding form – what we are seeing in these *isomorphisms*⁴² is the 'way-to-form' rather than the form itself; that is to say, an example of an energy is to be considered as isomorphic provided its constituent parts *do what the original* (or counterpart) *does*. As such, a painting representing an instance of rain falling upon water may tell us something about that rain at that time (principally what it *looked* like), but by contrast, a painting, most likely abstract in style, which attempts to *do the same thing* as the falling rain will be able to

⁴⁰ Bateson, Gregory – *Mind and nature: a necessary unity* – Hampton Press, 2002, pp. 6-8

⁴¹ Hofstadter, Douglas R. – *Gödel, Escher, Bach: an Eternal Golden Braid* – Penguin, 1979, p. 147

⁴² Hofstadter's definition of the word, which I will adopt for the purposes of this text, reads as follows:

The word "isomorphism" applies when two complex structures can be mapped onto each other, in such a way that to each part on one structure there is a corresponding part in the other structure, where "corresponding" means that the two parts play similar roles in their respective structures.' (ibid. p. 49)

communicate the energy forming that phenomenon. The implication is that the rainfall and painting will at some level share a formal 'fingerprint' or set of internal relationships which at some level defines an important part of their character – that without even recognising the painting as anything remotely connected with rainfall, the onlooker could experience the nature of that energy, and perhaps even an internal (and ultimately very personal) reaction similar in some way to that which being present at the time of the rainfall may have induced in them. It is important to stress that at no point does the receiver of such a process need to be conscious of the isomorphism to appreciate its effect. The painting and the rain become equal if the same energy is behind them both, and each may stand alone as an expression of the same energy at one level or another. The artist's concern is with the energy itself, and not the instances of that energy which were studied; as such has not created a painting of rain any more than Bateson's crab represents the expression of a different animal. The subject itself enters the realm of that which is alive and forming rather than something so well-formed, so individual in its identity that it is already, in essence, quite dead. Borrowing terminology from the field of historical studies, one could argue that the painting of rain hitting water constitutes secondary evidence of the energy behind the process, whereas the painting of what rain *does* when it hits water can be as primary a source of evidence as witnessing the event.

Patterns or energies occur constantly and on many levels in the natural world. We have seen some already, all of which have in some way grown from our example of tree energy, or *t*. Symmetries, asymmetries, repetitions, cycles, expansions and contractions, expressions of numerical patterns, fractal sets, recursion, etc.; all are raw energies, ways-to-form of the natural world which can be studied through processes of notation and mobilised to further our understanding and appreciation of many aspects of life around us. An understanding of the basic notions involved in fractal and recursive phenomena allows us to be receptive to the same energy, present on several levels simultaneously. It constitutes a return to the notion that

patterns can act in a similar way by connecting various expressions at different levels, just as 'something of *b* connects [the bison with] all mammals of bovine race, and on a looser level still, all four legged creatures, all creatures with horns, all mammals, etc. until we are faced with all living and breathing organisms.' Bateson clarifies this and prepares the notion for application in further thought by applying useful terminology:

The parts of a crab are connected by various patterns of bilateral symmetry, of serial homology⁴³, and so on. Let us call these patterns within the individual growing crab first-order connections. But now we look at crab and lobster and we again find connection by pattern. Call it second-order connection, or phylogenetic homology.

Now we look at man or horse and find that, here again, we can see symmetries and serial homologies. When we look at the two together, we find the same cross-species sharing of pattern with a difference (phylogenetic homology). And, of course, we also find the same discarding of magnitudes in favor of shapes, patterns and relations. In other words, as this distribution of formal resemblances is spelled out, it turns out that gross anatomy exhibits three levels or logical types of descriptive propositions:

- 1. The parts of any member of *Creatura* are to be compared with other parts of the same individual to give first-order connections.*
- 2. Crabs are to be compared with lobsters or men with horses to find similar relations between parts (i.e., to give second-order connections).*
- 3. The comparison between crabs and lobsters is to be compared with the comparison between man and horse to provide third order connections.⁴⁴*

The importance to artistic practice of drawing together so many disparate notions in the service of a simple observation about nature ('no two trees are the same, yet all can be identified as trees') is well captured in the above statement. The implication of Bateson's writing is that important patterns are to be found far from the surface

⁴³ Bateson's definition of the word reads as follows:

'Homology: A formal resemblance between two organisms such that the relations between certain parts of A are similar to the relations between corresponding parts of B. Such formal resemblance is considered to be evidence of evolutionary relatedness.' (Bateson, p. 212). It is important to point out the difference between homology and isomorphism, the former being an isomorphism of relationships, so that rather than functional part being mapped onto functional part, interstices *between* functional parts are mapped onto one another.

⁴⁴ Bateson, Gregory – *Mind and Nature: a necessary unity* – Hampton Press, 2002, pp. 9-10

of our observations. Klee points out that what is important and living is the forming of the energy, not the form it eventually achieves. It is easy to overlook the fact that the beauty of such a finite form, as we see it, is that it somehow expresses the energy behind it. By moving away from the individual instance towards the *spaces between* it and another like it (second-order connections), and then comparing that space with another between two further instances, often seemingly unrelated (third-order connections), we may actually be drawing closer to the essence of the subject. It seems that the real character of an energy can reside in the spaces between several expressions of that energy, as the nature of the spiral lies in the space between the snail's shell and our galaxy (and many things in between these).

In this chapter we have been able to note some of the many ways in which the natural patterns and forms that may suggest music (mentioned in the first chapter) manifest themselves, and are understood by scientists and artists alike. It will be noted that many of these ideas exist not in concrete form but in a theoretical, *implicate* realm – we use these ideas to understand the physical manifestations of our understanding of nature. In the realm of art (sound- and mark-making), it is important to understand this distinction, since it is the key to the problem of abstraction being either an interface by which one can experience the forming processes of natural patterns, or merely being a replica of a formed, explicit instance of these patterns. It is this notion of the observation of that which is *implicit* which we will take on to a discussion of artistic methodologies, both in terms of fieldwork and finished pieces.

Chapter 3

The Application of Fieldwork

We have seen in the last chapter how observation, in particular of relationships (interstices), can be a very fertile process for informing artistic practice, and how the study of sciences and arts can guide these observations as well as enriching our interpretations of them. However it should be remembered that for one's practice to remain insightful and personal, it is important to ensure that observations are made and interpreted by oneself in addition to these studies of existing work. It has also been of great importance to the work associated with this research that these observations were documented and applied effectively.

Thus we are confronted with the necessity of fieldwork, but are still to define the form(s) that it will take. How then are we to go from these simple observations towards a more concrete methodology which allows those elements that may suggest work to come to the fore and present themselves for study? This is clearly a question which demands a somewhat individual response and this I will only be able to answer for my own part, but naturally certain considerations on the very nature of fieldwork can first be made on a more general level.

The purpose of *notating* (which is to be considered one of the fundamental aims of conducting fieldwork) is one of *fixing*, as we have seen in previous chapters (See chapter 1, p. 28; chapter 2, pp. 33 & 36). By fixing, we may understand any action which halts a process in its temporal progression, or isolates all or part of a phenomenon which it is difficult to see in context and at length.⁴⁵ It is unarguably the case that the making of images allows various levels of selectivity on the part of

⁴⁵ Perhaps photography is the best example of this process, in that by taking a photograph one is preserving a moment which may be fleeting in reality but may be studied at length and at convenience. We are, for example, able to learn a great deal about such things as the deployment of bird's wings in flight by taking several still images at various stages in the process. This however, does not offer the possibility of extraction to the same degree as mark making, as we will see later in this chapter.

the maker, to a greater or lesser degree depending on the medium used, and that this, far from being a handicap to true representation, allows for much deeper understanding of the elements we choose. As was mentioned previously, images, used as a tool for understanding, can be seen in use as far back as the cave art of the Upper Palaeolithic period, and from these early examples we can doubtless draw some valuable conclusions as to practice and purpose which will aid our more general study of mark-making as fieldwork. It is with a brief study of the relevant qualities of these images and their context that we may begin this chapter, before moving on to examine a progression and development of the fieldwork processes that formed part of the research which accompanies this text. This latter will also serve as a preliminary study to the more detailed analysis of the musical work which is to follow.

To concentrate for the present only on the figurative instances of the Upper Palaeolithic work (and by this I refer to images of recognisable external phenomena), usually found in larger, outer caves, we see that subject matter is somewhat limited to images of (mainly) larger animals. It is likely that these creatures either represented danger or quarry in the assumed lives of the artists, and often both. This limited and recurrent subject matter is often easily explained as being simply the result of people drawing what they saw around them, but it has been effectively argued that an accurate reading is likely to be much less simple than this. Naturally, the creatures represented in these images would indeed have been present in these peoples' environment, but this does not explain why we see no pictures of other things which clearly must have also been there. We almost never see images of plants, landscapes or birds in these paintings, and rarely do we see pictures of people. It must be added here that even when images of such things do occur they are drawn in much less detail. A few famous images from several of the cave complexes in the Dordogne region of France depict small human stick figures which are given much less important placement in the caves than their animal counterparts. The style of these is again often dismissed as due to early man's lack

of understanding and/or mastery of the two-dimensional image, but this also fails to address the fact that the larger (and more frequently encountered) images of big animals do not show the same lack of rendering and solidity in form.

The question which arises from this then is to do with the reasons for the concentration of efforts on a particular type of subject and style of mark-making. It is clear that the artists in question had a strong grasp of representation using stick figures and simple outlines from the occasional appearance of these in what seem to be less important settings. It is also clear that these images were the result of a much more simple process than their large counterparts. The conclusion that is to be drawn from this is that there must have been some aspect of the image-making process, some vital aspect, which was not captured by the small, simple drawings we have mentioned, and that the subjects of the more 'complete' images required further reverence and/or understanding than others (see below). We see then that the artists were at pains to concentrate their efforts in the service of a particular end, and were prepared to adopt a more time consuming and more laborious process than the simple act of image-making could demand.

To briefly ascertain an idea of the purpose of these images will be useful in our discussion of them as being an example of mark-making as fieldwork. It is widely accepted that these large and detailed paintings of quarry or dangerous animals are in some way an aid to understanding – and thus avoiding or hunting – the real thing. It is also highly likely that images such as these, due to the strength of their link to survival, had religious or magical significance which caused such concentration upon subject matter on the part of the artist. In this way they are to be seen as a kind of detailed study so as to be well prepared for survival. Noting this does in fact place an enormous importance upon their function, and if it is accepted as a principal reason for the existence of the images it becomes hardly refutable that a great deal of deliberate thought must have gone into their creation.

In Anthony Storr's book *The Dynamics of Creation* he mentions these images, and some like them, studied before him by Herbert Read. Both writers refer to the practice as *realization*. By this term Storr states that the activity in question is absolutely linked to a consolidation of knowledge on the part of the artist:

'Realization' in this sense is an active grasping or apprehension, as opposed to a merely passive appreciation. As examiners know well, a student can only be said to have really grasped a subject when he can actively reproduce it; and this is one of the most cogent reasons for preserving the written examination as part of the educational system... if a man can draw an animal, he 'knows' its appearance in a far more complete way than if he merely recognised it.⁴⁶

It is doubtless true that the man who has observed an animal carefully enough to be able to make a life-like drawing of it will be in a much stronger position when it comes to finding, recognising, killing or avoiding it in reality. However, I would like to go a little further in this discussion of the value of fieldwork and suggest that not only can such activity consolidate one's existing knowledge but it can also add to it.

It is more difficult to see how such a thing can be possible than it is to accept that laying on a plane ones' observations of a phenomenon will consolidate existing knowledge of it. After all, it is logical that we should not be able to notate something ourselves of which we are not already aware. Despite this it is clear that the act of *fixing* which is being performed will allow unlimited time for study of the subject (not least the time spent in making the image), and may allow for conclusions to be drawn as the result of attention paid to the resulting image. In particular this will be relevant when considering the interstices that have been notated, and indeed the interstices which exist between separate notations. These revelations are in fact what Bateson refers to as *second- and third-order connections* in his writing (see chapter 2, p. 48). It is not hard to imagine that a painting of one animal, when compared with another would show similarities and differences which may offer insight when it came to dealing with various types of interaction with it. An animal

⁴⁶ Storr, Anthony – *The Dynamics of Creation* – Penguin, 1972, p. 178

which has been observed to have a similar taxonomy to one which the observer is experienced in, for example, hunting may well be easily killed using a similar technique. In other words fieldwork can be an ideal area in the search for *isomorphism* which will deepen our understanding not only of the subject but of the subject's relationship to other subjects. This would be much more difficult to see without such notational practice.

I have referred to these images as figurative to separate them from other cave art, usually found much deeper in cave complexes and in very inaccessible places, and is much less representative in its style. However, despite recognisable bison, deer, horses and the like, it is probable that these images will make more sense to us if they are considered as being conceived in the abstract, in at least some respects. This approach will also help to consolidate the theory of knowledge *gained* as a result of mark-making mentioned above.

When taken individually, these paintings are unmistakably images of a horse, of an aurochs etc., although as was mentioned in the last chapter, in many instances these appear either without feet, or with feet resting on nothing, and thus can be said to have already been subject to some abstraction⁴⁷. The more revealing observations, however, are to be made with regard to the images that are found around one another in complexes on large cave walls. It is clear that despite many very realistic aspects to the drawings, relative size has not been a predominant consideration, and thus we are able to observe horses of varying sizes, both larger and smaller than aurochs or deer, which are also variant in size. In such great galleries as that in the caves of Lascaux we also see that creatures are depicted at all heights, irrespective of the level at which a neighbouring animal may be. Again there is no sense of floor upon which these creatures may rest. More revealing still is

⁴⁷ It has been suggested that the feet of these creatures were erased by more recent cultures interacting with existing cave art, which may imply not only that fieldwork may be of value to those who did not originally create it, but also that at some point it was felt that it was necessary to abstract these images from their context, presumably for reasons similar to those suggested above.

the superimposition of images on these walls; often accounted for by the need to create new images, which perhaps took precedence over older ones. This is very possible but throws up further interesting questions, not least one which asks why further pictures of the same creature were needed after the initial one was created. It is also highly unlikely that such a sophisticated process of abstractive notation should disregard the revelatory capacity of superimposition in the observance of second- and third-order connections between images. This exploitation is made even more probable in observations made by Lewis Williams on the way in which the textures of the surfaces upon which some of the less figurative examples of cave art were drawn were used as an integral part of the image.⁴⁸

The implications of both the qualities of abstraction in these images and the question as to the need for further images of similar subjects points very strongly towards an increasing knowledge and understanding, or *realization*, of the phenomena being studied. It is likely that each successive image of an animal held something which, to the artist at least, seemed new. This is not to say that each time a horse was drawn upon the wall of a cave by the same artist it was presented in more accurate detail than the last, but rather that the artist should have chosen a slightly different aspect of that horse upon which to concentrate his efforts. It is inescapable that by choosing to draw or paint, one is opting to extract certain qualities which seem appropriate or informative and *re-place* them onto a plane. This re-placement can naturally be performed to a greater or lesser extent, depending on the desired level of abstraction and whether or not it is in the artists mind to capture a 'realism' of (for example) perspective or rendering. What one ends up with, however, is invariably a reduction from the three-dimensional to the two-dimensional, and a document which exposes one or more aspects of the subject, usually using a set of spatial relationships, or interstices. This then freezes that one view of an evolving or changing phenomenon and lays the chosen aspects of its

⁴⁸ A more detailed discussion of this particular theory, which is too involved for the constraints of this text, is to be found in the remarkable book by David Lewis-Williams – *The Mind in the Cave* – Thames and Hudson, 2002

makeup out for unlimited scrutiny; it is at this point that one may be able to gain new insight into the subject.

This is to say nothing of the knowledge gained through the direct observation one has to make whilst creating the notated document. It is naturally part of the process of fieldwork and causes us to concentrate in a quite different way on the subject in question than we would if we were not making an effort to notate it. The very act of drawing or otherwise notating an external object or phenomenon causes us to spend a good deal of time concentrating on a very limited area, assessing carefully the proportions and qualities of our subject. The point need not be laboured that this is sure to alter our knowledge of a subject by increasing our appreciation of its internal values and the detail of its structure and makeup. Suffice it to say that we are bound to be influenced in the later interpretation of our own fieldwork by our experience of having made it, not least at a subconscious level. This is perhaps why the study of the fieldwork of others, while very valuable, is in no way a substitute for one's own practice. However, the preferences, taste and 'ego' of the notator are also an unavoidable and important filtering element in this process, which does not seek to negate the individual role of the composer by substituting mechanical processes of fieldwork for the instinctive sense of harmonious or effective sonic combinations. The importance of first hand fieldwork lies precisely in that it allows for this filtering to occur at a formative stage of the process, and results in work which is as much the reaction of an individual mind to its subject as any other form of artistic activity may provide. The application of fieldwork methodologies by an individual unavoidably makes the resulting fieldwork personal and stylistically typical as a result of the filtering decisions that individual makes, both at a conscious and an unconscious level.

Thus fieldwork is an extremely revelatory practice, as we have seen by looking only at the rather specific example of Upper Palaeolithic cave art. The purpose of such an example is of course to indicate the point to which such practice may prove to have

a practical value, and this knowledge we may then translate to the realm of making art in keeping with the subject of this text. If such image making can be beneficial to the activity of (say) a hunter-gatherer then we can form a hypothesis to the effect that similar activity may be of use to people working in other areas. Certainly, to the artist who seeks to incorporate elements of the natural world into an art form as abstract as music, such a 'bridging' area of study, or *interface*, is of vital importance.

Musical notation is a very specific drawn-language and as such is excellent for prescribing in detail the progress and quality of music itself, but naturally is a clumsy tool when it comes to notating anything other than sound. Even 'non-musical' sounds (that is to say, naturally occurring sounds, not deliberately issuing from an instrument or voice) prove a challenge to notate using this method: one necessarily has to iron-out small variations in rhythm and pitch to allow for the distinct durations and intervals Western music theory is built upon. Although some composers have made vibrant and successful attempts at doing this, as has Messiaen in his notebooks⁴⁹, they are an exception, and despite the musical brilliance of their creations, we are forced to admit that these transcriptions are in effect translations into another language, and thus subject to the constraints of that language. This is made even more true by the act of transcription itself, which by its very nature constrains further the expressive possibilities of language by confining the nuance of expression to set rules.⁵⁰ These constraints may be perfectly acceptable, and even lend a certain elasticity to a finished work of prose, poetry or music which will be the seed of various expressive interpretations, but they can prove a handicap when considering a subject which exists quite independently of the language in question. Music itself is clearly not capable of expressing directly what one encounters in the natural world, even on a sonic level. Naturally, direct equivalencies between the visual aspect of nature and the sonic realm of music are

⁴⁹ For beautiful and enlightening reproductions of these sketches, including lengthy notations of birdsong and other natural sound the reader is referred to Hill, Peter & Simeone, Nigel – *Messiaen* – Yale University Press, 2005

⁵⁰ The relevance of this to the open and graphic score in music is not to be overlooked, and will be discussed during analysis of my own work later in this text.

even more difficult to find. If one simply attempts to recreate outlines using pitch the effect can be rather dull, and the finished product bear very little relation to its initial model. To be any more literal with a notation as specific as that of music is simply to court disaster, as experiments in the practice will prove quickly.

However, it is widely accepted that energies, patterns and shapes from nature are often expressed musically to great effect, and from this one must conclude that the isomorphism at work exists somewhere in the deeper fabric of the qualities and capacity of music (and I use the word isomorphism deliberately, for in what other way could one transpose, or *re-place*, natural qualities into such an abstract realm?). In order for this re-placement to be effective, the natural model must exist at the most fundamental level in music, beneath the changeable surface of performance which relies upon the creative agencies of performers and the characteristics of particular acoustics and instruments over which the composer has little or no control. In this way the 'skeleton' of the work (or the interstices which constitute its character by defining the relationships between its constituent parts) can remain a fundamental aspect of the music, regardless of detail at the surface which may change from performance to performance. This in fact gives license to the composer to introduce important compositional factors such as taste and intuitive decision making to such elements of the work as generation of pitch material without undermining the formal processes of the isomorphism in the music. We may recall again at this point the importance of Bateson's third-order connections in this theory. The notion that in making art we may attempt to tap into *the pattern that connects*, and thus may engage people in relation to that which they have already experienced, is a vital one at this juncture and will, I hope, serve to clarify the role of fieldwork in the process of creating art of any type. We are therefore looking for a fieldwork methodology which, at its best, is capable of exposing the underlying energies within our subject, of stripping away differences at the surface and allowing us to concentrate on the patterns that form the very fabric of its makeup.

For a true notation of one's subject, then, one is forced to turn to a medium which does not display such prescriptive rules as those of spoken language and music. The key here is that the latter type of notation is one which serves to document a separate medium, and thus sets rules with which that original medium can be recreated. The method of notation we seek for the purpose of providing an interface between nature and (for example) music is one which is an expressive means in its own right, subject to no strict lexical or theoretical constraints. This is why turning to mark-making and the creation of images of various types can offer much more than a direct translation into a coded language. The very notion of mark-making implies a basic and instinctive response to stimuli: we have already noted at length that our prehistoric ancestors were prolific in their practice, and it would seem that this was indeed an instinctive response to a need for a deeper understanding – an understanding that could not be reached through observation alone. As E. H. Gombrich has so clearly put it:

The way the language of art refers to the visible world is both so obvious and so mysterious that it is still largely unknown except to the artists themselves who can use it the way we all use languages – without needing to know its grammar and semantics.⁵¹

It should be added to this that the reason why artists can use this language in such a way must be because they are aware of the communication they are making with it, just as our knowledge of our intention allows us to speak without analysing our sentences. The act of mark-making is not dependent on grammar and semantics precisely because it relies so strongly on an instinctive reaction to one's subject, and it is the instinctive nature of this reaction which qualifies the practice so fully for our purposes: namely to bring to the fore that which we see as being of particular importance.

⁵¹ Gombrich, E. H. – *Art and Illusion* (6th edition) – Phaidon, 2002, p. 7

We are clearly also confronted with the need to correlate the findings of our practical fieldwork with our existing knowledge from secondary sources, the combination of which (it is to be hoped) will be the ground upon which art can be built effectively. It is interesting to note that at this stage a language and notational procedure as strictly regulated as that of written music can in fact be of great use to us as a plane upon which to bring these disparate elements together. Such an approach can in fact lend structure and solidity to work which has arisen from several sources.

The fertile combination of seemingly unrelated elements in thought and practice was a subject studied by Arthur Koestler in his book *The Act of Creation*. In it he proposes that all creative activity arises from the meeting of two separate, *and apparently unrelated*, planes of thought. His argument essentially allows for originality as the result of combination, thus concurring with our theory of relationships being the primary seat of information. It would be, in fact, the recognition of particular interstices which provided the fingerprint for a work of art. More specifically, this recognition has the potential to provide the unusual or original observation.

Koestler speaks of the *eureka* moment, a clear reference to the famous parable of Archimedes' discovery of the relationship between displacement and volume. Koestler in fact cites this story in his book, pointing out that Archimedes' breakthrough in creative thought occurs not necessarily as the result of continuous study of the problem in hand, but at the point at which this ongoing thought meets a simple, everyday and apparently unrelated action, in this case bathing. This is the classic moment of bisociation⁵² which derails thought based on directly relevant precedent, revealing those relationships or interstices which have not yet been

⁵² 'I have coined the term 'bisociation' in order to make a distinction between the routine skills of thinking on a single 'plane', as it were, and the creative act, which... always operates on more than one plane. The former can be called single-minded, the latter a double-minded, transitory state of unstable equilibrium where the balance of both emotion and thought is disturbed.' - Koestler, Arthur - *The Act Of Creation* (Penguin), 1964, pp.35-36

discovered. In the clear words of Koestler, who approaches the parable from the other angle (bathing back towards the problem of volume):

[Archimedes] was in the habit of taking a daily bath, but the experiences and ideas associated with it moved along habit-beaten tracks: the sensations of hot and cold, of fatigue and relaxation, and a pretty slave girl to massage his limbs. Neither to Archimedes nor to anybody else before him had it ever occurred to connect the sensuous and trivial occupation of taking a hot bath with the scholarly pursuit of the measurement of solids. No doubt he had observed many times that the level of the water rose whenever he got into it; but this fact, and the distance between the two levels, was totally irrelevant to him – until it suddenly became bisociated with his problem.⁵³

Thus, to receive inspiration relevant to the subjects that we as artists are interested in, we are bound to prime ourselves to receive apparently unrelated bisociations, perhaps bridging the gap between an idea and the reality of constraining that idea within the bounds of a defined practice such as music or mark-making. Naturally these connections can be actively sought, and exploring the possibilities of one field by means of another is a fruitful way of training the mind in this area. Thus mark-making can inform musical composition, even in the abstract, as artists such as Kandinsky have shown us with their large scale compositions in paint based on music. It is unlikely that the mind of a musician would remain unaffected upon seeing this kind of visual representation of its medium. However – by way of second- and third-order connections – one can take from this relationship the potential to explore and at times discover others. If, as in this case, the natural world is to play an important part in the construction of abstract music, its exploration through a medium such as mark-making, which has a demonstrably solid and revealing relationship with sound, can only serve to enrich the territory explored, and increase the potential for the discovery of these new bisociations that are the seat of original and potent ideas.

⁵³ Koestler, Arthur – *The Act Of Creation* (Penguin), 1964, p. 106

It is clear that inspiration for a work of art is a highly personal matter, and thus I am bound to draw upon my own experience and centres of interest in expanding upon this notion, but it strikes me as inescapable that the potential for truly new music is unlikely to exist within music itself, any more than it can exist in passive observations of nature or in scientific knowledge. What is clear is that *the possibility of work*, the source of inspiration, lies within the various combinations of these elements which can be produced by the continued study of them all. Naturally it is not possible for simply any combination of ideas, elements or observations in any field to necessarily produce the ground for effective artwork: it is one's sense of taste and preference which guides and selects as part of an ongoing investigative process.

The process has also been described to me by Edward Cowie as a moment of *fission*, as in a nuclear reactor where the combination of two elements produces an explosive reaction which creates a new whole that is more than simply the sum of its parts. That is to say, the artist who wishes to embrace elements from outside his direct sphere (such as in his study of nature) will be more likely to succeed if he is continually trying different combinations, and collecting material with which to perform these combinations. Thus without fieldwork the process is rendered much more difficult. Again, it is the relationships between elements, or interstices, which seem to hold the fertile ground that leads to successful work. It is natural, then, that interstices themselves should hold such interest at the level of fieldwork, and natural also that this should be carried over into the work itself. This goes a long way towards explaining my own deep interest in the relationships between basic sonic elements such as sound and silence, or extremes of texture and complexity. We must also remember that we can receive '*only* news of difference, and the differences must be coded into events in time (i.e. into changes) in order to be perceptible' (see chapter 2, p. 34).

Let us briefly refer back to the examples reproduced from the notebooks of Paul Klee in chapter 1 (pp. 25-27). We noted in his fieldwork a combination of the artistic and

mathematical which led to his comparisons between visual art and sound, and an acceptance of a necessary level of articulation which would facilitate notation and understanding. The link to Western musical theory, and in fact to its constraints mentioned above, should not be lost on a composer interested in fieldwork. The stable tonal interval, maintained throughout, is perfectly analogous to the consecutive semitones which make up our chromatic scale in pitch. Klee in fact talks of tonal intervals, and in a process of thought which may be influenced by the laws of Western classical harmony he stresses that points should be kept apart, just as according to those laws the minor second is considered a highly dissonant interval and thus should be avoided. We find that he has, with one very simple observation viewed from several angles, embraced several art forms as well as his scientific and personal observation.

We see then in this very simple instance the way in which a mathematical approach to understanding can combine with personal observation to create fertile ground in which an artistic methodology can grow. Klee's observation in itself is remarkably simple, yet it is of profound insight and was clearly greatly enabling to him as a practicing artist. Again we are able to see that the value of this work lies in the isomorphisms it displays, not only between the natural subject (the behaviour of colour) and the artistic practice (painting) but also involving such elements as the behaviour of sound in relation to space and the ordering of musical theory. These revelations are all due to careful consideration which, I argue, is the direct result of Klee's attentive fieldwork.

* * * * *

Before moving onto the second and principal part of this text, in which my own music and accompanying work in mark-making will be analysed in greater depth, it will be useful to look briefly at a few examples of the more general visual fieldwork which forms part of my working practice. This work has naturally evolved over time

and it will be of use to consider a small number of pages from several sketchbooks in order to trace this evolution. The differences in drawing style we can chart, and the subsequent differences in effect these cause, will be of value when considering the fieldwork that is specific to individual pieces of music later on.

Experiments in fieldwork necessarily begin with simple and direct practice, undertaken with the intention of a refinement that will allow more insightful observation in future. Thus it can be argued that my own early fieldwork is as much research into the process of conducting fieldwork as it is into the relationship between my subject and my music. In fact, the two earliest sketchbooks, which were kept alongside one another, did precisely this at opposite extremes of my area of interest.

To investigate the powerful relationship between the sonic and the visual, one must naturally read in art and music theory and study the rich literature of scores and writings on the subject, but when this is to be used as part of an individual creative practice it becomes equally important to cultivate one's instinctive and personal understanding of this relationship. It is to this end that the small sketchbook *sketches of sound, studies in line* was begun, some pages of which are reproduced here in the plates. The instinctive response to music not only reveals elements of the fertile link between sound and mark-making but also proves a very fresh way of studying the behaviour of the chosen pieces of music. Music was chosen purely on the basis of taste, in that I made a deliberate effort to study a range of music I admired or felt had some kinship with at an æsthetic level of taste. From the very start colour is used alongside line and texture to create a map of small sections of pieces such as the opening of Tippett's second piano sonata (plate 2) or a Haydn Quartet (plate 3).

This is essentially an unusual but effective way of studying the literature of music, borne doubtless of my own innate sense of the very natural link between sound and

sign. It should however be noted that from this very early stage a sense of the orthographic is strong in these sketches, notably in the fact that they read from left to right, as a piece of writing, or indeed a musical score. This is something I have found is almost unavoidable in the representation of sound with signs, and in fact can raise very interesting questions regarding the boundaries between written music and the graphic score. Note, however, that these sketches are not intended as scores, or in any way as documents to be read for the reproduction of sounds. They are, rather, an attempt at *notation* (in its most literal sense, removed from the idea of musical notation) of a behavioural phenomenon.

The practice is deepened as we progress into the book, and certain elements come to the fore as particularly effective notational tools. Most notable is the use of line alone, beginning as a study of a simple vocal line (plate 4a), and becoming an effective method of exploring interactions and tensions within more complex music (plate 4b). We can also note, jotted in the margins of early sketchbooks, notations of birdsong and other non-musical sounds, such as in plate 4c.

Turning again to Kandinsky and Klee's exhaustive studies of the behaviour of visual elements these sketches can be elaborated and the study of the visual/musical relationship can be further explored. By adopting Kandinsky's notation depicting the forces acting upon a line we can analyse the forces acting upon one or more musical lines, as in plate 5a, depicting the opening monody of Poulenc's cantata *Figure Humaine*. We can also use Kandinsky's study of the weights (thicknesses) and temperatures (colours) of lines and angles to distil further the same piece of simple monody (plate 5b).

The combination of art theory and an instinctive visual reaction to sound thus proves very interesting and can prove revealing for the artist concerned with identifying and exploiting an interface. It is possible to move from this kind of detailed study of simple monodic lines to more complex amalgamations of sounds,

both natural and musical, and subject them to equally detailed visual analysis. This can reveal fundamental qualities that can easily be related to other analyses, either of music or of different (visual) stimuli.

Alongside this we can observe the work found in the second of my sketchbooks of this period, *observational sketches i*, which concerns itself with more conventional artistic study of the natural world in various forms. Again we see a marked use of colour in these early sketches, although much of the work is in the form of detailed drawings in pencil. These are all drawn from the life, on location, occasionally accompanied by a photograph and elaborated later as a method of further study. Often small details are the subject of study – a leaf or twig for example – and the irregularities within the overall patterns and symmetries which govern the phenomenon in question are rendered visible (plate 6).

Although this work is substantially different in appearance to that which appears in the contemporary sketchbook mentioned above, it is vital to note that the nature of the two practices is identical. Without this knowledge the *rapprochement* which offers insight into the relationship between sound and visual art cannot be fully appreciated. The similarities lie, as we have noted before, at a fundamental, elemental level rather than at the surface, and this in itself reinforces yet further the value of observation at this level. As with the sketches of existing music, the purpose of these drawings is to identify some underlying pattern which can be related to another observation, made elsewhere and at another time.

As the practice evolves we can note the two elements (representation and abstraction according to specific art theories) appearing alongside each other, as in plates 7a and 7b. The abstraction is now applied to the basic linear interpretations of certain elements of the subject rather than to a musical model, and the previous studies based on music provide a precedent upon which musical notions can be

formed in direct response to the patterns notated. These may involve harmonic, formal or rhythmic ideas, and in any combination.

The ideal progression from this two-pronged approach is one of integration, in which the abstracted patterns which contain the potential for interface with sonic behaviour can be arrived at directly. The resulting sketches would naturally have to be of a much less figurative nature, and the ability to create such marks rests on the understanding of the abstractive process which until this point has occurred parallel to figurative work. This can only be done by familiarising oneself with the nature of the abstract material through the process described above, and the study of the type of existing art theory we have briefly discussed. Later sketches show early experiments in this more direct approach (plate 8), leading to fully abstracted fieldwork that displays sets of relationships quite apart from the representation of the subject which displayed these relationships (plate 9a & 9b).

These later sketches, almost invariably quickly executed using ink on a brush or a brush-shaped pen, share a great deal of their nature with my early (and ongoing) work in creating visual documents of music and other sounds (see plates 4a-4c). This therefore begins to notate the aforementioned *rapprochement* between the sonic and visual that it is the intention of this text to explore, in that the same simple processes are being observed. Elements of notation such as weight (or thickness), texture, line, point, plane and spatial disposition (or degrees of *tension*), which have been shown by the development of my fieldwork techniques and the study of visual art theory to be relevant in the analysis of both sound and visual arts, are the very building blocks of these pieces. As such, they allow a greater freedom of thought in both visual and sonic spheres than more detailed or figurative work does, and, as the following study of the development of these techniques will show, they offer a much more lively and direct approach to the interface mark-making can offer between the world of the sonic and that of the natural sciences.

Part Two

Analysis



Chapter 4

§1: On and with reference to *prélude (totem i)* for bass clarinet and optional drone⁵⁴

- §a. On silence and the drone [referring to the literature]
§B. On retrospective structural processes [extracts from the notebooks]
§C. On material and content [referring to the score]

§1. Our perception of silence, like our perception of all things, is based upon relationships. Cage has clearly argued that a lack of deliberate musical sound constitutes silence only in a relative context. The silence is not absolute – plenty of external sounds (including the sounds of our own bodies functioning) exist within it.

§1. 'Messiaen: Thinking of rhythms in terms of their total values:

e.g. A rhythmic phrase has the total value of 8 x , or 15 x , etc.

'As such these can be patterns of patterns, can echo each other, can contradict each other, can contain each other, etc. Rhythmic cells are expanded and contracted using e.g. addition of the dot or addition of 1/3 of each value

⁵⁴ Note: The form of this section of text is designed to demonstrate the formal processes used in the piece in question by analogue, and thus also demonstrate the effectiveness of isomorphism in enabling a different kind of understanding to simple description or concern with the detail of individual manifestations of phenomena. The relationships in time/space between the sections of text are of a clear character, and explain the formal processes of the piece in question in a very succinct manner.

The writing contrasts and balances pieces of text on the various aspects of the analysis of the 'prélude', and echoes the piece's symmetrical form (inexactly). The parallel is as follows:

prélude [totem i] – structure

(where x = an initial gesture, used to open both halves of the piece)

X,A,B,C,D,E: A,B,C,D,E: X,E,D,C,B,A: D,B,A

Chapter [analysis] – structure

(where x = an image, used as a gesture to punctuate the formal process and illustrate the content – it also serves to disrupt the symmetry of the form)

A,B,C: A,B,C: X,B,A,B: C,B,X,A: C,B,A

The tone, colour and typesetting of each section is different, in analogy to the difference in technique, tempo and register used in the writing for bass clarinet. These differences are listed at the top for the reader, as are the tempos and performance indications in the score for the performer. Writing on the drone opens and closes the text as the drone itself opens and closes the piece.

(augmentation) and therefore retain their shape but can alter in size (gnomic). In effect this is deliberate preservation of “the pattern that connects”

§1. Perhaps as many as half the sounds produced by the bass clarinet during the ‘prélude’ are pitchless or of indeterminate / unpredictable pitch content. These sounds are produced in many ways, including the production of multiphonic chords, air tones, and the slapping of the keys and reed to create percussive sounds. Naturally these sounds can be controlled to a much lesser degree than pitched sounds, for which the instrument is primarily designed. The material and quality of the bore, the choice of keys and embouchure etc will all contribute to the sound produced when following an inexact instruction in the score (nowhere are these elements specified).

The overall character of the passage is carefully calculated but its detail is left to what is referred to by scientists as ‘sensitive dependence on initial conditions’⁵⁵. This is one way of embracing the unpredictable element of natural patterns. The presence of the fully notated elements serves as a constant by which the unpredictability is measured. As with other aspects of the music, this judgement may only be made retrospectively, as a comparison between two passages of the same ‘type’, or two complete performances.

* * * * *

⁵⁵ ‘In science as in life, it is well known that a chain of events can have a point of crisis that could magnify small changes – chaos theory provides the knowledge that these points can appear at any place or time, causing enormous differences to the state of systems based upon minute inconsistencies in their earlier states.’ – Gleick, James – *Chaos*, Vintage, 1998, p. 23.

§2. The ancient philosophers studied ‘the music of the spheres’, suggesting that bodies in motion such as the planets were bound to create sound. Their answer to questions on the inaudibility of this sound would certainly have been to suggest that it was a part of what we consider to be silence. We are born with it in our ears – we do not know what its absence sounds like.

§2. ‘The relationships between order and chaos (as in nature, that which follows a pattern / that which is unpredictable: these are usually elements of the same thing) are then preserved and exploited formally and rhythmically in one gesture, relationships of perception being the means of expression.

‘Therefore superimposition and augmentation/diminution as methods of “development” allow “the pattern that connects” to dwell inside music as a driving formal consideration. e.g. Messiaen’s example from Stravinsky:

*Danse sacrale: 5 / ♪ / ♪ / | 4 / ♪ ♪ ♪ | 2 / ♪ | 4 / ♪ ♪ ♪ |*⁵⁶

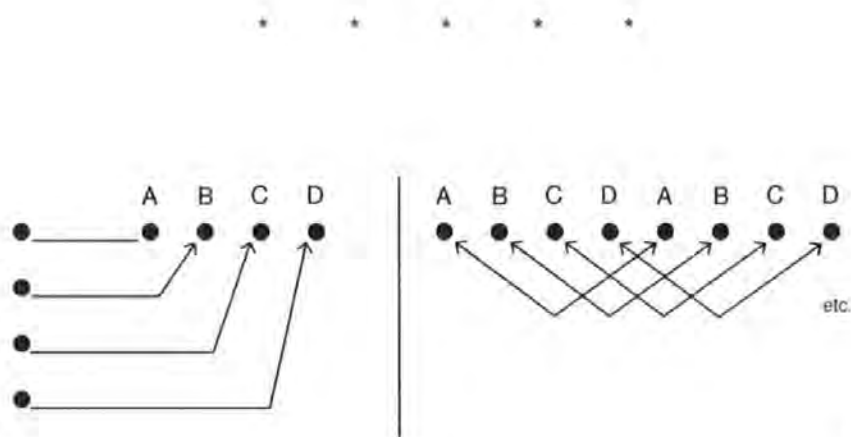
A B A¹ B

§2. The piece contains an early use of measured silence, which appears in many of my works. Naturally in this case its principal purpose is to allow the drone (be it pitched or silent) to assert its presence and maintain its importance as the plane upon which the sonic objects of the piece are placed. The silences also serve to divide the sections of the work, a double length silence marking the pivotal point in the symmetrical form.

Measuring the silence also permits the careful placement of elements around each other, permitting a sense of spatial relationships to be achieved at a fundamental level (as the stones in the Japanese garden described elsewhere by Cage).

⁵⁶ Adapted from Messiaen, Olivier – *Téchnique de mon Langage Musical* (2 volumes), Éditions A Leduc, Paris, 1944, p. 9

The measurements in this piece are unusual in my own output as they use the unit of the beat (from the last tempo used) rather than the more abstract use of seconds. This is of course easier for the performer, but binds the silence to musical concerns and removes the sense of detachment which measuring in seconds can give us. It was appropriate here as the tempos alter enough during the piece to remove a sense of ruling metre.



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§3. '[In Messiaen's example] order and chaos are complementary – A expands and contracts but B remains the same. There is the pattern that connects B with itself, but a different kind of pattern which connects A to permutations of A.

'So the consideration of total values of rhythmic phrases as well as of cells and individual values makes for the possibility of a fractal construction of polyrhythmic (both horizontal – as Stravinsky – and vertical, e.g. rhythmic canon/isorhythm) textures and superimpositions.

'The retrospective superimposition of several elements in monody (see 'prélude (totem i)', and Tippett – Piano Sonata no. 2) is a similar principle to Stravinsky's mosaic of A & B in permutation.'⁵⁸

⁵⁷ Reproduced from Martin, Mat. – Notebook 2, pp. 29 & 37

⁵⁸ Martin, Mat. – Notebook 2, pp. 28-29

§3. The musical ramifications of this are clear. We may be 'born into' a piece which throughout displays a drone of some kind. This drone need not be a single sustained note, as in the case of my 'prélude [totem i]', repeated patterns will produce the same effect over time⁵⁹: George Crumb has indeed shown us this with direct reference to the music of the spheres in his large work 'Star-Child'. Through the duration of a piece, be it a minute or an hour, the notion of silence is made deliberately relative by the composer, and as listeners our perception of the piece depends entirely upon the sounds which emerge from, or present themselves in contrast to, this drone. A pitched drone will of course fundamentally alter our perception of all subsequent pitches used, due to harmonic theoretical precedent, and thus the comparison between performances of the *prélude* with and without the drone included becomes interesting as a study of the way in which a single alteration in a work's internal relationships may alter our perception of all of the relationships contained in that work.

§4. The effect of the relationships between slight variants of a repeated pattern can be noted in several different ways: In the forms and sounds of nature we note heterophonies in large number (for example in the simultaneous songs of birds or the complexes of several trees of a single species). Contrary to musical tradition these heterophonies need not be superimposed to display their individualities and similarities. The songs of several birds and whales use the structural process which I have called monodic superimposition (a contradiction in terms, yet an ideal expression of the retrospective, or cumulative effect of the process) – the spreading on the surface of several thematic elements,

⁵⁹ Klee, Paul – *Pedagogical Sketchbook* p. 22:

'1 + 1 + 1 + 1 + 1 + 1 – 'the most primitive structural rhythm based on a repetition of the same unit from left to right, or top to bottom...'

1 + 2 + 1 + 2 + 1 + 2 + 1 + 2

'this rhythm is more complex. its theme is: one plus two (1 + 2)...

'if 1 + 2 + 1 + 2 are replaced by (1 + 2) + (1 + 2) it equals 3 + 3 + 3 + 3 which amounts to another repetition of the basic theme [1 + 1 + 1 + 1]'

interspersed with one another and developed through variation at a minute level (inexact repetition, or separated heterophony).

'Sherlaw Johnson, on Messiaen's technique – "... the form described as 'variations of the first theme separated by developments of the second'"⁶⁰ – see notes on the idea of 'flattened' polyphony in notebook ii, where several concurrent ideas are 'pulled' to the surface and varied, expanded, contracted in turn.

'Sherlaw Johnson again – "The significant point about this is the fact that it is a compositional procedure [or musical behaviour] rather than a form and so allows a great deal of variation and flexibility in its application. By alternating the treatment of two different musical ideas Messiaen achieves a sense of continuity and growth across the contrasting sections of the form."⁶¹ ⁶²

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§3. The character, register and tempo of the separate elements which make up the piece are of necessity sufficiently different to make clear the transitions between them. In a 'music of relationships' this must be paramount. Certain definite distinctions are made: those of texture, register, intervallic properties, tempo and dynamics. These latter two are simply kept as differing as both possible and appropriate to the style of the piece – dynamics range from silent to *f*, and tempos are set out at the start to give each passage its definite identity (this is preceded by a similar practice in Tippet's piano sonata no 2).

The textural question is one of whether or not the element is to be pitched, unpitched, or a combination of the two. Clearly,

⁶⁰ Sherlaw Johnson, Robert – *Messiaen*, J M Dent & Son, 1974, p. 23

⁶¹ Sherlaw Johnson, Robert – *Messiaen*, J M Dent & Son, 1974, p. 23

⁶² Martin, Mat. – Notebook 3, p. 41

elements such as that in bar 4 (and its recurrences) are purely textural, and those such as are seen in bars 5 and 6 (and again, their recurrences) purely pitched, or melodic. Those which combine the two do so either by applying textural elements to pitch in a register which perhaps lacks clarity in the instrument (bars 1 and 14, pulsating on a very low pitch) or by combining the two elements in succession (bar 3).

Register is defined simply as low, middle or high. As these notions only apply to those elements which include pitched sounds it is possible to separate the different sections using these parameters. Those two elements which share the middle register (at tempos ii and iv) are separated by textural type and tempo.⁶³

Melodic elements are kept separate by their intervallic properties. The principal gesture of the passage will either display a wide interval (over a third) or one of a second, again this is kept consistent throughout.

§5. Schoenberg: 'Remembering is the first step towards understanding'⁶⁴

'A piece of music continues from point A, following [for example] an idiosyncratic gesture (G). This gesture has not been heard before. The gesture is taken at face value – perhaps it is arresting or shocking, perhaps it provides an escape from a longer arresting passage... It does no more than this.

'Later in the same piece the gesture reappears [G¹]: Again the music continues from A¹ and the gesture is taken at face value, although its initial impact may,

⁶³ Feldman famously used the technique of defining three registers: low, middle and high, in some of his early aleatoric music. He specified only the range and number of notes to be played – pitches were left to the performer. This music is very clearly distributed and spatially sound, and demonstrates the power of abstraction from harmonic continuity. His is (at this point) a purely temporal-spatial concern.

⁶⁴ Schoenberg, Arnold – *Style and Idea*, Faber & Faber, 1975, p. 378

depending on context, be very different, unrelated even, to the first instance.

However, something else happens:

A relationship is formed retrospectively with the first gesture [G-G'].⁶⁵

Relationships are also formed between the two moments of transition [A-A']. We

as listeners then note the re-emergence of a pattern, not necessarily identical in

its external manifestation but in its behavioural content, which crystallises a form

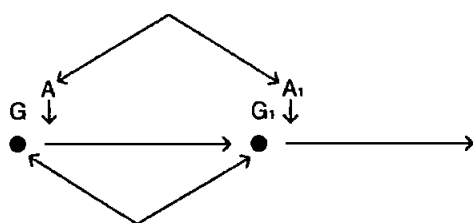
over time.⁶⁶ In the 'prélude' this is combined with inexact repetitions of material

which form retrospectively perceptible patterns on several levels at once (within

the sections A, B, C..., and between the sections). The relationship [G-G'] is also

exploited in the 'prélude' through the inclusions of the low pulsating drone which

begins both halves of the piece in the bass clarinet's part.



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§4. This is effective, and valuable to the composer precisely because it brings forward the notion of relativity in music. For a composer interested in 'a music of relationships'⁶⁸ which draws upon its constituent interstices to display fundamental patterns, such a tool is extremely revealing. The inclusion of an *optional* drone in the *prélude* is a very deliberate action. The benefits of this are only noticeable in retrospect, once the listener has heard the piece both with the drone and without, or rather, with the silent drone

⁶⁵ Martin, Mat. – Notebook 2, p. 37

⁶⁶ This is clearly illustrated by the 'stabbing' motif which punctuates John Tavener's otherwise lyrical work for cello and strings *The Protecting Veil*.

⁶⁷ Reproduced from Martin, Mat. – Notebook 2, p. 37

⁶⁸ Martin, Mat. – Notebook 2, p. 34

(which is still a drone).⁶⁹ As the piece's internal structure relies on retrospective understanding in any case, this simply emphasises that quality and creates a fractal symmetry which joins the interstices between sections within the piece to the interstices between performances.

* * * * *

§4. Material in the piece is never repeated. Neither is it in the traditional sense of the word developed. It is simply repeated inexactly. The word inexact refers to the fine detail of the durations and pitches in each bar. What is reproduced, each time we hear again the particular identity of a passage in the piece, is its sense of proportion, its balance of elements and its dynamic / intervallic range. It is possible to predict the shape, approximate proportions and dynamic qualities of the episodes, but not to accurately identify the individual durations, intervals or other details. This in fact could be argued to be a form of exact repetition based upon a higher pattern – the details become unimportant. It may be seen in all aspects of nature as heterophony – in the taxonomic repetitions of plants and animals, the repeated behaviour of tides and other cycles, the repetitions in birdsong and other natural sound. At no point does nature mechanically produce carbon copies of itself, rather, every instance of a phenomenon is a unique expression of a fundamental blueprint at a deeper level. So it is with the instances within the 'prélude'.

⁶⁹ The reader is referred to the recordings of the *prélude* which accompany this text.

§6. We may note also that the imperfect symmetry of form in the work (A,B,C,D,E: A,B,C,D,E: E,D,C,B,A: D,B,A) provides an overall shape which we also note regularly in nature – the non-retrogradeable forms of Messiaen, found ‘in all the decorative arts, in the veins of the leaves of trees, in butterfly wings, in the human face and body, and even in ancient magical formulae.’⁷⁰ Most of these may be observed to display imperfections or inexactitudes at the surface level.

§5. The overall effect of the drone (created retrospectively by its presence or absence) emphasises not the musical material but the spaces and relationships within and between elements of that material. We are reminded of Kandinsky’s observations on the subject of silence, the point, and the minimum requirement for a composition to be judged on a qualitative basis.

⁷⁰ – Olivier Messiaen, quoted in Hall, Michael – ‘Leaving Home’, Faber and Faber, 1996, p. 83

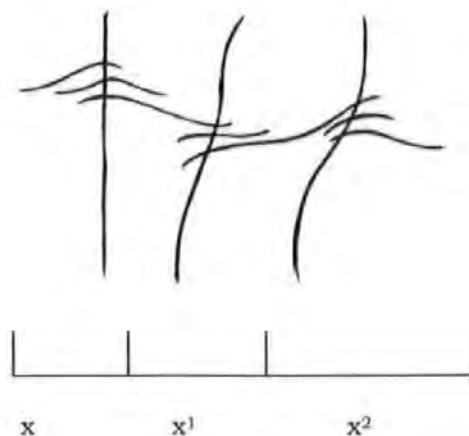
§2: On Rhythmics (extracts from the notebooks)
with reference to the study of *prélude (totem i)*

The following page offers a selection of writings and drawings from the sketchbooks and notebooks, made at the time of composing the *prélude*.

They serve to illustrate the observations on gradual change over time which are put into effect by the formal process of the piece. The elaboration of the initial drawing from the sketch of erosion on a cliff-face shows an attempt to place two elements into a relationship which emphasises the qualities of each through their juxtaposition. In this case the increasing movement toward the horizontal displayed by the succession of vertical lines (abstracted from the initial sketch) is set against the continuous horizontals, which have a repeated internal structure of overlaps.

The numerical notation, reminiscent of passages in Klee's *Pedagogical Sketchbook* expresses this relationship in yet another way. The final notation equates the process of movement from one end of the drawing to the other to that of a spiral, which shows a regular amount of expansion or contraction as it progresses.

The similarity to the bass clarinet piece lies in the formal processes from which the music and the text of the last chapter are built, and the effect of all of these expressions relies upon a sense of time and memory which allows retrospective relationships to be formed by the reader, listener or onlooker.



from sketch in *observational sketches i*:



vertical lines = $(1) + (1 + 1) + (1 + 1 + 1) \dots$ (regular expansion/augmentation)

overlaid onto horizontals = $3 + 3 + 3 (= 1 + 1 + 1)$ (primitive rhythm)

giving the following = 1: 1: 2: 1: 3: 1 ...

the 1 giving a solid order by which augmentation may be measured:

= A: B: A1: B: A2: B ...

spacing as disruption (and augmentation) of the primitive rhythm:

= A: B: A1: / : B: A2: / / : B ...

(a gradual temporal expansion interrupts the primitive framework)

the effect over time is that of a spiral:

primitive =

expanding =

()

Chapter 5

móna (night music) for solo piano

We have noted, in both chapters one and three, the importance of articulated scales in perception and their isomorphism to western musical scales as pointed out by Klee, and it is perhaps in the set of variations for solo piano, *móna (night music)* that this is most literally used in the compositions borne of this research. An early work in the process, it is more complex than later pieces; is fully notated in the score, and relates in very precise ways to the specific research which preceded its composition. We may recall that an interest was stated in chapter one (p. 18) in creating a 'music of relationships, in which the spaces and relationships (interstices) between events (on all scales) take precedence at the point of composition.' This was indeed the starting point for a piece which is concerned primarily with permutations of relationships between several aspects of its constituent parts.

The explicit natural phenomena which serves as the starting point for the piece are the various rhythmic behaviours of the phases of the moon seen from earth, and the way in which these fit together in a fractal, nesting pattern, containing cycles within cycles. The static harmonic and formal progression through the work is also designed to be directly analogous to the distribution of light and dark across the surface of the moon over time. As an explicit expression of implicit patterns such as cyclical and fractal energies, and as a particular model of the behaviour of light and shade, the subject of lunar behaviour is one which is capable of providing insight into fundamental patterns which may govern music.

§1: Structural considerations

The initial drawings for the piece investigated the movement of shadow and the division of this process into discrete steps, as with Klee's exchange of the natural unarticulated scale for the articulated yet impoverished scale, clarified in perceptibility (see fig. 2, p. 25). Already at this point we may see attempts to create isomorphisms between these tensions and musical intervals, albeit without the direct isomorphism developed later and used in the piece itself (see plate 9).

If the temporal divisions of the phases of the moon are to be understood in order to clarify the isomorphism created in the behaviour of the music, a brief explanation of this must be given here. The rhythm of the moon is closely associated to the number 13: it moves 13 degrees in 24 hours, orbits the earth 13 times per year, and has an average value of 13 between its two principal cycles over a year (the time between full moons (synodic month) and the time the moon takes to return to the same position in relation to the fixed stars (siderial month)) – there are 12.368 synodic months and 13.368 siderial months in one year. The structure of 13 within 13 as displayed here is crucial in understanding the musical behaviour of this piece, as can be seen from the early notes on composition (below). The musical/formal implication of such a pattern – the repetition of a single behaviour several times with discrete differences in each, leading to a return to the point of origin – is remarkably suggestive of the existing musical form of theme and variations:

Piano variations: importance of the number 13 in study of the moon.

13 cycles of the moon in one year

13 degrees of movement in one lunar day

13 is the rough average between the number of siderial and synodic months in the year

Heath – 'Each successive day finds the moon belonging more and more to the night sky as the waxing phases increase the crescent to a quarter, gibbous and then full moon, taking about 13 days to complete'⁷¹

⁷¹ Heath, Robin – *Sun, Moon and Earth*, Wooden Books, p. 14

Therefore – 13 movements to the piece, moving as follows:



I and XIII to be the same (recapitulation of the theme).

Movement of dark and light across surface must be schematised to 13 stages (see sketches) – allows for fractal symmetry within the work and for each variation to begin at a different point, each further along the process than the previous one – see sketchbook.

Division of the theme into 13 ‘gestures’ (again 1 and 13 the same, as with structure of piece) for this to be possible.⁷²

The connection in the piece between pitch and the distribution of light and dark on the surface of the moon lies in the understanding of the latter as a relationship between *an amount* of dark and *another* of light. Following the thought process which governs Klee’s mixing of paint and water according to ratios defining the point on the scale between absolute black and absolute white (see pp. 26-27), it is possible to create a sense of movement from one extreme of tone, density and shade to the other, by selecting appropriate intervals in pitch. We have already noted that ‘human sense organs can receive only news of difference’ (p. 34), and it would seem that the key to creating an isomorphism in sound is contained within this knowledge. The analogy in the behaviour of the music to the behaviour of the studied phenomena lies in the sets of relationships – or interstices – that this behaviour creates. To use Bateson’s terminology we are interested in creating *second- and third-order connections* which echo those that exist in our subject.

At this point the allocation of aspects of pitch content becomes clear to the composer, particularly in this case where the predominant numerical quality of the subject is so easily reconciled with that of the medium being used. We may recall the observation made on Klee’s scale theory (p. 62): ‘The stable tonal interval, maintained throughout, is perfectly analogous to the consecutive semitones which make up our chromatic scale in pitch.’ To our number 13 we are able to apply the

⁷² Martin, Mat. – Notebook 2, p. 99

twelve divisions of the chromatic scale, plus the final step to the octave of which totals that number. Where in the previous sketches the octave/unison is applied to the precise halfway point in the lunar cycle (see plate 10b) it becomes apparent through this analogy that in fact the point of rest at the 'half moon' stage should be a precise halfway point between the unison and the octave at the augmented fourth. The table in plate 11 is reproduced from the sketchbook and illustrates an entire harmonic plan for the piece.

Thus if each movement of the piece is to represent a distinct phase in the cycle of the moon from the schematisation suggested in the excerpt from the notebook (above, pp. 82-83), each may be assigned an interval which must then dictate its harmonic content. The result is that the variations of the theme will serve to expand or contract the harmonic base of the material over the course of the piece as a whole. The augmented fourth having been identified as the neutral halfway point, it seems appropriate to make this the predominant colour of the theme, causing the full/new moon (or octave/unison) to be the central point around which the piece is based. Important here is the point that this combination of pitches acts as an isomorphism with levels of dark and light and relies upon those relationships rather than the absolute nature of pitch. Thus one may concentrate on a single interval yet place it at any point and with any pitch at the root. The predominance of an intervallic structure does not necessarily result in a sense of fixed tonal centre or key. However, this freedom may necessitate a constant grounding element, which will clarify the perception of intervallic change over a longer period, as the lack of a sense of key will make the constant less clear. In this case, the continued presence of the minor second (the single unit of the articulated scale being used), as a secondary interval throughout the work, is used to give a constant against which the change can be measured.

Also mentioned in the excerpt from the notebook, and illustrated in plate 10a, is the notion of moving through the theme laterally by beginning the procession through

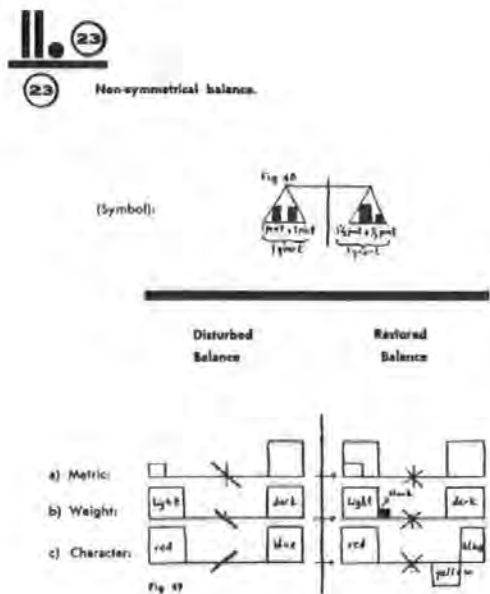
its sections at a different point for each variation. There being twelve different movements in the proposed structure (the thirteenth being a repetition of the first), the division of the theme into twelve sections is necessary in order to allow a full rotation to be completed by the end of a thirteen-movement work. The fractal symmetry observed in the patterns of behaviour of the moon is preserved here by using a number inside itself – twelve starting points within the theme to allow for twelve variations, made up to a total of thirteen by the return to the point of origin (implying that the process is set to begin again). We then, in theory, have a basis upon which to construct the entire piece within which we may hope that aspects of its behaviour will be isomorphic to those of our subject. We are already aware of how the harmonic and formal aspects of the piece will evolve to form the whole and thus are able to compose according to the implications of these by now purely musical considerations. The result is that by concentrating on second- and third-order connections between our subject and our medium, we have been able to replace, into a sonic context, the sets of relationships which give the lunar cycle its distinctive properties.

§2: Construction of thematic material

Composing the theme from which twelve variations are to be drawn is of course a crucial aspect of making a piece such as this one successful, and the manner in which this is done will directly affect the possibilities for the subsequent movements. In this case particularly, as the principal modes of variation are part of the fundamental design of the work, the scope for variation must be considered at the point of composition of the theme.

Returning to the sketch of the overall shape of the piece (plate 10b), we may note the 'stress' laid on certain sections of the diagram (areas shaded darker than the rest) which represent a certain internal balance. Dividing the whole into two equal halves of six sections each, a significant 'stress' was applied to two sections of each; not in

symmetry but to a single common 'weight' for each half of the piece. Noting in the harmonic sketch (plate 11) that half of the piece is to contract away from the augmented fourth towards the unison and the other from the octave back to the augmented fourth we see a clear reason to divide the piece into two halves. We also note that while the first half of the piece will feel harmonically condensed, as intervals become closer, the second half of the piece will feel relatively lighter and more open due to a sudden change in harmonic texture and wider intervals being predominant.⁷³ The balance struck in this way is subject to visual art theory and references Klee, not least because it is investigated through mark-making practice. The result of the balance is analogous in music however, and the theory is explained in Klee's *Pedagogical Sketchbook*.



II.24

Fig. 50a: Overloaded through the heavy dark, the axis AB has dropped from a to A, and has risen from b to B. Its original horizontal position was ab. Both axes, ab and AB, have the point C as a common pivot. As the result of a turn around this point, left-dark is now lower than right-light. To restore balance, black is added to right-light.

⁷³ We may be reminded by this observation of the ancient Celtic beliefs regarding the cycle of the year which were based largely on observations of the moon. The year began in November and the first half – until May – was considered to be the dark half, in which gestated the summer light and generative forces of crop growing, so abundant in the second half of the year. According to the calendar discovered at Coligny in 1897 the Celts observed twelve lunar months, and such was the similarity between the qualities described here and the properties of the composition that the names of these months were adopted for the individual variations.

Or: I am stumbling forward toward left and reach out toward right to prevent a fall.

Fig. 50b: The upper portion of my body is too heavy. The vertical axis shifts toward left and I would fall if correction would not take place in time by broadening the base through a step outward of my left leg.⁷⁴

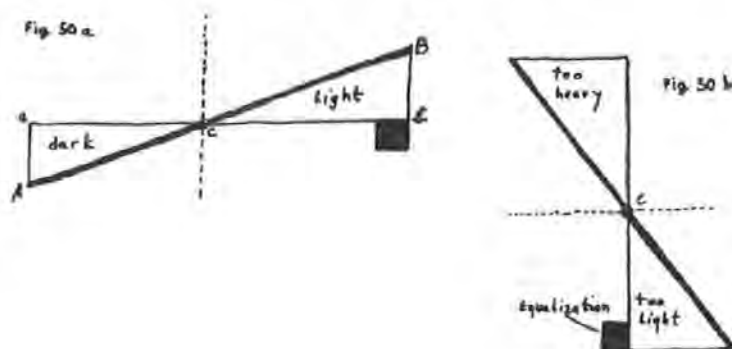


Fig. 6 – Studies of balance in Klee's *Pedagogical Sketchbook*

We therefore are able to define which sections of the theme, according to the balanced diagram, will contain similar material to one another – material of a heavy, dark nature (fig. 7). By using low chords built of stacked minor seconds, not only is the establishment of a misleading tonal centre avoided, but the only harmonic material illustrated is that of the single unit from the articulated scale. Use of the SOS pedal in the piano allows this to ring on beneath a repeated statement of the augmented fourth over a minor second, in a contrasting range of the keyboard. The pedalling is carefully notated to stress the combination of the two sets of intervals and separate their shades, and the entire gesture to illustrate in static form the fundamental pitch relationships which form the basis of the theme and will be elaborated in subsequent sections. The initial sketch for this material is reproduced in plate 12 and shows the balance of light and dark within the section itself.⁷⁵

⁷⁴ Klee, Paul – *Pedagogical Sketchbook* – Faber & Faber, 1953, pp. 43-44

⁷⁵ Interestingly, and despite the assertions in part one of this text, we are faced here with a natural model whose interpretation offers solutions for the generation of pitch material in the theme of the work, and for subsequent harmonic treatment of that material. This is the only piece analysed here which displays this characteristic of rigorous harmonic procedure (even the colour-chords which are experimented with in *fire dances* are composed in a principally intuitive way - see pp.102-107). However, the combinations of intervals arrived at, and the

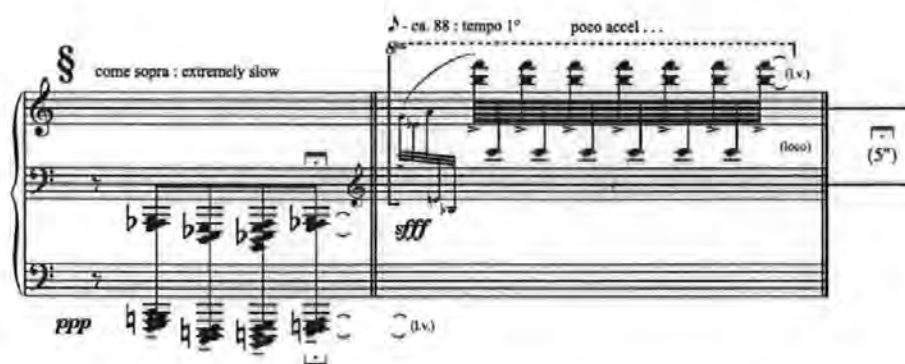


Fig. 7 – A section from the theme, showing the static iterations of the principal intervals, densely packed in time and space to give the necessary weight for the balance of the piece.

The remaining sections of the theme rely on similar combinations of the two intervals, although treated differently in order to build into them the possibility of variation. Looking to natural behaviours, and drawing on our observations on inexact repetition or separated heterophony made in relation to the *prélude* for bass clarinet (p. 77), we note that much expressive power is to be found in the process of exploring permutations of a limited amount of material.⁷⁶ Aside from observations made in the notebooks (reproduced on pp.75-76) on the presence of heterophony and inexact repetition in nature, we note a similar observation in Arnold Schoenberg's *Style and Idea*:

*...a basic configuration or combination taken asunder and reassembled in a different order contains everything which will later produce a different sound than that of the original formulation.*⁷⁷

way in which the generated pitch material is used and contextualised, still respond principally to notions of taste and intuition on the part of the composer, and the pitch generation itself is subject to taste decisions made at an earlier stage, during the process of fieldwork itself. The composer chooses an isomorphism from a most likely infinite number of possibilities. As such this work lays open the possibility for the still freer intuitive pitch generation and musical 'detail' present in subsequent works.

⁷⁶ This process returns in several forms in the music mentioned in this text, and will be noted again in our studies of *orrery* for resonant strings, *pebble music* for any solo performer, and *crumbs* for solo amplified flute.

⁷⁷ Schoenberg, Arnold – *Style and Idea* – University of California Press, 1975, p. 397

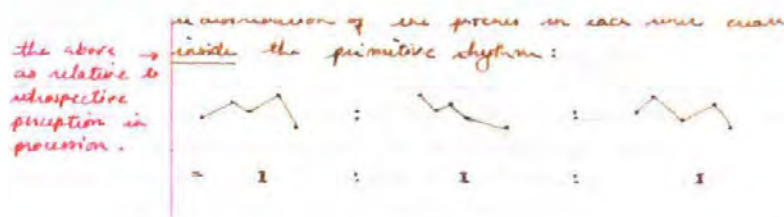
While Schoenberg is considering complex contrapuntal music here, the fundamental observation in his statement is strong even in monodic work. It can be seen in the folk music traditions of Finnish runo-metric singing, a form of extracting musical material from spoken language. Extracts from the notebooks on this subject show how this relates to more recent compositional processes:

Texts are usually four-foot trochaic (only four stresses in the line) and do not rely on end rhymes for unity, using instead heavy alliteration much as in the style of Icelandic edda/saga forms and Anglo-Saxon poetry.

Intonation occurs on a limited number of pitches (usually five) and melodic (or monodic) interest is borne of various permutations of the pitches. They are repeated, but never in the same order. Metre is usually in 4- or 5-part time.

In a way similar to Schoenberg's 12-tone system borne of the desire to avoid repetition of a pitch – to prolong all repetition as much as possible – this system suggests a unit made up of the five pitches, although the various permutations of those pitches will allow for precipitated repetitions due to a lack of set order as imposed by Schoenberg.

The whole suggests a kind of irregular musical alliteration which echoes the textual alliteration. Redistribution of the pitches in each unit creates a flux inside the primitive rhythm.



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These observations can be seen at work in further sketches on the building of the theme, using a carefully built sequence of pitches created by alternating the augmented fourth and the minor second (plate 13). We already see on this page two possible permutations, with the pitches numbered in their original sequence to illustrate the movement (plate 13a). Plate 13b shows a second page exploring an arrangement of the five pitches into eight permutations making the material for eight sections of the theme (totalling twelve sections with the four 'stressed' sections

⁷⁸ Martin, Mat. – Notebook 2, p. 72

as detailed above). Notions of alliteration are considered here: the first two sections begin with a wide interval, from low to high, the second two from high to low, and the final four with various instances of the minor second. The implications in shade of these intervals are also considered – alliteration of more or less ‘heavy’ harmonic material.

In order to clearly set out the permutations of these pitches for variation, the theme presents them simply as plain sequences, divested of embellishment or alteration, and at a slow pace so that their patterns and the relationships between the permutations are clear and easily perceived. In order to allow such minimal material to hold interest, extended playing techniques are employed. A combination of pedalling, silent fingering on the keys and pizzicato make for a less ordinary sound world which draws us in without adding to the simple procession of pitches which are the key to the rest of the work. The clusters of minor seconds are kept resonating in the bass and vibrate in sympathy with subsequent sonic events while the pitches themselves are cut short and made to sound brittle and harsh (fig. 8).

The musical score for Figure 8 is written for piano and consists of two staves. The tempo is marked as '♩ = ca. 88 : tempo 1^a'. The score is divided into five measures, each with a time signature above it: 7/16, 3/16, 4/16, 3/16, and 4/8. The first measure includes the instruction '(pizz : trail)' and the second '(pizz)'. The third measure includes '(on keys)'. The fourth measure includes 'f' and 'ff'. The fifth measure includes 'ff'. The score uses various noteheads: black squares for silent key depression, white squares for release of those keys, and triangular noteheads for pizzicato technique. The bass staff shows clusters of notes that are sustained, with some notes marked with 'f' and 'ff'.

Fig. 8 – A permutation of pitches presented in the theme, showing the extended technique required of the pianist and the preparation of ringing pitches in the bass to vibrate sympathetically with subsequent events. Black square noteheads represent silent key depression, white ones release of those keys; triangular noteheads represent pizzicato technique.

§3: Variation of the theme

Bearing in mind the possibilities for variation which are written into the theme of this piece, the approach to the process is effectively illustrated by the following extract from my notebooks. It refers specifically to the approach to variation 1, but is relevant to the processes involved in all subsequent movements of the piece. In fact, to concentrate principally on a single variation for the purpose of analysis will serve to illustrate the processes used throughout in more depth than to attempt to consider all twelve:

Approaching variation 1 we are confronted with the prerequisites of the chosen form. That is; beginning the variation not at the opening of the theme but at the start of the second gesture that makes up the theme; allowing the interval of the perfect fourth (5 semitones) to permeate the movement; encouraging, if and where possible, a sense of contraction...

The sequence of pitches in the theme is built by the 'stacking' of intervals of an augmented fourth followed by a minor second in succession. Preserving the neutrality of the minor second yet replacing the augmented fourth with the perfect fourth each time will alter enough of the pattern to give a sense of contraction but due to the constant of the minor second the pattern retains its identity. The pattern that connects the two (original and variation) is in the general shape but also in the primitive rhythm of the sequence of pitches.⁷⁹

The process described in these notes is the key to the principal method of variation throughout the whole cycle of pieces which make up *móna*. These early notes, written once the theme had been rigorously sketched and plotted but not yet composed, and looking forward towards the beginnings of a methodology for variation, already note the potential for isomorphism in music and the importance of the scale in perception. The substitution of a new interval for the augmented fourth in each variation relates directly to the sequence of intervals shown in plate 11. The beginning of the process can be seen in the diagram which appears next to

⁷⁹ Martin, Mat – Notebook 3, p. 1

this in the sketchbooks, comparing for illustrative purposes the sequence of pitches using first the perfect fourth, then the major sixth (plate 14).

The notebooks continue to illustrate the mechanics of the process by referring to examples we have already encountered in the previous chapters (chapter 1, p. 18, chapter 4, pp. 71 & 80):

A theoretical return is made towards the principle of the Messiaen / Stravinsky example: a: b: a1: b: a2: b... etc, where (a) = the augmented fourth and (b) = the minor second. We have in this a formal consideration transposed onto the harmonic plane. As with examples from nature we associate between them due to a 'connecting pattern' which links non-identical elements in a deep rooted manner through their behaviour. Emphasis here is on the 'way-to-form'.⁸⁰

Having applied the process of substitution to the sequence of pitch permutations found in the theme, a great deal of the melodic content of the first movement is determined. However, the manner in which this is delivered is also to be considered, as to continue declaiming the pitches in the manner of the theme would not constitute variation, nor would it sustain a piece which is to be almost forty-five minutes in duration. Other methods of treating the material must then be considered, and again at this point we may turn to our intuitive sense of taste and balance as composers. Again the notebooks reveal that the processes used thus far allow for further methodological development:

Ideas of interlocking the primitive structural rhythm [in this case the minor second] with an expanding or contracting one, as described above re. harmonic (patterned) concerns, may also be applied to the processional treatment of the basic five-note units: the opening and closing of each gesture corresponding to the five-note figure, and between these interjections expanding / contracting the gesture, as:



⁸⁰ Martin, Mat – Notebook 3, p. 1

To create the overall sense of contraction each treatment should begin at its longest and work back toward the original (harmonically contracted) five note figure. A treatment using either one or two extensions may suffice, making each gesture two or three phases in length. This will make the first variation considerably longer than the theme. A moderate tempo (no slower than ca. 60) should help to balance this.⁸¹

In this way we see the process of methodical intervallic expansion and contraction of the pitch sequence echoed in the temporal expansion and contraction of the gestures themselves. The pitch sequences are placed into sequences of their own and the result is reminiscent of a fractal symmetry: as the harmonic element contracts from movement to movement, the gestures which contain the pitch sequences contract within the single movement – all of this within a movement which has the same structure as the entire piece. Having already noted the fractal nature of the cycles of the moon (p. 82), we may observe that behaviours within this piece are in some way analogous to this property in the subject. The levels at which these elements operate differ from one example of these patterns to the other, but the overall behaviour of fractal symmetry is maintained, and as we are fundamentally concerned with an abstract ‘music of relationships’, we accept that a direct link may not be drawn. However, our interest lies with the question as to whether the isomorphism in behaviours may elicit a similar response in the listener or viewer to both phenomena. We are aiming at a music which contains one or more implicit natural energies also present in the aspects of the lunar cycle that our fieldwork has explored.

The above extract from the notebook makes reference to Stravinsky’s *Symphony of Psalms*, and specifically to the sketch made of the opening of the second movements in the book *sketches of sound, studies in line* (fig. 9). Again we note an example in the work of this composer of a very precise behaviour in sound. The opening and closing intervals of each strophe of this fugal theme remain constant as the

⁸¹ Martin, Mat – Notebook 3, pp. 1-2

movement between them expands in a manner similar to that described above (fig. 10).



Fig. 9 – Sketch of Stravinsky's *Symphony of Psalms* (second movement, opening)⁸²



Fig. 10 – Stravinsky – *Symphony of Psalms* (second movement, opening)⁸³

The sketch for this process (plate 15) brings together these elements on a single page and contains initial material which exists in the final form (fig. 11).

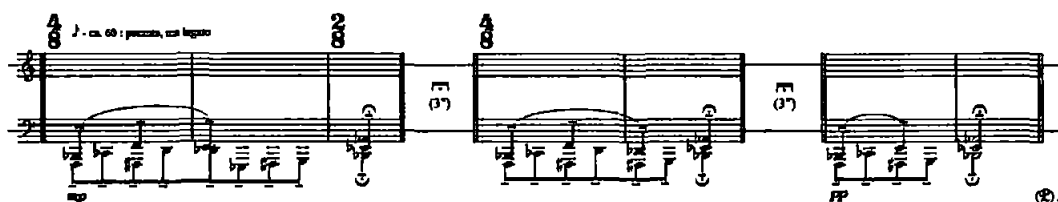


Fig. 11 – From *móna*. An example of the treatment in variation 1 of the first pitch-sequence from the theme, showing substitution of the augmented fourth with the perfect fourth and expansion/contraction of the sequence according to the principles outlined above.

Other elements of variation in this movement concentrate on maintaining the relationships between sections established in the theme. Of interest is the following, again from the notebooks, considering the gesture which begins the statements of

⁸² Martin, Mat – *Sketches of Sound, Studies in Line*, p. 17

⁸³ Stravinsky, Igor – *Symphony of Psalms* (opening), Boosey & Hawkes

pitch-sequence in the theme, allowing for the sympathetic resonance of the bass strings (see fig. 8):

Interjection of a new sonority as a punctuation particular to this movement, recurring at regular intervals will add to the retrospectively appreciated layering of elements (a: b: a1: b...) [see also chapter 4, §B]. Possibly a drum-style low roll either struck with the heel of the hand on a crossbar joint inside the piano (damper pedal depressed) or somehow created with low, ppp notes on keys, although this latter may be too similar to the stressed sections of the theme.⁸⁴

Looking at the 'stressed' sections of the theme, composed almost entirely of minor seconds (the interval which is to remain unchanged throughout the piece), we are forced to seek alternative techniques to state the harmonic stasis and darkness they provide. Looking through the variations, we may note that this is done principally through changes in texture and register. In this case, we see that in variation 1 quick successions of pitches are used to 'build' the clusters through resonance. The clusters are then 'refracted' into a descending pattern which is iterated against a repeated perfect fourth (fig. 12a). The principal difference between this and the equivalent sections of the theme being dynamic and register, along with the opening-out of the cluster into a succession of single notes or dyads. Elsewhere we note scraping on the winding of bass strings, punctuated by knocks on a crossbar (variation 2, fig. 12b), or the setting into motion of all the strings of the instrument by use of the damper pedal, applied and released quickly in a 'tremolo' style (variation 4, fig. 12c).

⁸⁴ Martin, Mat. – Notebook 3, p. 2

3/16 ca. 90 : più mosso (loco) legato 5/8

ff *mp*

(2) (sec)

Fig. 12a – Variation 1, stressed section showing cumulative clusters formed at the high end of the piano’s register then moving downward in fourths over the iteration of a static interval.

(*) *ff* *ff* *ff* *ff* *P* *ppp*

(*) knock on crossbar (knuckles)

§ (5") (1.v) (3")

piano *ff*

(*) trem on pedal (presto possibile)

Figs. 12b & 12c – Stressed section from variations 2 and 4, showing scraping and knocking sounds (b) and resonances produced by manipulating the damper pedal (c).

Considered as a whole, and as an example of the treatment of the following variations, the overall structure of the first variation, analysed above, remains the same as that of the theme, and is marked out by measured silences of the same length and in the same positions (taking into account the temporal shift of one section per variation). Individual sections are lengthened in many cases but retain their balance in relation to one another. In short, the interstices between sections can be mapped onto those in the theme, creating an isomorphic relationship in the sonic behaviours of both movements which echoes that within the movement between sections of a similar type. The harmonic contractions and temporal expansions of the variation, while important and deliberate as explained above, are details which arise from any number of possibilities contained within the small number of variables which the chosen methodology for the process of composing creates. The result reminds us again of the idea of sensitive dependence on initial conditions and reinforces the notion that an infinite variety of explicit expressions are potentially within any implicit pattern or energy. This method of approaching the theme and variations form not only finds a way of making a new explicit expression of the pattern which implicitly governs its subject, but fractally replaces that relationship within itself, with the result that each variation resembles more closely an expression of the pattern of the theme than a secondary development of its explicit qualities.

A final extract from the notebooks quotes from the writings of Leonardo da Vinci and speaks more broadly of the various elements brought together in an attempt to compose this piece within the ideas of isomorphism and interconnectivity. The writing touches on observations of diverse subjects, but each in some way has informed the sense of deriving sonic or otherwise artistic material from observations of the natural world. It should be noted that although only briefly mentioned above (p. 89), the study of the rules which govern the poetic metre of Anglo-Saxon and traditional Scandinavian poetry has provided an excellent parallel to this work in music, principally due to the strict rules which govern the composition of such

texts. Rules dictating numbers of syllables, level of stress and type of alliteration make for poetry which falls into a very rigid fundamental pattern, yet an infinite amount of variation is possible within this, making a sense of the heterophonic strong in the work. The idea of work which creates explicit expressions of implicit patterns and rules, as is the intention of the music being composed here, is inescapable within this practice, and thus rightly features in the note-taking.⁸⁵ As mentioned in relation to plate 12, the stresses which make up a line can be accurately notated using a combination of the following symbols: / (primary stress), \ (secondary stress), and x (unstressed)⁸⁶:

'Anaxagoras:

*'Everything comes from everything, and everything is made from everything, and everything can be turned into everything else; because that which exists in the elements is composed of those elements.'*⁸⁷

Essentially, that there are certain elemental building blocks in which are contained the raw material for all things, and that the energies (in the form of patterns) that these blocks naturally give out in their simplest form are infinitely permutable and contain the seeds for a sensuous effect on the receiver. In simple terms, by using these building blocks to create art, we can be sure that

⁸⁵ Daniel Donoghue, in his introduction to Seamus Heaney's translation of *Beowulf*, writes on Anglo-Saxon metric practice (annotations from the notebooks are included in square brackets):

'It is almost as if the Germanic innovators of this prosody (sometime before the fifth century) selected a limited number of phrasings from their ordinary speech and formalised those rhythms as the basic units of the poetic line. Other rhythms were excluded. So rather than elevate a regularly repeating pattern (like the iamb), they pieced together phrasal units from already-familiar rhythms... [a selection of natural rhythms, from observational pictorial fieldwork could constitute the basis for such treatment in a musical situation]

'... two such phrases, called half-lines, combine to form an Old English verse line. In pairing them together a premium is placed on variety, so that the same rhythm is rarely repeated in both halves of the line (thus ruling out an iambic line), and two successive lines are rarely alike. The paired half-lines are linked by alliteration on the stressed syllables, as in the g-sounds of

1 2 3 4
Grendel gongan, Godes yrre bær...

'... Taken together, the metrical constraints favour an economy of expression within the half-lines so that each syllable is carefully weighed.'

From Heaney, Seamus – *Beowulf*, a verse translation – Ed. Daniel Donoghue, Norton, p. xvi
Annotation from Martin, Mat. – Notebook 2, p. 77

⁸⁶ Example from *Beowulf*, reproduced from Heaney, Seamus – *Beowulf*, a verse translation – Ed. Daniel Donoghue, Norton, p. xix:

/ x / x / \ x /
hreas on hrusan hord-ærne neah.

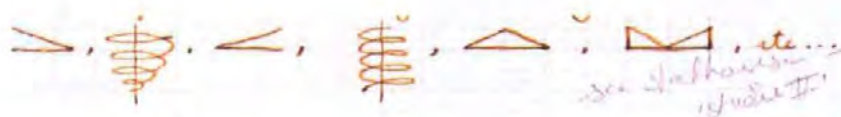
N.B. We are not first to adopt these symbols in a musical context. Indeed, Schoenberg adopted them as illustrations of stress in performance in *Style and Idea*.

⁸⁷ da Vinci, Leonardo – *Notebooks* – OUP, 1952, p. 14

our art will share a certain 'genetic code' with nature and hopefully will be perceived in a similar way.

The link between finding / using these patterns to create art and the model of ancient poetic forms is strong. Through use of balance of stress patterns in lines [which all have the same fundamental structure] and development through embellishment or contraction through the use of the unstressed element ('x'), a sense of inexact repetition [or 'separated heterophony' – see p. 77] is created which stresses these patterns.

Examples of these basic energies are easily notated:



As well as being possible to permute these patterns individually, they can be combined in all possible ways.

Considering the *móna* variations as an example we see several of these patterns, manifested through various techniques:

formal / observational (from initial sketches) -



And translated into poetic models from Anglo-Saxon and ancient Finnish idioms



These are present in the forming of the theme, but are also permuted throughout the variations.⁸⁸

⁸⁸ Martin, Mat. – Notebook 3, p. 6

Chapter 6

fire dances for solo harp

shadow musics for guitar quartet

The two pieces discussed in this chapter share their origins in the same body of fieldwork, in that the observations which informed the second were made whilst researching the first. The piece for harp, *fire dances*, was written for harpist (and specialist in improvised music) Rhodri Davies, who assisted with technicalities and refinement of instrumental ideas throughout the process. The fieldwork, as suggested by the title, concerns itself with aspects of the behaviour of fire, particularly in relation to that of individual flames. As it is almost impossible to consider fire or any other source of light without also considering the shadows which accompany it, it is perhaps to be expected that these observations should engender a second piece which deals with this aspect. Naturally, both pieces consider both aspects of these observations, although whilst *fire dances* concentrates on creating isomorphic relationships with flame behaviour, *shadow musics* for guitar quartet concerns itself principally with the nature of shadow. In this respect the latter benefits from comparison with the piano cycle *móna*, as both deal with relative considerations of light and dark. The two pieces (*fire dances* and *shadow musics*) also make an effective illustration of the shift from complex, detailed music to more open and simple forms which characterises the progress of this research. The two, however, are best analysed separately to begin with.

§1: *fire dances* for solo harp

The fieldwork process with which the planning of this piece begins is very similar to that which constitutes the early work carried out on *móna* (*night music*). Initial sketches of flames appear in the books, accompanied by notes on the fundamental aspects of behaviour – colour and movement being the most easily grasped here.

Very quickly these distil into sequences of lines and arrows laid over one another, showing the principal movement of the flame at successive moments in time. The observation is made that a certain number of basic movements is repeated in a chaotic fashion by any one flame, and thus may be represented by a complex of lines, 'rooted', as it were, to one spot on the page. The overall character of the resulting drawing may be taken to represent the culmination over time of the composite form which the flame takes as it flickers between various instances of its expression. Studies of the various colours involved and their distribution are then added to these drawings (plates 16 & 17).

The initial observations may also be found in a verbal form in the notebooks:

'fire dances' for solo harp:

Fire does indeed dance, and according to my sketches (observational sketches, book ii), it does so in a very particular way. The recognised sense of 'flickering' we know in the movement of flames is the obvious example of this, and it appears to be the result of constantly changing detail inside certain set parameters.

Although flames merge and separate with and from one another, they are essentially dependent upon their source of fuel and thus remain in one position with a basic constant in size and shape [in order to grow and spread, new flames must be born of fuel ignited by an existing flame – it is not the flame itself which moves, it is a transferral of energy to a new fixed point]. The 'dance', then, is rooted to the spot, and all the variation is to happen within this framework – flame and fuel constantly rearrange their relationship around one another, particles are mobile within a static phenomenon.⁸⁹

Thus a sense of what causes the type of behaviour manifested in the movement of individual flames is achieved. A continual reassessment of an equation or relationship between flame and fuel, tied to one spot and repeating regular movements in an irregular, or chaotic, way. The musical implications of this bring to mind the serial heterophony, permutations of pitch-groups and imposition of pre-determined length and sub-division of that length we have encountered in both the

⁸⁹ Martin, Mat. – Notebook 3, p. 48

prélude for bass clarinet and the piano variations. These elements will all come to serve in the construction of the music itself.

The notebooks show a clear definition of observed parameters from the fieldwork which have musical possibilities:

- *flames repeat their 'dance' patterns,*
- *flames exhibit clearly defined movement when alone, but merge and separate (superimposed or overlapping) in numbers,*
- *flames rely on air (another element) to 'dance' – if here the music itself is the dance of fire, a relationship with silence must feed it,*
- *flames fold over one another, and especially over themselves,*
- *the base of a flame often moves less than the rest of the flame (a core displays static qualities),*
- *movement is often twisted and always upwards – heat rises,*
- *colour is constant in flames – see sketches – a movement through the primary colour wheel is discernable, from a blue base through yellow to red at the flame's tip,*
- *the 'dancing' of flames causes 'added resonance'⁹⁰ to itself by causing surrounding coloured shadows to dance in parallel.⁹¹*

The latter two observations made here concern colour, and indeed it is difficult to look at flames without considering their coloured aspect. The sketches make efforts to reconcile the relationships of the colour wheel with the intervallic approach to light and dark used in previous works, equating blue with dark, contracted intervals (e.g. seconds) and red with the opposite (sevenths), moving through yellow at the centre (fourths and fifths, including the centrally placed augmented fourth). Applying the same notions of weight to this sequence as previously to that of the grey scale used in *móna*, and working with the possibility of concentrating not on one interval as before but on combinations, stacked one above the other, sets of intervallic relationships can be created which are isomorphic to sets of colour relationships (plate 18). Provided the assignment of a particular harmonic value to a particular

⁹⁰ see p. 105

⁹¹ Martin, Mat. – Notebook 3, pp. 48-49

colour value remains unchanged, the relationships created between them can be considered analogous to observed sets of colour relationships. These may of course also be combined into complexes of colour chords.

The notebooks also contain initial investigations into the areas between the clearly defined primary colours. Small sketches in both the note- and sketch-books show ideas using the gradual movement from, for example, dark blue at the minor second, to yellow at the augmented fourth moving through green at the point halfway between these (the minor and major third). Examples are given in the notes:

Thus – a series of perfect fifths = a yellow plane [yellow-orange in early stages]: the 5ths need not be the same pitches as one another – the interval is where the 'colour' lies.

Also – a series of dyads as follows: m2, M3, aug.4th, m6, M7 = a steady progression around the colour wheel (the voicings of these dyads would infer a level of darkness over several octaves, so that intervals in bass registers would give out darker shades of their respective colours).

Finally – a chord built of more than one interval, such as aug.4th over m2 over m6 = a gradient of colour, from bottom to top: orange, darker than following colours; blue, lighter than orange but darker than yellow; yellow, lightest hue.⁹²

The idea of applying complementary colour harmony to chords derived from distribution of the primary colours (plates 18a-18c) as described above is explored in the notebooks with reference to Goethe's writing in his theory of colours:

With coloured light, and in certain conditions, the shadows cast take on colour themselves, directly complementary to that of the light source. Of course, when considering the harmonic language of flames by studying the distribution of colour within them, it is possible to create 'harmonic complementary shadows' as chords of 'added resonance'.

e.g. A chord of red-blue (open/closed intervals e.g. 7th & m2nd), at mf, accompanied by a chord of green-orange (such as m3rd & m6th, where green rests between the tight harmony of blue at the dark end of the spectrum and those of yellow in the centre, and orange between yellow and red), played higher

⁹² Martin, Mat. – Notebook 3, p. 52

(around 2 octaves) and at ff; or by a single note or pair, in similar colour(s), lower (again around 2 octaves) and played p.

Goethe notes this phenomenon in his theory of colours:

*'The phenomena of coloured shadows may be traced to their cause without difficulty. Henceforth let any one who sees an instance of the kind observe only with what hue the light surface on which they are thrown is tinged. Nay, the colour of the shadow may be considered as a chromatoscope of the illuminated surface, for the spectator may always assume the colour of the light to be the opposite of that of the shadow, and by an attentive examination may ascertain this to be the fact in every instance.'*⁹³

This is also true of the shadows on the retina, he says – shadows which happen after the event rather than in parallel (coloured echoes):

*'If in the morning, on waking, when the eye is very susceptible, we look intently at the bars of a window relieved against a dawning sky, and then shut our eyes or look towards a totally dark place, we shall see a dark cross on a light ground for some time.'*⁹⁴

So in black and white, but the inverse colour phenomena are present here where colour occurs:

'The impression of coloured objects remains in the eye like that of colourless ones, but in this case the energy of the retina, stimulated as it is to produce the opposite colour, will be more apparent.'

'Let a small piece of bright-coloured paper or silk stuff be held before a moderately lighted white surface; let the observer look steadfastly on the small coloured object, and let it be taken away after a time while his eyes remain unmoved; the spectrum of another colour will then be visible there too, for it arises from an image which now belongs to the eye.'

'In order at once to see what colour will be evoked by this contrast, the chromatic circle may be referred to.'^{95 96}

These ideas can be seen put into a musical dimension in the notebooks (plate 19).

To ensure that the intervals used retain their qualities in order to show the relationships replaced into the music, notions of dynamic and register must be considered to avoid building a chord which will eventually become a simple cluster of seconds. This consideration reminds us of Messiaen's technique of 'added

⁹³ J W von Goethe – *Theory of Colours* – MIT press, 1970, p. 32, note 72

⁹⁴ J W von Goethe – *Theory of Colours* – MIT press, 1970, p. 7, note 20

⁹⁵ J W von Goethe – *Theory of Colours* – MIT press, 1970, p. 20, notes 48-50

⁹⁶ Martin, Mat. – Notebook 3, pp. 50-51

resonance', mentioned in the extract above. Messiaen speaks of 'added resonance' in his writings on music, and his ideas are well illustrated by Robert Sherlaw Johnson in his biography of the composer:

'The device of added 'resonance'... can take the form of either a note or chord played quietly above a louder principal note or chord, or of a chord played loudly in the bass register of the piano against other material (inferior resonance)...

'The sound of the resonance tones should be absorbed as much as possible into the sound of the principal notes, so that the device becomes essentially a modification of timbre rather than a straightforward harmonic device.'⁹⁷

Interestingly, the above fieldwork on colour and music seems to imply a complex and richly layered style of composing, and seems likely to produce music which is far from the sound world of the *fire dances*, and further still from that of subsequent works relating to this research. The ideas of colour-harmony which began to form in this way did in fact run counter to the general trend of the music being produced at the time. A desire to maintain a simplicity and openness which would suit the improvisatory style of the performer who was to receive the piece meant that although some of the harmonic material in the final pieces remains 'coloured' in this way, this tends to occur in isolated moments where such an approach is appropriate, rather than in an holistic fashion perhaps more typical of the approach to composition being developed here.

By way of comparison it may be noted that a variation on the original sketch shown in plate 18c appears in an early version of the score:

⁹⁷ Sherlaw Johnson, Robert – *Messiaen* – J M Dent & Son, 1974, pp. 17-18



Fig. 13a – From an early score of *fire dances*, showing a progression through the colour wheel according to the chosen intervallic isomorphism to colour relationships (n.b. accidentals in the notation which do not occur in the pedalling instructions are set before the excerpt begins).

The sequence of pitches moves through two concurrent sets of intervals which loosely take us from blue to red, as in the sketch: the seconds of B to C to D flat, and of F, G and A, all within the first bar, place us firmly at the blue end of the spectrum. The distance between the two being small (only a major second from A to B), we are kept within a specific tonal area. Moving into the next bars we note the retrospective relationships between the pitches here and those we have just heard: we move from motion implying the second to larger intervals, D flat to F to B, A to C etc. Finally the intervals open out into dyads in the fourth bar of the example, sounding the larger intervals as an illustration of the shift into open, red-coloured space. This passage does not occur in the final score.

Fig. 13b shows a passage from the same (second) movement of the final piece in which the same principle is applied but the sense of movement is made much less deliberate, the passage as a whole distributing the colour intervals over a wider pitch range:

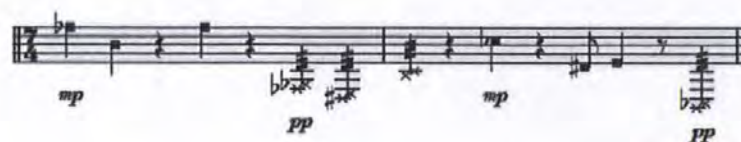


Fig. 13b – From *fire dances*. The notes written with cross heads and marked with tremolo symbols are performed by scraping the winding of the string(s) with the fingernails. Square noteheads are performed by muting the string at the table with the left hand. The example is in the bass clef.

Here the ‘blue’ root of the colour distribution through a flame is maintained throughout in the scraped bass pitches. The exclusive use of such a technique holds firm the identity of the material, keeping it static and, in effect, rooted to a register and timbre. The remaining pitches move more freely above this root, yet display a shift from yellow to yellow-red to red in their intervals: A flat-D, A flat-E flat, E-flat-F sharp (lower), E flat-G (lower). The processional manner in which the intervals are presented (as opposed to being presented as chords) allows a greater separation between them, keeping the identity of each and therefore the resulting ‘colour’ separate despite the resonant nature of the instrument.

The observations made over the course of the fieldwork, as with *móna*, suggest some more general guiding principles for the piece as a whole, however, and as with the piano variations, these are mostly formal (concerned with form and time rather than harmony or melody). Of note in the comparison with the earlier piece is the fact that the construction, although still relying on a succession of short movements, is not temporally defined by a ‘narrative’ element which dictates the progression of the piece. In answer to its more abstract qualities other elements of *fire dances* are required to maintain the cohesion necessary for a static piece of this nature. This is achieved principally through aspects of the movements being consistent across the piece as a whole.

The framework which contains the material, on several levels of the piece, is designed to be analogous to the notion of permutation within limited parameters, noted in the fieldwork (plates 16a-c). The initial drawings of varied movement rooted to a single spot suggest that musical ideas may be contained in a similar structure, and indeed this is applied to several aspects of the piece.

Most clearly this is visible in the length of the movements themselves. The possibility for containment within a certain set of parameters presents itself as measurable in several ways: a piece may be made up of units of the same number of minutes and seconds, or these units may be composed of an equal total number of beats, etc. Seeking a constraint which is as elastic as the movement of the flame (which displays the same inner structure at all times but is never twice the same) we may turn to the precedent of Pierre Boulez's *Notations* for solo piano which, as part of their total serialist construction, dictate a duration of twelve bars per movement. A set number of bars is in fact an ideal set parameter for the isomorphism necessary in this piece as it displays an overall recognisable shape without being tied to external and artificial notions of absolute time. Both Boulez's piece and this one do this by not dictating a bar length in beats which must remain unchanged throughout the movement; rather the bar length is affected by phrasing and material and thus is in fact more discernable. The resulting seventeen bar movements of *fire dances* are all of differing lengths but share a basic internal structure which causes them, upon listening, to be clearly identifiable as resulting from the same fundamental process, or 'genetic code'.

Within these movements we can note other sets of restraining parameters which reinforce the general sense of rooted activity described in the fieldwork. This also allows for the fractal symmetry of patterns within patterns which may be noted in the relationship between the single flame and the fire made of several flames. An example of this restraint may be drawn from the way in which the instrument is used in several parts of the piece.

The double action harp, which relies on pedals to alter the length of its diatonic strings in order to access the full chromatic scale, offers an opportunity for permutation of the type relevant to this piece in its technical makeup. Much use is made throughout the piece of static pedal settings which alter the sound of a repeated passage. This is particularly obvious than in the opening of the first movement, which not only makes use of the ‘constellations’ of pitch-groups explored in the piano variations, but sets these against mechanical changes in the instrument itself (fig. 14).

1 (processional) : ♩ - ca. 60, sonorous, pesante

Figs 14a & 14b – From movement 1 of *fire dances*, showing the initial statement of the pitch group and a later statement of the same, with alterations in pitch order and pedal settings (accidentals⁹⁸). The permutations of limited material remind us of the pitch groups which make up the theme of the piano variations, and also echo the limited movement of the flame rooted to a single spot.

This approach is taken further still in movements 2 and 4 of the piece, where ‘mobile’ sections are introduced (fig. 15). Essentially these act in the same manner

⁹⁸ It is interesting to compare this use of accidentals as a chaotic element in the repetition of pitches to the use of the flat-natural-sharp ‘key signature’ in the flute piece *crumbs*, which allows the performer to apply any accidental to the pitch being played (see chapter 7).

as the notated permutations of pitch groups seen in movement 1 and in *móna*, but leave the act of permutation to the performer at the time of playing. The element of chaos, or the unpredictability of the movement within order which is noted in the sketches is thus maintained, not only within the piece, but between performances.

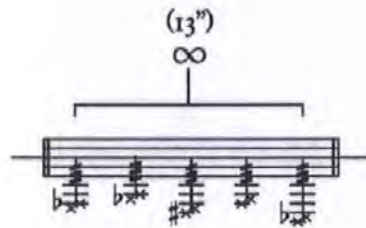


Fig. 15 – Mobile section from movement 2 of *fire dances*. The elements of these 'mobile' sections may be played in any order and any number of times within the given duration. Events are of equal duration but may be overlapped, or separated by silence. The mobile sections, although notated in the same way as one another, should differ in sound.

The character of the final piece is far from that suggested by the initial musical sketches, which attempt to include complex notions of colour-chords, added resonance and rhythmic 'flickering'. In fact the score concentrates on simple aspects of the observations made through the fieldwork and allows them the space to be expressed through unfolding and permutation. The result is perhaps not what would at first be expected of music which has been informed by fire, being for the most part slow moving and very quiet, and this illustrates well the important idea in this work; that with music of this type we do not seek to emulate or evoke our subject but rather to replace one or more of its behaviours into an abstract musical context. It is, of course, unlikely that any listener to this music would recognise fire as its subject, yet we hope again that something in the behaviour of the music may abstract certain patterns from nature with which the listener is familiar, and in doing so expose these patterns or energies in a way that is new to that listener. The simplicity of the final work is the result of a process of distillation, in which the several detailed observations made at the fieldwork stage are emphasised or removed from the work altogether according to an instinctive sense of their relevance to the design of the music itself. This serves to illustrate that conducting

fieldwork is not only a method of collecting information but also one of organising it, and eventually identifying which observations of a subject contain the most apposite or fundamental qualities. The simplification of the resulting work allows for clearer communication of that which remains in the piece, and is a process which can be seen to continue in the second piece to emerge from this fieldwork, *shadow musics* for guitar quartet.

§2: *shadow musics* for guitar quartet

A small amount of additional fieldwork with this piece specifically in mind accompanies the observations on shade made during the process of composing both *fire dances* and *móna*, mostly concerned with the details of the more general observations already made. Some reference is made to earlier sketches in the book *observational sketches ii*, and these are brought together in note-taking which precedes the act of composing itself. The notebooks also are comparatively brief with regard to this piece, and begin immediately by repeating the exercise used for *fire dances* (p. 102) of listing the qualities inherent in the subject which may offer valuable equivalents in sonic terms. They also allude from the beginning to the proposed instrumentation of four guitars, and make fundamental observations on the overall dynamic level of the piece:

Musical equivalencies to aspects of shade seem to lie in permutation, repetition, variation through proportional distortion (foreshortening), growth in size and intensity in inverse proportion, rotation with time, parallel outline, etc...

Loss of definition and colour as a result of diminished (removed) light. With light being equated to volume we see that at a lower dynamic level differences in timbre (between instruments of the same type, perhaps separated from one another by slight alterations e.g. in tuning, timbre or preparation; between techniques, etc.) become less defined.⁹⁹

⁹⁹ Martin, Mat. – Notebook 3, pp. 54-55

A certain amount of reading to explore the ideas suggested by the existing fieldwork may also be noted in the writing. Again observations on the lack of distinction caused by varying degrees of shade are indicative of the appropriate nature of the subject to the instrumentation for the piece:

Quoting Baxandall: '... there are no absolutes in the perception of tone: the same tone can look different within the same array. It also means that the system [of perception] is very casual about what is happening between contrast edges.'¹⁰⁰ This is to say that perception with regard to shadow, as with all perception, is reliant upon relationships. The nature of something is altered, perhaps diminished in shadow, colours can vary and can become more difficult to distinguish from one another in the absence of direct light.'¹⁰¹

Looking at existing drawings such as those of plates 20a and 20b, we can see notation of the varying levels of dark and light produced by the layering of shadows in, for example, the overlapping of leaves. This is taken further in new drawings which recall the grid-like chord diagrams of Klee, although the tensions within these are not confined as before to levels of shade placed within a clearly marked grid system, but are the result of freely moving blocks of uniform shade, creating a complex of relationships out of a single repeated unit (plate 21). Already on this page we note detailed examples in musical notation of how this process may be replaced into the sonic context.

Also visible in the sketch shown in plate 21 is a drawing, reproduced and simplified from the notebooks of Leonardo da Vinci, showing the cumulative effect of shadow in varying intensity. Sketches elsewhere in the books also note the phenomenon of shadows of different size and intensity being cast simultaneously by the same object from several light sources (plate 22).

¹⁰⁰ Baxandall, Michael – *Shadows and Enlightenment*, Yale University Press, 1997, p. 67

¹⁰¹ Martin, Mat. – notebook 3, p. 56

The musical implications of the combination of these observations and the instrumentation of four equal voices are clear from an early point in the composing process, and this in itself can be suggestive of possible effective techniques to be used. Artificial and deliberate differences in timbre between the guitars are to serve to separate the voices and create an isomorphism to the relationship between the constituent parts of the phenomenon in question (object and shadow, shadow and shadow etc.). Conducting this type of experiment at a low dynamic level then serves to mask these differences in a lack of definition. The individual elements each have their characteristics yet are lost within one another.

As for the material which is to be treated in this way, we see in this piece for the first time a visual method of creating abstract balanced sonic units which are to be used as the basis for a piece, and treated according to the isomorphism governing the behavioural patterns of that piece. In fact, turning again to the notebooks, we see that this piece is suggested as a ground for experimentation in precisely this, in response to a freer and more abstracted fieldwork style using ink (plates 9a & 9b):

Use shadow musics as a series of extreme miniatures to conduct initial experiments in closer relations between the abstract calligraphic visual pieces and sonic material – single sets of simple relationships (that of an object and its shadow, for instance), expressed only once (see Cage's Haiku for piano).

Create images as sketches for tensions/relationships that can be translated into static statements for guitar quartet, performing in sound the same process as a series of drawings typical of my present visual work. Elaborate the initial drawings from observations of shadows' relationships (to their causes, to each other, etc.).¹⁰²

Examples of the resulting 'hieroglyphs' are to be found in a late sketchbook (plate 23), and their musical implications are to be found at varying levels in the score (see below). The result is that the piece, despite being made up of six movements, can be further subdivided into eighteen miniature sections, each of which centres

¹⁰² Martin, Mat. – Notebook 3, p. 75

around the musical expression of an image like the ones in plate 23 (created in a way directly analogous to the instinctive transferral of sound to mark in the book *sketches of sound, studies in line*), and each of which treats the expression of those relationships in a manner analogous to the observations made above about the behaviour of shadow.

The manner in which musical behaviour isomorphic to observed phenomena is to be created is subject to analogies made before the composing process begins. These include ideas regarding technique, treatment of the instruments themselves, treatment of the notation used to communicate the material to the performer and consideration of the temporal divisions of the piece. The following analogies to shadow behaviour are made:

- Differences in timbre are less discernable at low dynamic levels, just as clarity of outline and hue is lessened in shadow.
- The effect of two concurrent shadows from similarly placed light sources may be produced by recreating that heterophony between two or more instruments. This could be done by specifying either pitch or rhythm to each player, but not both. The differences in interpretation provide the equivalent of inconsistencies present in the model.
- The effect of shadows from one object being thrown in separate directions by different light sources can be created in a similar fashion to that described above, but rather than being concurrent they may be processional, or overlap.
- The effect of lengthening or foreshortening caused by the angle of the light source can be created over time, by spreading material over a longer period in one voice than in another.
- The coinciding of shadows to create a single definite edge from an object can be recreated in sound by the sudden alignment of parts which otherwise are independent.

- Any of the above techniques may be combined to create composite effects as of several shadows from one or more objects overlapping and forming complexes.

We can see examples of all of these techniques being used and integrated with one another throughout the score. Each of these techniques are provided and identified as examples in the figures below by way of analysis. It is also interesting to note the various ways in which the 'hieroglyph' models are translated into musical material, at times using all four guitars to create one composite figure (fig. 16a), and at times subdividing the instruments to create concurrent gestures (fig. 16b). The open notation, which for the most part leaves timing and rhythm to the performer, provides a framework within which differences between parts (sometimes given identical written notation – note the similarity with the 'mobile' passages in *fire dances*, p. 110 above) can occur naturally.

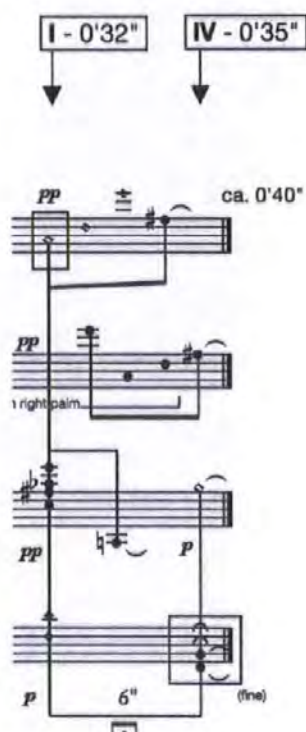


Fig. 16a – A single hieroglyph across all four guitars, from movement 6.

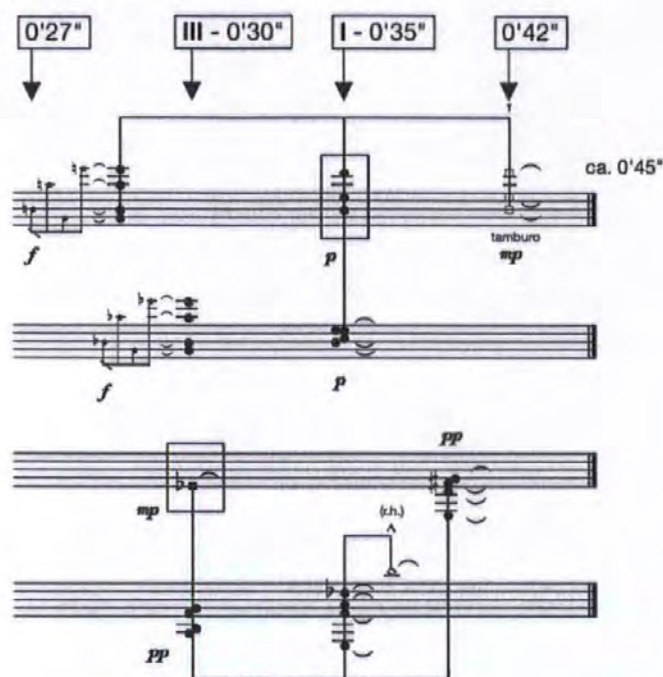


Fig 16b – A hieroglyph stated over two guitars, concurrent to another statement of the same shape in the remaining instruments, from movement 4. Note the sense of foreshortening in the contraction of the statement in guitars III & IV.

Fig. 17 is taken from movement 3 of the piece and shows examples of the remaining points made above. Note the use of a single set of pitches given to guitars I, II and III. Although the starting point in the sequence is different for each player they perform the same material as one another. They are each marked with a low dynamic instruction but their individual timbres are marked out by differences in technique (using the fingernails, using a felt pick, etc.). The passage begins and ends with points of vertical alignment that clearly define the edges of the 'hieroglyphic' gesture. In this instance the heterophonic interplay between guitars I-III is not fully aligned, implying an overlap of shadow, and in fact we can follow the intensity of texture from a single voice through two voices to the full three, and back again to one – it is a process reminiscent of da Vinci's drawing, reproduced in the sketches (plate 21). The lack of precise rhythmic material maintains the simple quality of the composition (as an expression of idea) yet paradoxically allows for eventual effects of great complexity, relying on the element of chaos within order to

bring this about without producing unnecessarily complex individual parts for performers.

The image displays a musical score for four staves, likely for guitar, with various performance instructions and dynamics. Above the staves, two boxes are labeled 'IV - 0'20"' and 'III', each with a downward-pointing arrow. The first staff is marked '(fingernails)' and begins with a *p* (piano) dynamic. The second staff is marked 'flautato ("")' and begins with a *pp* (pianissimo) dynamic. The third staff is marked '(ord.)' and begins with a *p* dynamic. The fourth staff is marked '(felt pick)' and begins with a *pp* dynamic. The score includes various musical notations such as notes, rests, and slurs, along with circled numbers 1 and 2. The dynamics *p* and *pp* are used throughout the piece.

Fig. 17 – From movement 3, demonstrating several points from the fieldwork process present in the final score.

By way of a final example, fig. 18 demonstrates the simplest form of heterophonic expression which relies upon open notation. Two instruments playing the same material in slightly different ways, and with no set rhythm (opening, guitars III & IV). The relationship is one of a single object and single light source, producing one clearly defined shadow. This initial gesture is followed by a more complex heterophonic passage which once again demonstrates both the sense of foreshortening that contraction of the material will allow and the gradual overlapping of elements to increase the sense of density in shade.



Fig 18 – From movement 4, showing the basic heterophonic practice, followed by an elaboration involving overlapping and foreshortening ideas.

The result of the clearly defined ideas and processes which make up this piece, combined with a freer sense of progression than a structural framework such as the system of variation in *móna* or the seventeen bar movement length in *fire dances* would allow, is a sense of clarity, economy of gesture and strong expressive patterning in sound. In this respect *shadow musics* can be said to take the work undergone in previous pieces and integrate their more successful elements in a much more effective manner. The combination of open and determined elements is balanced to give the piece a clear sense of purpose yet a spontaneity which arises from the freedom allowed to the performers in which they may truly draw on their own relationships to their instruments. It is also perhaps the most successful piece of the three (*móna*, *fire dances* and *shadow musics*) in its attempt to turn its model into a basis for abstract music with clearly defined behavioural patterns, and thus in creating an effective and expressive isomorphism with the natural world.

Chapter 7

Smaller experimental solo works

Having looked in some depth at the three longer works which make up the catalogue of music resulting from this research into fieldwork and sound, it will be of interest to look at the shorter, often freer, small works which make up the remainder of the corpus. These are often composed without direct fieldwork, but as a result of a more general awareness of the connections between composing music, mark-making and the natural world, resulting from the specific fieldwork undertaken with the longer works in mind. It will, therefore, be of less value than in previous chapters to analyse the notes and sketches prior to looking at the music itself. Here we may look directly at the finished works, making reference to their relationships to the fieldwork we have studied in earlier chapters. Where specific notes or sketches have been made these will be referred to in parallel.

It should be noted in more detail at this point that during the process of composing *fire dances*, and not least as a result of working closely on the piece with a performer who specialises in improvised music, a marked shift away from creating fully notated music occurred in the practical aspect of this research. This moved in favour of using varying levels of openness in the score which allow the performer the freedom to select elements of the music themselves. These shorter pieces all seek to explore the options offered by this practice at the same time as the benefits of the insight of fieldwork, and by this very nature serve as experiments as much as finished pieces. The attraction of an approach such as open scoring is twofold: firstly the artistic possibilities of including elements of chance, chaos or undefined parameters are fertile and apposite in the context of music based on natural models, and secondly there are technical and practical benefits, particularly from the point of view of the performer. The artistic possibilities will be explored as the music is

discussed, but the practical element should also be discussed briefly. In fact the two aspects of this approach to music are linked to one another.

Any music which seeks to express itself through simple, economical means yet wishes to contain the potential for isomorphism with natural models must be prepared to consider the complexity of nature and reconcile this with its means of expression. It is important to remember, however, that fieldwork has shown us the relatively small number of repeating patterns in nature are all of a comparatively simple construction, and models become complex due to their combinations and their inexact repetitions. To consider a possible musical manifestation of this as an example, it would of course be possible to write out the same five note figure several times, each time carefully notating the small rhythmic differences which make up its inexact repetitions, but this would not only be a laborious process, it would also make the task of performing these variants accurately enough to create the desired effect extremely difficult. To find a way in which the overarching pattern of the unit may be notated, and leave the changing details to the instinct of the performer (who will always have a superior knowledge of their instrument and their relationship to it, no matter how much study the composer undertakes), is not only to make the performer's task easier, more enjoyable and more natural, but also to maintain the element of chaos we continually observe in our natural models without artificially recreating formed examples of its possibilities. The layout of the score itself echoes that of the pattern to which the forming phenomenon adheres in nature, and not only do we enjoy spontaneous and reactive inexact repetitions *etc*, in a single performance, but on a higher level we note them from performance to performance.

There are many ways of applying this idea to written music. For every parameter which can be determined, a level of openness can be set, and these may be combined in any way. We may turn to composers such as Feldman, Cage or Berio for examples of this practice in the literature – here the practice of unspecified pitch in Berio's *Sincronie* for string quartet is described:

*Berio indicates the number of notes required within a given time space, and their general range. Even fingering is shown, but actual notes are given only for points of 'departure' and 'arrival'. This makes for a very brilliant effect, achieved with practical economy of effort.*¹⁰³

We will note that different parameters and different approaches are explored in the various pieces analysed below. Often the level of openness and type of scoring will be suggested by the combined nature of subject and instrumentation, as we have already seen in the guitar quartet *shadow musics* (chapter 6).

§1: *flux* for solo organ

This piece, composed during the work on *fire dances*, concerns itself with the chaotic element of natural science directly. It is an example of a piece which grows from an appropriate combination of subject and instrumentation, and stems from readings into chaos theory which suggested common ground with the behaviour of sound.

Flux seeks to recreate in sound the visual effect of the strange attractor, a particle orbit which behaves according to fractal patterns in order never to precisely repeat its trajectory. The principle is not unlike that of the infinite length of a coastline mentioned in chapter 2, a model which proves that inside every ordered level nature can present an element of chaos – we know how and when the orbiting particle will return but cannot pinpoint exactly where. The visual representations of these attractors are fascinating (fig. 19), and of particular importance in relation to this piece of music are the Poincaré maps which show a cross section of the orbit. Built over time these images have a single point added to them each time the orbit passes that point on its cycle. James Gleick describes the phenomenon:

¹⁰³ Smith Brindle, Reginald – *The New Music*, OUP, 1987, p. 176

[A scientist] can imagine, for example, a strange attractor buzzing around before his eyes, its orbits carrying up and down, left and right, and to and fro through his computer screen. Each time the orbit passes through the screen, it leaves a glowing point at the place of intersection and the points either form a random blotch or begin to trace some shape in phosphorous.¹⁰⁴

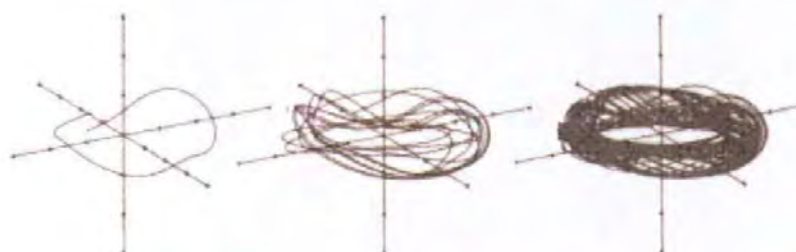


Fig. 19a – Movement of a strange attractor in three dimensions.

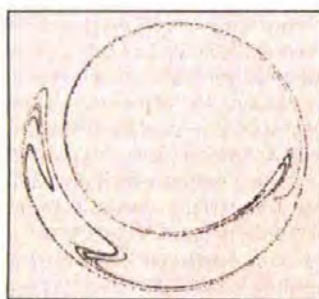


Fig. 19b – A Poincaré map of a strange attractor, showing the overall shape created by the orbit.¹⁰⁵

It is a sonic equivalent of these Poincaré maps which *flux* proceeds by building. In order to define the parameters in which this can happen, certain observations about strange attractors, about the organ as an instrument, and about the nature of western musical sound need to be made. Firstly, the strange attractor is defined by its qualities as stable, low-dimensional ('an orbit in a phase space that might be a

¹⁰⁴ Gleick, James – *Chaos: making a new science* – Vintage, 1998, p. 139

¹⁰⁵ Both diagrams reproduced from Gleick, James – *Chaos: making a new science* – Vintage, 1998

rectangle or a box, with just a few degrees of freedom'¹⁰⁶) and non-periodic (never exactly repeating). These are the elements which need to fit the musical parameters of the composition in order to preserve an isomorphism.

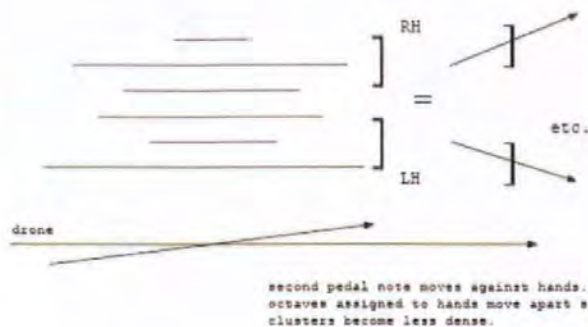
The organ is suited to this, being one of the few instruments able to sustain pitches indefinitely, as a gradual amassing of individual sonic 'points' can easily be achieved by using this quality. It also has the advantage of being capable of multiple pitches played at once via the keyboard and pedal interface – one player is capable of producing twelve pitches simultaneously using ten fingers and two feet. As we did in the construction of *móna*, we find that the significance of the number twelve to the western tonal system serves as an excellent basis for the elaboration of the behaviour of the music. We noted that the strange attractor is low-dimensional, or confined within a certain space – combining this idea with the limitations of twelve distinct notes and precisely that many voices from the instrument gives us a clear bounding 'box' within which the sonic map may unfold. An extract from the notebooks describes and analyses the procedure:

Behaviour is predictable on an holistic level, but detail is unpredictable (chaos within order). In music – a cluster (12 pitches) can complete itself note by note but we will not know which pitch will come at which point. The shape of the chromatic system will provide the low-dimensional quality as well as an element of stability. The clustering processes themselves are non-periodic.

The process of building to 12 pitches (the organ is ideal for this – 10 fingers + 2 feet, indefinite sustain) may happen a number of times. Fractal elements of the pattern can be alluded to by altering the octaves in which this happens.

e.g. The piece is contained within a low drone (left foot) [see notes on the drone in chapter 4] which continues throughout the different clusters. The remaining eleven notes are taken from 3 octaves, 1 note in the right foot, 5 in another octave (left hand) and 5 in a final octave (right hand). For each cycle the octaves' relation to one another can be altered:

¹⁰⁶ Gleick, James – *Chaos: making a new science* – Vintage, 1998, p. 139



Fractal patterns occur as we find clusters within clusters (due both to full clusters moving within the instrument's range and to partial clusters making up the full ones as adjacent pitches occur in each hand). These instances appear within each cycle, which in turn appear as several separate formations within the space defined by the single drone.¹⁰⁷

The open element of the score emerges from the lack of a need to score sustained pitches in a measured manner, which would necessitate tied values and complex notation beyond the basic premise of the sounds emitted. A symbol is produced for the depression of the key, another for its release, and these are simply placed in the order required for each cycle from drone through a cluster of all twelve notes and back to the drone. The music is without metre. This leaves timing very much to the instinct of the performer, who is not required to count out beats as is more usual. Instead, the instruction to the performer is 'to hold the texture after each event until the sound settles, moving to the next event when it seems appropriate and being guided in these decisions by the layout of the score (a greater distance between events on the page implies a greater pause in performance).' This of course allows the performer to take account of the individual organ's characteristics and those of the room or building in which the organ is situated, and their effect on the sound. The result is that the concentration of the performer is shifted from absolute timing to a sense of time guided by the sound being produced, and thus their ultimate concern is the sound quality itself. From outside the technical sphere of performance we can see that the open scoring has completed an isomorphism with the model in that it

¹⁰⁷ Martin, Mat – Notebook 3, p. 64

has imbibed the principle of uncertainty. We know the shape of the twelve-note cluster and we are aware that it is being built note by note. This is the pattern to which we may adhere. Within that pattern we are unable to predict which pitch will follow the last, and even less precisely when it will be added to or subtracted from the sonic map before us.

§2: *pebble music* & *single stone* for solo performers

As was *flux*, *pebble music* was completed whilst involved in the process of composing *fire dances*, and although it was completed very quickly, and does not respond well to analysis due to its nature as a completely open graphic score, it must be mentioned as an example of the subconscious generative influence of fieldwork, and as by far the most performed of the works resulting from this research. The piece for solo contrabass, *single stone*, is mentioned in connection with it as it is in fact simply a notated realisation of one movement of the *pebble music* score.

Part of the success of *pebble music* lies in its adaptability as a piece, which serves to illustrate the points made above on the practical benefits to performers of open-scored works. The piece is specifically written for a solo performer, but instrumentation is not specified, either by type or by number of instruments.

To assert that no fieldwork was undertaken for the composition of this piece would be inaccurate, although none was deliberately begun with the intention of forming a sonic work in the way the fieldwork for the pieces described in chapters 5-6 was planned and executed. The work conducted was on a more general observational level, and (unusually) principally in photographs to begin with. A large number of images of the quartz veins which run through igneous pebbles was collected, as a study in complexes of lines to be found in the natural world.

A few sketches were also made of pebble surface markings, as can be seen on plates 9 and 24. These latter images are obviously more abstract, concentrating solely on the lines themselves and their interplay rather than the object as a whole. To place several complexes so near one another, and confine each to an identical surface area, brings forth the abstract qualities in these relationships.

In fact, if we are to concentrate solely on the linear aspect of these drawings which forms the basis of the study, we may recall pages from the small book *sketches of sound, studies in line*, from which we studied several pages in chapter 3. Plates 4 and 5 already show a connection drawn between sonic elements and complexes of lines. These energies and tensions were also being analysed in this book from the perspective of art theory such as that of Kandinsky (chapter 1, pp. 19-20). Plates 25 and 26 show abstractions noted from Kandinsky's *Point and Line to Plane* dealing with the effects of lines upon one another, and a distillation into simple linear forces of a detail from the Upper Palaeolithic cave art of Lascaux.

It is perhaps not surprising then that despite not planning a musical work based upon these complexes of lines, one should be composed. With so much fieldwork in the area already conducted, it simply takes a small idea to crystallise the existing understanding of these phenomena. As a score, *pebble music* has a much stronger affiliation than the other musical works with a series of large scale charcoal drawings, visual by-products of the fieldwork conducted for musical ends which produces a small amount of finished works of mark-making. These images are purely abstract, often taking the principal structure of a fieldwork subject down to a minimal number of lines and developing it through inexact repetition. They are in effect documents of the forming patterns at work, divested of embellishment, and which, from a musical point of view, may provide the basis upon which an analogous behavioural structure may be built. The experiment of *pebble music* is to find out how this may occur if the musical elaboration of these patterns is performed in 'real time'.

The score of the *pebble music* draws upon many aspects of the above observations, yet economically places all its concrete instruction in a series of inexact repetitions on paper, with very few rules of interpretation given to the performer. In doing so it tests robustly the idea that the forming or governing pattern implicit in a phenomenon is discernable in all of its many different explicit forms. The overall sense of relationships and fundamental patterns should remain solid from performance to performance of this piece, regardless of player or instrument. Provided the relationships between the elements of the score are respected, this should be the case; certainly the performances on various instruments which have been given to date attest to this assertion. It should also be noted with specific reference to this piece that by the time the fieldwork has become a finished work of music the pebbles themselves have little or no bearing on the quality, character or effect of the music as an abstract work, and that the subject has become the nature of complexes of lines. The pebbles represent to the composer nothing more than the means of extracting through fieldwork sets of relationships from nature which may also be applied to musical behaviours. Thus the mediation of performance, and of the decisions of performers, particularly in the case of a very open score such as this one, does not necessarily negate the validity of the internal structure of the work, which remains contained in the tensions and complexes on the page. Rather the possible variants of interpretation and creative agency on the part of the performer bring to the music character which allows it to be engaging as abstract work.

The score itself does nothing more than re-place the kinds of linear complexes to be found in plate 24, around one another in areas of defined space. Music paper is used for this in order to give not an indication of pitch but one of scale, the constant lines providing a unit against which the images may be compared to one another. The images themselves are elaborations and exaggerations of the images collected in fieldwork, and retain the practice of confining the complexes of lines to defined surface areas (as in plate 24). These areas differ from one another in size, however,

and the performer is invited to consider these differences in scale as indicative of several possible parameters including dynamic and complexity, provided the assignation made to size is maintained throughout the seven movements. Fig. 20 shows a typical event from the score:



Fig. 20 – From *pebble music*, showing a typical event over two staves, delineated by three designations of surface area yet allowing the linear complex to overlap and join the separate elements.

The true sonic content, then, is defined by the performer rather than the composer, meaning that the role of the composer in a situation like this is one of organising the patterns and relationships which govern the music. Not only does the process embrace the notion that explicit expressions of energies are but an indication of the order and energy which is implicit beneath, it also illustrates it by being capable of sounding so very different with each performance.

The intuitive transcription of a single movement of the piece for solo contrabass serves merely to illustrate a possibility, and offer a piece of music which stands alone as an explicit expression of a set of relationships which has been carefully balanced by the composer. It remains simple and shares much of the sonic language of *shadow musics* in its use of unusual technique and spacious silence. Interest is added to this in the form of an optional piano accompaniment which is simply a re-transcription of the graphic element printed onto a transparent sheet and laid over the bass part. The effect is one of a heterophony as the piano and bass play

effectively the same implicit patterns as one another – a technique used a great deal in *shadow musics* (chapter 6, pp. 116-118). The combination of one formed, static part and one fluid changing part, serves to illustrate the different levels at which this energy is being expressed, and of course, over several performances this difference in nature would become illustrated more profoundly.



Fig. 21 – From *pebble music* and *single stone*, showing the opening of the original movement from the graphic score and the opening of the transcription for double bass. To play both at once and in the same timescale occasions further insight into the tension between implicit and explicit forming energies.

§3: *orrery* for resonant strings

The piece *orrery* is borne, as with *pebble music*, of cumulative work in an area which has not previously been destined for a specific piece. Unlike *pebble music*, there was no existing fieldwork which led to the subject of *orrery*, rather there is a precedent of the single compositional idea used in the piece deep within several earlier works.

The word orrery refers to a mechanical device which illustrates the motions of the planets using clockwork. Small representations of planets on arms of differing lengths circle a central pole at speeds which are, in proportion to one another, equivalent to those of the real planets, thus displaying relationships over space and time. The element of this which occurs in a great deal of the music discussed so far is that of permutations of groups of pitches, gradually rotated so as to explore the various orders in which they are presented. It has often been noted that the drawings of these groups at the sketching stage, particularly in the composition of *móna* resemble constellations of stars or planets (plates 14a & 14b). This is also true of aspects of the *pebble music* score.

The piece takes two groups of pitches (undefined in the scale yet absolute in and defined by their relationships to one another) and seeks to present them in a series of permutations which progress through a cycle by building a two-dimensional ‘orrery’ on the page which then turns with each re-statement (fig. 22). The two pitch groups’ progressions are placed around each other in the manner of ‘retrospective heterophony’ used in *prélude [totem i]* (chapter 4) and later in *móna* (chapter 5).

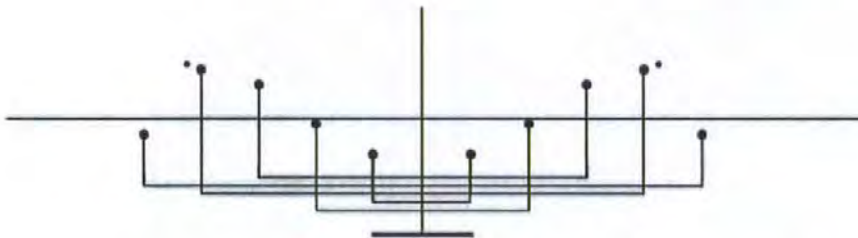


Fig. 22 – From *orrery*, showing the first statement of the *Corvus* pitch group.

Pitch groups are defined in relation to two real constellations of stars, Corvus and Corona Borealis, and the order of pitches in the statements of these (three permutations of Corona Borealis and two of Corvus), suggested by the orientation of the constellations at specific times of year. The initial pitch relationships which form the groups are drawn from the positions of the stars in January and the orreries

built in the score 'rotate' by the relevant amount for each restatement of the group. As the Corona Borealis group is given in three permutations the year is divided into three and the positions at each of these points are used. This is intended to give a sense of movement through a cycle. The two statements of the Corvus pitch group seek to give a sense of polar opposition rather than of rotational movement, as the half-way point of the year is used to define the second permutation. This means that the permutation is as close as possible to an opposite to the original statement. The difference in the sense of movement between the two pitch groups makes for an interesting tension and a clearer definition between the two. It should also be noted that whilst Corona Borealis moves forward through the piece (first, second then third permutation), Corvus does the opposite, moving against it and coming to rest on its original permutation.

Despite our investigation of the model for the groups, it must again be stressed that at no point does the listener need to be aware of the subject for the implicit energies to be present in the structure of the work. It would of course be impossible to expect a listener to this piece to recognise the turning of constellations over time in the sounds they are hearing. Nonetheless, the fundamental pattern which governs the behaviour of material in this piece is in some ways analogous to that which governs the behaviour of the subject, and thus as abstract music it displays its own explicit rendition of the patterns behind it.

The performer chooses certain parameters of the piece, as with other scores discussed in this chapter – in this case pitch is left open to interpretation, although the relationships between pitches are given, and must be respected for the piece to work as intended. The instrument and register are also left to the performer, although the technique used calls for an instrument with a large number of resonant strings, such as piano interior or harp. The performer sets the strings in motion and then re-applies objects to them as they vibrate to alter the sound. The strings are affected in this way in the reverse order to that in which they have been set in

motion, using a mirror symmetry not only to emphasise the permutation being performed but also to increase the sense of cyclic motion.

The piece essentially takes the element of permuted pitch groups from earlier works and seeks to explore the possibilities of this as the generative material for an entire work. Using the model of changes in the orientations of constellations as a fundamental implicit pattern it simply works its way through a series of possibilities and ends in a position from where its next step would be to begin again (the cyclical energy is another fundamental pattern which we see in a multitude of natural examples and was used prior to this in the formal sketches for *móna*). The result is a very static piece, whose character depends upon its overarching isomorphic structure, but is likely to remain more immediately engaging due to the unusual sonorities and completeness of the performance of the patterns themselves. It is an example of a finished piece working as a result of balancing the natural model with the sonic interest, and the notion of taste with that of adherence to a natural model – this can be seen in the theme of the piano variations, where extended technique was used to draw attention to the very simple pitch groups which were to form the basis for almost all the variation that follows. It is not to be confused with the extended techniques in *shadow musics* however, which had the role of differentiating between instruments of a single type in order to experiment with these differences at low dynamic levels.

§4: *ancient bone (totem ii)* & *crumbs* for solo winds

Finally there are two examples from remaining pieces which reinforce the techniques developed in the above pieces and should be noted. Both *ancient bone* for solo bass clarinet and *crumbs* for amplified flute are experimental pieces dealing with aspects of the balance of order and chaos open scoring can offer the composer. Each in some way seeks to investigate the result of combining techniques developed in previous work.

Both are pieces with no specific natural model, and are attempts at a freer abstract music which relies on the musical behaviours developed as a result of fieldwork to maintain a level of adherence to implicit natural models. In *ancient bone* we witness the combination of expanding pitch groups as used in the first variation of *móna* (pp. 93-94) with the indistinct nature of very low dynamic level, as exploited in *shadow musics* (chapter 6). In fig. 23 we see the expansion of a pitch sequence which uses close intervals to create a dark and dense unit over time. The second (expanded) statement lifts away from this, reaching towards a lighter plane in a manner reminiscent of the colour chords sketched out for the *fire dances* (plates 18 & 19). The process is preceded by a colourless air-tone and the whole is notated without metre or strict rhythm.

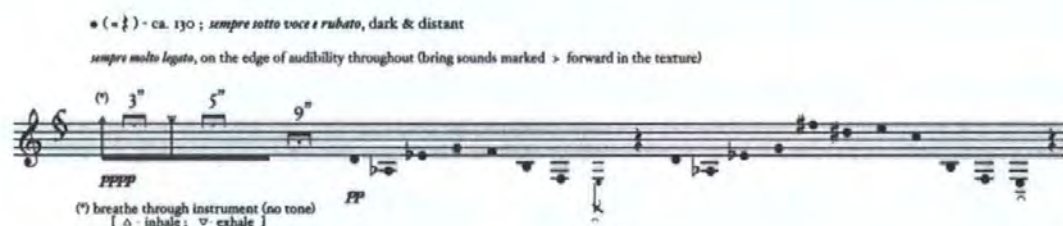


Fig. 23 – From the opening of *ancient bone*.

The piece continues by using ideas akin to the foreshortening technique of *shadow musics*. In fig. 24 we note both the condensing of sequences of pitches and the greatly elongated values of the static middle section. Both perform the same processional single note groups as in fig. 23, yet their characters are greatly altered by their intensifying or desaturating quality, in respect of their density of movement. Note also the removal of definite pitch in the quick sections, much as described in Berio's music by Smith Brindle (p. 120-121).

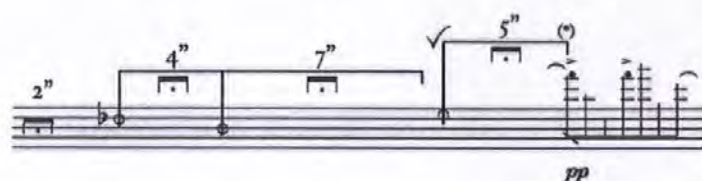


Fig. 24 – From the central section of *ancient bone*.

Gradually the piece, which begins by clearly delineating sections such as are found in figs. 23 and 24, seeks to integrate them in a manner much like that of the *prélude* for bass clarinet (chapter 4), by cross referencing sections and relying upon the relationships between the several distinct types of playing to make links with themselves and establish tensions with one another. The end result in *ancient bone* is much less formal than in previous pieces which rely on this sense of inexact repetitions placed around one another, or ‘retrospective heterophony’. The piece becomes, as a result of these combinations and refinements of techniques developed in other works, a dark and dense study in processional values, exploring the interplay between statements of the type of material in question at three specific differing densities and using low dynamic levels to blur these differences into shadow, adding to the sense of darkness and age alluded to in the title.



Fig. 25 – From the final section of *ancient bone*, showing the integration of the three types of pitch group.

The score for *crumbs*, for solo amplified flute and resonant electric guitar, uses some of the same techniques, but its principal mode of procession is in the manner in which groups of pitches are given to the performer and the manner in which he or she may choose to perform them.

The principal elements of these parameters are shown in fig. 26. The 'constellations' of pitches are given in such a way that the order of notes may be defined according to the performer's reaction to certain rules. The starting point is shown by a large numbered arrow; the performer then progresses through all pitches by following the lines linking them. This may necessitate repetition of pitches within the one permutation, a possibility not given in previous pieces. The 'key signature' of flat-natural-sharp, given at the start above the stave, indicates permission to perform any of the written pitches with any accidental inflection desired.

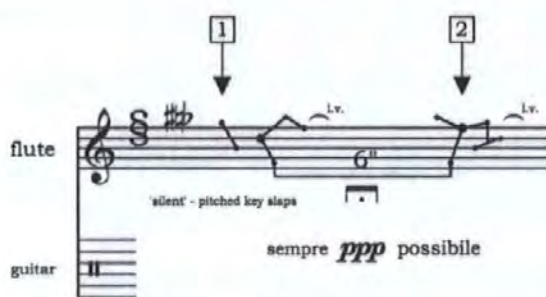


Fig. 26 – From the opening of *crumbs*, showing the system of pitch permutation and optional inflection of accidentals.

The permutations are arranged in symmetrical groups, as in the example. The overarching effect is one in which we may note clear and precise patterns at a high level (symmetry, inexact repetition) but once again are unsure of the detail within this pattern (in particular, the ability of the performer to alter the pitch by a semitone in either direction gives us an analogue to the natural model of being able to locate a phenomenon in a certain area but not its specific point within that area). Accompanying this is a truly unpredictable element in the resonances of a distorted electric guitar. The signal from the amplified flute is set up so that the sounds produced cause the guitar's strings to resonate in sympathy, although the resultant pitches are arbitrary due to the insertion of a second artificial 'bridge' under some strings. Small differences in the way in which the loop is set up have the potential to drastically alter the resultant sound, particularly as the piece progresses and the

resonances accumulate. At certain points the flautist is required to stop playing and allow the guitar sounds to take over, coaxing them by sliding metal on the strings.

Part Three

Conclusion

Chapter 8

Conclusion

We have seen in the previous chapters the way in which fieldwork, conducted through a combination of methodologies, can influence the process of creating original music. By being attentive to previous work in the field which illustrates the common ground between such areas of study as the natural sciences, the theory of art and the creation of music, we are able not only to draw upon the observations and techniques of other thinkers in these areas but bring them together and create from these combinations specific methodologies. These methodologies can in turn open our eyes to new areas of our own discipline by displaying very definite relationships between the behaviour of music and that of other observable phenomena, such as the interaction of line or colour, or the levels of patterning displayed by various branches of scientific thought. Coupled with our first-hand observations of our subjects – made or interpreted in part using processes offered by other practitioners both in our field and in others – this gives us a strong point of departure for the creation of new music.

It must be remembered, however, that once it reaches a finished state and is presented to the listener, music is really no more or less than music, and cannot be expected to contain the information which our fieldwork presents to us. It is subject to the same understanding based on precedent and theory, and to the same processes of mediation that apply to all other music, regardless of the way in which it has been composed. This music then does not seek to directly inform listeners on the non-musical subjects which form a part of its generative processes, and we accept that even if a connection is made on a subconscious level by the listener it will be so abstract as to be impossible to identify and label as understanding. Rather, the music seeks to reach the listeners' ears as abstract music - sets of relationships in sound which we hope are to be found interesting, pleasing, challenging, *etc* as such.

The inclusion of fieldwork and natural models of behaviour in the generation of this music remains the composer's individual methodological approach to creating sets of relationships which have these qualities, and as such is valid not as a way of composing music *about* something, but composing it *with* that thing. The validity of this methodology is not affected by this provided the composer's intention truly is to create abstract music, and the isomorphisms to natural models which form a part of the work are not diminished by remaining unrecognised by the listener if they are the underlying cause of the internal relationships present in the music. By the time the music is being performed these patterns and energies have re-entered the realm of the *implicit* in their expressions.

Perhaps one of the most exciting aspects of this approach to acoustic invention is its continuous alteration – whilst the principle of observing behaviours and patterns in nature through specific means (mark-making, for example) remains unchanged, the ways in which these techniques are subject to continuous alteration; the balance of elements in practice (e.g. how much mark-making may be appropriate to any given subject) alters with each new project, and the possibilities for the style and mode of the outcome are varied.

Taking as points of comparison the piano variations *móna (night music)* (discussed in chapter 5) and the piece for solo performer *pebble music* (chapter 7) we can see how different both process and outcome can be, although both are examples of the use of visual fieldwork as an intermediary stage, or interface, between subject and work. The first of these pieces required a relatively large amount of fieldwork which dealt in detail with aspects of the movement of light and dark and built a model of this movement in harmonic terms. The result was a fully notated and lengthy piece of music which relied upon the visual only *during* the process of composing – the performer of the piece not needing to concern themselves with anything other than traditionally notated musical elements. The latter, however, required much less initial fieldwork and brings the art-music relationship into the process of re-creation,

or performance. The level to which this element is brought to the score of a piece created in this way remains the decision of the composer, and because we are aware within this process of considerations such as chaos and order we can choose in which ways these are allowed to surface. The various end results (performances) of the *pebble music* are of course a great deal more varied (as the recordings will demonstrate) than that of *móna* would be, although the process used to create the two is borne of the same modes of thought.

This is in itself a means of further fieldwork. A piece such as *pebble music* takes on one level its subject from the markings of quartz on pebbles, but it is also a piece about chaos – about the way in which decisions taken at certain stages in the creation of music can affect the outcome dramatically, or to use the scientific terms, about *sensitive dependence on initial conditions*. In this case a fundamental decision is made at the point of performance (which instrument(s) will be used?), but another at an earlier stage, by the composer, who decides that the replacement from image to sound will not be fixed before performance, and thus be communicated in the same way each time it is performed. This piece, then, is also about the nature of the relationship between image and sound – means and subject are at some levels the same.

Within the practice being discussed here these pieces demonstrate a significant difference to one another, and as such are a strong illustration of the variety of expressive means at our command when working this way, but it is the points between these extremes which offer the most subtlety and interest when we consider the possibilities of fieldwork-based practice in composing. We have seen over the relatively small number of works discussed in this text various points of completion between the fully notated and the fully graphic which have used their position on this scale as an integral part of the way in which they deal with their subject. Pieces such as *orrery*, with its reliance on certain notational conventions as well as notions of relative space within a graphic context, or *shadow musics*, which leaves open only

one aspect of otherwise fully notated passages have this in common: that the level of open-ness present in the method of communication to the performer is as much an integral part of the nature of the music as any other. The resultant behaviour of the music is carefully calculated, even if the precise pitches or rhythmic values cannot be predicted. A model is created by the composer and followed by the performer – we are simply noting that this may be done at a variety of levels.

It is of course precisely this – the *nature* of the music – which can produce isomorphisms at various levels to the nature of the phenomena explored through fieldwork. We should remember that it has been our objective here not to create music which evokes nature, dealing with second-hand accounts of that which is already explicit, but music which arranges itself according to, and displays examples of, implicit patterns observed through fieldwork. The nature of abstraction at the point of observation has shown itself to be of particular importance here, and we have traced a movement from representative mark-making to a calligraphic abstract ‘short-hand’ in the fieldwork for the pieces studied here. Many of these sets of interstices have shown a strong quality of their own, which we attempt to preserve as the relationships and energies are re-placed into an acoustic frame. These have suggested larger scale works in mark-making which either directly transfer the initial sketches or develop their qualities further. All remain, however, within the boundaries of the language that has emerged from the fieldwork practice, and rely almost entirely on complexes of lines to show the tensions and temperatures of certain sets of interstices.

These large scale works, seen as complete pieces in their own right, are an interesting illustration of the nature of the music that is intended – non-evocative and abstract. They exist as themselves, not relying upon any external reference which is obvious to the onlooker, because their subject remains implicit. However they remain instances of formative patterns observed elsewhere, and as such may be hoped to communicate a kind of familiarity which welcomes the receiver. We are

indebted to Klee and Kandinsky for the insight their writings and works offer into the dynamic qualities of basic pictorial elements, and which allow us to experiment in this way.

This lucidity which comes of paring down our elements to the very basic is one which has occurred in the music presented here. The process of simplifying can be seen in the piece *fire dances*, which can be considered a transitional work, not from complex to simple music rather than from an intricate to a simple means of creating musical complexes. In the later works some textures which are created, such as in passages of *shadow musics*, are far more complex than could have been written down using traditional notation, yet are simpler to write, perform and understand as they are presented here. The complexities of the natural world are the result of the unpredictable development of a few simple elements – to re-place them into a musical context by making complexity the subject is to miss the point of this observation. The complex elements of a piece such as *shadow musics* are created by a process which is isomorphic to the way in which complexes of shadows are built by relatively few elements. Thus we create music about the process of forming rather than about complete and static forms from nature.

The continuation of this practice must to a large extent rely on further fieldwork, since it is only the observations collected which form a solid basis for material and treatment. Whilst reading and scientific study offer insightful ways of considering that which we are observing, it is the process of observation itself which allows for the creation of music of this kind. It will therefore be of great importance to continue to refine and develop the mark-making language which has emerged as a result of this process, and in this process the continued creation of larger scale visual pieces will no doubt be of great help.

There are of course areas which would yield globally useful approaches if probed further. Certainly the colour-harmony relationship which is investigated in the *fire*

dances could be developed into a rigorous set of relationship-values that would provide insight into further aspects of natural properties and add depth to music derived in this way. One could imagine a table of such relationships, based upon the harmonic progression from dark to light used in several of the pieces discussed in the central portion of this text. To include colour would necessitate the imposition of further 'dimensions' of measurement, dealing with the fact that the colour wheel removes the 'polar' quality of the dark-light scale. Such a table would by no means necessitate the permanent assignment of certain pitches to certain colour-values, rather it may suggest sets of intervallic relationships as colour-mixes, which would be re-assessed for each new work with colour as subject.

For this to be integrated holistically to the processes developed here one would need to bring colour back to the fieldwork process, which has over the period of research distilled itself to a principally colourless practice. The drawing of such a table of relationships would perhaps reveal a method of using colour in as abstract a fashion as line, from which another dimension could be added to the expressive qualities of the abstract mark-making. Some movement towards this can be seen in some of the later sketches from the book *sketches of sound, studies in line*, notably in the coloured lines used to study the relationships formed by the opening of movements from a Haydn quartet (plate 3).

The simple fact that, provided we do not fall into the realm of habit and formula, composing in this way will require a fresh approach to every new subject suggests that the development of the techniques suggested and explored here will continue for as long as we are interested in using music to explore and re-place observations of the natural world. Not only are new ways of combining sounds suggested as solutions to the problems of making music behave as our fieldwork dictates, but we are also consistently faced with decisions regarding the combinations of techniques developed in previous work, and the methods of communicating instructions to performers. The acceptance of the idea that the common quality with nature lies in

aspects of the very fabric of the music we write (implicit kinship over explicit reference) means that we need to consider the way in which the music is performed as much as its content, and thus the nature of the score becomes crucial. It is certain because of this that an engaged and thorough development of these techniques will explore the possibilities of the score as a musical element in great depth, not least because of the vested interest in mark-making the fieldwork process instils in the composer.

The 'music of relationships', or music borne of fieldwork practice, then, should by its very nature continue to develop in a natural manner. Being free of the self-referential constraints which burden music whose subject is music itself, yet also free of the need to evoke or communicate explicit expressions of natural imagery, such abstract music will mature and become yet more expressive the wider its vocabulary becomes. For this to occur continued fieldwork is absolutely necessary, and thus it is fieldwork itself which assures the growth of our practice as composers. This seems natural and healthy, in that it allows the extra-musical to be continually assessed in musical terms, and *vice versa*, making the space between music and the natural world (here represented and explored by the transitory practice of mark-making) the fundamental interstice upon which this whole practice rests.

Plates

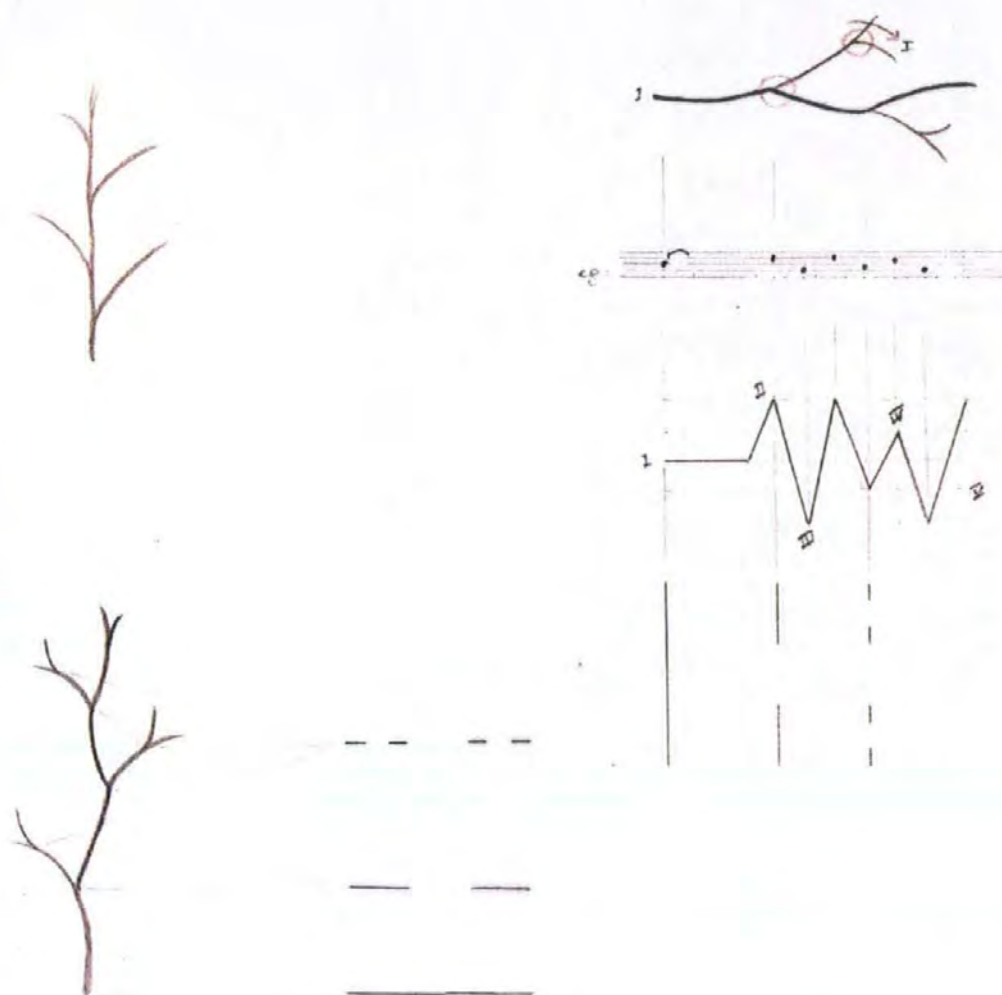


Plate 1 – Growth and branching patterns in plants. Stages of the branching system (branching of branches as a fractal phenomenon) linked to stages in the creation of the Cantor set. Subsequent evaluation in terms of pitch relations in music. Note that the diagram showing branching patterns remains abstract enough to apply to either the actual branches of a tree or to the branching of the veins within one of its leaves, allowing for fractal symmetry to be considered.

Reproduced from Martin, Mat – *Observational Sketches I*, p. 3

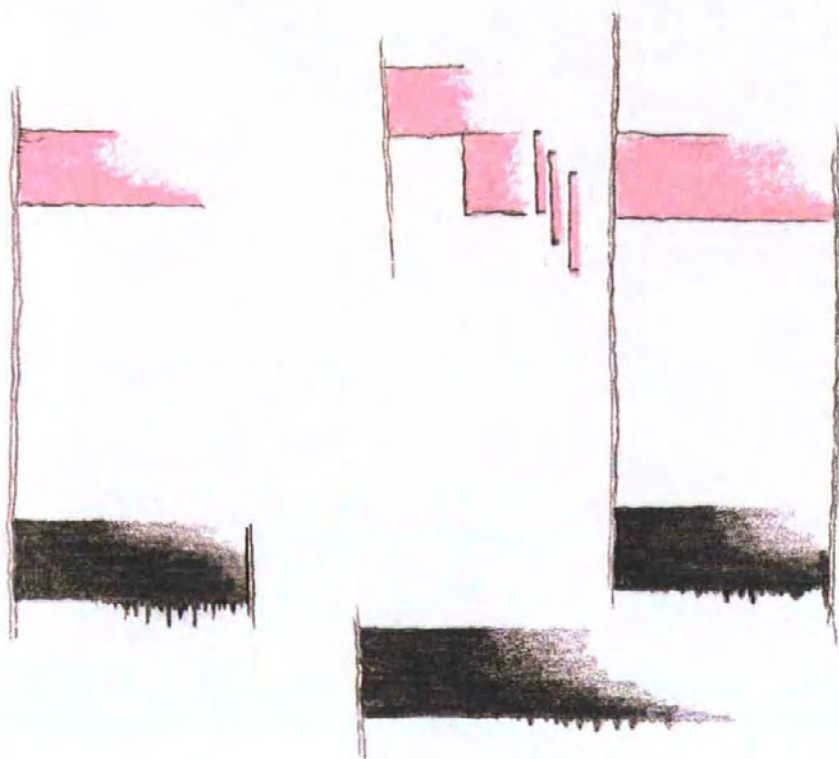


Plate 2 – Michael Tippett – *Piano Sonata no 2*.

Reproduced from Martin, Mat – *sketches of sound, studies in line*, p. 7

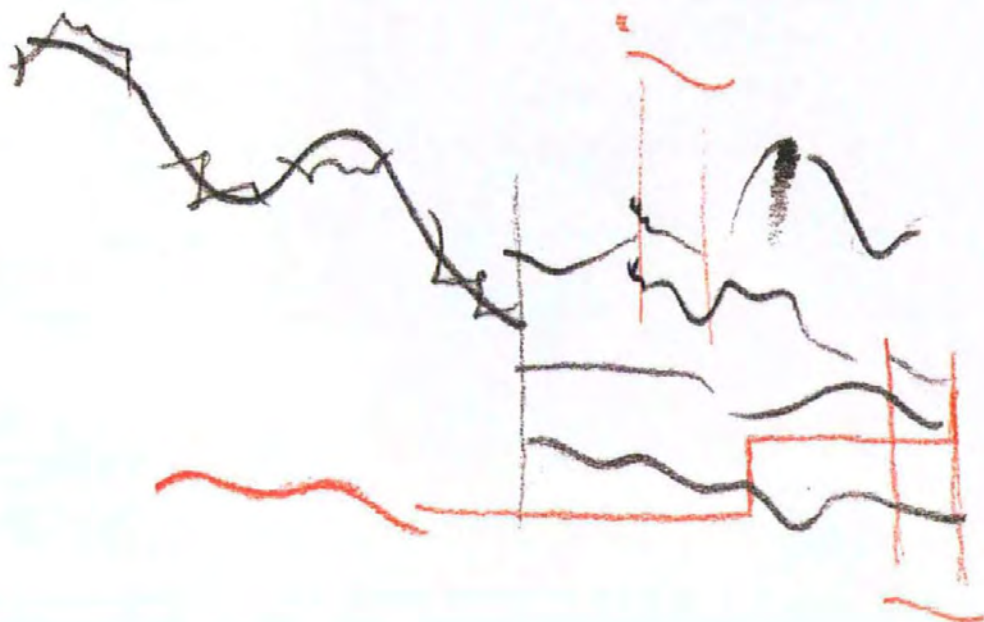


Plate 3 – Josef Haydn – *Quartet op 76, no 2, mvmt 1* (opening).

Reproduced from Martin, Mat – *sketches of sound, studies in line*, p. 61



Plate 4a – Henry Purcell – *O Solitude*.

Plate 4b – William Byrd – *Gaudeamus Omnes*.

Reproduced from Martin, Mat – *sketches of sound, studies in line*, pp. 15 & 24

Plate 4c – Song of an unidentified bird collected in Spain, also showing later additions in musical notation.

Reproduced from Martin, Mat – *Observational Sketches I*, p. 58

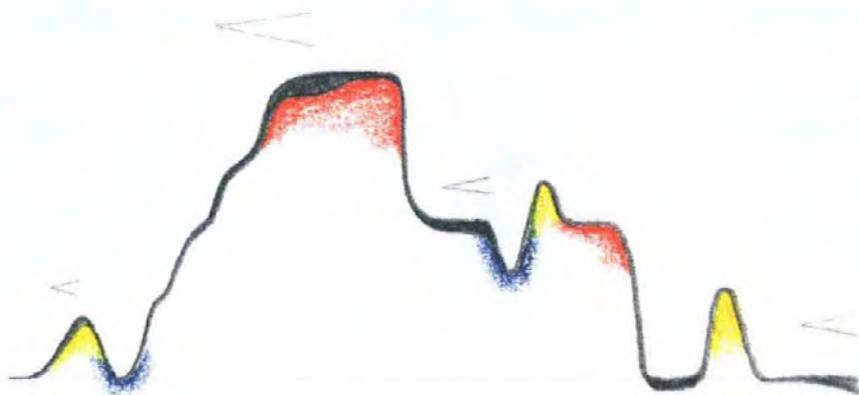
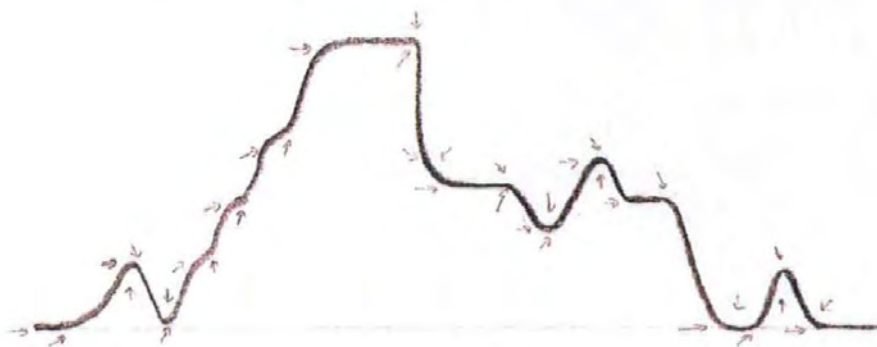


Plate 5 – Francis Poulenc – *Figure Humaine* (opening, notated according to Kandinsky's methods).

a) Forces acting upon a line.

b) Weights and temperatures.

Reproduced from Martin, Mat – *sketches of sound, studies in line*, pp. 14 & 38



Plate 6 – A typical page from an early sketchbook of the author's.
Reproduced from Martin, Mat – *Observational Sketches I*, p. 1

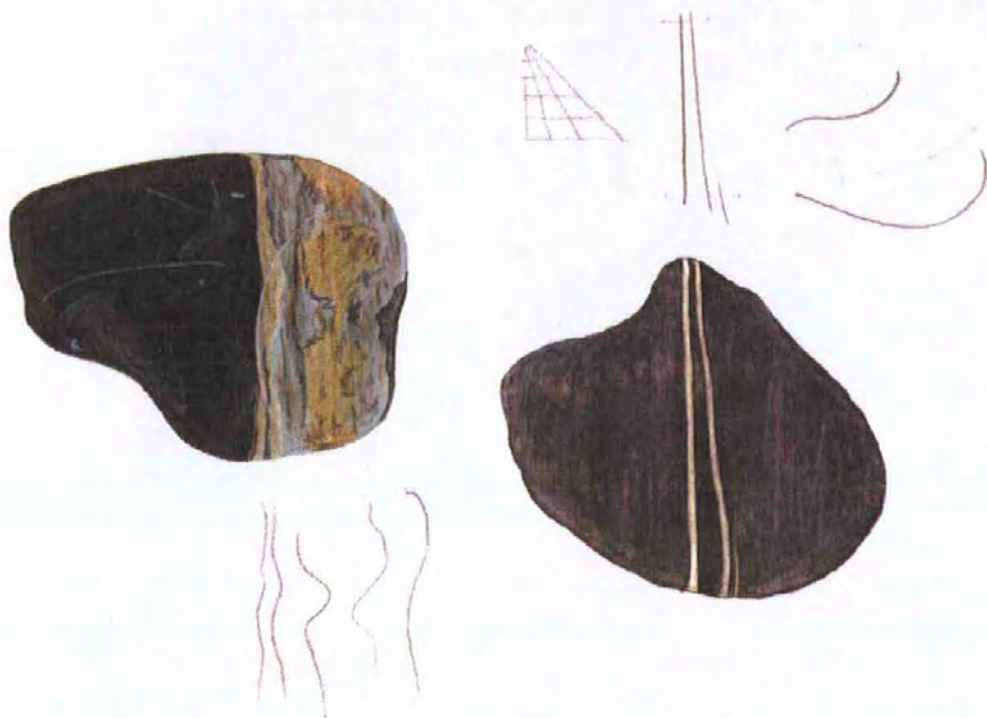


Plate 7a – Sketch exploring patterns on pebbles.

Reproduced from Martin, Mat – *Observational Sketches II*, p. 17

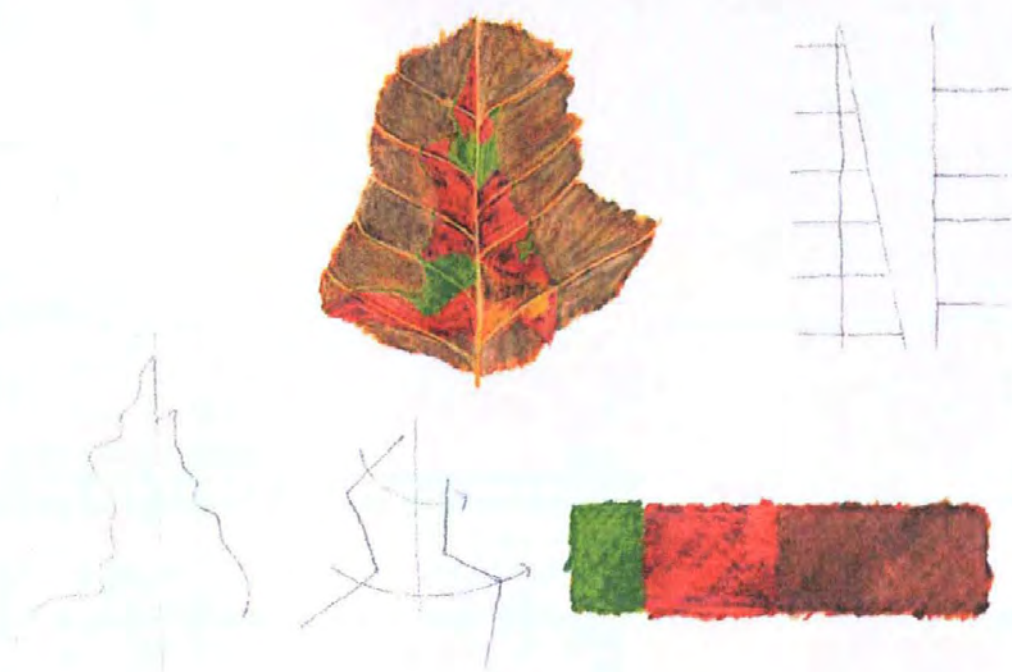


Plate 7b – Sketch exploring structure and colour distribution in leaves.

Reproduced from Martin, Mat – *Observational Sketches II*, p. 14



Plate 8 – Abstraction from sweet chestnut bark, showing sets of relationships in line and tone.

Reproduced from Martin, Mat – *Observational Sketches I*, p. 97



Plate 9a – Abstraction from markings in wood made in ink on paper.
Reproduced from Martin, Mat – *Sketchbook 5* (detached page).

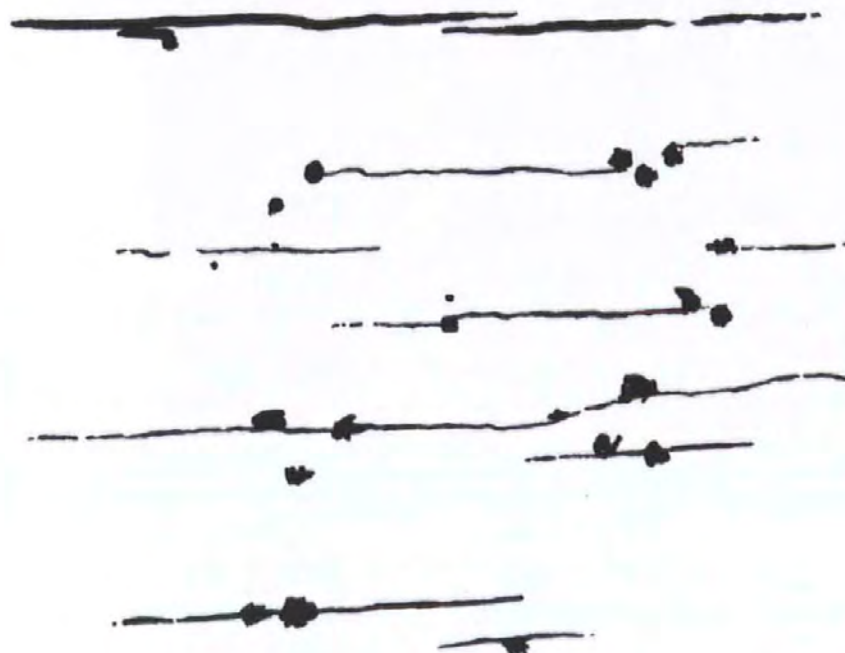


Plate 9b – Abstraction from markings in wood made in ink on paper.
Reproduced from Martin, Mat – *Sketchbook 5* (detached page).

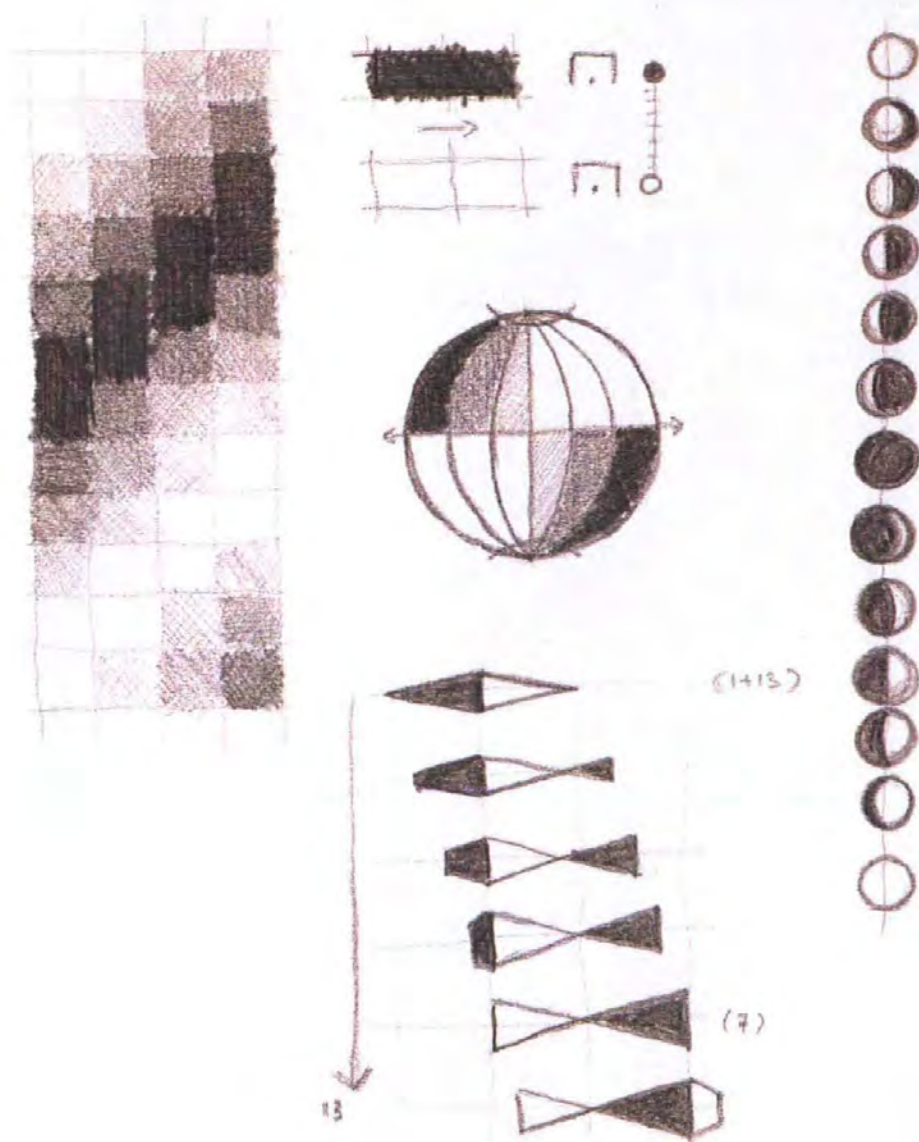


Plate 10a – From the structural sketches of *mōna*, showing temporal movement of light and dark across the moon's surface and visual representation of structural ideas analogous to that movement.

Reproduced from Martin, Mat – *Sketches for New Pieces*, p. 2

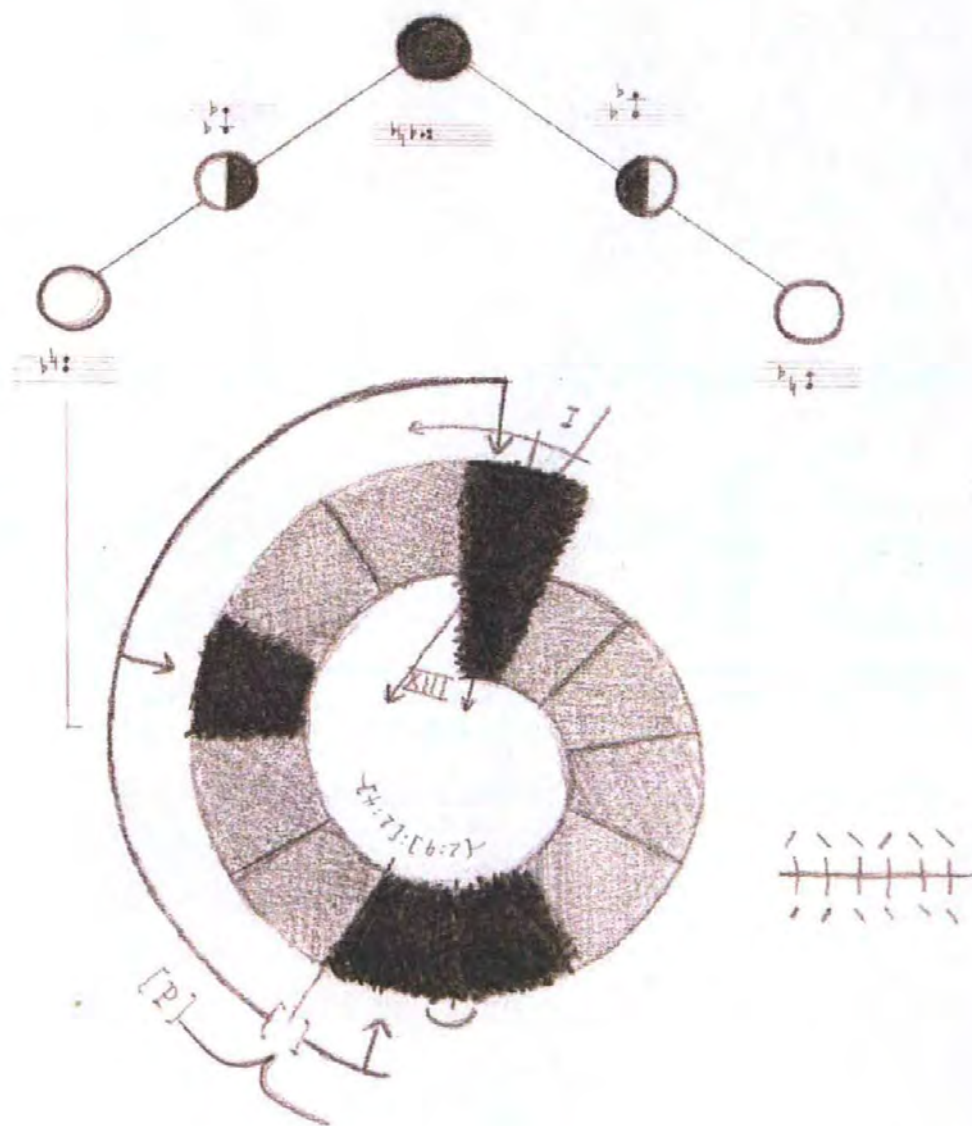


Plate 10b – From the structural sketches of *móna*, showing temporal movement of light and dark across the moon's surface and visual representation of structural ideas analogous to that movement. This page also shows initial ideas on the isomorphism to be created between pitch and ratio of light/dark. Reproduced from Martin, Mat – *Sketches for New Pieces*, p. 4

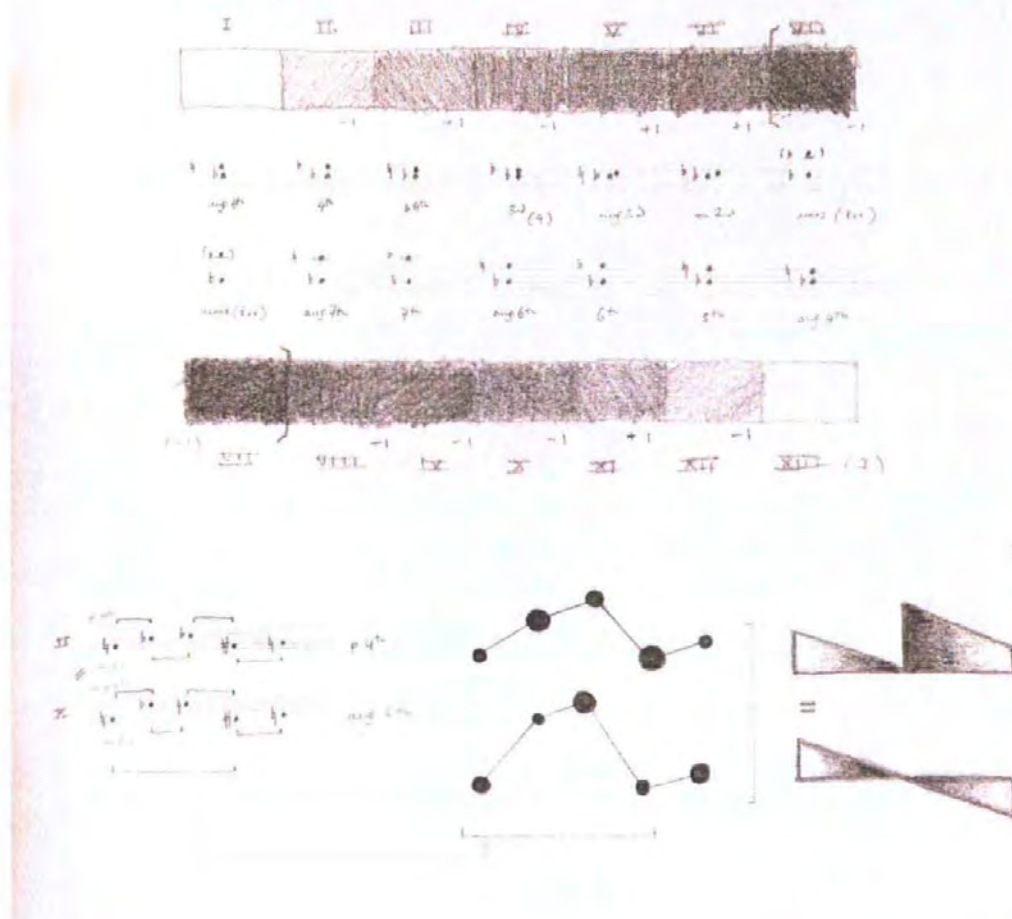
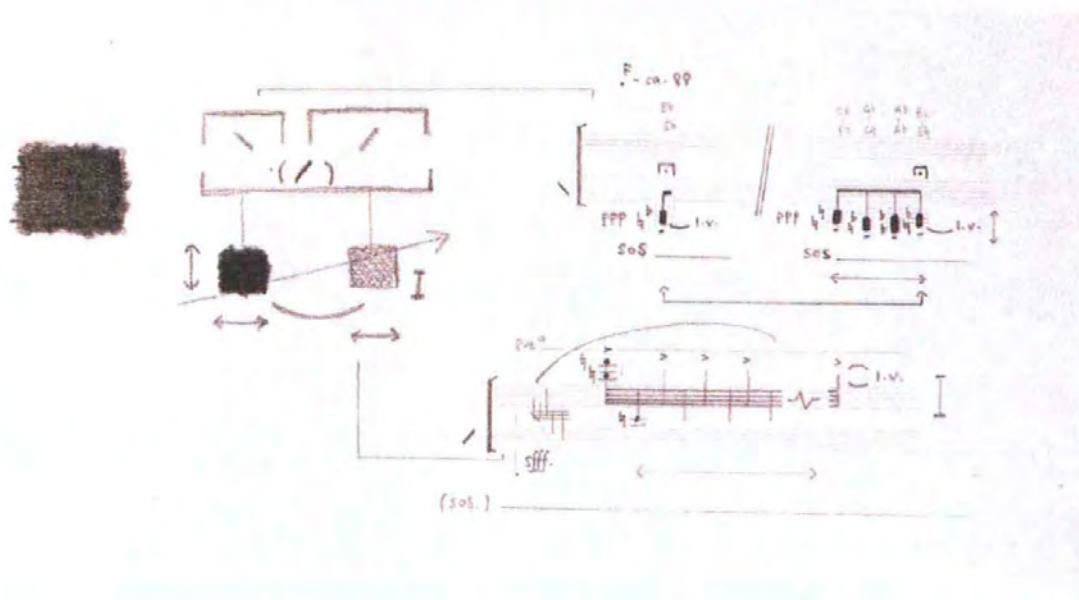


Plate 11 – Harmonic sketch for the entire set of variations – a simple stepwise contraction from the augmented fourth to the unison, and a continued contraction from the octave back to the augmented fourth. The regularly changing ratios of the intervals, with the changing pitch considered as a point on the scale between the root note and the octave, is directly analogous to the ratios of light to dark upon the surface of the moon shown in the schema in plate 10a.

Reproduced from Martin, Mat – *Sketches for New Pieces*, p. 11



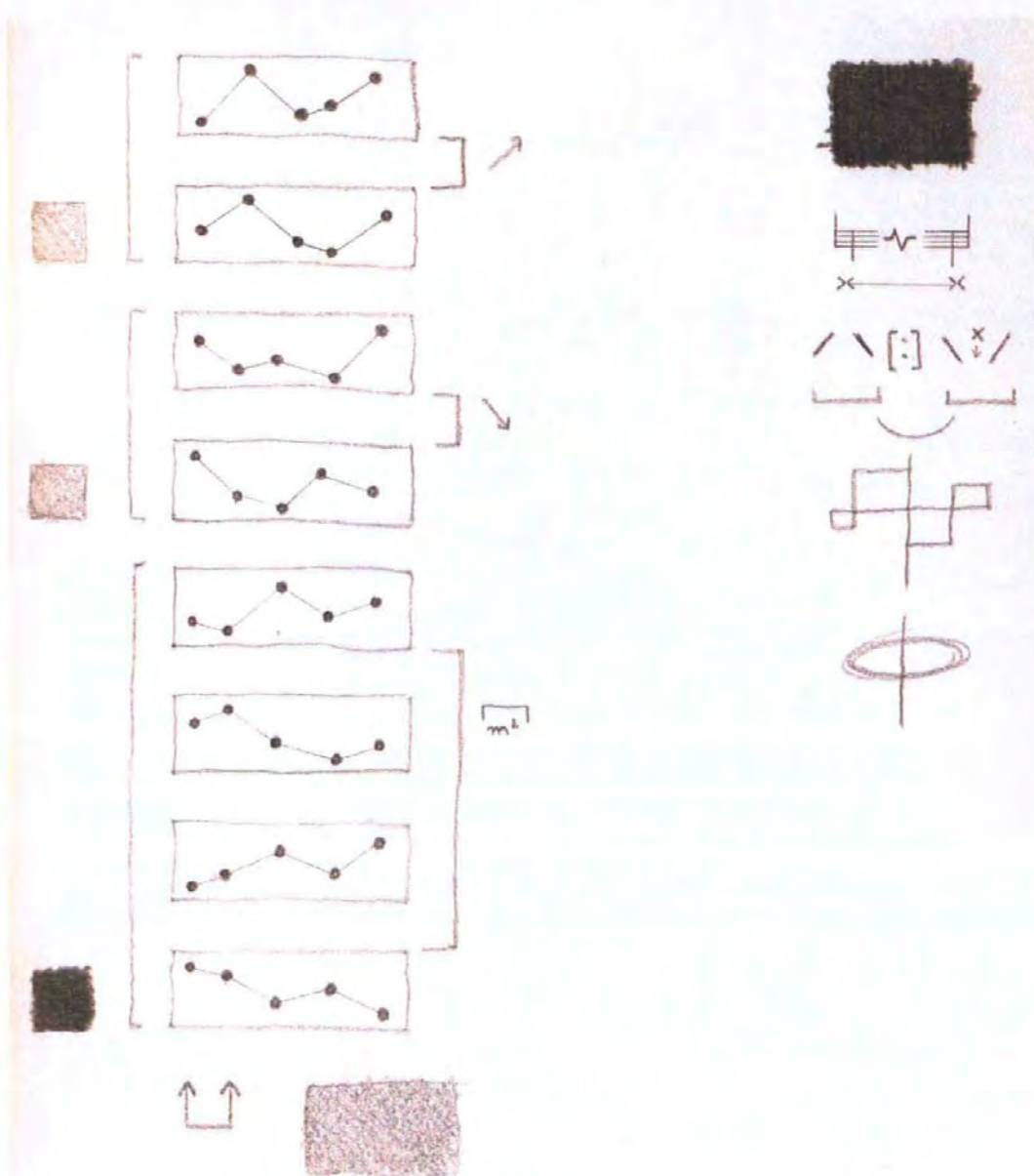


Plate 13b – Sketch showing the development of the five-note figure into a series of permutations, considering the alliterative aspects of interval, direction of movement and harmonic weight – diagrams showing considerations of balance can be seen on the right.

Reproduced from Martin, Mat – *Sketches for New Pieces*, p. 9

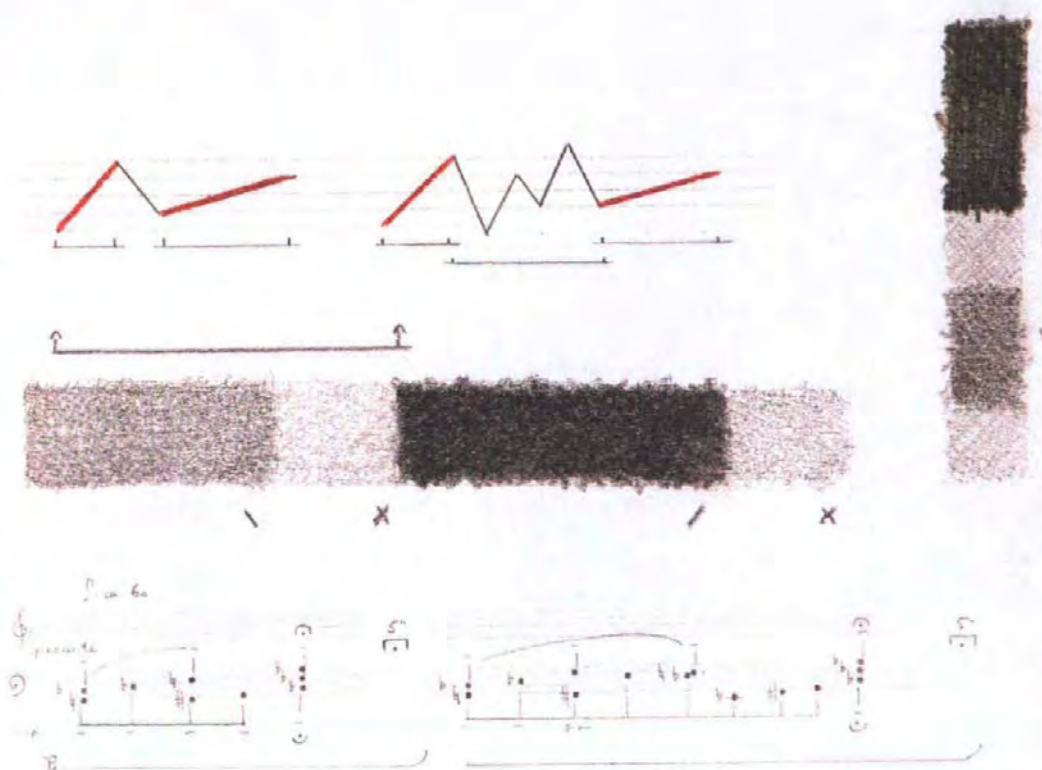


Plate 15 – Sketch exploring the possibilities of the technique shown in plate 14 in the variation of the *móna* theme. The notions of alliteration considered in the building of the theme (see p. 86 & pp. 94-95 (footnote)) are not only preserved but emphasised by using this technique. Note the use of colour to denote the static, alliterative elements of the material.

Reproduced from Martin, Mat – *Sketches for New Pieces*, p. 11



Plate 16a – From the early sketches of individual flames for *fire dances*, showing overlaid instances of movement, both complex and simplified into a small number of strong lines.

Reproduced from Martin, Mat – *Observational Sketches II*, p. 28

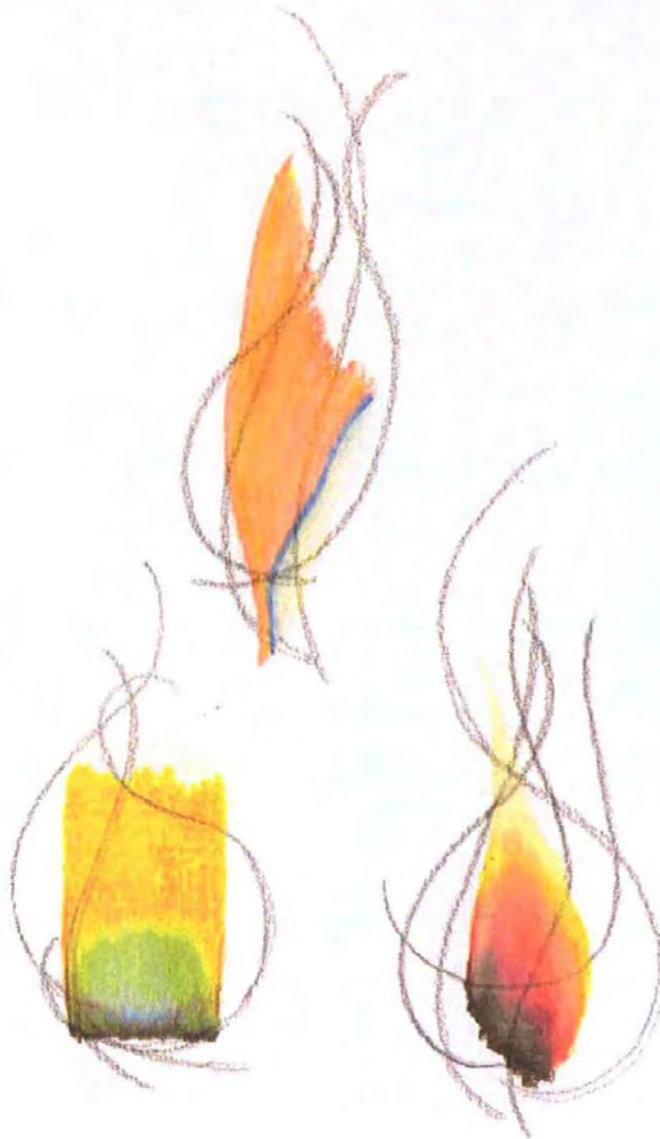


Plate 16b – From the early sketches of individual flames for *fire dances*, showing overlaid instances of movement, both complex and simplified into a small number of strong lines. Also showing observed colour balance and distribution.

Reproduced from Martin, Mat – *Observational Sketches II*, p. 25

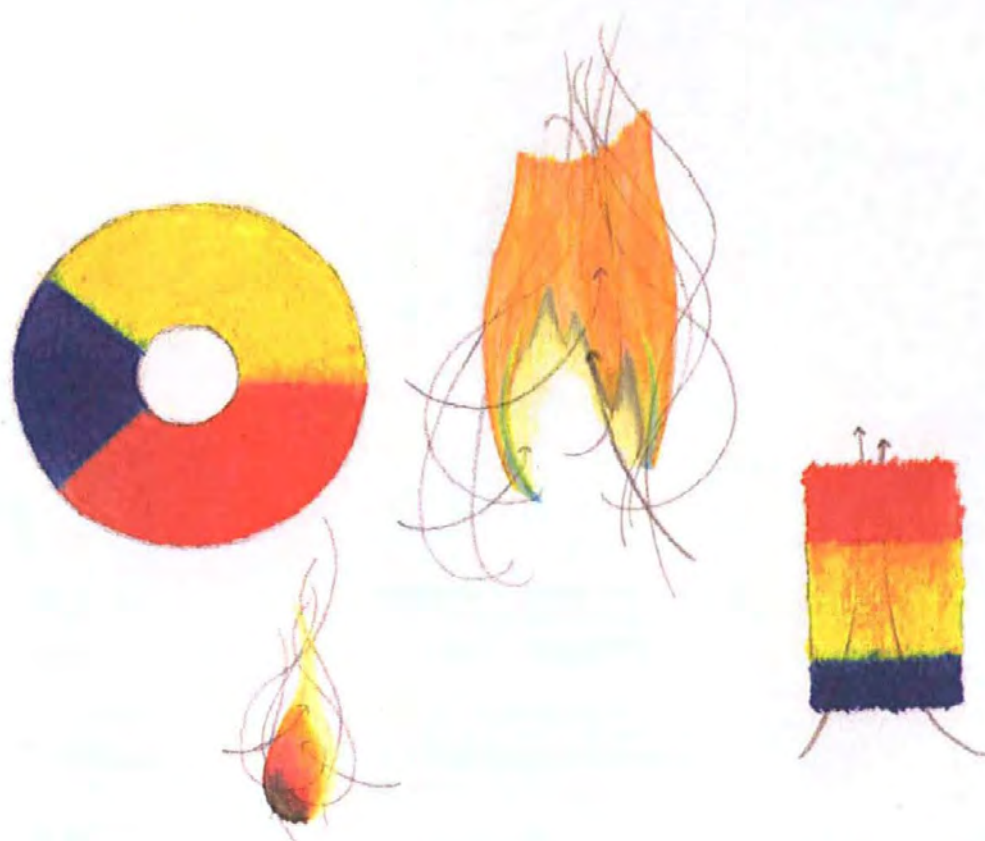


Plate 16c – From the early sketches of individual flames for *fire dances*, showing overlaid instances of movement, both complex and simplified into a small number of strong lines. Also showing observed colour balance and distribution.

Reproduced from Martin, Mat – *Observational Sketches II*, p. 27

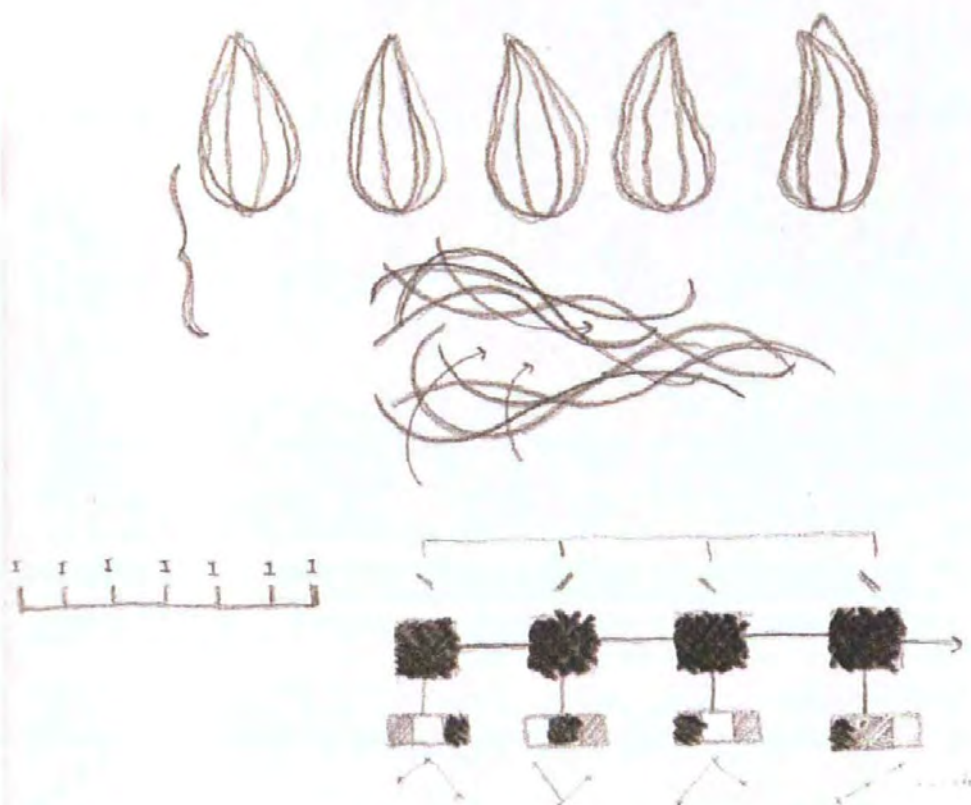
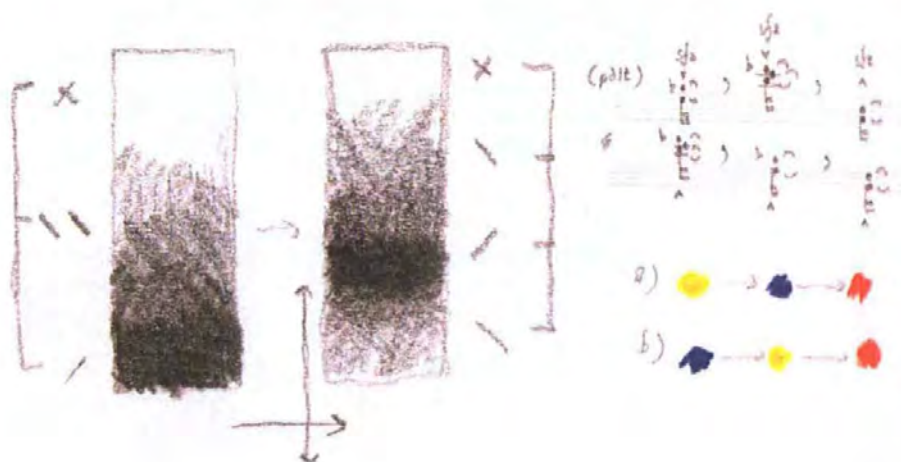
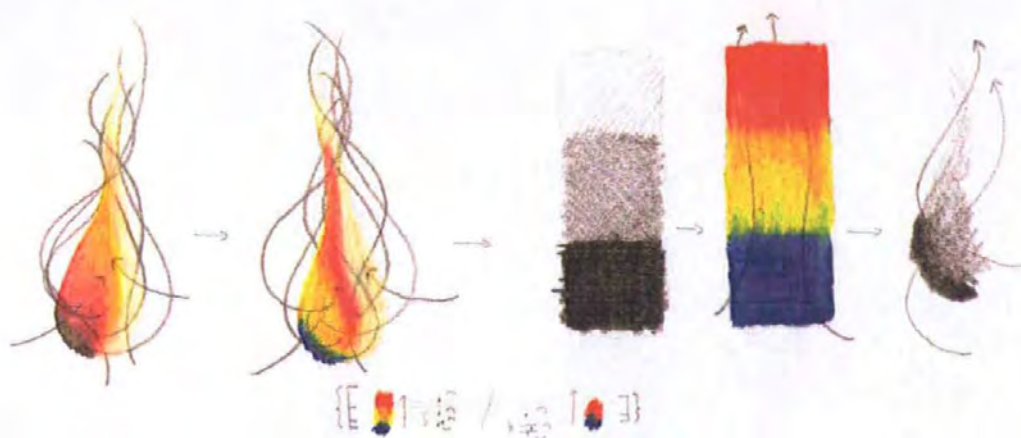


Plate 17 – Further drawings of linear movement and overlaid patterns from a later sketch for *fire dances*. Note the use of stress notation as explored during the composition of *móna* (*night music*).

Reproduced from Martin, Mat – *Sketches for New Pieces*, p. 21



Plates 18a & 18b – From the sketchbooks. Identification of an isomorphism between movement from black to grey to white, and from blue to yellow to red, with examples of intervals in musical notation.

Reproduced from Martin, Mat – *Sketches for New Pieces*, pp. 19 & 20

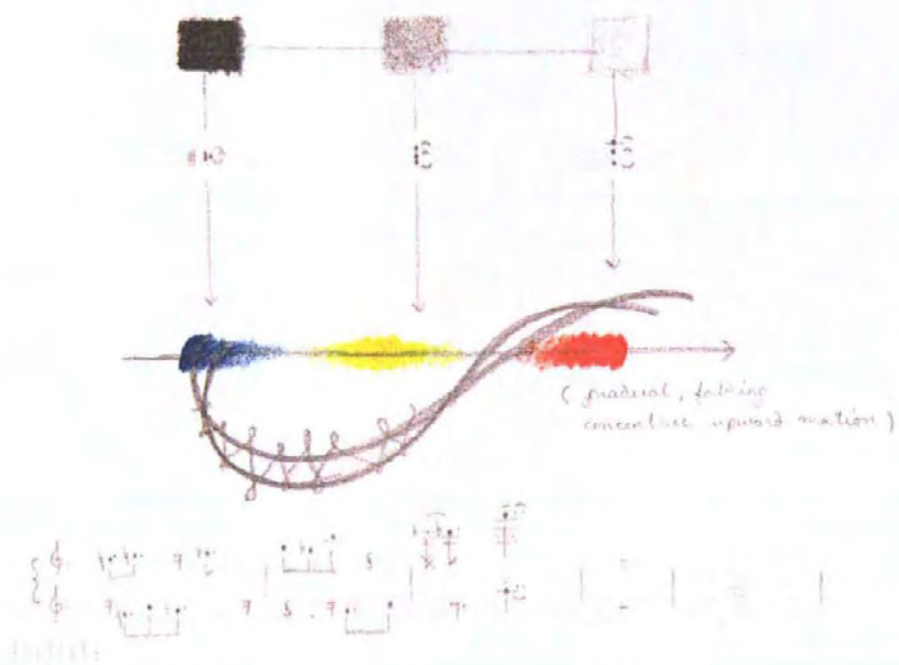


Plate 18c - From the sketchbooks. Identification of an isomorphism between movement from black to grey to white, and from blue to yellow to red, with examples of intervals in musical notation and a possible progression for harp which embodies this.

Reproduced from Martin, Mat - *Sketches for New Pieces*, p. 23



Plate 19 – Initial exploration of added harmony using the theory of complementary coloured shadows in a manner reminiscent of Messiaen's 'added resonance' technique.

Reproduced from Martin, Mat – *Notebook 3*, p. 50

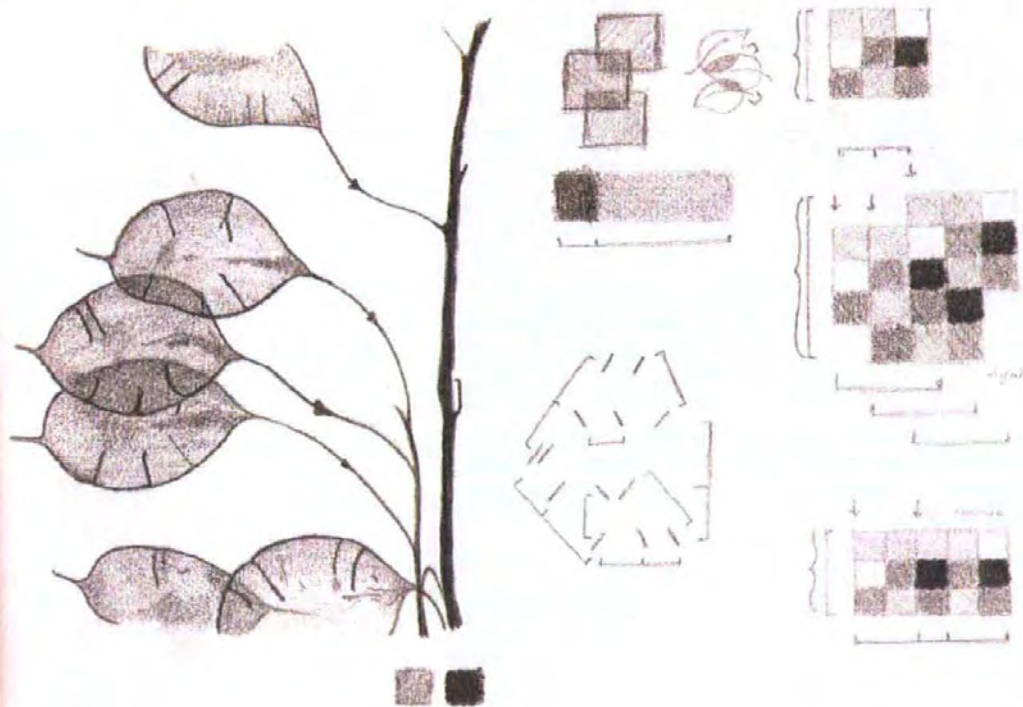


Plate 20a – Sketches showing studies of shade built in units by overlapping in front of a source of light.

Reproduced from Martin, Mat – *Observational Sketches II*, p. 15

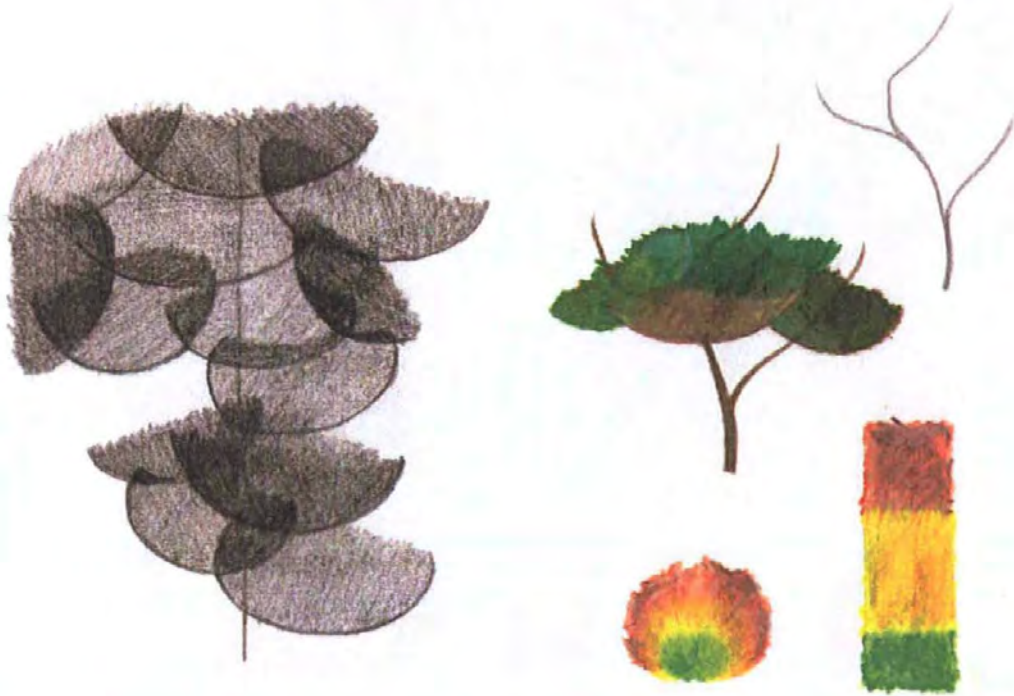


Plate 20b – Sketches showing studies of shade built in units by overlapping in front of a source of light.

Reproduced from Martin, Mat – *Observational Sketches II*, p. 19

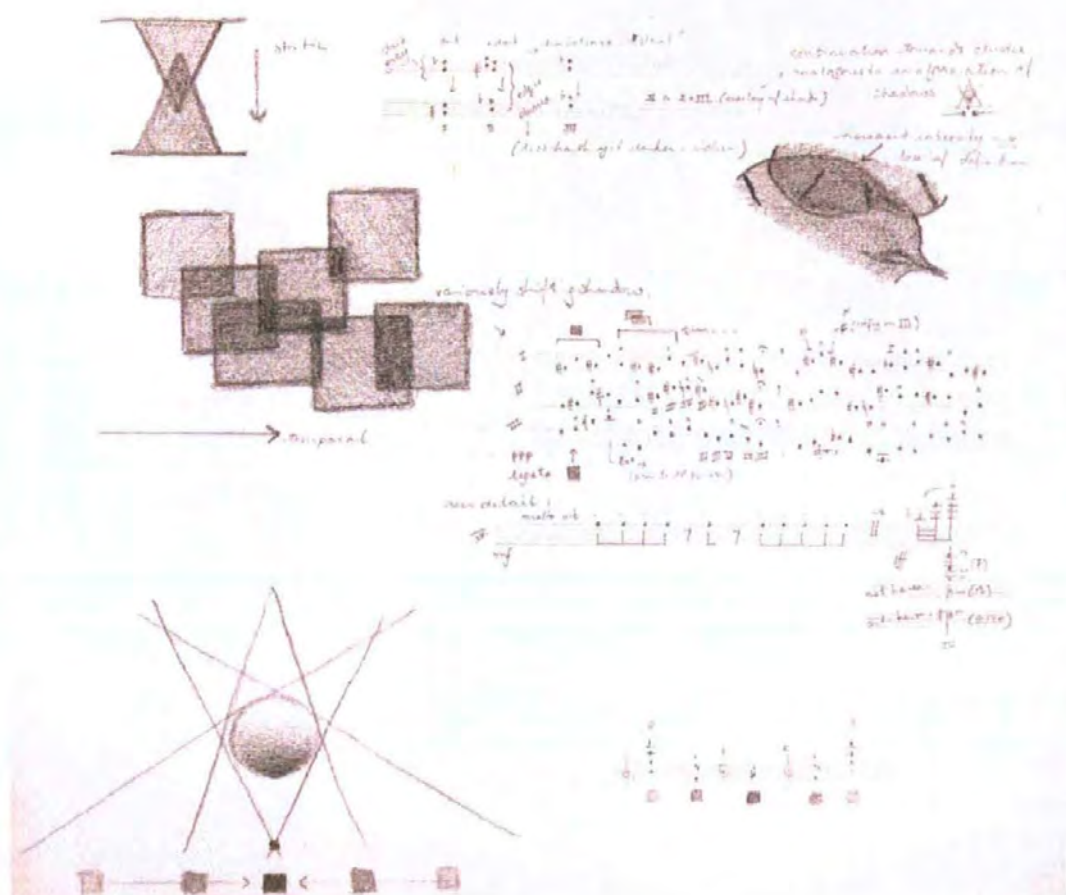


Plate 21 – Sketches showing the abstraction of phenomena noted in earlier pages (plates 20a & 20b), and examples of their musical implications.
 Reproduced from Martin, Mat – *Sketches for New Pieces*, p. 25



Plate 22 – Detail showing several shadows from a single object, differing in size and intensity.

Reproduced from Martin, Mat – *Observational Sketches II*, p. 31

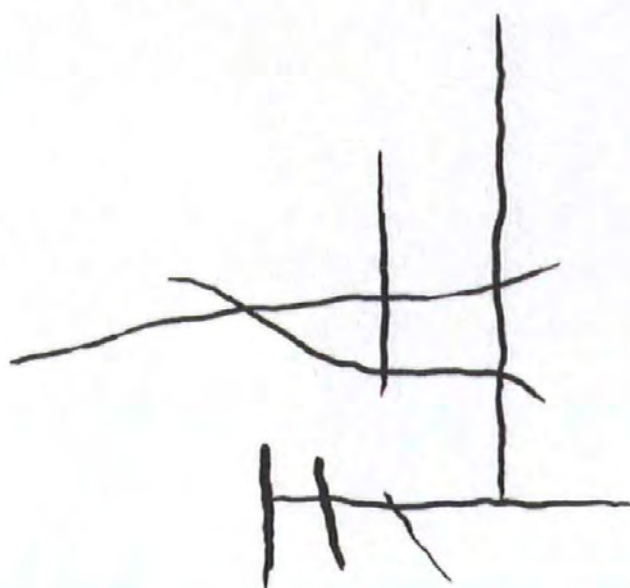


Plate 23 – Sketches showing two of the 'hieroglyphs' designed to provide initial material for *shadow musics*.

Reproduced from Martin, Mat – *Sketchbook 5*, pp. 13 & 16

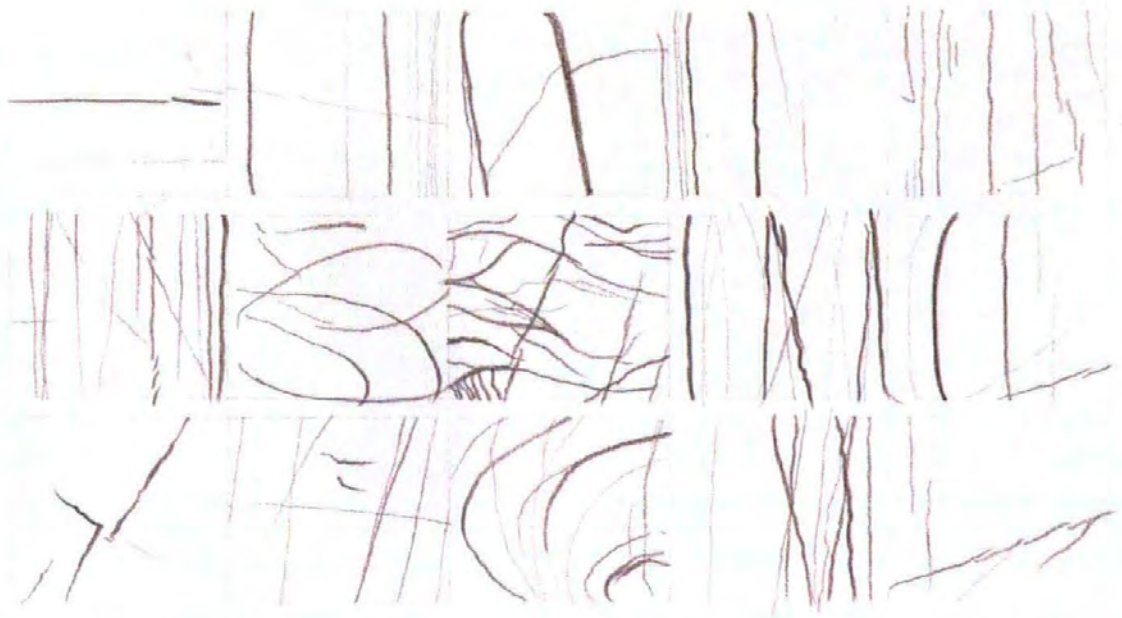


Plate 24 – Abstracted lines from pebbles with quartz veins, concentrating in particular on weight of line and tensions between lines.

Reproduced from Martin, Mat – *Observational Sketches II*, p. 18



Plate 25 – Studies showing linear interactions from Kandinsky's writings.

Reproduced from Martin, Mat – *sketches of sound, studies in line*, p. 36

Original drawings appear in Kandinsky, Wassily – *Point and Line to Plane*, in
'Kandinsky – Complete Writings on Art', Lindsay & Vergo (eds), da Capo Press, 1994,
pp. 615-616

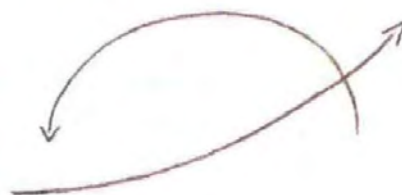
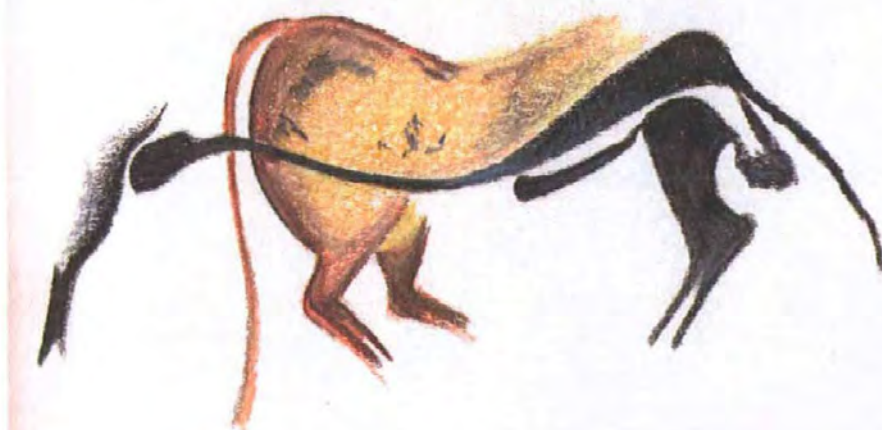


Plate 26 – Three stages of abstraction and distillation using the model of a detail from a cave painting.

Reproduced from Martin, Mat – *sketches of sound, studies in line*, pp. 39-41

Bibliography

Bibliography

- Bachelard, Gaston - *The Poetics of Space* - Beacon Press, 1994
- Ball, Phillip - *The Self-Made Tapestry* - OUP, 1999
- Bateson, Gregory - *Mind and Nature; A Necessary Unity* - OUP, 2002
- Baxendall, Michael - *Shadows and Enlightenment* - Yale University Press, 1997
- Blatter, Alfred - *Instrumentation and Orchestration* - Schirmer, 1997
- Bohm, David - *Wholeness and the Implicate Order* - Routledge, 1980
- Bohm, David & Hiley, Basil J. - *The Undivided Universe* - Routledge, 1993
- Bosseur, Jean-Yves - *Le Sonore et le Visuel* - Editions Dis-Voir, 1992
- Bosseur, Jean-Yves - *Du Son au Signe* - Editions Alternatives, 2005
- Bosseur, Jean-Yves - *Musique et Arts Plastiques* - Minerve, 2006
- Boulez, Pierre - *Penser la Musique Aujourd'hui* - Gallimard, 1963
- Cage, John - *Silence* - Marion Boyars, 1995
- Carroll, Sean B. - *Endless Forms Most Beautiful* - Norton, 2005
- du Sautoy, Marcus - *The Music of the Primes* - Harper Collins, 2003
- Ehernzweig, Anton - *The Hidden Order of Art* - Weidenfeld, 1993
- Gage, John - *Colour and Meaning* - Thames & Hudson, 1999
- Gillespie, Don (Ed.) - *George Crumb; Profile of a Composer* - Peters Edition, 1986
- Gleick, James - *Chaos; Making a New Science* - Vintage, 1998
- Gribbin, John - *Deep Simplicity* - Penguin, 2005
- Goehr, Alexander - *Finding the Key* - Faber & Faber, 1998
- Goethe, J. W. von - *Theory of Colours* - MIT Press, 1970
- Gombrich, E. H. - *Art and Illusion (6th Edition)* - Phaidon, 2002
- Gombrich, E. H. - *The Preference for the Primitive* - Phaidon, DATE
- Gombrich, E. H. (Ed. Woodfield, Richard) - *The Essential Gombrich* - Phaidon, 1996
- Gombrich, E. H. - *Shadows* - National Gallery, 1995
- Hall, Michael - *Leaving Home* - Faber & Faber, 1996
- Heaney, Seamus (Ed. Donoghue, Daniel) - *Beowulf; A Verse Translation* - Norton, DATE
- Heath, Robin - *Sun, Moon and Earth* - Wooden Books, 2001
- Hill, Peter & Simeone, Nigel - *Messiaen* - Yale University Press, 2005
- Hofstadter, Douglas R. - *Gödel, Escher, Bach; An Eternal Golden Braid* - Penguin, 1979
- James, Jamie - *The Music of the Spheres* - Abacus, 1993

Jauch, J. M. - *Are Quanta Real?* - Indiana, 1975

Kandinsky, Wassily (Eds. Lindsay & Virgo) - *Complete Writings on Art* - Da Capo Press, 1994

Kauffman, Stuart A. - *The Origins of Order* - OUP, 1993

Klee, Paul - *Notebooks, Vol. I; The Thinking Eye* - Overlook Press, New York, 1961

Klee, Paul - *Notebooks, Vol II; The Nature of Nature* - Overlook Press, New York, 1973

Klee, Paul - *Pedagogical Sketchbook* - Faber & Faber, 1953

Klee, Paul (Ed. Klee, Felix) - *The Diaries of Paul Klee* - University of California, 1968

Koestler, Arthur - *The Act of Creation* - Penguin, 1964

Lange, Art - Essay on the early piano works of Morton Feldman, in *The Early Piano Works* - Hat Recordings, 2003

Latham, Alison (Ed.) - *Sing, Ariel* - Ashgate, 2003

Lewis-Williams, David - *The Mind In The Cave* - Thames & Hudson, 2002

Livio, Mario - *The Golden Ratio* - Review, 2002

Mandelbrot, Benoît - *Fractals; Form, Chance and Dimension* - W. H. Freeman, 1977

Messiaen, Olivier - *Téchnique de mon Langage Musical* (2 volumes) - Éditions A Leduc, 1944

Paul, Jim - *The Rune Poem* - Chronicle, 1996

Pfeiffer, John E. - *The Creative Explosion* - Harper & Row, 1982

Samuel, Claude - *Olivier Messiaen: Music and Colour* - Amadeus Press, 1994

Schoenberg, Arnold - *Style and Idea* - Faber & Faber, 1975

Sheldrake, Rupert - *The Presence of the Past* - Park Street Press, 1988

Sherlaw Johnson, Robert - *Messiaen* - J. M. Dent & Son, 1974

Smith Brindle, Reginald - *Musical Composition* - OUP, 1986

Smith Brindle, Reginald - *The New Music* - OUP, 1987

Stewart, Ian - *Nature's Numbers* - Weidenfeld & Nicholson, 1995

Storr, Anthony - *The Dynamics of Creation* - Penguin, 1972

Storr, Anthony - *Music and the Mind* - Penguin, 1997

Stravinsky, Igor - *Poetics of Music* - Harvard University Press, 1998

Surrans, Alain - *Le Regard Du Musicien* - Editions Plume, 1993

Thompson, D'Arcy Wentworth - *On Growth and Form* - Cambridge University, 1961

Tirion, Wil - *The Cambridge Star Atlas* - Cambridge, 2001

Tufte, Edward R. - *Envisioning Information* - Graphics Press, 1990

Wade, David - *Li; Dynamic Form in Nature* - Wooden Books, 2003

Appendix : Scores

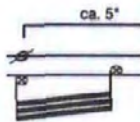
mat martin ·
prélude [totem i]
for solo bcl with optional drone
2003

for christopher cundy

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mat martin
prélude [totem i]
for solo bcl with optional drone
2003

explanation of symbols used in the score :



produce air tone accompanied by quick pitchless key slaping sounds



note finished with a short, sharp reed slap



beginning with the single pitch indicated by the grace note, produce a multiphonic chord of undefined pitch content.

for christopher cundy
prélude (totem i)

tempo i : ♩ - ca. 40 [heavy, powerful]

tempo ii : ♩ - ca. 70 [declamatory, authoritative]

tempo iii : ♩ - ca. 70 [peaceful, humble]

tempo iv : ♩ - ca. 55 [agile, tentative]

inclusion of a drone on a low F# (sounding pitch, on any instrument) is optional.

mat martin

without strict tempo
sotto voce : undulating

tempo i : ♩ - ca. 40
liquid

tempo ii : ♩ - ca. 70
ca. 5°

bcl
ppp
f
p
pp

tempo iii : ♩ - ca. 70
dormant

tempo iv : ♩ - ca. 55

tempo i
[sempre sim.]

tempo ii
ca. 5°

bcl
pp
f
p
f
p
pp

tempo iii
[sempre sim.]

tempo iv

without strict tempo
sotto voce : undulating

bcl
ppp

tempo iv
tempo iii

ca. 8°

tempo ii

bcl
f
p
pp
pp
p

tempo i

tempo iii

tempo ii

tempo i

bcl
f
pp
p
f

mat martin

« móna » (night music)

synodic / sidereal variations for piano solo

(2004)

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móna (night music)
synodic / sidereal variations for piano solo

programme note

móna (night music) was composed during 2004 from sketches and observations of lunar patterns and cycles which i had gathered over several years. i had long searched to find a distinct and unorthodox form in which to cast a 'lunar' piano cycle before finding that the natural expression of the pattern was one of variations on a theme: a musical form in itself.

in sketching the form of the piece i was aware of the importance of the balance of darkness and light upon the surface of the moon at various points in its cycle and noted a parallel in these ratios to intervallic relationships, allowing me to 'map' the chromatic scale onto the sequence of 'moons' and work in 'greyscale' harmony through the variations. thus the theme's dominant interval (the augmented fourth) expands and contracts over the entire cycle, eventually coming back to rest in the restatement of the theme at the end of the piece. throughout the variations the complementary interval of the minor second remains a constant, a measure against which the harmonic movement can be perceived.

the form of the piece mirrors more closely the theme and variation model of the lunar cycle than that of traditional musical form, although there is naturally some common ground: lunar variances occur in position and visibility, working their way *through* a cycle to a point of rest which also signifies departure. *móna* echoes this by using each movement to work slightly further into the theme, beginning the variation at a later point in the theme each time, and returning to rest at that point. thus the piece presents a sequence of cycles within cycles. the number thirteen is of paramount importance at all levels of the piece, being the average value between the moon's two 'rhythms' ; the synodic and sidereal months. the theme (and therefore each variation) is made up of thirteen sections (each used as a starting point for a different variation), the final number of movements (including the restatement of the theme) is thirteen and the prominence of each degree of the chromatic scale also reflects this number.

the titles given to the variations are taken from the celtic calendar discovered at coligny in 1897 and reflect the importance of the cycle to the celtic tribes. although each word connotes something of the month's qualities to the celts i have not attempted to capture this in the music (a notable exception may be variation v (*cutios* – meaning 'rain month'): played *sempre pizzicato* inside the piano, the sound quality shares something of the pointillist nature of rainfall). a sense of the 'dark' and 'light' halves of the celtic year, however, is contained in the contraction and expansion of intervals throughout the work.

the piano oscillates between polarities throughout the piece. 'internal' and 'external' techniques are opposed to one another ; extremes of register and dynamic are required. although some of the sounds produced by the pianist are unusual, no extra equipment is needed for the performance of *móna*. during composition it was important to me that all sounds should come from a direct contact between pianist and piano, thus reflecting the dualities inherent within the work.

mat martin 26.10.04

móna (night music)
synodic / sidereal variations for piano solo

duration: ca. 43'

contents :

		page :
tema	(samonios)	I
variation i	(dvmannios)	4
variation ii	(rivros)	7
variation iii	(anagantios)	9
variation iv	(ogronios)	11
variation v	(cvtios)	13
variation vi	(giamonios)	14
variation vii	(simivisonnos)	15
variation viii	(eqvos)	17
variation ix	(elembivios)	19
variation x	(edriniosor ædrinios)	21
variation xi	(cantlos)	23
tema	(samonios)	25

the piece makes use of several extended techniques involving the pianist accessing the interior of the piano. amplification may be necessary to project the quietest of these sounds in a larger performance space, and this will also increase the effect of the louder passages.

throughout the score particular noteheads are used to indicate certain techniques, although for each movement the first instance of this is always also marked in text. triangular noteheads, which are used to indicate *pizzicato* technique, are suspended in variation v (cvtios), however, as the movement is performed entirely (*sempre*) *pizzicato*.

the term *sempre* after a pedal marking (often at the start of a movement) indicates that the pedal will remain depressed throughout the movement. all pedalling is fully notated. a piano with the third pedal (*sostenuto*) is required to perform substantial parts of the piece.

the symbol § is used in place of a time signature to indicate *senza misura* passages. the symbol is valid until negated by a new time signature.

♩ - ca. 88 : tempo 1° poco accel ...

come sopra : extremely slow

ppp (l.v.)

fff (loco)

(5")

♩ - ca. 60 [poco meno mosso] : tentative, molto rubato

3
16

4
16

5
16

4
16

3
16

mp (pizz : l'up)

(*) + : mute with left hand, approx. 3 cm from end of string

5
16

4
16

3
16

(3")

(7")

come sopra : extremely slow

ppp

(D) -----

SOS

♩ - ca. 88 : tempo 1° poco accel ... a tempo poco accel ...

fff (l.v.)

fff (loco)

(D) -----

(sos) -----

4
16

6
16

a tempo *fff*

(pizz)

(on strings)

fff

(D) -----

6/16 *fffz fffz* 7/16 *mf* poco rit. *fff* (a tempo) 6/16 *ffz* (pizz: f'nail) *ffz*

♩ - ca. 60 [meno mosso] : molto rubato

3/16 4/16 3/16 4/16

(on keys) *mp* (f'tip)

4/16 7/16 3/16 4/16 3/16 4/8 3/16 5/16

♩ - ca. 88 : tempo 1°

(3") (pizz: f'nail) (pizz) (on keys) *f* (depress silently) *fff*

(3") (on strings) *fff* (to end)

SOS

5/16 6/16 5/16 3/16

♩ - ca. 60 : meno mosso

p *f* *p* *mf* *ff*

(f'tip) *ppp* (lasc. vibrer to silence)

variation i (dvmannios)

piano

§ (5") (l.v.)

♩ - ca. 60 : pesante, ma legato

4/8 2/8 4/8

(3") (3") (5")

fff *mp* *pp*

(*) strike crossbars over bass strings with heel of hands

§ (5")

4/8 2/8 4/8 3/16

(3") (3") (5")

fff *f* *mp* *f* *mp* *pp*

(*)

♩ - ca. 90 : più mosso

3/16 5/8 4/8 9/16 4/8

(loco) legato

fff *mp* *fff* *p* *p*

(sec) SOS

tempo giusto : tranquillo

poco rit... a tempo

4/8 8va (3")

9/16

4/8 8va (5")

3/16

ppp *p* *ppp*

This system contains three measures. The first measure is in 4/8 time with an 8va octave marking and a 3-second duration. The second measure is in 9/16 time. The third measure is in 4/8 time with an 8va octave marking and a 5-second duration. Dynamics include *ppp* and *p*.

a tempo (loco)

3/16 4/16 5/8

fff *f* *dim...* *p* *sff* *p* *sff* *sff* *p*

(9) (sec) sos

(7")

This system contains four measures. The first measure is in 3/16 time with *fff* dynamics. The second measure is in 4/16 time. The third measure is in 5/8 time with *f* and *dim...* dynamics. The fourth measure is in 5/8 time with *p*, *sff*, *p*, *sff*, *sff*, and *p* dynamics. There are also markings for (9) (sec), sos, and (7").

(5")

4/8 ♩ - ca. 60 ; tempo 1°

2/8

5/8

7/8 4/8

(3") (3") (5")

sfff *mp* *sff* *pp*

This system contains five measures. The first measure is in 4/8 time with a tempo marking of ♩ - ca. 60 ; tempo 1° and a 5-second duration. The second measure is in 2/8 time with *mp* dynamics. The third measure is in 5/8 time with a 3-second duration. The fourth measure is in 7/8 time with a 3-second duration. The fifth measure is in 4/8 time with a 5-second duration. Dynamics include *sfff*, *mp*, *sff*, and *pp*.

The musical score for 'The Rose Tree' is presented in a single system with three systems of music. The first system is in 4/8 time, featuring a treble clef and a bass clef. The melody is in the treble clef, and the accompaniment is in the bass clef. The second system is in 5/16 time, featuring a treble clef and a bass clef. The melody is in the treble clef, and the accompaniment is in the bass clef. The third system is in 5/8 time, featuring a treble clef and a bass clef. The melody is in the treble clef, and the accompaniment is in the bass clef. The score includes various musical notations such as notes, rests, and dynamic markings like *pp* and *f*.

The musical score for 'The Great Wall of China' by John Cage is presented in two systems. The first system includes a piano part with a tempo marking of 'molto rubato : in free time' and a percussion part with a '3/16' time signature and a tempo of 'ca. 90 : più mosso'. The piano part features a series of chords with dynamics ranging from *sff* to *mp*. The percussion part has a '3/16' time signature and a tempo of 'ca. 90 : più mosso'. The second system continues the piano part with a '5/16' time signature and a tempo of 'ca. 90 : più mosso'. The piano part features a series of chords with dynamics ranging from *sff* to *pp*. The percussion part has a '5/16' time signature and a tempo of 'ca. 90 : più mosso'. The score includes various performance instructions such as 'legato', 'dim.', 'pp', 'ff', and 'sff'. There are also notes in parentheses: '(*) play clusters with right hand, returning immediately to crossbar roll' and '(B) (sec)'. The score is written for piano and percussion, with the piano part using a grand staff and the percussion part using a single staff with various rhythmic markings.

pause of ca. 15" before beginning next movement

variation ii (rivros)

♩ - ca. 98 : molto leggero, rubato throughout

piano

(on keys)

p

sf

mf

p

f

sff

f

(*) (l.h.) strum over strings with back of nails (pitches approx.)

U.C. (5")

f

mf

ff

mp

ff

p

PPP

f

rubato (*)

(l.v.)

(*) scrape f/nail along winding of string in one swift movement

U.C. (3")

sff

sff

sff

sff

p

ppp

p

f

mp

ff

tempo giusto

(*) knock on crossbar (knuckles)

(*) gradually apply l.h. finger to string

U.C.

(*) nb : the pedal should remain fully depressed throughout movements marked *sempre pedale* and accumulate resonances during rests and measured pauses.

Musical score for guitar, featuring complex rhythmic patterns and dynamic markings across three systems.

System 1:

- Measures 1-2: 6/8 time, *sff* (5").
- Measures 3-4: 5/8 time, *p* to *ppp* (5").
- Measures 5-6: 4/8 time, *sfff* (5"), *acc. possibile ...*, 19:16 ratio.
- Measures 7-8: 6/8 time, *f* to *fff* (5"), *rit...*, *(*) knock on crossbar (knuckles)*.

System 2:

- Measures 1-2: 6/8 time, *a tempo*, *sf* (f'nail), *mp*.
- Measures 3-4: 3/8 time, *ff* (3").
- Measures 5-6: 4/8 time, *rubato: come sopra*, *mp* (3").
- Measures 7-8: 4/8 time, *ff* (f'nail) (3").

System 3:

- Measures 1-2: 5/8 time, *p*, *mf*.
- Measures 3-4: 5/8 time, *ff*.
- Measures 5-6: 4/8 time, *rubato*, *(*) strum over strings with back of nails*, *mp*, *sff*.
- Measures 7-8: 4/8 time, *a tempo*, *ff*, *(**) strike clusters w. f'nails (pitches approx.)*.

4/8 *a tempo : come sopra*

6/8 *posanto* *molto accel ...*

4/8 *ff*

(3") (7")

f *fff*

sf *ppp*

molto rit al fine ...

pp (*)

(5")

mf (*l'naïl*) *f* *p* *mf*

(*) strike cluster

variation iii (anagantios)

piano (on strings) *extremely slow*

(*)

ffz *ffz* *mf*

(2")

(on keys) ♭ - ca. 140 : *dolce*

9/16 *pp*

3/8 *mf*

u.c.

(4")

(on strings) *extremely slow : come sopra*

ffz *ffz* *ffz* *ffz* *ffz*

(2")

(on keys) ♭ - ca. 140 : *come sopra*

6/16 *pp*

9/16

u.c.

(*) apply fingers firmly to strings and remove sharply to produce chords (improvise pitches)

variation iv (ogronios)

♩ - ca. 40 : bright, joyous

The musical score for 'L'Espresso' by Luciano Berio is presented in two systems. The first system begins with a piano part marked 'piano' and a violin part. The piano part features a series of chords and a tremolo effect, with dynamics ranging from *fff* to *f*. The violin part is marked *fff* and *f* *legato*. The second system continues the piano part with a tremolo effect and the violin part with a series of chords. The piano part is marked *fff* and the violin part is marked *f* *legato*. The score includes various musical notations such as notes, rests, and dynamic markings.

2/4

fff *f* legato

ff *mf*

(to end)

♩ - ca. 55 : poco più mosso

fff *p*

♩ - ca. 40 : a tempo

f *p*

u.c. _____

p *mf*

u.c. _____

fff *pp*

(u.c.) _____

(lasc. vibrer to silence)

variation v (cvtios)

♩ - ca. 55 : lento e leggero, sempre pizzicato

piano

(D'nails)

(*)

fz

f

mf

p

(5")

sfz

f

pp

ffz

(D'tips)

mp

p

fz

f

p

mf

f

ff

(3")

(D'nails)

fff

(D'tips)

mp

pp

fz

ppp

(5")

f

ffz

fz

f

ffz

fz

f

ffz

fz

p

ffz

(3:4)

(3:4)

(*) gently apply fingernails to winding of strings at dampers and slowly scrape back up string, allowing pitch to sound throughout

(**) touch node to create harmonic at octave

pause of ca. 10" before beginning next movement

variation vi (giamonios)

♩ - ca. 70 : delicate, luminous

(on keys)

piano

p *ppp* *p* *fz* *fz* *fz* *mp*

(sec)

dolce (en dehors)

rubato

(*) gradual cresc. del niente . . .

pp *mf* *f* *dim* . . . *pp*

pizz. (f'nail) *mf* *on keys* *on keys* *on keys* *pizz.* *on keys* *pizz.*

sim.

3

3:4

on keys

(*) strike string with back of thumb nail (gentle, bouncing action).

(come sopra)

p *ppp* *p* *ppp* *p*

♩ - ca. 70 : tempo giusto

(3") (5")

p

♩ - ca. 40
pesante

♩ - ca. 70
on keys

♩ - ca. 40
(como sopra)
grad. cresc. del niente ...

ppp *p* *ppp* *fz* *p*

(3^{va}) (3^{va})

(D) (sec)

rubato *f* *molto rit. ...*
dim al niente ...

mf *pizz. (f'nail)* *on keys* *pizz.* *on keys* *pizz.*

2:3 3 2:3

variation vii (simivisonnos)

♩ - ca. 110 : delicate, luminous

piano *sf* *mf* *sf* *mf*

(on keys) (4^{va}) (3^{va}) (5^{va})

u.c. *u.c.*

Musical score system 1, measures 10-15. The system features a treble and bass staff. Measure 10 has a *sff* dynamic. Measure 11 has a *mf* dynamic. Measure 12 has a *p* dynamic. Measure 13 has a *ppp* dynamic. The system concludes with a repeat sign and a *ppp* dynamic.

(u.c.) _____

Musical score system 2, measures 16-21. The system features a treble and bass staff. Measure 16 has a *ff* dynamic. Measure 17 has a *pp* dynamic. Measure 18 has a *sff* dynamic. Measure 19 has a *mf* dynamic. Measure 20 has a *sff* dynamic. The system concludes with a repeat sign and a *sff* dynamic.

(D) _____

Musical score system 3, measures 22-27. The system features a treble and bass staff. Measure 22 has a *ff* dynamic. Measure 23 has a *pp* dynamic. Measure 24 has a *sff* dynamic. Measure 25 has a *sff* dynamic. The system concludes with a repeat sign and a *sff* dynamic.

(D) _____

First system of the musical score. The piano part includes a (3") pedal marking. The celesta part is in 6/8 time and features dynamic markings *fff*, *mf*, and *sf*.

variation viii (eqvos)

♩ - ca. 44 : dolce ma pesante

Second system, piano part only. It includes a piano marking, a 5/8 time signature, and dynamic markings *mp* and *f*.

♩ - ca. 116 : presto, bright

Third system, celesta part only. It includes a 4/8 time signature, a (3") pedal marking, and multiple *sf* dynamic markings.

Fourth system, piano part only. It includes a 5/8 time signature, a (3") pedal marking, and multiple *sf* dynamic markings.

Fifth system, celesta part only. It includes a 4/8 time signature, a (5") pedal marking, and multiple *sf* dynamic markings.

Sixth system, piano part only. It includes a 4/16 time signature, a (5") pedal marking, a *pizz. : rubato* marking, and a *mp* dynamic marking.

(*) catch damper with left hand and hold it up whilst releasing pedal

4/16 *pp* (2")

5/8 on keys : tempo giusto *f*

fff *fff* *fff* *fff* *fff*

fff *fff* *fff* *fff* *fff*

3/16 (3")

3/16 *pizz. : rubato* *p* (5")

5/8 *pp*

♩ - ca. 44 : tempo primo
on keys : tempo giusto

sfp

9/16 *pizz. : rubato* *ff* *mp* *ff* (5")

4/8

5/8 11/16 *f* *detaché*

fff *fff* *fff* *fff* *fff* *fff*

variation ix (elembivios)

♩ - ca. 75 : tentative, leggiero

piano

3/8 on keys
5/16
7/16
5/16
3/8
4/8

p *PPP* *PPP* *p* *PPP* *p*

on keys
(pizz : D'up)
(sim.)

(5")

♩ - ca. 60 : presto, sempre leggiero

3/8 a tempo
4/8
7/16
3/8

f *sff* *mp* *f* *sff* *f* *sff* *f*

legato : en dehors

19:16

(3")

(9) sos

♩ - ca. 75 : tempo primo

3/8
2/8
3/8

mp *f* *sff* *mp*

tempo giusto

cresc ...

5

(3")

(9) sos

sff *mf* *sff* *sf* *sf* *sf* *sf* *sf* *sf* *sf*
sff *sf* *pp* *mf*
 5 9.8

♩ - ca. 75 : tempo primo
 a tempo
 ♩ - ca. 60 : tempo secondo
 sempre legato
 crescendo molto
 f *pp* *mp* *f*
 sos (sempre)
 6:4 7"

♩ - ca. 75 : tempo primo
 5/16
 f *ppp* *p* *ppp* *p*
 7" (*) knock on crossbar

505 (info next mvmt) _____

(P) _____

variation x (edriniosor ædrinios)

♩ - ca. 138 : presto, desolate, arid

5/16

piano

f *mp* *ppp* *f* *pp* crescendo molto ...

accl...

(3")

The musical score for 'The Great Wall of China' by John Cage is presented in two systems. The first system consists of a piano part (treble and bass staves) and a percussion part (bass staff). The piano part begins with a series of notes marked *ppp* and *f*, followed by a section marked *sfff* and *pp*. The percussion part features a series of notes marked *pppp* and *pp*. The second system continues the piano part with notes marked *ppp* and *pp*, and the percussion part with notes marked *pp*. The score includes various musical notations such as dynamics (*ppp*, *f*, *sfff*, *pp*, *pppp*), articulations (*pizz.*, *on keys*), and time signatures (*5/16*). The tempo is marked *poco meno mosso : rubato*.

acel ... a tempo

mf *ppp* *p*

(3")

pizz.

on keys
pp

This system contains two staves. The upper staff is in treble clef and contains a series of eighth notes with accents, marked 'acel ...' and 'a tempo'. The lower staff is in bass clef and contains a series of eighth notes, marked 'mf'. A 3-second rehearsal mark (3") is placed between the staves. The system concludes with a piano part marked 'p' and a pizzicato part marked 'pizz.' and 'on keys pp'.

f *p* accel ... *pp*

(3")

p *f* (on keys)

erose ... (acc)

This system contains two staves. The upper staff is in treble clef and contains a series of eighth notes with accents, marked 'f', 'p', 'acel ...', and 'pp'. The lower staff is in bass clef and contains a series of eighth notes, marked 'p' and 'f'. A 3-second rehearsal mark (3") is placed between the staves. The system concludes with a piano part marked 'p' and a forte part marked 'f'.

variation xi (cantlos)

♩ - ca. 90 : lento e pesante

poco - a - poco - cresc - en - do

piano

ff *fff* *pppp* *p*

sempre

5 [sim.] 1 [sim.]

(5") (3")

This system contains two staves. The upper staff is in treble clef and contains a series of eighth notes with accents, marked 'piano', 'ff', 'fff', 'pppp', and 'p'. The lower staff is in bass clef and contains a series of eighth notes, marked 'ff', 'fff', 'pppp', and 'p'. A 5-second rehearsal mark (5") is placed between the staves. The system concludes with a piano part marked 'p' and a forte part marked 'f'.

cresc - en - do (cont)

p *mf* *fff* *p* *ppp*

on keys
pizz. (l/tips)

cresc - en - do (cont)

fff *mf* *ff*

on keys

cresc - en - do (cont)

ppp *ff* *ff* *ff*

on keys
pizz.

fff

(10")

tema (samonios)

♩ - ca. 88 : senza rubato poco accel . . .

extremely slow

piano

ppp (l.v.)

fff (loco) (l.v.)

fff (5")

a tempo : dark, awakening

$\frac{4}{16}$ *fffz* $\frac{6}{16}$ *fffz fffz*

(pizz : *f*/nail)

(on keys : silent)

(gliss over strings : *f*/nail)

(l.v.)

fff

$\frac{3}{16}$ *fffz* $\frac{4}{16}$ *fffz* $\frac{3}{16}$ *fffz fffz* $\frac{4}{8}$ *fffz*

(3") (5")

(come sopra)

(l.v.)

fff

(*) dampen string in notated time

(sos) (hold down)

♩ - ca. 60 [un poco meno mosso] : tentative, molto rubato

come sopra : extremely slow

♩ - ca. 88 : tempo 1° poco accel . . .

ppp (l.v.)

fff (loco)

mp (pizz : f/tip)

(*) + : mute with left hand, approx. 3 cm from end of string

3/16 4/16 5/16 4/16 3/16

5/16 4/16 3/16

(3")

come sopra : extremely slow

ppp

(7")

(D) -----

sos -----

♩ - ca. 88 : tempo 1° poco accel . . . a tempo poco accel . . .

fff (l.v.)

fffz (loco)

fff (loco)

(D) -----

(sos) -----

4/16 a tempo 6/16

fffz (pizz)

(on strings)

fff

(5")

(D) -----

6/16 *fffz fffz* 7/16 *mf* poco rit. 3 5 (th f th f th) *fff* (a tempo) 6/16 *ffz* (pizz: /nail) *ffz* (3")

♩ - ca. 60 [meno mosso] : molto rubato 3/16 4/16 3/16 4/16 (on keys) *mp* (l'rip)

27

♩ - ca. 88 : tempo 1° 4/16 7/16 3/16 *fffz* 4/16 *fffz* 3/16 *fffz fffz* 4/8 *fffz* 3/16 *fffz* 5/16 (on strings) *fff* (to end)

(3") (pizz: /nail) (pizz) (on keys) (depress silently) *f* *fff* (3")

☺ SOS

5/16 *fffz* 6/16 *fffz* 5/16 *ffz* (pizz: /nail) *ffz* (5")

♩ - ca. 60 : meno mosso 3/16 *p* *f* *p* *mf* *ff* (l'rip) *ppp* (lasc. vibrer to silence) (fine)

mat martin

fire dances

four miniature flame studies for solo harp

duration : ca. 9'30"

for rhodri davies

© 2006 mat martin / flatpack music

mat martin
fire dances
four miniature flame studies for solo harp

programme note :

« fire dances » was completed in early 2006 for rhodri davies, whose improvisatory style has naturally influenced its creation. the piece is based upon my own fieldwork into the nature of fire, made up principally of drawings notating the movement, shape and colour of individual flames. it attempts to set out combinations of the predominant recurring patterns brought out by these observations.

fire is dependent on both fuel and air to burn, and thus flames are rooted to a particular point from which their energy is drawn. any movement made by a flame is therefore confined to its immediate environment, causing all flux to be contained within a certain area. the nature of combustion maintains variations on the typical 'flame' shape at all times (heat rises, therefore movement in a flame is always towards its tip, where it becomes thinner in shape), and the distribution of colour from bottom to top, although fluid in proportion, is confined to a certain distribution pattern. the fact that movement within flames is dependent on permutations of a finite energy source gives birth to the distinctive repetitive 'flickering' movement we associate with them. the pieces attempt in many ways to recreate this fluid movement within a finite framework in their construction.

each piece has a duration of 17 bars, which contains the material within a framework that allows a certain elasticity (the duration in actual time is allowed to vary due to changes in time signature and tempo), and the nature of the harp itself is used to create further flexible restrictions within which the pieces were formed. pedal settings are used in a very static way throughout the pieces to conserve the basic harmonic colour relationships, and much use is made of the repetition of passages with altered pedal settings, again creating movement within a fixed frame. shadows (or echoes, in musical terms) diminish, repeat or exaggerate the movement within the material, and harmonic colouring in complementary shades parallels the 'negative' coloured shadows that flames can cast on the retina in the onlooker's eye.

the harpist is required to use several extended techniques throughout the piece, including the application of paper and metal to the strings, and to produce several unpitched 'noise' sounds. the greater scope of timbral qualities allows for a textural approach, making the sense of movement and variation within the music vivid. the piece is dedicated to rhodri davies, who has helped me with great patience over the course of this project, and has been willing to experiment freely with making my ideas work. the title is of course an allusion to a musical form, but also an assertion of my observation that fire does indeed dance.

mat martin
fire dances
four miniature flame studies for solo harp

note on scoring :

1 : the paper used to thread into the strings during the first piece should be thick and reasonably stiff. two strips approximately 3cm wide should be threaded tightly and *près de la table*, each covering half of the metal strings' range, with the corners bent out to either side so that they can be grasped by both hands and swiftly removed at the end of the movement.

2 : the diamond notehead represents a natural harmonic at the octave.

3 : the square black notehead indicates that the fingers of one hand should be placed against the string(s), *près de la table*, and pressure applied in this way whilst the string is plucked with the other hand.

4 : all knocking sounds are to be produced on the soundboard of the instrument.

5 : the two lowest strings (C, D) and the highest string (G) should all be tuned to the natural position.

6 : the symbol ∞ is used to indicate a semi-improvised section (mvmts i, ii & iv). further instructions are given in the score around these events. all improvised sections should use or be in keeping with the surrounding material.

7 : sounds produced behind the bridge pins (mvmt iv) are of indefinite pitch but should be produced using the strings in the middle to low register for a clear ringing timbre.

9 : the symbol § is used in place of a time signature to indicate *senza misura* passages. as with time signatures, the symbol is valid until it is negated by a new time signature.

mat martin
fire dances
four miniature flame studies for solo harp

contents :

	page :	duration :
i - (processional) : e = 60, sonorous, pesante	p. 1	ca. 2' 45"
ii - (mobili) : <i>senza tempo ma lento possibile</i> , entwined and hesitant	p. 2	ca. 2' 30"
iii - (echoes) : e = 55, lento, gentle and emergent	p. 3	ca. 2' 20"
iv - (coloured drones) : <i>senza tempo ad libitum</i> , dark, distant <i>come sopra</i>	p. 4	ca. 2' 00"

for rhodri davis

« fire dances »

four miniature flame studies for solo harp

mat martin

1 (processional) : 2/4 - ca. 60, sonorous, pesante

harp

PP PPP PP sfz (clear, bell-like) sfz (sim.) sfz mp pp pp C# Fb Bb

(*) thread all wound strings with thick paper (1 piece)

9

(15")

tap soundboard with pads of fingers

PPP

(7")

(4")

G# Eb A# D#

pp p mp f mp pp sfz sfz (remove paper)

(1x)

(*) apply pressure to strings with pads of fingers and remove sharply to produce chords - do not pluck

11 (mobili) : *senza tempo ma lento possibile*, entwined and hesitant

harp

(10'')
(7'')
(13'')
(5'')
(2'')
(7'')

pp mp pp mp pp

(*) the elements of these 'mobile' sections may be played in any order and any number of times within the duration. events are of equal duration but may be overlapped or separated by silence. the mobile sections should differ from one another.

(**) slowly scrape winding of string with fingernail, *laissez vibrer* any pitched sound as the finger leaves the string.

9

(10'')
(9'')
(15'')
(10'')
(7'')

p sfz p sfz pp sfz pp

(*) bend string (as vibrato) before plucking and release after pitch sounds

iv (coloured drones) : *senza tempo ad libitum*, dark, distant *come sopra*

harp

laissez vibrer throughout

PP (- A₄) (- B₄) A₄ B₄ (- A₄) (- B₄) (9th) (4th) (7th) (5th) (4th) (7th) (12th) (3rd) (- E₄) (- D₄) (7th)

(*) change pedal settings slowly to produce and sustain metallic buzzing sound

(**) use pad of thumb to damp string at a nodal point *près de la table* and pluck between thumb and soundboard with fingernail. do not remove thumb as with standard harmonic.

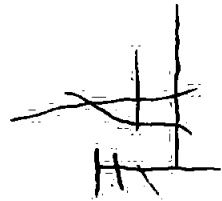
(***) 'mobile' sections *come sopra* (mvmt 11)

10

PP (- G₄) (- C₄[#]) (9th) (9th) (7th) (9th) (7th) (9th) (7th) (9th) (7th) (9th) (7th) (9th) (7th) (9th) (7th)

(*) apply pressure to strings with pads of fingers and remove sharply to produce chords - do not pluck

(**) pluck behind bridge pins



mat martin

shadow musics

eighteen chromatic hieroglyphs in six movements

four nylon- or steel-strung guitars

duration : ca. 4'00" - 4'30"

(2006)

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shadow musics
eighteen chromatic hieroglyphs in six movements

note on the score

this piece was written in early 2006 and is for four guitars of equal range and tuning. either nylon or steel strung guitars may be used although the four instruments must be of the same type. several 'open' elements (mostly concerning duration and alignment) are used in the scoring of the piece, along with certain designated noteheads indicating technique. these apply consistently throughout the score and are detailed below :

1 : all players read from the score.

2 : all durations shown in seconds are approximate.

3 : temporal procession (rhythm and duration) through the music is in part indicated and in part intuitive :

a) vertical alignment in the score is approximate and should not be striven for. where events are intended to sound at once they are given in red and joined by a vertical line which crosses the staves and a red 'conducting' mark is given directly above this, along with the point in time at which the event is to occur. the mark consists of a downward arrow marked with the number (I - IV) of the player who is to bring in the others. this role is assigned to different guitarists depending on the nature of the material. all events which are to be aligned are coloured, the 'conductor's' event is also boxed.

b) pitches joined by a horizontal bracket are to be performed with an intuitive sense of time in relation to the timescale above the music, and - unless otherwise marked - performed *laissez vibrer*.

c) pitches contained within a 'beam' (where only the first and last pitches of the group have stems) are performed in the order marked but in free rhythm. this may mean irregular durations but can also be interpreted as equal durations. the overall time spent on these beamed groups is indicated by their size (length) in relation to surrounding elements, timed or free.

d) a 'white' two note chord with tremelando markings attached to the bracket indicating its duration (mvmt. V, gtrs I & II) indicates sustain of these pitches to be maintained (tremelando between the two pitches) for the given or implied duration.

e) a square fermata on an empty staff indicates a pause of the length suggested by the surrounding events. all pitches should be left to vibrate *al niente* into the pause.

f) the approximate duration of the entire movement is given in seconds at the end of the page and after the tempo indications at the start of the movement.

shadow musics
eighteen chromatic hieroglyphs in six movements

4 : the following noteheads are used to indicate technique :

- ◊ - natural harmonic (at pitch to be fretted) ;
- - artificial harmonic (pitch to be fretted with left hand, harmonic produced with right 12 frets above) ;
- ◆ - string plucked behind fingers of left hand (pitch to be fretted) ;
- x - tap on soundboard (fingertips) ;
- - tamburo effect (pitches fretted prior to tapping the bridge with the thumb).

5 : the following symbols are used to indicate technique :

- ◊ - 'bartók' pizzicato - the string is pulled away from the fretboard and released when played (snapping sound) ;
- ∩ - (through a note's stem) string plucked behind the nut ;
- + - note 'tapped' on with right hand (not plucked) ;
- ∞ - (combined with a duration - mvmt. V, gtr. IV) improvised section, following written instructions in the score.

6 : where possible the above instructions relating to technique and to any other effects called for are described in the score beneath their first occurrence.

7 : guitarists I, II & III each require a soft, thick felt pick for movements II, III and V. in addition to this, guitarists I & IV will require a thick, hard (nylon, plastic, wood) pick for the opening of movement III.

8 : the pieces are to be performed successively, with the shortest of intuitive pauses between them (allowing for any preparation).

shadow musics
eighteen chromatic hieroglyphs in six movements

contents

I : lento, sempre rubato e legato	(ca. 35")	p. 1
II : lento, static and empty	(ca. 45")	p. 2
III : moderato, quiet and hesitant	(ca. 40")	p. 3
IV : grave e pesante	(ca. 45")	p. 4
V : andante, dark and percussive	(ca. 30")	p. 5
VI : moderato, disrupted, legato	(ca. 40")	p. 6

« shadow musics »

eighteen chromatic hieroglyphs in six movements for four nylon- or steel-strung guitars

[illegible]

II : lento, static and empty (ca. 0'45")

II - 0'00" II - 0'15" I - 0'20" III III III - 0'35" IV - 0'40" ca. 0'45"

gtr I

gtr II

gtr III

gtr IV

mf sempre sul 3 & 4 (*)

sfz *sfz* *p* *mp* *p* *pp* (l.v.)

sempre sul 3 & 4 (*) *mf* *p* *sfz* *mp* *pp* *p* *pp* (l.v.)

sempre sul VI (l.h. only) *pp* molto vib. held notes *p* (ord.) *pp* *p* *pp* (l.v.)

(*) guitars II and III to insert a soft felt pick vertically between strings 3 and 4, *sul pont*, to act as a mute to these strings.

(**) fret notated pitches and pick behind fingers.

(***) pick notated string behind nut.

III : moderato, quiet and hesitant - ca. 0'40"

I - 0'00" 0'05" I - 0'07" I IV - 0'20" III I - 0'33" II - 0'37" ca. 0'40"

gtr I (hard pick) (*) *p* ① (fingernails) *p* *sf*

gtr II (scrape w/ nail) *ppp* ① ② ① ② (felt pick) *mp* flautato (**) *pp* (ord.) ① (felt pick) *p* (felt pick) *pp*

gtr III (scrape w/ nail) *ppp* ① ② ① ② (ord.) *mp* (fingernails) *p* (felt pick) *pp* (ord.) *sf* (fingernail) *pp*

gtr IV (hard pick) (*) ② (ord.) *p* (ord.) ② (scrape w/ nail) *mp* *sfz*

(*) lightly damp strings with left hand. bounce edge of hard pick on string 1 with right hand (over soundhole) to create high pitched, quiet, percussive sound.

(**) ghostly, transparent, indefinite sound produced by applying left hand fingers too lightly to completely define pitch.

v : andante, dark and percussive - ca. 0'30"

I - 0'00" III - 0'03" 0'10" IV - 0'15" 0'23" II - 0'26" ca. 0'30"

gtr I
insert felt pick (*)
f
① ② ③ ④
mp
f
(remove felt pick)

gtr II
insert felt pick (**)
mf *sf p*
② ③ ④
mp *sfz* *f*
sempre sul 3 & 4
(remove felt pick)

gtr III
tamburo
mp *pp* *pp* *mp*
muted with right palm.

gtr IV
tamburo
mp *pp*
4"
short bursts of light tapping on bridge (l/tip), with all strings deadened by left hand.
PPP

(*) guitar 1 to insert a soft felt pick vertically between strings 1 and 2, sul pont, to act as a mute to these strings.

(**) guitar 11 to insert a soft felt pick vertically between strings 3 and 4, sul pont, to act as a mute to these strings.

VI : moderato, disrupted, legato

I - 0'00" I - 0'02" I - 0'08" I - 0'10" III - 0'17" I - 0'18" III - 0'21" I - 0'22" I - 0'24" I - 0'32" IV - 0'35"

gtr I
sfz *sfz* *sfz* *sfz* *sfz* *sfz* *mp* *pp* ca. 0'40"

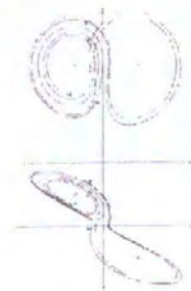
gtr II
mp *mp* *mp* *sfz* *pp* muted with right palm.

gtr III
 sempre sul 6 *sfz mf* *sfz mf* *sfz* *sim.* *p* *pp* *p*

gtr IV
 sempre sul 5 muted with right palm. *p* *p* *6"* (fine)

sfz *sfz* *sfz* *mf*

(*) fret notated pitches and pick behind fingers.



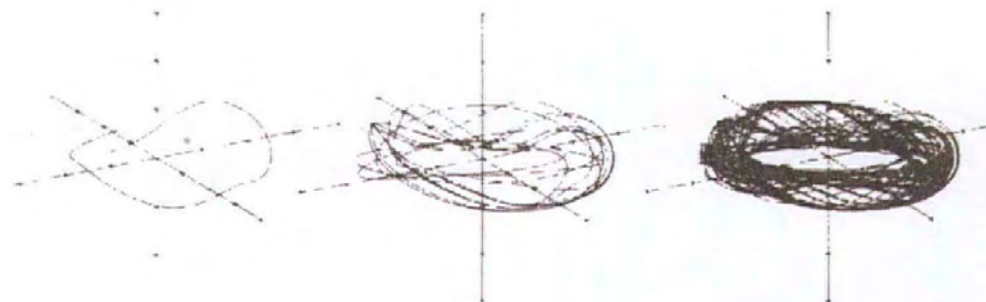
mat martin

flux

for solo organ

after the strange attractors of edward lorenz

© 2005 mat martin / flatpack music



strange attractors reproduced from : james gleick - chaos (vintage 1988)

• flux •
after the strange attractors of edward lorenz
for solo organ

note :

i : stops and pitch designations

precise stop choices are left open, with the general instruction to the performer that all sound should be simple, gentle, and as quiet as possible, avoiding complex harmonic development in sustained pitches, particularly in the pedal organ and swell organ (or that controlled by the upper manual). the sound quality assigned to the great organ (or that controlled by the lower manual) may be a little more complex by comparison, and richer in upper partials, but should not differ greatly in volume. the exclusive or substantially dominant use of foundation and flute stops for the pedal and swell organs is suggested, adding string and/or hybrid stops to the great organ. reed stops should be avoided.

the piece is marked *sempre* ppp, and thus a minimal number of pipes should be used for each organ, making the sound as light and clear as possible throughout the piece. once a suitable sound quality has been achieved it should remain unchanged throughout the piece.

pipe lengths are given as numbers (e.g. 2', 32' etc) at the start of the piece and subsequent changes are marked at the points at which their effects are first heard. the length applies to all stops used for the manual in question, meaning all pitches played on that manual will behave in the same manner in relation to the written pitch.

ii : scoring

because of the nature of the sustained pitches which make up the piece, only the beginning and end of these pitches are notated in the score. the black square notehead indicates the beginning of a note (key down) and the white square notehead indicates the end of that note (key up). the space between these is left empty.

the initial pitch played on the pedal organ is held throughout the piece. the performer may wish to use a weight or wedge on the pedal to produce the drone and avoid fluctuations in sound quality or physical fatigue. time is allowed for this at both the start and end of the piece.

iii : timing

timing in the piece is free and intuitive but relative to the distances between events on the page. no time line is given : the performer is to hold the texture after each event until the sound settles, moving to the next event when it seems appropriate and being guided in these decisions by the layout of the score (a greater distance between events on the page implies a greater pause in performance). as much as possible two events which are vertically aligned should be executed simultaneously. a square fermata indicates a significantly longer pause between events than occurs elsewhere.

after the strange attractors of edward lorenz,

« flux »

for solo organ

lento - sempre rubato mat martin

man

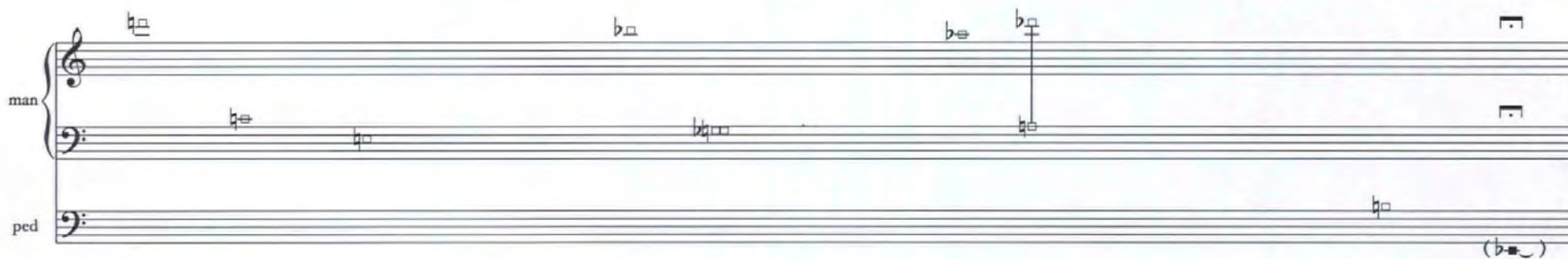
organ

pedals

man

ped

(*) this pitch is held continually throughout the piece.



man

ped

(even spacing)

The first system of the musical score consists of two staves. The upper staff is for the man's voice, with a treble clef and a bass clef. It contains a 1:16' / 11:2' ratio. The lower staff is for the pedal point, with a bass clef. The score includes various musical notations such as notes, rests, and dynamic markings. The man's part has a treble and bass staff with a 1:16' / 11:2' ratio. The pedal point is in the bass staff. The score includes various musical notations such as notes, rests, and dynamic markings.



man

ped

The second system of the musical score consists of two staves. The upper staff is for the man's voice, with a treble clef and a bass clef. The lower staff is for the pedal point, with a bass clef. The score includes various musical notations such as notes, rests, and dynamic markings. The man's part has a treble and bass staff. The pedal point is in the bass staff. The score includes various musical notations such as notes, rests, and dynamic markings.

man

$\frac{I : 8'}{II : 4'}$ II II I I II I I II I II

ped



man

ped

mat martin

pebble music

seven miniatures for any solo performer

duration : ca. 4' 30"

[graphic score]

(2005)

© 2005 mat martin / flatpack music

mat martin
* pebble music *
seven miniatures for any solo performer

contents :

i	: ca. 30"	p. 1
ii	: ca. 20"	p. 1
iii	: ca. 35"	p. 2
iv	: ca. 40"	p. 2
v	: ca. 35"	p. 3
vi	: ca. 40"	p. 3
vii	: ca. 55"	p. 4

(total duration : ca. 4'30")

mat martin
« pebble music »
seven miniatures for any solo performer

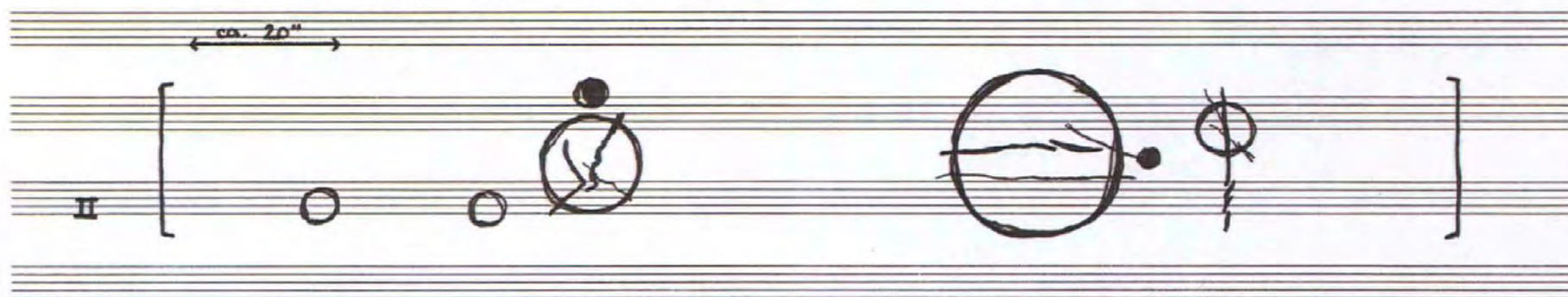
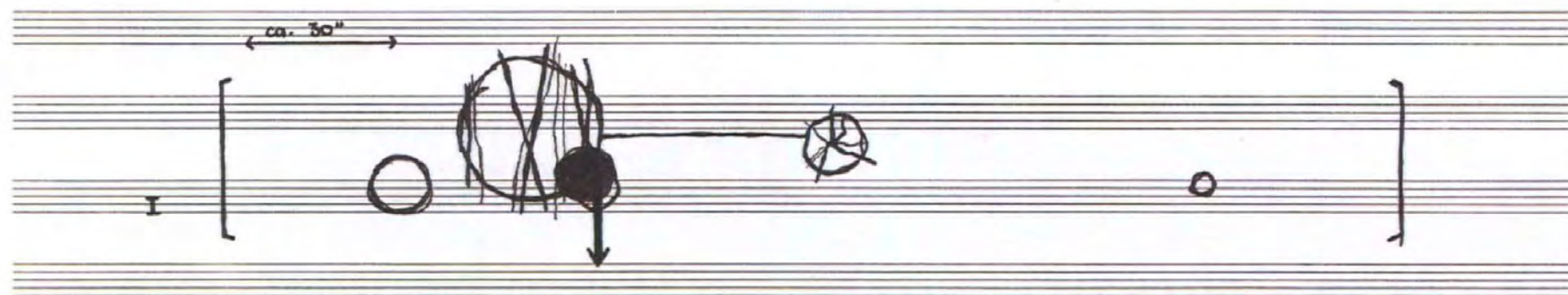
suggestions for interpretation of the score :

each of these miniatures comprises a small number of discrete 'events', either entirely separated from one another or joined by overlapping or by horizontal lines. the principal qualities of the pieces lie in the spatial relationships between these events. an approximate overall duration for each miniature is given above the stave, although the performer is not necessarily expected to read along the score at a consistent rate to achieve this time span. some events may require more time to elaborate than others. however, the empty areas of the score (between events, at the beginning and end of pieces) represent silence (or the dying away of sounds played *laisser vibrer* if applicable), and these silences should be longer or shorter depending on the size of the blank area (these relationships in visual space are to be preserved in sonic space).

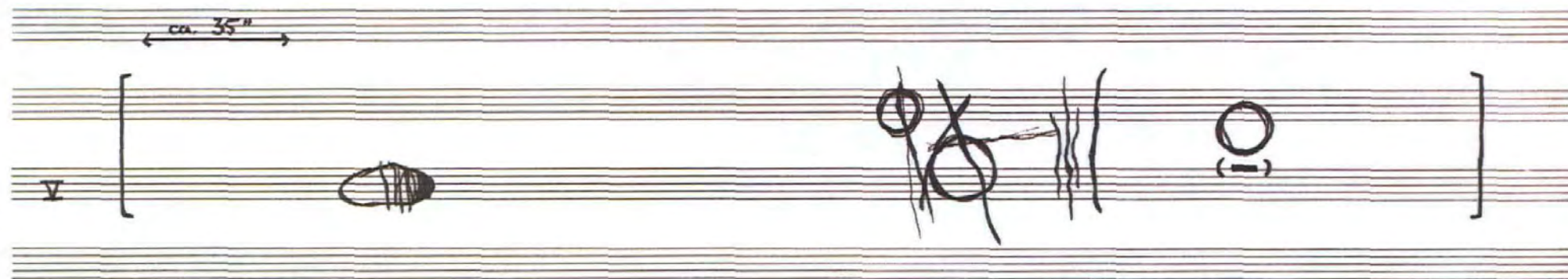
events themselves are to be read chronologically, their duration, compass and complexity being suggested by size, density and construction. size is also to be considered as an indication of dynamic (either large = loud or large = soft, but consistent throughout all the pieces). the internal makeup of some of the larger events may suggest internal movement or harmonic colour.

a short pause should be observed between each movement, although where larger silences are required the pieces end or begin with blank passages to accommodate this.

pieces may be performed separately, and the suggested order may be changed, although in this case each piece should retain its number (which also constitutes its title) regardless of the new order.









mat martin

single stone

a page in shades of quiet for solo contrabass
(optional piano accompaniment)

for the british and international bass forum

duration : ca. 1' 00"

(2006)

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mat martin

single stone

a page in shades of quiet for solo contrabass
(optional piano accompaniment)

note :

single stone was composed over a few days in early september of 2006, and is a development of one strophe from my graphic score, *pebble music*. the piece is written without metre or strict rhythm, although pitch and technique are specified throughout the score. it is in essence a very simple set of spatial relationships which divide the one minute duration of the piece into distinct events, each with its own internal structure. many unusual techniques are used, such as 'reverse' left hand pizzicato and scraping of the strings' windings with the thumb nail. these, coupled with a consistently low dynamic level lend an ethereal and understated tone to the piece.

the piece is intended to be performed as slowly as the minute will allow and in as static / slender a nature as is possible, allowing each individual sound to establish itself in relation to the others. the overall effect should be one of quiet ripples in silence, at times barely audible, and always extremely gentle.

the optional piano accompaniment consists of the graphic elements from the original score which are slightly rearranged and printed onto a transparent page. this can be laid over the contrabass part to show the spatial relationships between the events in the two instruments' material. it is to be performed entirely upon the strings of the piano using the hands or two large blunt objects and is designed to echo and preempt the shapes and forms in the contrabass solo.

mat martin, september 2006

for the british and international bass forum, september 2006

« single stone »

a page in shades of quiet for solo contrabass

mat martin

ca. 1' 00"

lento, static and gentle

contrabass

[piano]

4'' pizz with l.h. thumb at x behind harmonic, avoid clear tones.

bow catchpiece

arco col legno (raro)

pizz (put down bow)

1. h. only

ppp

pp

pp

p

ppp

mp

ppp

fine

run r. h. thumb nail down string, muting lightly with heel of hand

the piano should be played directly on the strings, using either the hands or large blunt objects such as pebbles or pieces of wood, and making much use of the damper pedal to prolong and exploit resonances. any sense of pitch should be avoided.

the dynamic throughout is *piano possibile*.

by reading the graphic score laid over the contrabass part the pianist will be able to assess the spatial relationships between parts.

the contrabass player does not need to alter a solo performance to allow for the optional accompaniment.

graphic events are to be read chronologically, their duration, compass and complexity being suggested by size, density and construction.

size is also to be considered as an indication of dynamic (either large = loud or large = soft, but consistent throughout the piece).

the internal makeup of some of the larger events may suggest internal movement or harmonic colour.

*photocopy this page onto acetate and lay it over the contrabass part.

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mat martin

o r r e r y

(corvus / corona borealis)

solo harp or solo piano interior

for rhodri davies

indeterminate duration

(2006)

mat martin
" orrery "
(corvus / corona borealis)

note :

an orrery is a mechanical device which uses clockwork to demonstrate the movements of parts of the solar system, and has been the inspiration for this simple piece. it is to be performed on harp, piano interior or any instrument which allows direct contact with resonant strings.

two constellations have been traced across the night sky, and 'orreries' built of their position / orientation at certain points in the year. these are laid out around one another in the score, moving in opposing directions and displaying their permutations on a two-dimensional plane.

the piece requires a simple 're-application' technique of the performer - the string is set into motion then touched using objects (glass, paper, metal or wood) to change the sound from a pure tone. each 'orrery' is built around a central vertical axis, and all pitches on one side have a mirror image on the other. the strings are set in motion with the fingers on the left hand side of the axis and the foreign material (given for each phase) is applied to the string on the right hand side. as the piece progresses the positions of the events in these two dimensional 'orreries' gradually alter with their 'orbits', leaving the internal relationships of structure that build the constellation to act as a single identifiable constant.

the objects used should be capable of producing sounds which are sufficiently different from one another. thick paper is recommended, and a rounded glass object (such as a large marble or paperweight) suggested. 'half pedal' positions (buzzing the string shortening mechanism against the string) on a double action harp may be used to create some of the metallic sounds. although no pitch is defined in the score it is suggested that a register of the instrument which offers deep and long sustaining properties will allow the most time for the re-application process, and that wound strings may give more sonically complex results. pitch areas do not need to be consistent between phases provided the overall shapes are maintained. although the piece is marked with a general *lento*, experimentation will dictate the speed at which each phase must be taken to avoid sounds fading before the re-application is performed. the higher in pitch the phase is placed, the more speed will be needed.

the piece was composed in september of 2006 for rhodri davies, and was inspired by his series of *constellations* concerts. thanks are also offered to the friendly people at jodrell bank, who gave me the name of the 'whirring clockwork thing that shows all the planets' orbits'.

for rhodri davis

« orrery »

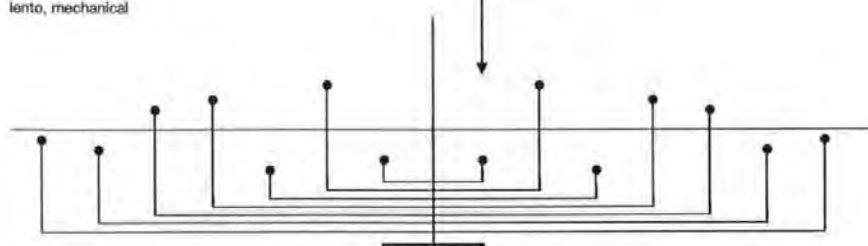
(corvus / corona borealis)

lento, mechanical

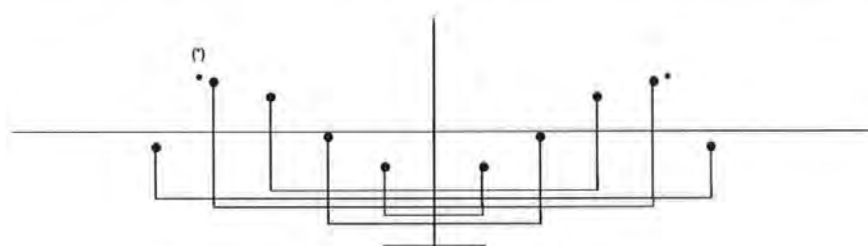
re-apply (see note)

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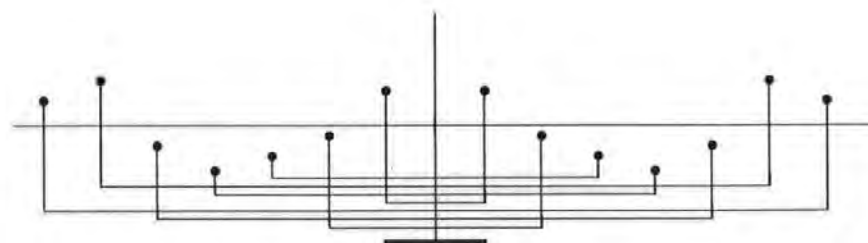
corona borealis I (glass)



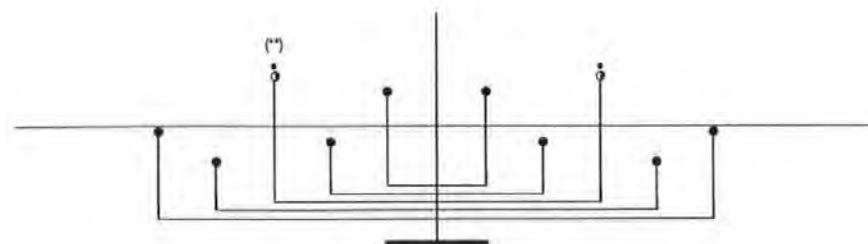
corvus II (paper)



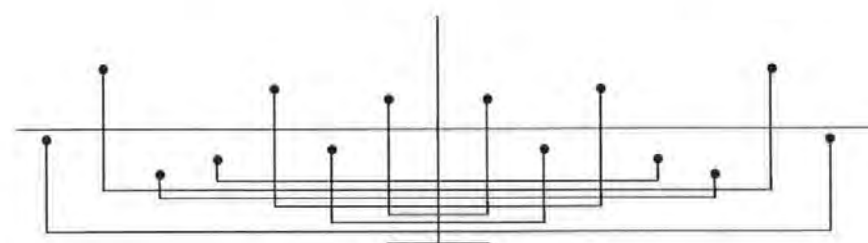
corona borealis II (metal)



corvus I (wood)



corona borealis III (glass)



(*) - these small noteheads are to be treated as 'grace' notes, around the principal event.

(**) - alterations in the colour of the noteheads should correspond to alterations in the production and treatment of the sound, within the confines of the materials used for this movement.

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ancient bone [totem ii]

quiet patterns for solo bass clarinet

for christopher cundy

duration : ca. 8'30

(2006)

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for christopher cundy

duration : ca. 8' 30"

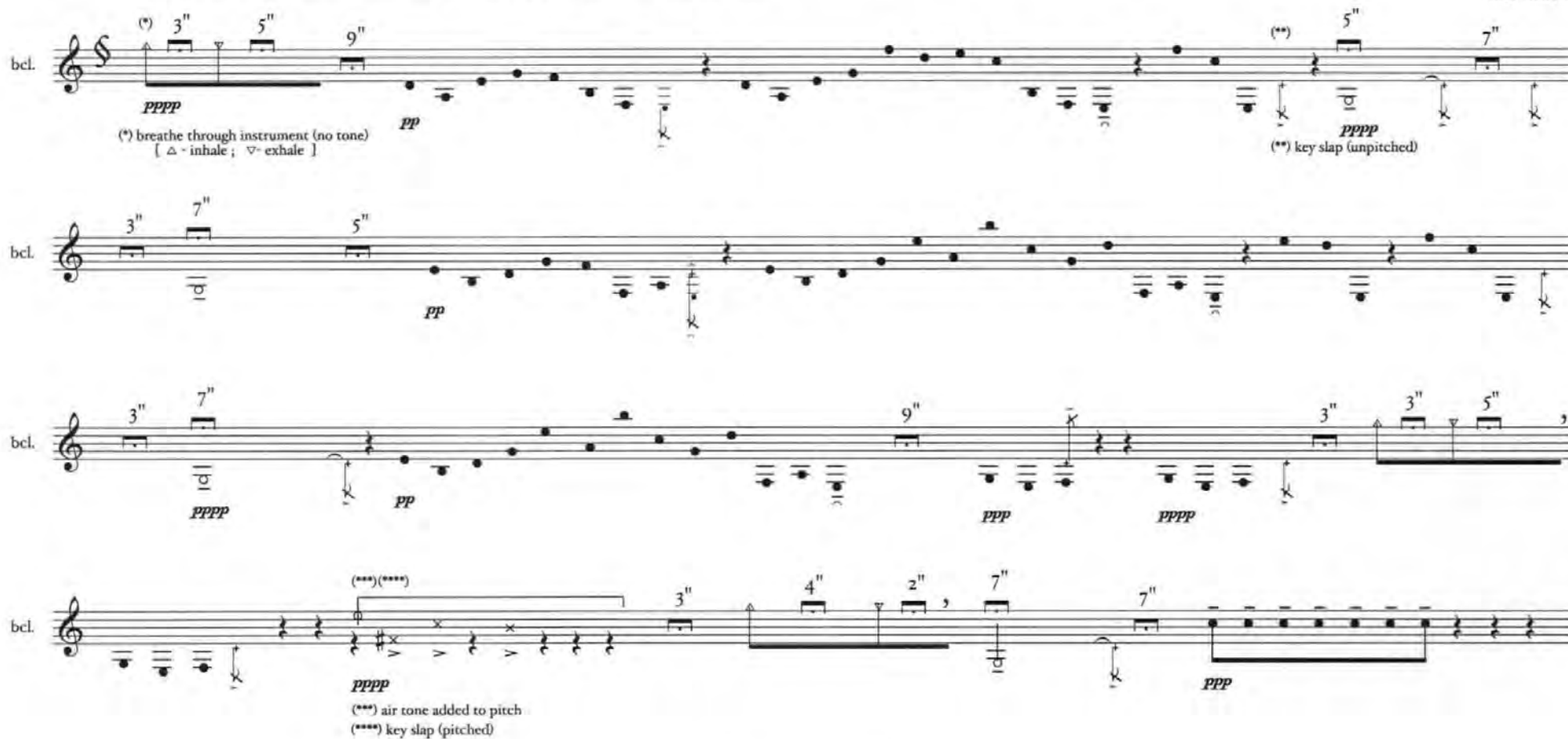
ancient bone (totem ii)

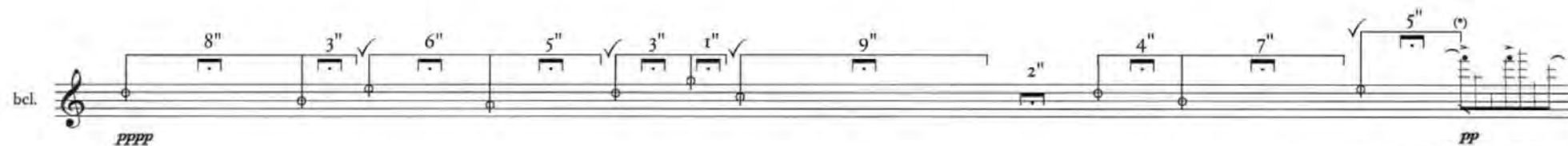
quiet patterns for bass clarinet

♣ (= ♯) - ca. 130 ; *sempre sotto voce e rubato*, dark & distant (evenly spaced noteheads without stems indicate a steady procession of pitches without strict sense of metre.)

sempre molto legato, on the edge of audibility throughout (bring sounds marked > forward in the texture)

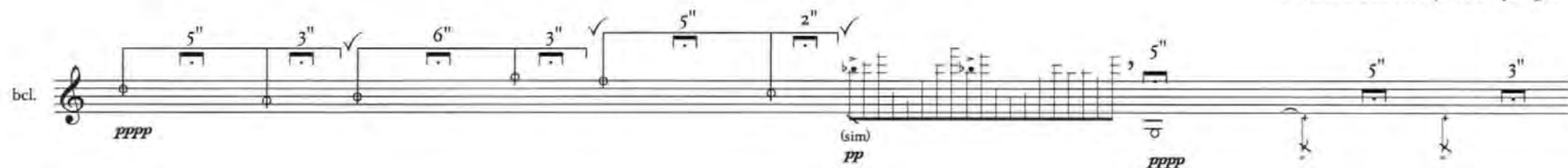
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bcl. 
pppp
(*) breathe through instrument (no tone)
[Δ - inhale ; ▽ - exhale]
pp
pppp
(**) key slap (unpitched)
pp
ppp
pppp
pppp
ppp
ppp
(***) air tone added to pitch
(****) key slap (pitched)

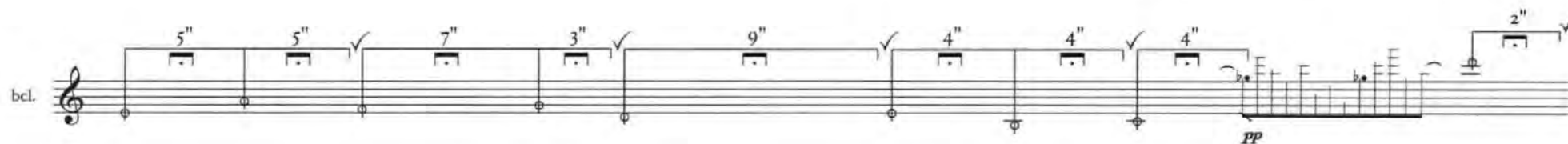
bcl. 

pppp *pp*

(*) as quick as possible
(accentuate sounds of keys in these passages)

bcl. 

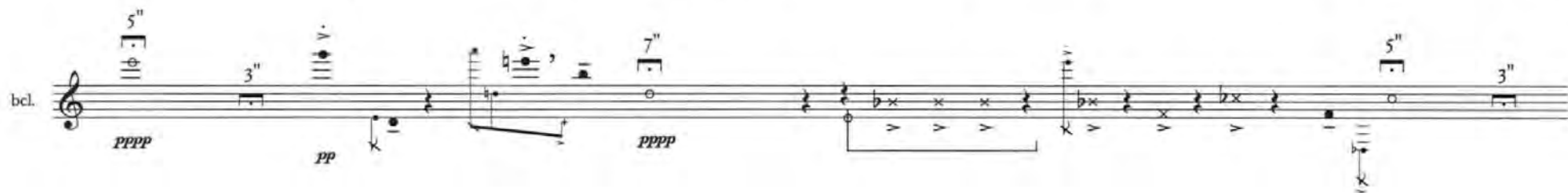
pppp (sim) *pp* *pppp*

bcl. 

pp


bcl. 

pppp *p* *pp*

bcl. 

pppp *pp* *pppp*

bcl. 

bcl. 

bcl.

7'' 3'' 5'' 5'' 7'' 5'' 9''

7''

PPPP

[illegible]

mat martin

crumbs

a page of quiet constellations for amplified flute & electric guitar (one player)

(2007)

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crumbs

a page of quiet constellations for amplified flute & electric guitar (one player)

note :

1. in order for this piece to proceed as intended certain preparations need to be observed before performance. these include the setting up of the instruments prior to beginning, and the provision of particular pieces of equipment.

a. the performer will need to hand a mandolin or banjo capo of the 'shubb' type (with a thin bar covered by a rubber sleeve) and a slide as used for pedal or lap steel guitars.

b. the guitar must be prepared by lowering the tremolo arm until the strings are completely flat. the capo is then applied *beneath* the top four strings at the 14th fret and the arm released to bring the strings back up to tension. the capo acts as a second 'bridge' halfway up the neck, and the strings can be played on either side of it. the two bass strings are left to resonate as usual.

if the guitar has no tremolo arm the same effect can be achieved by loosening the strings with the tuning pegs, then re-tightening them with the capo in place. in either case the pitches produced on either side of the capo are arbitrary, provided the tension is such to provide a definite pitch from each string.

c. the guitar and flute should be set up so that the amplified signal from the flute sets the guitars' strings into sympathetic vibration. the guitar's amplified signal should be set up with the same intention, so that any sounds from the guitar may create still more. the possibility of mild feedback from this loop is to be allowed during the performance should this occur. the volume controls on the guitar may be used to control this, and to create the diminuendo to nothing at the end of the piece.

2. the following observations are to be made on the scoring of the piece.

a. the 'constellations' in the flute part are to be performed following the joining lines, beginning at the point indicated by the downward numbered arrow and re-visiting the larger central pitch as many times as necessary. the round, stemless noteheads are pitched key slaps ; those with stems are played in the usual way, but with a strong air tone added to the pitch.

b. the notations on the guitar staff use a derivative of tablature notation in which each of the six lines represents a string on the instrument - the bottom line being the bass string. the guitar is played using the slide on the already resonating strings, to emphasise certain pitches and colour the effect. the arrows represent the direction of the slide on the string, and these are to be executed in any order, and as many times as desired within the indicated time. the central vertical line in these sections represents the capo, events to its left occur between the nut and capo, events to the right between the capo and the bridge.

c. the symbol § is used to indicate a lack of time signature.

d. the 'key signature' of flat, natural & sharp above the stave is used to indicate that all pitches in the piece may be performed with any or no accidental, independently of one another.

a page of quiet constellations for amplified flute & electric guitar (one player)

lawrence, kansas - 10.12.07

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Signed: 

Date:10/03/09.....