

BLOCK STRUCTURES, MULTI-LAYERING AND MEMORY.
COMPOSITION PORTFOLIO: COMMENTARY

A thesis submitted for the degree of Doctor of Philosophy

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Abstract

This commentary accompanies a portfolio of nine compositions written between October 2006 and June 2009. This commentary traces the development of a range of compositional ideas throughout the portfolio. These revolve around the creation of multi-layered textures where all the material and all subtle variations thereof are audible, leading to an investigation of rhythmical block durations and the role of memory. The context in which these ideas arose is provided through discussion of specific existing work that closely relates to the portfolio, in particular by John Cage, Morton Feldman, György Ligeti and Giacinto Scelsi.

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List of Compositions in the Portfolio

Just Prevaricating - Piccolo, Bass Clarinet in Bflat, Piano and Violoncello.

October - November 2006. Duration c.15 minutes.

Cautious Interference - Any 4 of Violin, Viola, Violoncello. Or 1 live soloist with other 3 parts multi-tracked onto cd for simultaneous playback.

November 2006 - January 2007. Duration c.24 minutes.

Scattered Polaroids - String Quartet.

September - November 2007. Duration c.8 minutes.

Going Missing - Solo Tenor Recorder.

November 2007 - February 2008. Duration c.12-17 minutes.

Standard Deviation - 8 Voices and 2 Sine Tones.

February - May 2008. Duration c.21 minutes.

The Main Complaint - Clarinet in Bflat, Trombone and Cello.

May - September 2008. Duration c.16 minutes.

Balaclava - Cello, Harp and Speaking Voice.

December 2008 - January 2009. Duration c.10 minutes.

Northfield Road - Flute, Oboe, Clarinet, Bassoon, Horn, Trumpet, Trombone, Double Bass and Percussion (Hi-Hat Cymbal and Woodblock).

October 2008 - February 2009. Duration c.11 minutes.

Grandad's Letters - Bassoon, Trumpet, Viola, Piano, Percussion and Recorded Voice.

March - June 2009. Duration c.14-15 minutes.

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Introduction

The portfolio is the main body of research and consists of nine compositions for different combinations of instruments and voices, with a maximum of nine parts in each. This commentary provides an accompaniment to the portfolio by tracing the development of ideas throughout the compositions. This introduction will discuss three principal research questions alongside a review of existing work, placing the questions within the context that they arose. The development of ideas in response to the research questions will then be considered and analysed within the commentaries for each composition. Interspersed amongst the commentaries will be a closer examination of a selection of existing work that is strongly related to the portfolio. Finally, the development of ideas throughout the portfolio will be considered and the extent to which these ideas effectively address the research questions. All three research questions are closely related and each affects the successful exploration of the subsequent question.

The first question investigates the creation of multi-layered textures where all the material and all subtle variations thereof are audible. My aim is to explore multi-layered textures consisting of individual layers of material that present subtle variations of one base layer. For the purpose of this commentary, the method to achieve this is defined as that of making subtle variations to one or more categories of material for each layer independently. The categories of material frequently explored in the portfolio include: rhythm, pitch, glissando, vibrato, density of sound events, different techniques of sound production on one instrument/voice (for example different bowing techniques), dynamics and block duration. My additional aim for each composition is to achieve a state where the material is constantly subtly varied and where exact repetition is very rarely employed, ultimately striving to create a sonic environment where the listener has the freedom and opportunity to perceive for themselves, all the subtle variations of material. A major consideration is the audibility of any one layer within a multi-layered texture; firstly those categories of material which do or do not combine effectively must be identified; secondly material must be stripped down so that it is pithy, creating a clearer multi-layered texture where subtle variations of material are more perceivable.

Morton Feldman's late music composed between 1979 and 1987, for example *Three Voices* (1982), explores the multi-layering of subtle variations of material, mostly exploring pitch

and rhythm. Feldman's use of both exact repetition and subtle variation of material questions the listener's perception of changes to the material, exploring the tension between the two. Like Feldman, Bryn Harrison also displays a playful approach to the subtle variation of material, again mostly exploring pitch and rhythm within dense multi-layered textures, for example in *Repetitions in Extended Time* (2008). Overall however, Harrison uses these multi-layered textures to focus upon the slow passage or brief suspension of time. The key difference of my work with Feldman and Harrison is that exact repetition is very rarely employed. Additionally, I employ a larger range of categories of material that are subtly varied, although the collection chosen for each composition differs throughout the portfolio. Giacinto Scelsi, for example in his *Fourth String Quartet* (1964), layers material within a fluid sound world, based around one pitch, where subtle variations to pitch, dynamics, rhythm and timbre are explored. These are organised around one base layer, which forms the basis for an ever changing sonic environment where the listener's perception of the inner activity of the sound is constantly challenged. This focus upon one sound is reinforced by a rare quote from Scelsi:

You have no idea what is inside one single sound! There are even counter points, if you like, displacements of various tone colours. There are even overtones that produce completely different effects inside and do not just come out of the tone but penetrate to its very centre. One single tone has movements travelling toward the inside and outside. When this sound has become very big, it becomes part of the universe. As minute as the sound may appear, it contains all. (Scelsi (trans. Theis) 1999, 13).

My use of a large range of categories of material is shared with Scelsi; however the focus within each of my compositions is upon the subtle variation of a smaller collection of categories of material, which are often the focus for the entire composition. Another difference from Scelsi is my use of block structures which divide the fluid sound world, transforming the context in which the subtle variations occur.

Pithy material is used in contrasting ways in John Cage's *Fourteen* (1990), Philip Glass's *Two Pages* (1968) and Steve Reich's *Piano Phase* (1967). Cage uses pithy material to create an anarchic society of sounds where parts overlap freely in accordance with a block

structure using time brackets. Glass and Reich use pithy material to explore rhythmical processes. Glass explores an additive process involving small rhythmic cells and their reordering. Reich explores a phasing process where the same rhythm is played in two parts, one part remaining at a constant speed while the other part accelerates very slightly. All three share in common with my work the idea of creating a sonic environment where subtle variations of material are audible, although at the same time they have slightly different priorities. The difference in my work is that it explores the audibility of the subtle variation of a collection of different categories of material within a multi-layered texture.

The second research question explores the creation of block structures where subtle variations to individual block durations are audible. Compared to all of the other categories of material that I selectively explore in some of the compositions, block durations are explored consistently throughout the portfolio. My focus is upon rhythmical block durations, which for the purpose of this commentary are defined as lasting less than forty seconds each. I explore structural durations, lasting longer than forty seconds, in some of the compositions in the portfolio, although they are of secondary importance. My aim is to explore block durations so that they are audible in their own right, as well as exploring the effect subtle variations of block durations have upon other material within each block. The major consideration here is the method used to articulate each individual block. I explore this in three ways, firstly through the use of different musical devices, either sound or silence, to audibly articulate each block. Secondly the most effective notation of a block structure which can aid the successful articulation of individual block durations is investigated; this involves experimentation with either standard time signatures, or minutes and seconds to structure durations in a composition. Thirdly, the quantity and range of different block durations that most effectively aid the articulation of individual block durations is explored. In addition, the influence of all the other categories of material upon the audibility of the block structure is considered.

Time structures serve as a consistent base for many of John Cage's compositions and he explored the notation of duration in a variety of ways. One approach can be witnessed in his late number pieces, written after 1987, for example *Fourteen* (1990), which use time brackets to provide the structure for each piece. The precise duration of each block is

determined by the performer and overlapping blocks can be merged together. The durations are always within the limits of Cage's carefully determined time structure. Cage's approach to duration as the basis for a composition is best illustrated by the following statement made in his seminal book, *Silence*.

For, when, after convincing oneself ignorantly that sound has, as its clearly defined opposite, silence, that since duration is the only characteristic of sound that is measurable in terms of silence, therefore any valid structure involving sounds and silences should be based, not as accidentally traditional, on frequency, but rightly on duration, . . . (Cage 2009, 13).

Similar to Cage's approach in his number pieces, James Saunders's modular composition *#unassigned* (2000-) uses a small collection of sounds organised into independent block structures. On the whole these only indicate the start times for each block. This results in either silences between each block or the merging of two different blocks because two consecutive start times are very close together. The block structure is used as a method of structuring material within the composition and is not an audible focus equal to all other material in its own right. My work differs from Cage's approach in the late number pieces and from Saunders's flexible approach to duration as the amount of different block durations that I employ in any one piece is fairly small and of fixed duration. Additionally, I never merge two blocks together; the emphasis is always upon individual block durations. This is also a key difference to Morton Feldman's late pieces where each block is not articulated separately. Feldman's late pieces use block structures that explore subtle variations of duration to short blocks of material which are sometimes attached to one another as a way of varying the structure. Feldman also explores different durations of silence between some of the blocks in order to let each one 'breathe'. The following quote from a conversation with Walter Zimmerman in 1975 reveals Feldman's approach to duration and silence closely preceding his late pieces:

So, the reason my music is notated is I wanted to keep control of the *silence*, you see. Actually, when you hear it, you have no idea rhythmically how complicated that is on paper. It's floating. On paper it looks as though it were rhythm. It's not. It's duration. (Villars (ed.) 2006, 52).

György Ligeti explores two contrasting methods of notating time within a block structure in *Aventures* (1962). Ligeti employs a block structure as a means of both presenting

material for different proportions of duration and achieving sudden dramatic changes of sound. Block structures exploring duration are not, however, a central focus of Ligeti's overall aesthetic. My work differs from Ligeti since the audibility of the block durations is equally as important as all the other material within each composition. Additionally, the block durations in my work are articulated and notated using the same method throughout each composition, although the same method is not necessarily used from one composition to the next.

The third research question examines the creation of a sonic environment that invites the listener to question their memory of subtle variations of material. My aim is to create a situation where the listener has the freedom and opportunity to question for themselves their memory of subtle variations of material. I explore the memory of one subtle variation compared to another, within a multi-layered texture where the material is constantly subtly varied, in the portfolio. Through the successful exploration of the first and second research questions it is hoped that a suitable environment for this third question to be explored can be created. I explore the role of memory in the portfolio using two methods. The first is the layering of material, with each layer of subtly varied material serving as a different memory of the same base layer. This relies upon the successful exploration of multi-layered textures so that all material and all subtle variations thereof are audible. The second method investigates memory linearly within the block structure, with the re-appearance of subtly varied blocks of material creating the opportunity for the listener to question their memory of different subtle variations. This relies upon the effective creation of both an audible block structure and an environment in which the listener has the freedom and the opportunity to perceive subtle variations of material for themselves.

The role of memory is explored in the majority of Morton Feldman's late compositions. Feldman presents subtly different variations of material, mostly across extended time scales, which encourage the listener to question their memory of different types of material. Attention is drawn to both the memory of subtle variations within each type of material, as well as between the appearances of different types of material. Feldman also explores the layering of memory, for example in *Three Voices* (1982), where each layer presents a different memory of the same base layer. The key difference of my approach

from Feldman's is that I explore the subtle variation of one type of material whereas Feldman explores changes to material both within each type of material as well as between the appearances of different types of material. The idea of layering memory is closely shared with Feldman, although as already mentioned I vary a larger collection of different categories of material.

Indeterminacy is employed intermittently in the portfolio through the use of chance operations to re-order blocks of material. As I do not explore it as a research question in itself it will only be discussed in relation to individual works. John Cage was the major exponent of chance operations to make decisions within a composition, for example in *Concert for Piano and Orchestra* (1957-58). Cage's use of chance operations is far more extensive than mine witnessed in the portfolio and so a detailed discussion is inappropriate as the portfolio does not make a significant contribution to the advancement of ideas within this research area.

All of the compositions in my portfolio were written for specific performers, when not commissioned I wrote them for composition competitions or with the aim of sending them to ensembles unsolicited. Therefore, in this situation the choices of instrumentation for each work were driven by a mixture of requests, competition requirements and upon hearing a professional ensemble in concert and, as a result, wanting to write a piece for them. This explains why one work follows another as each piece was written within one of the three aforementioned circumstances. The concentration on small-scale instrumental pieces is because of a personal interest in the more intimate nature of this area of music making. Essentially, all of the compositions in my portfolio explore both simple and complex relationships between individual, and sometimes independent, parts within a chamber ensemble.

Just Prevaricating

In *Just Prevaricating* I explore a block structure that is articulated by abrupt changes of tempo and dynamics. One or two out of four instruments play at any one time and on each instrument's (except the piano's) first entry they shadow the existing instruments' material before progressing to a presentation of evolved and new material. At these shadowing points I explore the layering of subtly varied material, for example when the piano and piccolo overlap (see Fig. 1).

Fig. 1. Bars 13-17, *Just Prevaricating*

The musical score for bars 13-17 of *Just Prevaricating* is presented in three systems. The first system (bars 13-15) features Piccolo and Piano staves. The Piccolo part begins with a 10:8 ratio, followed by a 9:6 ratio, and then a 9:6 ratio. The Piano part also features a 10:8 ratio, followed by a 9:6 ratio, and then a 9:6 ratio. Dynamics include *p*, *mf*, and *pp*. The second system (bars 16-17) features Piccolo and Piano staves. The Piccolo part includes a [tongue ran] section with a 10:8 ratio and a [normale] section with a 5:4 ratio. The Piano part includes a 7:6 ratio and a 5:4 ratio. Dynamics include *mf*, *f*, *sfz*, and *pp*. The third system (bar 17) features Piccolo and Piano staves. The Piccolo part includes a vib. section with a 7:5 ratio and a 9:6 ratio. The Piano part includes a 10:8 ratio and a 5:4 ratio. Dynamics include *ff* and *mf*.

Dynamics vary greatly throughout, although on the whole when the tempo is fast the dynamics tend to be loud and at a slow tempo they are mostly soft. My treatment of dynamics in this piece holds similarities with some of Michael Finnissy's work, for example *Jazz* (1972), where extreme and sudden changes of dynamics are employed. These emphasise abrupt changes from one section to another that involve contrasting material. In *Just Prevaricating*, however, I use dynamics both to articulate the block structure and to explore the presentation of a selection of sounds at different dynamic levels, particularly in the woodwind parts. I employed chance operations for one section, bars 71 – 105, in the piccolo and bass clarinet parts to create an order for a selection of sounds derived from extended techniques. This involved creating labels for each sound and then randomly drawing them from a bag to create a final order. Using chance operations to re-order blocks of material is further explored later in the portfolio, particularly in *Standard Deviation* and *The Main Complaint*.

Just Prevaricating illuminates crucial ideas that require more extensive investigation. The most valuable conclusion is that the variations of dynamics, rhythm and pitch are not subtle enough, they are too expansive, for example the dynamics range from *pppp* to *ffff*. Essentially, the variation of material needs to be very subtle to ensure that one category of material and its variation does not negatively influence the audibility of other material. Additionally, the subtle variations of these categories of material are not a consistent focus of the composition, the result being that their reappearance is the most perceptible aspect. The abrupt changes of tempo and dynamics are too dramatic and the changes do not always coincide with the beginning or end of a block, thus failing to articulate the block structure. These conclusions inform the next piece, *Cautious Interference*, which will be discussed after an examination of Giacinto Scelsi's multi-layering of subtly varied material.

Giacinto Scelsi – *Fourth String Quartet* (1964)

Between composing *Just Prevaricating* and *Cautious Interference* I became interested in the work of Giacinto Scelsi, in particular his *Fourth String Quartet* (1964). The study of compositional ideas within this piece, especially the multi-layering of subtly varied material, informed the development of my work. In the *Fourth String Quartet* Scelsi uses extensive scordatura to enable microtonal multi-stopping and the notation is unusual for its use of multiple staves, one for each string of the instruments. The continuous multi-layered texture explores the subtle variation of several different categories of material simultaneously, centred mostly on a single pitch. The categories of material utilised are glissandi, tremolos, trills, steady pitch, dynamics, multi-stopping, vibrato, the use of mutes, and different bowing techniques, all of which combine to make an equal contribution to the formation of the overall multi-layered texture. My discussion focuses upon the use of different bowing techniques, with the aim of demonstrating how extensive subtle variations of one category of material can be multi-layered. This complements a density graph illustrating the wider context of the multi-layering of material in this piece.

Scelsi uses five different bowing techniques in the piece, yet never all simultaneously. The bowing techniques table (Fig. 2) shows that normal bowing is used most frequently and forms the base layer of which the other four techniques are subtle variations. The other four techniques are employed less frequently, with flautando and col legno utilised the least. For the majority of the piece Scelsi employs combinations of two or three different bowing techniques that change regularly. The base layer (normal bowing) provides stability and continuity to the sound, enabling subtle variations (any of the other bowing techniques) of the base layer to be perceived by the listener. This is the central underlying method employed for the multi-layering of material in this piece. The density graph (Fig. 3) illustrates on a scale of 1 (low) to 5 (high) the density of sound events, a sound event is a sound that is produced by one or more instruments with a unique combination of categories of material when compared to other sound events occurring simultaneously. The density graph clearly shows the fluid, continuous, restless nature of the piece and that the density constantly fluctuates, never settling on one density for longer than seven consecutive bars, which itself only occurs once. Predominantly, the density fluctuates

around medium (2, 3 and 4 on the scale), as in the bowing techniques table where a medium combination of different bowing techniques is also maintained. This helps to achieve the fluid sound world as the texture always has the freedom to increase or decrease in density, so that no one layer of material is ever lost within a constantly high density texture. Ultimately this enables all the different sound events to be audible and all subtle variations thereof to be perceivable for the listener.

The bowing techniques table and density graph illustrate Scelsi's free approach to subtly varying material, as exact repetition or fixed sequences of material are largely eschewed. Overall, Scelsi's treatment of one sound as a base layer, with which subtle variations can interact, informed my approach to subtly varying material. Compared to Scelsi, the density of sound events in my work does not fluctuate as much, sometimes not at all, and a smaller selection of subtle variations of categories of material are multi-layered, placing the subtle variations in sharper focus for the listener, something which is explored in the next piece, *Cautious Interference*.

Fig. 2. Bowing Techniques Table for Giacinto Scelsi's *Fourth String Quartet* (1964)

Key

-  = Flautando
-  = Sul Tasto
-  = Normale
-  = Sul Pont
-  = Col Legno

Bar Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Violin 1																
Violin 2																
Viola																
Violoncello																

Bar Number	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Violin 1																
Violin 2																
Viola																
Violoncello																

Bar Number	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Violin 1																
Violin 2																
Viola																
Violoncello																

Bar Number	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
Violin 1																
Violin 2																
Viola																
Violoncello																

Bar Number	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Violin 1																
Violin 2																
Viola																
Violoncello																

Bar Number	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
Violin 1																
Violin 2																
Viola																
Violoncello																

Bar Number	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112
Violin 1																
Violin 2																
Viola																
Violoncello																

Bar Number	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128
Violin 1																
Violin 2																
Viola																
Violoncello																

Bar Number	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
Violin 1																
Violin 2																
Viola																
Violoncello																

Bar Number	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160
Violin 1																
Violin 2																
Viola																
Violoncello																

Bar Number	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176
Violin 1																
Violin 2																
Viola																
Violoncello																

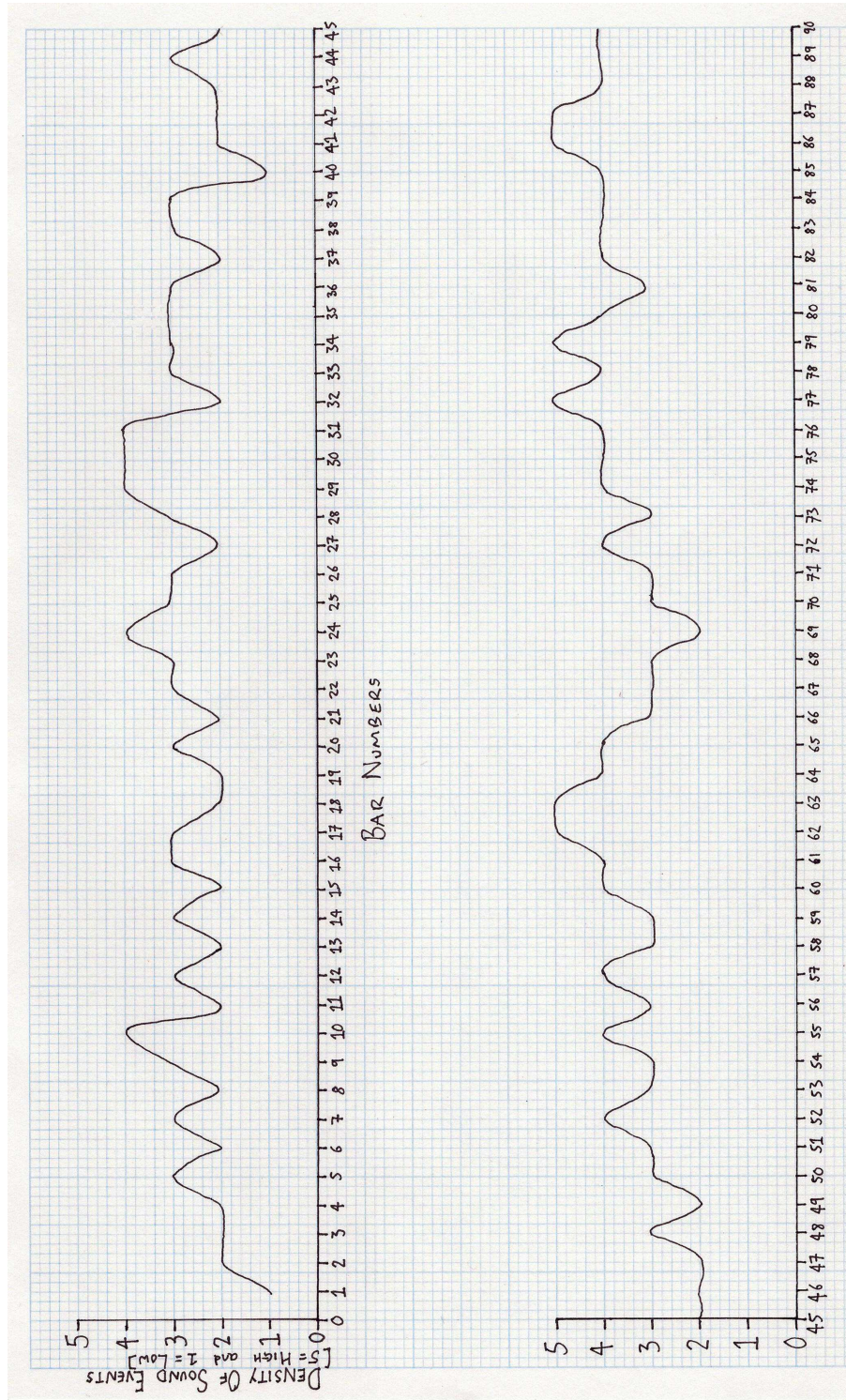
Bar Number	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192
Violin 1																
Violin 2																
Viola																
Violoncello																

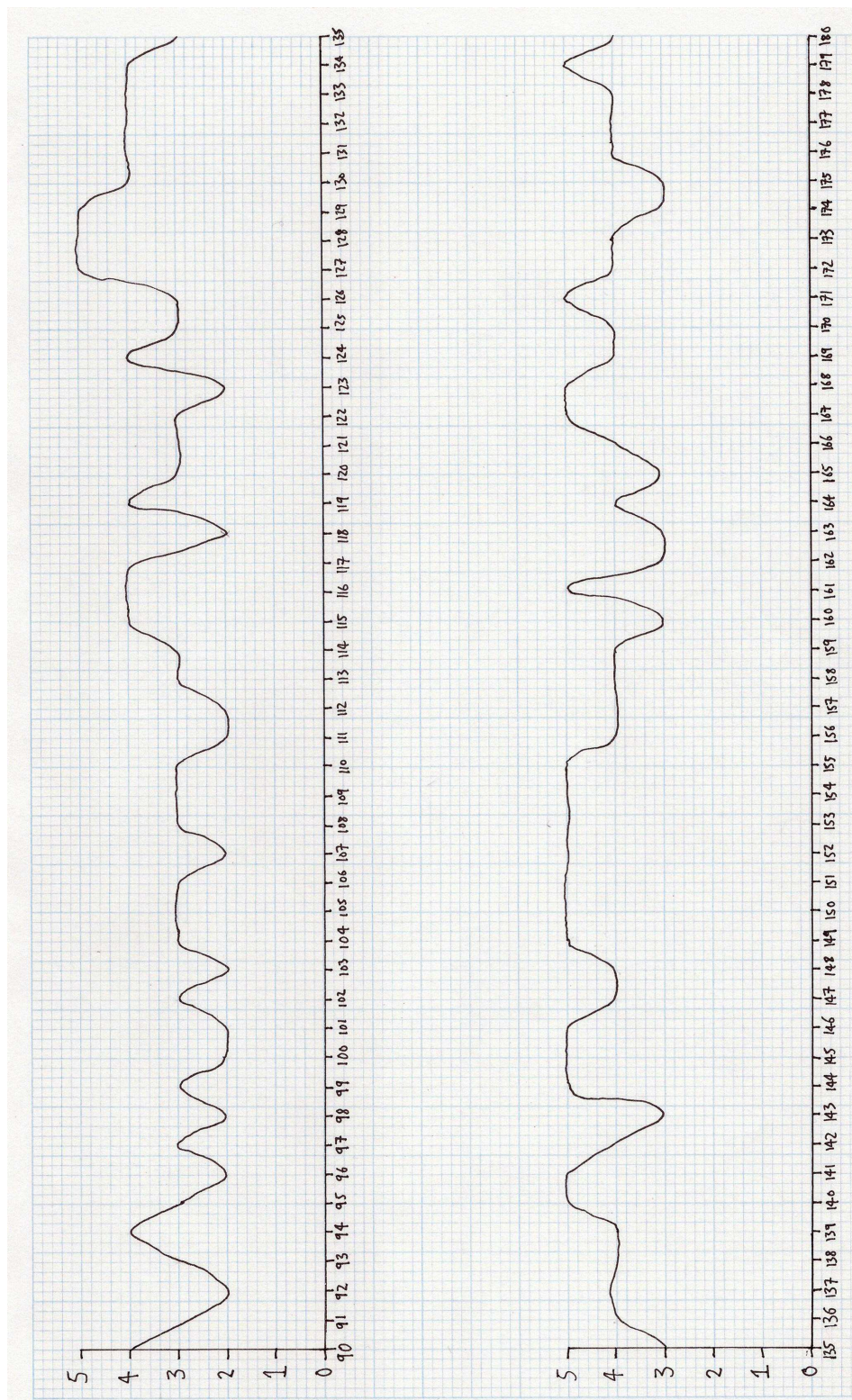
Bar Number	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208
Violin 1																
Violin 2																
Viola																
Violoncello																

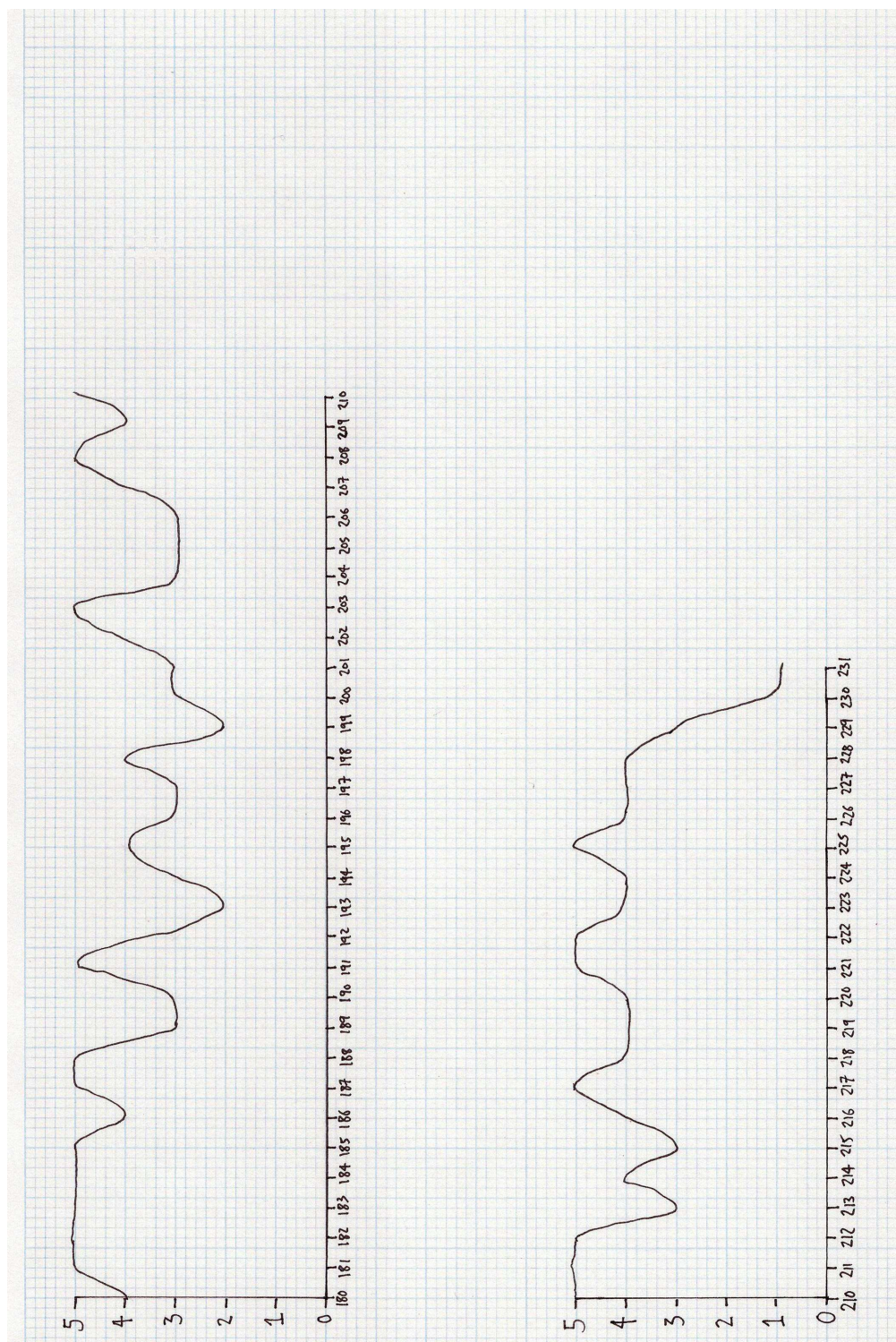
Bar Number	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224
Violin 1																
Violin 2																
Viola																
Violoncello																

Bar Number	225	226	227	228	229	230	231
Violin 1							
Violin 2							
Viola							
Violoncello							

Fig. 3. Density Graph of Giacinto Scelsi's *Fourth String Quartet* (1964)







Cautious Interference

In *Cautious Interference* I explore multi-layering within a small pitch range, made up of an eighth tone scale from G3 to B $\frac{1}{4}$ flat3, resulting in fifteen available pitches (see Fig. 4). The first half, page 1 to 31, consists of four sections which are in a different order for each part and I composed their individual block durations in seconds (see Fig. 5). To aid the audibility of the block structure one metronome marking, crotchet = 86, is used for the entire piece. Additionally, I use musical signposts to articulate each block and, therefore, the four simultaneous independent block structures as well. All four sections involve a gradual compression of the block durations, although I composed the rhythmic structure within each block from the shortest to longest duration to explore an additive process (see Fig. 6). The second half of the composition re-uses durations from the first half to sustain different pitches within the small pitch range.

Fig. 4. Pitch scale for *Cautious Interference*



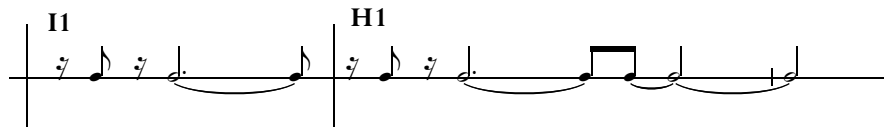
Fig. 5. Table of Block Durations for the first half of *Cautious Interference* (p.1-31)

Section A	Duration in seconds	Section A1	Duration in seconds	Section A2	Duration in seconds	Section A3	Duration in seconds
A	63	A1	31.18	A2	63	A3	28.63
B	56	B1	25.45	B2	54	B3	24.54
C	49	C1	22.27	C2	45	C3	20.45
D	42	D1	19.09	D2	36	D3	16.36
E	35	E1	15.90	E2	27	E3	12.27
F	28	F1	12.72	F2	18	F3	8.18
G	21	G1	9.54	G2	9	G3	4.09
H	14	H1	6.36				
I	7	I1	3.18				

Section A durations were divided by 2.2 to generate Section A1 durations.

Section A2 durations were divided by 2.2 to generate Section A3 durations.

Fig. 6. Example of additive rhythm employed in *Cautious Interference*



Cautious Interference, like *Just Prevaricating*, offers a useful initial exploration of the research questions, identifying areas which I need to further investigate. Compared to *Just Prevaricating* the variation of material is more subtle and occurs within a multi-layered texture throughout. However the variation of material is still not subtle enough and in the first section variations of the same base layer are not always presented because of the unique order of sections for each part. This creates a multi-layered texture of different types of material which, combined with the constant high density of sound events, results in a state where some of the material and subtle variations thereof are inaudible. The four independent block structures are largely inaudible for two reasons. Firstly, the individual block durations are too wide ranging: the differences between them need to be smaller, more subtle, to aid the audibility of the block structure. Secondly and most crucially, the variance of the sound used as the musical signpost from section to section, instead of between each part, deems it difficult to distinguish between each independent block structure. Additionally, the sound of the musical signpost is influenced by other material and is not consistently audible as a structural element employed to articulate the block structure. From both *Cautious Interference* and *Just Prevaricating* it is clear that the use of a sound or abrupt change to a sound to articulate the block structure is unsuccessful. The absence of an audible block structure means that the listener's linear memory of blocks of material is not examined, although the vertical layering of memory is explored in this piece. However this is unsuccessful as due to the independent block structures the parts never align to present four subtly different memories of the same base layer. These conclusions inform the next piece of the portfolio, *Scattered Polaroids*, which will be discussed after an examination of György Ligeti's exploration of block structures.

György Ligeti – *Aventures* (1962)

After *Cautious Interference* I began composing a piece for vocalist and large ensemble. This piece was discarded before completion, although its string writing, involving long continuous scurrying lines of material, was salvaged for further exploration in *Scattered Polaroids*. At the same time as working on the discarded piece I looked at György Ligeti's *Aventures* (1962) and the study of duration and tempo within this piece aided the development of my approach to block durations. *Aventures* is for three singers and seven instrumentalists and explores a phonetic text within a chromatic, quasi-serialist sound world. My discussion focuses upon the duration and tempo structure of the piece as this is the element of particular significance for my work.

The time structure table (Fig. 7) clearly shows that Ligeti uses two different methods of notating the time structure for each section. The first uses metronome markings with time signatures to achieve a precise tempo for the material and exact rhythmic synchronisation between the parts. The second specifies the amount of seconds for a bar to last, often involving more indeterminate notation with regards to the pitch and rhythmical synchronisation between the parts. The first method of notation is used for the majority of the piece, yet both methods, in particular the use of seconds, point towards the potential for exploring individual block durations within a block structure. In *Aventures* the second method is notated for each individual bar, whereas the first method is notated for a collection of bars, highlighting an interesting tension between the two. Ultimately the two methods have slightly different focuses; the first is on tempo and the second is on duration. The thicker black vertical lines mark the beginning of a new block and it is clear from the time structure table that this does not always coincide with a new tempo or duration marking. This illustrates that it is changes to other material, as opposed to pre-determined durations for each block, which shape the block structure.

The study of these two methods of notating time structures in *Aventures* assisted the development of my approach to block structures where individual block durations are audible. This is seen through my treatment of duration and tempo as two different categories of material that can be explored independent of each other. In my work it is predominantly the duration of blocks of material that is the focal point and not the tempo of the material, which explains the use of one constant metronome marking in the

majority of my compositions. The further development of audible block structures is evident in later pieces, beginning with *Going Missing*. Later in this commentary my discussion of compositions by Morton Feldman and John Cage, both of whom explored block structures more extensively than Ligeti, offer further exploration of these ideas.

Fig. 7. Time Structure Table of György Ligeti's *Aventures* (1962)

Key

Each notation of time applies to all subsequent bars until a new notation of time is marked.

█ = Marks the beginning of a new block within the block structure

| = Normal Barline

Bar Number	1	2	3	4	5
Notation of Time	$\frac{4}{8}$ Agitato ♩ = 132				

6	7	8	9	10
Senza Tempo 23-28"	$\frac{4}{4}$ A Tempo ♩ = 86-90		Senza Tempo 4-5"	ca.7"

11	12	13	14	15
$\frac{4}{4}$ A Tempo ♩ = 50		$\frac{3}{4}$		$\frac{2}{4}$

16	17	18	19	20
$\frac{3}{8} + \frac{1}{16}$	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{2}{4}$	$\frac{2}{2}$ Presto ♩ = 35-38

21	22	23	24	25

26	27	28	29	30
		$\frac{2}{4}$	$\frac{2}{2}$	

31	32	33	34	35
				$\frac{3}{2}$

36	37	38	39	40
$\frac{4}{2}$		Lo Stesso Tempo $\frac{4}{2}$ ♩ = 35		

41	42	43	44	45

46	47	48	49	50
$\frac{2}{2} + \frac{1}{8}$	Senza Tempo 30-35"	ca.35"	$\frac{2}{4}$ A Tempo ♩ = 56-58	Senza Tempo 3-5"

51	52	53	54	55
$\frac{2}{4}$ A Tempo ♩ = 56-58				

56	57	58	59	60
$\frac{4}{4}$ ♩ = 76	$\frac{2}{4} + \frac{1}{8}$	$\frac{2}{4}$ ♩ = 56-58		

61	62	63	64	65

66	67	68	69	70

71	72	73	74	75

76	77	78	79	80
			$\frac{4}{4}$	

81	82	83	84	85
		$\frac{4}{2}$ $\text{♩} = 30$		

86	87	88	89	90
			Senza Tempo 22-25"	ca.9"

91	92	93	94	95
4-5"	ca.3"	ca.5"	ca.4"	1,5"

96	97	98	99	100
4-5"	ca.2"	30-35"	$\frac{4}{2}$ A Tempo $\text{♩} = 44$	

101	102	103	104	105

106	107	108	109	110
	$\frac{3}{2}$	$\frac{4}{2}$ $\text{♩} = 40$		

111	112	113	114	115
		$\frac{3}{2}$	Senza Tempo 40-45"	15-20"

Scattered Polaroids

In *Scattered Polaroids* I explore the reflection of two separate layers of material, a process aided by the division of the four instruments into two separate pitch bands. The pitch bands are a minimum of an octave apart, with the two violins in the higher and the viola and cello in the lower pitch band. The quartet was divided again with violin 1 and cello possessing a different type of material to violin 2 and viola (see Fig. 8).

Fig. 8. Bars 1-2, *Scattered Polaroids*

♩ = 92 with urgency, wooden (should sound fast)

The musical score for Bars 1-2 of *Scattered Polaroids* is presented for four instruments: Violin 1, Violin 2, Viola, and Violoncello. The tempo is marked as ♩ = 92 with urgency, wooden (should sound fast). The key signature has one flat (B-flat). The score is divided into two systems, each containing two staves. The first system covers measures 1-4, and the second system covers measures 5-8. The Violin 1 part is marked *p marcato - secco* and *ff_{poss.}*. The Violin 2 part is marked *p* and *arco flautando (hollow sound)*. The Viola part is marked *p* and *arco flautando (hollow sound)*. The Violoncello part is marked *p marcato - secco* and *ff_{poss.}*. The score includes various performance instructions such as *non vib.*, *con sord. (practice mute)*, and *(wide vib.)*. The notation includes eighth and sixteenth notes, rests, and dynamic markings.

I use long continuous scurrying lines of material in the violin 1 and cello parts for the whole piece and this aspect holds similarities with Michael Finnissy's *String Quartet* (1984). In Finnissy's piece, however, there are clearly distinct sections where the instruments are given new material, interrupting the constant stream of continuous lines of material. In *Scattered Polaroids* the violin 2 and viola parts differ from the other two parts: they have two types of slow material that involve less activity and then a third type of faster material for the ending. Additionally, a pitch void between the two pitch bands is explored that is emphasised by the instruments' constant activity on either side of it as well as by them not entering it (see Fig. 8). I use five different durations, which are 9, 10, 11, 12, 13, 14 and 15 semiquaver beats in a bar, to provide an underlying subtly shifting rhythmical block structure for the piece. My overall aim is for the listener to become increasingly aware of the activity of the inner parts' material within the multi-layered texture as the piece progresses.

In preparation for a workshop performance by the Arditti String Quartet in February 2008, Irvine Arditti asked me where the players would turn their pages as there were no rests in any of the parts in the original score. As I did not want page turners on stage I agreed to insert rests in each part which would be just long enough, one to two bars, to enable page turns at appropriate points, approximately every two minutes. These are organised so that only one player turns their page at a time, retaining the momentum and continuity of the sound. In performance this decision had a very positive effect on the piece as it provides clear glimpses of the inner parts' material for the listener. The rests also refresh the listening experience, briefly questioning the relationships between the four instruments and their respective material. As a result of the success of these changes, I included them in the score presented in the portfolio as well as for all future performances.

Scattered Polaroids presents significant developments of ideas in response to the research questions. My use of two separate pitch bands enables each layer to be audible, which is reflected by the subtle change to the sound when each instrument rests to turn their page. Compared to the previous compositions in the portfolio, a smaller collection of categories of material, mainly rhythm and glissando, is subtly varied in *Scattered Polaroids*. As in preceding compositions the variation of material still needs to be a more consistent focus throughout and the variations themselves need to be more subtle. The page-turn rests with their subtle variation of the density of texture are a significant discovery, as they successfully question the relationships between the layers of material and refresh the listening experience. Compared to *Cautious Interference* I employ a smaller range of durations, organised in the same order for all four parts. The block structure is inaudible because no sound or silence is employed to articulate the individual block durations. The vertical layering of memory is successful in this piece, as both the violin 1 and cello, and the violin 2 and viola, present different memories of their respective base layers. Due to the inaudible block structure the questioning of memory linearly is not explored in this piece. Key developments in *Scattered Polaroids*, in particular my use of pitch bands, independent short rests and a smaller range of block durations, are more extensively explored, respectively, in *Standard Deviation*, *The Main Complaint* and *Going Missing*.

Going Missing

In *Going Missing* I explore a block structure that employs ranges of duration in seconds for each block, each of which is separated by a silent breath of a fixed duration. I also explore the subtle variation, mainly by duration, of a small collection of sounds, thus questioning the listener's memory linearly. I decided upon the ranges of duration with input from Charlotte Pugh, the recorder player for whom the piece was written (although ranges are not used for the silent blocks). The ranges lend a certain amount of flexibility to the block structure as well as for the performer in performance (see Fig. 9).

Fig. 9. Table of Block Durations for *Going Missing*

All ranges are in seconds and read from left to right.

16-20	8-20	12-14	8-20	8-10	8-20	6-7
8-20	4-5	8-20	2-3	8-20	As long as possible	8-20
7	2-3	4-5	2-3	5	2-3	4-5
6-7	4-5	6	4-5	6-7	5	4-5
2-3	12-14	4-5	7	8-20	8-10	6-7
6-7	2-3	6	6-7	4-5	12-14	12-14
2-3	6	8-20	4-5	6-7	8-20	5
2-3	16-20	4-5	7	6-7	4-5	8-20
5	11	7	8-20	6-7	15	5
2-3	6-7	6	4-5	6-7	2-3	5
12-14	12-14	7	8-10	4-5	8-10	6
8-20	8-10	8-20	12-14	7	2-3	4-5
6-7	2-3	6-7	5	11	6-7	8-10
6	2-3	4-5	8-10	7	6-7	8-10
6	2-3	4-5	6-7	2-3	6-7	8-10
4-5	6-7	12-14	8-10	15	11	16-20

I defined most of the sounds during a workshop with Pugh in November 2007 and explored the way each would work within the block structure. The possible duration for each sound varied because of different amounts of air needed to produce each sound at varying dynamics. My initial sketches demonstrated that the collection of sounds was too large to create the audible focus on block durations so I chose a smaller collection, involving more stripped down material. The characteristics of these sounds are: glissando, singing and glissando, multiphonics, rapid random fingering, silence and wide vibrato. As I composed this piece in close collaboration with Pugh, most of the potential issues were resolved through conversations during the composition process or in workshop rehearsals

prior to the completion of the piece. The major issue that arose throughout was the range of durations used for the multiphonics. As some multiphonics require a lot of air, more if the dynamic is *ffff*, the ranges that went beyond eight seconds proved problematic. To solve this, I inserted a range of 8-20 seconds for all previous blocks that used ranges that were above 8 seconds. Additionally the performer is instructed to end the multiphonic when they run out of air or reach twenty seconds, whichever is the soonest.

The exploration of multi-layered textures was not possible in *Going Missing* as it is a solo piece. However, significant developments are made towards the successful exploration of subtle variations of material, audible block structures and the role of memory linearly. Firstly, the subtle variation of each sound is not as audible as I envisaged; instead it is the appearance and disappearance of different types of sound that is prominent. This highlights that the presentation of one or two types of material throughout would more successfully explore a sonic environment where the subtle variation within a type of material would be audible. This is demonstrated at the end of the piece when one type of material, each time separated by a silent breath, is repeated for different durations and successfully results in all the material and all subtle variations thereof being audible (see Fig. 10).

Fig. 10. Bars 107-112, *Going Missing*



My use of silence to articulate individual block durations combines with the stripped down material to achieve an audible block structure. In particular the use of silence to articulate each block is a valuable discovery, providing a clear contrast to the other material within each block and resulting in an audible block structure. The layering of memory is not explored because it is a solo piece, although the role of memory linearly is investigated. However the memory of subtle variations within each type is unsuccessful as it is the appearance of different types of material that is more noticeable. The use of one type of

material would make it easier for listeners to hear subtle variations within each type of material. Overall, *Going Missing* provides extremely important developments, and points the way towards the successful exploration of all three research questions. These ideas are more extensively explored in the rest of the portfolio, starting with the next piece, *Standard Deviation*.

Standard Deviation

In *Standard Deviation* I explore a densely multi-layered texture of eight voices and two sine tones split equally into two separate pitch bands. Within a block structure all the voices, apart from voice 3, interact solely within a quarter-tone interval either side of the sine tone pitch in their respective pitch band. This interaction explores subtle variations of three categories of material in particular, which are pitch, vibrato and glissando, although block duration, mouth position and dynamics are also explored (see Fig. 11). Each block is articulated by a three second rest that remains exactly the same throughout and is represented by a comma between each block.

Fig. 11. Bars 1-4, *Standard Deviation*

♩ = 58

pp non vib. *ppp* *pp*

Voice 1

pp narrow vib. non vib.

Voice 2

pp non vib. *ppp* *pp* *ppp*

Voice 3

ppp non vib. *pp*

Voice 4

ppp non vib. wide vib. *pp* *ppp* *pp* narrow vib.

Voice 5

pp narrow vib. wide vib. non vib.

Voice 6

pp non vib.

Voice 7

pp non vib. narrow vib.

Voice 8

Sine Tones

pp

Fig. 12. Five Vertical Intervals employed in *Standard Deviation*



I chose five different vertical intervals (see Fig. 12) to form the basis for five initial blocks of material. I then assigned these five blocks a different phonetic sound, unique to that vertical interval for the entire piece. The vocalists sing with their mouths either half open or fully closed and I composed this for each voice part individually. Combined with the phonetic sound, this explores very subtle changes to the shape of the cavity in the mouth and therefore to the sound produced. Next I composed four variations of each of the five initial blocks, resulting in twenty-five blocks in total. Each of the twenty-five blocks were then stretched or compressed into four different durations of 7, 9, 10, and 11 semiquavers to a bar, creating one hundred blocks in total. As in *Scattered Polaroids* the four durations used are within a small range to reflect the subtle variations of the other material. The final order of these blocks was decided using the same chance operations process as *Just Prevaricating*: each block was labelled, placed in a bag, and drawn out randomly. One metronome marking is used throughout to allow the subtle variations of block duration to be audible. My use of a pure tone as a basis for a composition is a shared idea with Alvin Lucier's *Music for Piano with slow sweep pure wave oscillators* (1982). In Lucier's piece, an additional pitch played on the piano is used to create a resultant, mostly beating, sound at points when the two pitches are within a small microtonal interval of each other. My approach in *Standard Deviation* differs from Lucier's approach by focusing upon the multi-layering of material and the perception of each subtle variation of material within this texture.

James Weeks (director of EXAUDI Vocal Ensemble) provided feedback on the completed piece. The main point that he raised was about the extreme difficulty for the altos and basses to continue singing, or especially humming, high and so quietly for so long. He made the point that it would make more sense to do the piece with a SSSSTTTT line-up, as opposed to a SSAATTBB line-up. This should not have a negative effect on the sound of the piece and therefore I will recommend this revised line-up for all future performances.

Standard Deviation represents a significant development in my portfolio as it successfully explores all three research questions. The presentation of one type of pithy material creates a multi-layered texture where all the material is audible, enabling subtle variations of block duration, mouth position, glissando, vibrato and dynamics to be perceived by the listener. In contrast to *Going Missing*, the focus is upon subtle variations of one type of material and not between different types of material. The equal division of the ensemble into two pitch bands aids the audibility of each layer within the texture and prevents layers of material from becoming inaudible within the dense texture. The block structure is audible throughout because the fixed three second silence between each block serves as a rigid base for the subtle variations of individual block durations to be placed alongside. Additionally, my use of four closely related block durations and pithy material enables the block structure to be heard as clearly as the other material. The successful exploration of the first two research questions enables the third question, on the layering of memory, to be examined: the music presents two base layers (the sine tones) and four memories (the vocal parts) of each base layer. This is made possible by the use of one type of material and by the subtlety of the variations of the material; the use of one type of material creates a clear sonic environment where the listener is free to question their memory of subtle variations of material. The remaining pieces in the portfolio explore the three research questions within mixed ensembles, beginning with *The Main Complaint*. This presents fresh challenges towards exploring the research questions, in particular when I use independent parts. Before a discussion of *The Main Complaint*, however, Morton Feldman's use of block structures and his approach to the subtle variation of material is examined.

Morton Feldman – *Clarinet and String Quartet* (1983)

At the time of composing *Standard Deviation* I became interested in Morton Feldman's compositional ideas in a couple of his late pieces. Firstly, in *Three Voices* (1982), a piece whose layering technique connects it with the next piece to be discussed, *The Main Complaint*, and secondly, in *Clarinet and String Quartet* (1983), a piece which I will use to illustrate Feldman's approach to subtly varying material and block structures. These are illustrated in the form of a material tree and a material table, which complement each other by first identifying different types of material and then by revealing how these are deployed.

The material tree (Fig. 13) reveals how subtly varied material is multi-layered within the same pitch range, for example in material A2. Feldman's layering of subtly different rhythms and individual pitch sequences for each instrument can also be witnessed in material A2. Octave transposition is also frequently employed as a method of subtle variation, for example the clarinet part in material B and Ba. The material tree highlights that seven different types of material are employed, although the last one, G, is not presented until bar 498 (of 540). The material table (Fig. 14) shows how the material is organised within the block structure at both the micro- (using labels) and macro-level (using colours). The deployment of material as well as the approach to block durations appears free and not pre-determined. The colours show that materials A and C are focused upon most frequently. These are often placed, even for short durations, amongst the presentation of new types of material. The material table also illustrates how different sub-categories of each type of material are employed upon every appearance of each type of material. This questions the listener's memory of the previous appearance of each type of material; for example, between bars 41-45 A2a and A3a are presented whereas upon the next appearance of this type of material at bars 130-132 only A3a is presented. The material that is markedly different from other types of material – types F and G for example - appear less often in the piece. Their relatively short appearance refreshes the listening experience, contrasting with the other more frequently deployed types of material.

Fig. 13. Material Tree of Morton Feldman's *Clarinet and String Quartet* (1983), extracts ©Universal Edition 1983.

A



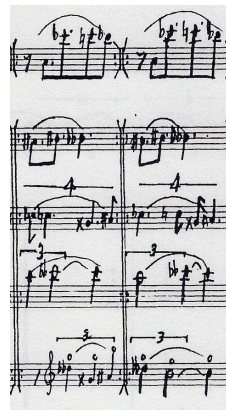
A1



A2



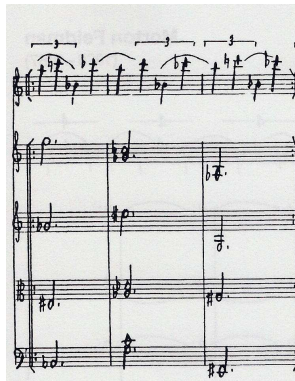
A2a



A3



A3a



A4



B



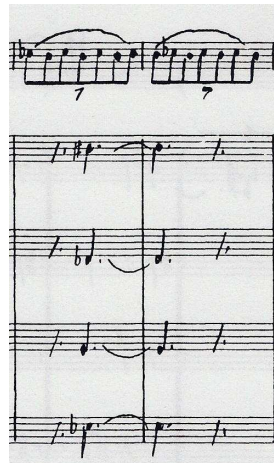
Ba



B1



B1a



B2



C



Ca



C1



C1a



C2



C2a



C3



D



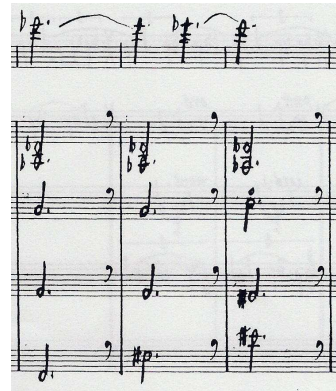
E



D1



E1



E2



F



G



F1



F1a



Material	Score Reference
A	Pg.1, system 1, bars 1-3.
A1	Pg.1, system 3, bars 1-2.
A2	Pg.1, system 3, bars 5-6.
A2a	Pg.2, system 2, bars 5-6.
A3	Pg.1, system 3, bars 7-9.
A3a	Pg.2, system 1, bars 1-3.
A4	Pg.6, system 3, bars 6-9.
B	Pg.2, system 1, bar 8.
Ba	Pg.6, system 1, bars 1-2.
B1	Pg.2, system 1, bar 9.
B1a	Pg.6, system 1, bars 3-4.
B2	Pg.9, system 1, bars 1-2.
C	Pg.2, system 3, bars 1-3.
Ca	Pg.3, system 1, bars 5-6.
C1	Pg.3, system 3, bars 1-2.
C1a	Pg.3, system 2, bars 1-3.
C2	Pg.7, system 1, bars 1-2.
C2a	Pg.4, system 3, bars 4-5.
C3	Pg.13, system 3, bar 1.
D	Pg. 3, system 3, bars 5-6.
D1	Pg. 4, system 2, bars 3-4.
E	Pg. 8, system 3, bars 1-3.
E1	Pg. 8, system 3, bars 4-6.
E2	Pg. 18, system 2, bars 1-2.
F	Pg. 14, system 1, bars 2-4.
F1	Pg. 19, system 1, bars 2-3.
F1a	Pg. 19, system 3, bars 2-3.
G	Pg. 19, system 2, bars 7-9.

Fig. 14. Material Table of Morton Feldman's *Clarinet and String Quartet* (1983)

Key

Material (and all sub-categories thereof)

- A
- B
- C
- D
- E
- F
- G

R = rest for whole ensemble

Bar	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Material	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
A1	A1	A1	A1	A2	A2	A3	A3	A3	A3a	A3a	A3a	A3a	A3a	A3a	B1a	B	B1

37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
B	B1	B	B1	A2a	A2a	A3a	A3a	A3a	C	C	C	C	R	C	C	C	C

55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
C	C	C	Ca	C	C	C	C	C1a	C1a	C1a	C1a	C1a	C1a	C1a	C1a	C1a	C1a

73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
C1	C1	C1	C1	D	D	D	D	D	D	D	D	D	D	D1	D1	D1	D1

91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
C	C	C	C	R	C	C	C	C	C	C	C	C2a	C2a	C2a	C2a	C2a	C2a

109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
D1	D1	D1	D1	D1	D1	D1	D1	D1	D1	D1	D1	C1a	C1a	C1a	C1a	C2a	C2a

127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
C	C	A3a	A3a	A3a	R	Ba	B1a	Ba	Ba	B1a	Ba	Ba	Ba	B1a	B1a	Ba	Ba

145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162
B	B	B1a	B1a	Ba	Ba	B1a	Ba	Ba	B1a	A3	A3	A3	A3	A4	A4	A4	A4

163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180
B2	C1	C1a	C1	C1a	C1a	C1a	C1a	C1a	C1a	C1a	D	C	C	C	B1a	Ba	A3a

181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
A	A	A	A1	A1	A2	A2	A4	A4	A	A	A	A	A	A	A	A4	A3

199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216
A4	A3	A3	A3	A3	A4	A3	A3	A3	E	E	E	E1	E1	E1	E	E	E

217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234
B2	B2	B2	B2	B2	R	B2	B2	B2	B2	B2	B2	B2	B2	R	B2	B2	B2

235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252
B	B	B	R	B2	Ba	B2	B2	Ba	B1a	A3a	C1a	C1a	C2	C1	C1a	C1a	C1a

253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
C1	C1a	C2	C1a	A3a	C1a	C1a	B1	B	C1a	C1a	C1a	C1	C1	C2	C1a	C1a	C1a

271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288
	A4			D1			A4					C	Ca				C
289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306
R	C2	Ca	C	R	Ca	C2a	C	R	C1a	Ca	C	R	C	Ca	C2	A4	
307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324
C						A4			A3a			C3	C2	A4			
325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342
C3	C2	A3a		C3		C2	A4		C2	R	A4	C2	A4	C2	A4	C1	A4
343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360
C3	A4	C3	A4	C3	R	C3		C1	C3	F						C3	F
361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378
					A4	C3	A4		C1a	C1	C1a	C1	C2		C1a	C2	
379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396
F			C3		F	C3	F	C3	B2		R	B2					
397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414
	R	B2							A4		C3	C2a	C3	A3	C1a		C3
415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432
	C2	A4	C2	A4	C2	A3	A4						D1			D	
433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450
					C2	Ca	C	R	A2		A3						
451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468
E			R	F					C3	F							C3
469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486
E2									E			E1			E		
487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504
F1					F1a				C3	A4	G						F1
505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522
F1a					F1				G						A4	C3	
523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540
E2									R	E				E1			R

The study of Feldman's approach to multi-layering, block structures and the way they influence memory helped to refine my approach to these ideas. Feldman tends to focus on variations of pitch and rhythm whereas I explore the subtle variation of a wider range of categories of material which also differs from piece to piece. I focus upon subtly varying individual block durations to stretch and compress the other material within a block structure, whereas Feldman subtly varies duration so that material appears for a different period of time on each appearance. Finally, my work explores the listener's perception of change within one type of material, for example in *Standard Deviation*, whereas Feldman explores the perception of change both within and between different types of material. The next piece to be discussed, *The Main Complaint*, explores three independent block structures simultaneously, as well as subtle variations of density of sound events.

The Main Complaint

In *The Main Complaint* I explore the idea of layering memory for each live performer by using two pre-recorded parts alongside each of the three live instruments (nine parts in total). In performance the performers are spaced horizontally across the stage, each with their own CD player which plays back their two pre-recorded parts as they play the third part live. In this piece I layer subtly varied rhythms and explore both a three-quarter, and a one and a quarter, tone horizontal interval throughout (see Fig. 15). My overall aim is to present different combinations of pithy material so that every subtle variation of material is audible.

Fig. 15. Page 17, *The Main Complaint*

17

The musical score for page 17 of *The Main Complaint* is arranged in three systems. The first system contains staves for three Clarinets in Bb (1st, 2nd, and 3rd) and three Trombones (1st, 2nd, and 3rd). The second system contains staves for three Violoncellos (1st, 2nd, and 3rd). The 1st Clarinet, 2nd Clarinet, and 1st Trombone parts feature melodic lines with slurs and dynamic markings such as *5-4* and *4-3*. The 2nd and 3rd Trombone parts have more rhythmic, sustained notes. The Violoncello parts are mostly sustained notes, with the 1st and 2nd parts marked with *[pppp]* at the end of the page. The 3rd Violoncello part also has a *[pppp]* marking at the end. The score is written in 4/4 time, with a key signature of one sharp (F#).

Initially a large quantity of blocks of material was composed; I then selected only those blocks which were pithy enough to be compressed or stretched into seven different durations. These durations are all closely related, 7,8,9,10,11,12 and 13 semiquavers in a bar. As in *Standard Deviation*, I used chance operations to re-order these blocks by labelling each bar, then drawing them randomly from a bag to create a new order. The clarinet's order of blocks was then fixed to provide a base layer for the other two instruments. In turn, I re-ordered the trombone and cello blocks for a second time, independently of the other two instruments, resulting in three independent block structures. Finally, I chose independent points for existing material to be erased for each instrument, which is an extension of the page-turn rests used in *Scattered Polaroids*. Independent points are used to retain the continuity of the sound, although in *The Main Complaint* the durations of the rests, compared to *Scattered Polaroids*, are longer. Additionally, rests are used in the pre-recorded parts so that each instrument is not always presenting three layers of material; this provides subtle variations of density (see Fig. 15). As in *Going Missing* and *Standard Deviation* I used a fixed duration of silence, a quaver's rest, between each block to articulate the duration of each block and therefore the structure overall.

Anton Lukoszevieve (cellist and director of Apartment House) provided feedback on the completed piece. The most crucial question he asked was how each live instrument was going to synchronise with their pre-recorded parts, especially in a live performance when the other instruments might disturb their concentration. I explained that as the three live instruments have independent block structures it would be acceptable for the live performers sometimes to be out of synchronisation with their pre-recorded parts. Additionally, with a quaver's rest at the end of each block, falling out of synchronisation would be less likely and also quick to resolve if it did happen. Andrew Digby (trombonist with Apartment House) observed that the register and quiet dynamics were difficult for the trombone, but possible (for him at least). He also recommended experimenting with different mutes to get the desired balance with the other instruments.

The Main Complaint, like *Standard Deviation*, successfully explores all three research questions. My presentation of one type of pithy material enables all the material and all subtle variations thereof to be audible. The erasure technique that, as in *Scattered Polaroids*, effects changes to the density of the texture refreshes the listening experience by

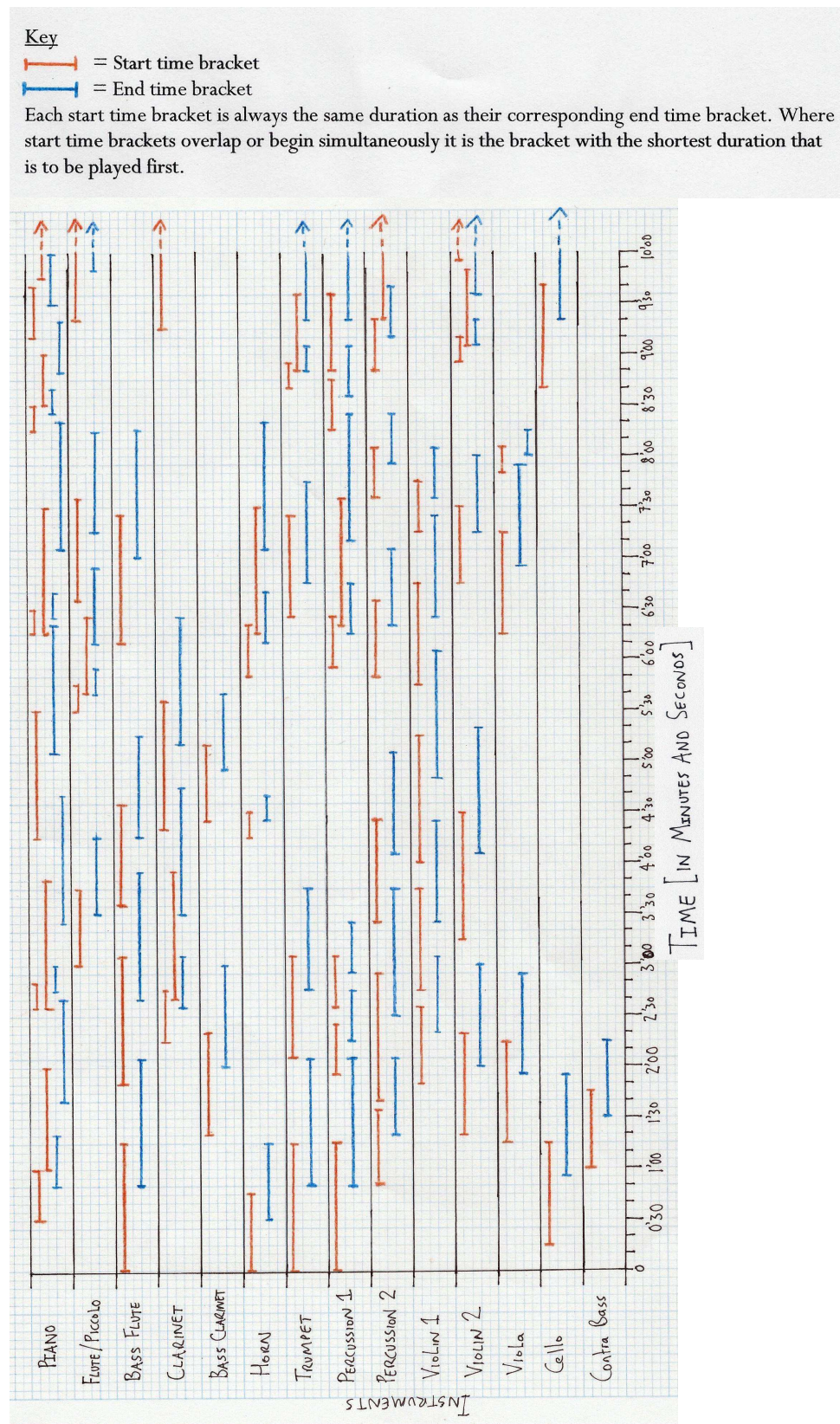
questioning the relationships between the different layers within the texture. The subtle variation of density provides a significant development in the portfolio and is further developed in the remaining compositions. The use of silence between each block creates a sense of three audibly independent block structures, another significant development in the portfolio. Compared to *Standard Deviation*, I employ a larger quantity of block durations, but the audibility of each block is not compromised because the durations are all within a small range. This subtle variation of block duration reflects that of other categories of material such as pitch. The layering of memory is successfully explored as changes of density explore different quantities of simultaneous subtly different memories of the same base layer. The pithy material aids both the vertical and linear exploration of memory as a sonic environment is achieved where the listener is free to question their memory of subtle variations of material. The key conclusions of *The Main Complaint*, in particular of density and independent block structures, are explored in the next piece to be discussed, *Balaclava*. Before this however, John Cage's use of pithy material and block structures is examined.

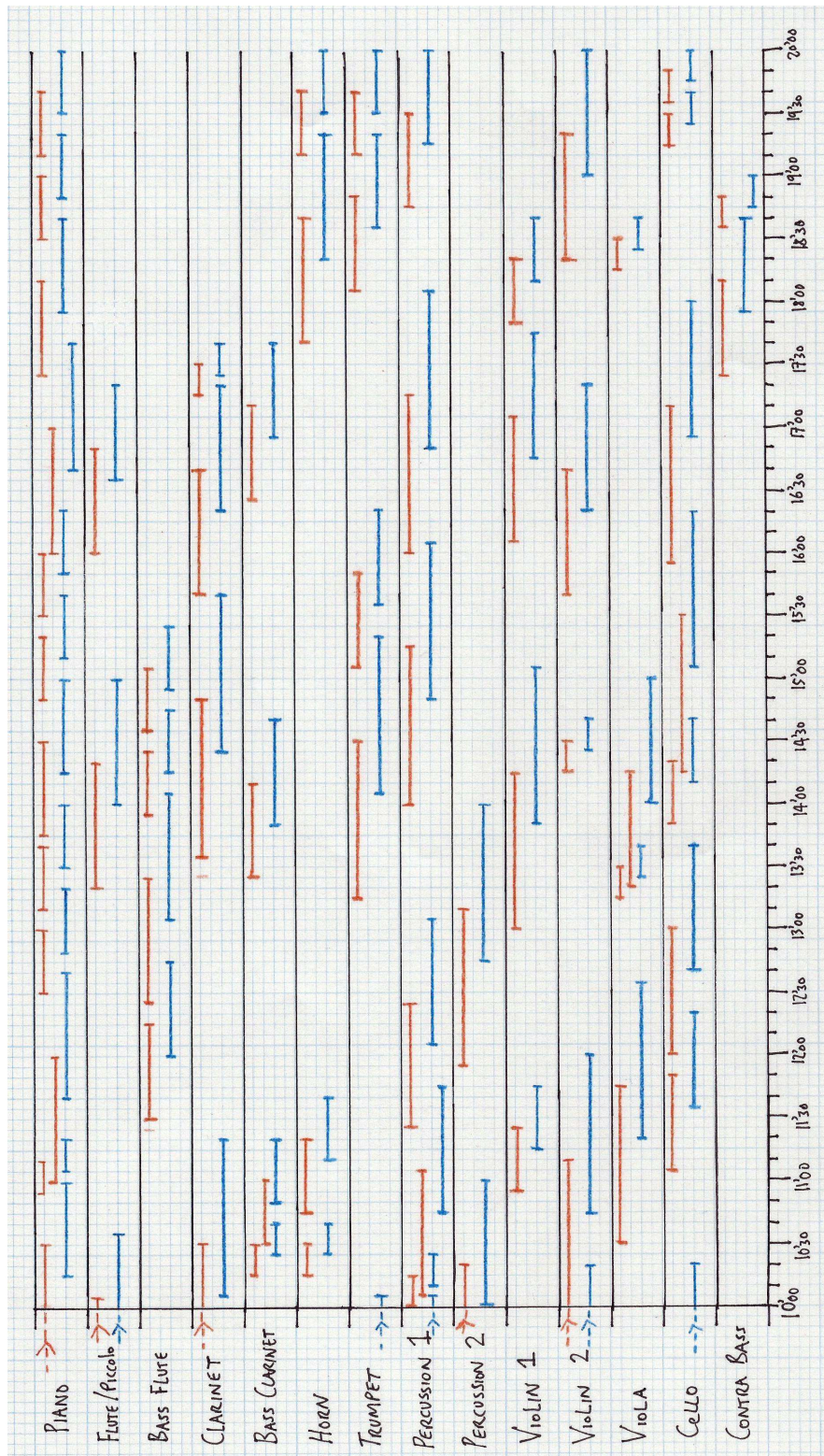
John Cage – *Fourteen* (1990)

Around the time of composing *Balacava* I became interested in John Cage's late number pieces, specifically *Fourteen* (1990). *Fourteen* is for fourteen instrumentalists and uses time brackets, notated in minutes and seconds, to indicate to the performers a separate range of time for each entry and exit into the sound world. On each appearance, an instrument plays either one, two or three notes and the duration of each note is decided by the performer in accordance with the time brackets. Dynamics are not given but Cage advises that if the durations are medium or long the dynamic should be soft, and if durations are short the dynamic can be loud. The piece explores an anarchic society of sounds where the independent parts, in accordance with their unique time brackets, freely overlap one another. It is on the combination of the time structure and pithy material in *Fourteen* that my discussion focuses.

The time structure graph (Fig. 16) shows both the potential for many different combinations of instruments and each performer's freedom to play for both short and long durations. The time brackets gift flexibility to the structure, resulting in a sound world which can vary from one performance to the next. It is also clear that a large quantity of adjacent brackets within the same part overlap; Cage's performance instructions advise the performer to find a solution to accommodate one bracket to the other. This can result in an instrument playing continuously for longer than the clearly separated blocks of the score suggest, but the brackets still provide the opportunity for a gap of silence between each block. This further illustrates Cage's belief in an anarchic society of sounds as he wishes to allow the performers the freedom to make their own decisions within the set time structure. The pithy material - there are no markings on the score aside from the pitch to be played and the time brackets - helps to make the structure clearly audible, creating a sound world where parts enter and exit with a subtle, yet clearly audible, effect on the overall sound of the piece.

Fig. 16. Time Structure Graph of John Cage's *Fourteen* (1990)





Like Cage, I also use pithy material to create music where all the material is audible. On the other hand, my work explores a larger quantity of categories of material than Cage, whilst still aiming for a multi-layered texture where all the material and all subtle variations thereof are audible. Although I never use time brackets, the idea of independent parts entering and exiting the sound world with pithy material can be clearly witnessed in *Balacava* and *Grandad's Letters*, but unlike Cage, the majority of my compositions specify exact entry and exit times. This keeps each part's block structure independent of one another, for example in *The Main Complaint*, and draws attention to a small range of block durations. This is not a primary focus in Cage's *Fourteen* where individual block durations can vary greatly, creating an anarchic society of sounds. In the remaining three compositions I explore further the use of pithy material within block structures, starting with *Balacava*.

Balaclava

In *Balaclava* I explore a multi-layered texture, based on a murmuring sound, and three simultaneous independent block structures. I chose the speaking voice's text for its sound and rhythmic stresses when murmured and not for its meaning. The cello and harp parts explore changes in bow direction and the subtle rhythmical stresses that these create. The block structure is notated separately from all the other material, the speaking voice having seven subtle variations of material and the cello and harp each having four. The materials can be infinitely repeated and are presented so that when the performer returns to each one they play from where they finished on the previous occasion. Each performer decides the order of their material to be plotted in their block structure. This is different from *The Main Complaint* for example, where chance operations were employed to generate the order of the blocks. The block structures use minutes and seconds (see Fig. 17) to notate the entry and exit times of the sound world for each part independently. This explores constant subtle variations of density as the combinations of each layer regularly change.

Fig. 17. Example of the block structure notation used in *Balaclava*

0.07	0.30		0.33	0.50	
Normal			Fast		

I use three different block durations, 13, 17 and 23 seconds, with a three second rest in between each block, as in *Standard Deviation*. The loud entry at the beginning of each block and silence between each one is used to articulate the block structure. I also use three different tempi to vary the speed in which the material is played for each block, fast (crotchet=70-73), medium (crotchet=61-64) and slow (crotchet=52-55). I ordered these differently for each part with the aim of at least two different tempi always combining simultaneously.

Balaclava was commissioned by Anton Lukoszevieve in response to a SPNM/SAM call for shortlisted composers for the Sound Source concert series. One week prior to performance the harp part was changed quite significantly and this is why two harp parts are provided, the original part and the altered part used for the premiere performance.

The new harp part does not use a bow because the performer did not want to get rosin on the strings of their harp and the e-bow is not used because the harp used in the performance was not strung with metal strings. These decisions resulted in the harp part having three, instead of four, subtle variations of material and everything being plucked in the conventional manner instead of bowed. I was happy to compromise on these aspects as the performer was very generous with advice and ideas for solutions to these problems (although I would still like to hear the original score performed) and the performance was a successful demonstration of the core ideas that were set out at the start of composing the piece. I performed the speaking voice part in the premiere and discovered that it was difficult to remember to perform the loud entries to each block when these were not notated in the score; they were only in the performance notes. A solution would be to write *forte-piano* for each block on each part since this is the dynamic landscape that achieved the best sound in rehearsal and performance.

Balacava successfully explores the three research questions, illustrating an alternative method of notating a block structure to the rest of the portfolio. The pithy material enables subtle variations of material, mainly by duration, tempo and density, to be audible. The combinations of different tempi successfully contribute to the multi-layered texture, subtly influencing the rhythmical interlocking between each layer. The changes of density that occur between each part's exit and re-entry of the sound world is effective and questions the relationship between each layer, as well as providing a glimpse of the other layers. This was also evident in *The Main Complaint* but in *Balacava* the silences between each block are longer. The silence between each block and the loud re-entry of each part articulates the three independent block structures successfully. My notation of the block structure is particularly effective as it sets the order of block durations yet also allows the performer to decide the order of the other material. The exploration of one type of material aids the layering of memory, as the three parts present a different memory of the same base layer. This is an important achievement, compared to the rest of the portfolio, as the piece is for a mixed ensemble. The exploration of memory linearly is successful in *Balacava* because all the material and all subtle variations thereof are based upon the same murmuring sound. The next piece to be discussed, *Northfield Road*, explores an alternative method of articulating a block structure, as well as further investigating subtle variations of density.

Northfield Road

My main ideas for *Northfield Road* formed in response to a question of whether it was possible to create a piece where the instruments were treated mechanically, each having unique material of the same fixed duration. I use the changing of combinations of instruments as the method of articulating the block structure. The fixed block duration is eighteen bars long, unlike the rest of the portfolio where I use a collection of different block durations in each composition. Each instrument explores a rhythm or pitch sequence subtly different from all the other parts (see Fig. 18), and upon each instrument's re-appearance they begin with the last three bars from their previous appearance. This is an idea drawn from *Balaclava* where the harp and cello parts pick up from where they finished on the previous appearance of the same material. I used chance operations (flipping a coin for each instrument in turn to decide whether an instrument would play or rest for each block) to decide upon the different combinations of instruments to be used for the twenty-eight blocks of the piece (see Fig. 19). If the chance operations produced any combinations that were duplicates, used only one instrument, left only one instrument out, or used the whole ensemble (9 instruments) then I discarded these as the idea was to explore different combinations of instruments that were playing as well as resting; isolating one instrument either way was not desired, nor was duplicating a combination. My use of large quantities of different combinations of instruments within an ensemble is an idea also witnessed in Anton Webern's *Symphony op.21* (1928) and Igor Stravinsky's *Movements* (1958-59), the difference being that in *Northfield Road* the primary focus is upon the frequent arbitrary changes to the combination of instruments. In the Webern and Stravinsky pieces the changes to the combination of instruments is not a primary focus, instead it is one aspect among many in a serially determined sound world.

Fig. 18. Example of rhythm and pitch sequences for each part in *Northfield Road*.

(This is not an extract from the score.)

The musical score is for the piece *Northfield Road*. It features a tempo of $\text{♩} = 138$ and a time signature of 3/4. A 7:6 ratio is indicated above the first staff. The instruments and their parts are as follows:

- Flute:** Treble clef, 3/4 time. Part begins with a *fff* dynamic. A bracket above the first six notes indicates a 7:6 ratio.
- Oboe:** Treble clef, 3/4 time. Part begins with a *fff* dynamic.
- Clarinet in B♭:** Treble clef, 3/4 time. Part begins with a *fff* dynamic.
- Bassoon:** Bass clef, 3/4 time. Part begins with a *fff* dynamic.
- Horn in F:** Treble clef, 3/4 time. Part begins with a *fff* dynamic.
- Trumpet in B♭:** Treble clef, 3/4 time. Part begins with a *fff* dynamic.
- Trombone:** Bass clef, 3/4 time. Part begins with a *fff* dynamic.
- Hi-hat cymbal:** Indicated by a double bar line and a 3/4 time signature. A note above the staff reads: "[Hi-hat cymbal should be tightly closed and struck on the edge]".
- Woodblock:** Indicated by a double bar line and a 3/4 time signature. A note above the staff reads: *fff*.
- Double Bass:** Bass clef, 3/4 time. Part begins with a *fff* dynamic. A note above the staff reads: *pizz.* (pizzicato). A note below the staff reads: *fff*. A bracket below the staff indicates a cross notehead, with a note below it reading: "[Cross notehead indicates a knock to the body of the instrument with the knuckle]".

Fig. 19. Table of the 28 combinations of instruments employed in *Northfield Road*

	Oboe	Clarinet			Trumpet	Trombone		Percussion
	Oboe			Horn	Trumpet		Double Bass	Percussion
Flute		Clarinet		Horn				Percussion
Flute					Trumpet	Trombone		Percussion
	Oboe			Horn				Percussion
	Oboe	Clarinet	Bassoon	Horn				Percussion
		Clarinet		Horn	Trumpet	Trombone	Double Bass	
		Clarinet	Bassoon	Horn	Trumpet		Double Bass	Percussion
Flute	Oboe			Horn		Trombone	Double Bass	Percussion
	Oboe	Clarinet	Bassoon	Horn		Trombone		Percussion
		Clarinet					Double Bass	
		Clarinet	Bassoon			Trombone		Percussion
			Bassoon	Horn		Trombone	Double Bass	
Flute			Bassoon	Horn	Trumpet	Trombone		Percussion
	Oboe						Double Bass	Percussion
	Oboe	Clarinet		Horn	Trumpet	Trombone		
Flute				Horn	Trumpet			
		Clarinet				Trombone	Double Bass	
		Clarinet	Bassoon	Horn	Trumpet			Percussion
Flute	Oboe	Clarinet	Bassoon			Trombone	Double Bass	Percussion
	Oboe				Trumpet	Trombone	Double Bass	Percussion
Flute		Clarinet		Horn	Trumpet	Trombone	Double Bass	Percussion
		Clarinet			Trumpet		Double Bass	Percussion
Flute								Percussion
			Bassoon		Trumpet		Double Bass	Percussion
	Oboe		Bassoon	Horn	Trumpet	Trombone	Double Bass	
	Oboe	Clarinet	Bassoon		Trumpet	Trombone		
Flute	Oboe	Clarinet		Horn	Trumpet			

Northfield Road successfully explores the three research questions and compared to the rest of the portfolio presents some alternative methods of achieving these. A multi-layered texture where all the material and all subtle variations thereof are audible is successfully explored, in part through my use of pithy material and the subtlety of the variations of material. Additionally, keeping some categories of material constant, for example block durations, allows subtle variations of other material, for example density, to be perceptible. The block structure is successfully articulated by changes to the combination of instruments and this is aided by the use of the same fixed duration for the entire piece. The layering of memory is successfully explored as constantly different combinations of memories of the same base layer are presented. This closely affects the linear exploration of memory as, although each part repeats the same material, that material is always presented within a different combination of instruments, creating a sonic environment

where the listener is invited to question their memory of subtle variations of each block. The final piece in the portfolio, *Grandad's Letters*, explores different combinations of instruments within a semi-flexible block structure that employs aural cueing to coordinate the entry and exit of each instrument.

Grandad's Letters

Grandad's Letters uses two letters written in 1829 and 1840 by a distant relative of mine, John Edward Pearn, as the base layer of material. I recorded these letters spoken by my Grandad (Gerald Scantlebury) at his home using a piece of 'lo-fi' equipment, in this case a Dictaphone. I based the instruments' material upon the sound of my Grandad's voice on these 'lo-fi' recordings, as well as any other sounds that were picked up by the Dictaphone during the recording. I also explored the process of transcription, with each stage of the transcription process extending the idea of presenting subtle variations of one base layer (see Fig. 20).

Fig. 20. Flow diagram of the transcription process explored in *Grandad's Letters*

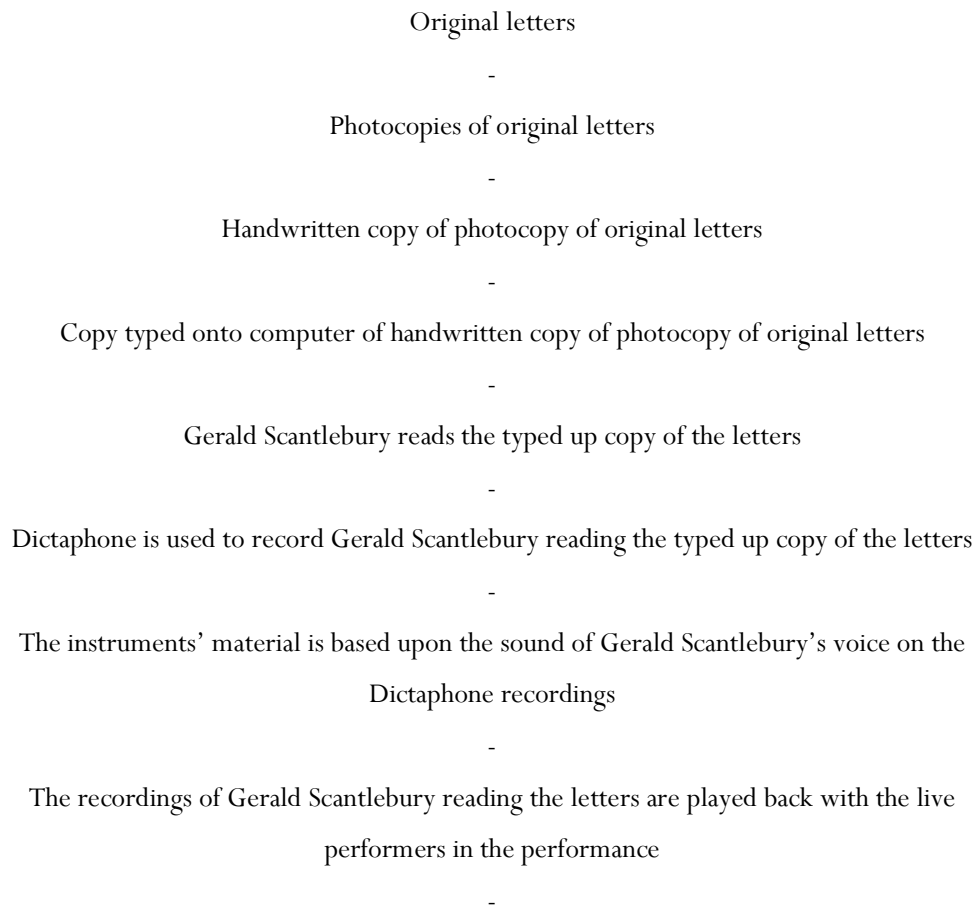


Fig. 21. First system of page 2, *Grandad's Letters*

2

I use aural cueing to provide some flexibility in each part's entry and exit of the sound world (see Fig. 21), as well as keeping the ensemble roughly together with one another and the recorded voice. I also explore constantly shifting combinations of material, an expansion of the same idea witnessed in *Northfield Road*, however here the layers often enter and exit independently. I did not predetermine the block durations and instead these are determined by the approximate duration of sentences in the letters. My aim is for the sections without the recorded voice to be approximately the same length as the sections with the recorded voice. The block structure is articulated by either an audible inhalation through the trumpet, silence, or changes to the combination of instruments. In *Grandad's Letters*, I explore different combinations of layers of material instead of the arbitrary change in instrumental combinations focused upon in *Northfield Road*. Amplification is used for any instruments that are too quiet since all the material should be equally audible. A range for the metronome marking is provided at the beginning of the piece, each player deciding upon their own tempo marking for the whole piece. My aim is to create a texture where some of the parts are playing their material at very subtly different speeds, thereby exploring the effect on the layered structure, an extension of the multiple tempi idea witnessed in *Balaclava*.

Grandad's Letters successfully explores the three research questions and like *Balacava* presents an alternative method of notating a block structure. As in all the pieces from *Standard Deviation* onwards, pithy material aids the successful creation of a multi-layered texture where all the material and all subtle variations thereof are audible. Different combinations of layers of material are explored through the use of aural cueing, which results in subtle variations of rhythm as the layers interlock in contrasting ways. The block structure is successfully articulated throughout, by changes to the combination of instruments, as in *Northfield Road*, by silence, or by quiet inhalations through the trumpet. Like the overlapping of layers, the block durations have some freedom, although they are of a consistent duration in relation to one another within each section to ensure that they remain audible. Unlike *Northfield Road*, the layering of memory is explored through the presentation of different combinations of material within a fluid structure where layers enter and exit independently. The role of memory linearly is successfully explored as the listener is free to question their memory of subtle variations of material, mostly by changes to the combination of instruments and their material.

Conclusion

Each composition in the portfolio provides significant solutions, as well as discovering some additional ideas, towards the exploration of the three research questions.

In creating multi-layered textures where all the material and all subtle variations thereof are audible I demonstrate in the portfolio that the subtlety of the variation of each category of material, as opposed to different combinations of categories, is the key factor which influences the audibility of material and its subtle variation. For example the variations of dynamics in *Just Prevaricating* are too large (ranging from *pppp* to *ffff*), distracting attention away from variations to other material, whereas in *Standard Deviation* the variations of dynamics are very subtle (ranging from *ppp* to *pp*). The stripping down of material so that it is pithy aids the audibility of material, particularly when the subtle variations are of one type of material throughout a composition, as demonstrated by a comparison of *Going Missing*, where I use a collection of different sounds, with *The Main Complaint* where one sound is focused upon. My focus upon one type of material helps to create a sonic environment where the listener has the freedom and opportunity to perceive for themselves subtle variations of material. Additionally, pitch bands, for example in *Scattered Polaroids*, and independent parts, for example in *Balaclava*, allow the listener to listen to the activity of individual layers of material. These two techniques slightly separate the layers from one another within a multi-layered texture, so that all the layers do not occupy exactly the same pitch range or time structure. Subtle variation to the density of sound events, first witnessed in *Scattered Polaroids*, is a key discovery within my work; it refreshes the listening experience by questioning the relationships between each layer within the texture and provides another category of material that can be subtly varied, for example in *The Main Complaint*, as well as being successfully employed to articulate the block structure in *Northfield Road*.

I also explore in the portfolio the creation of block structures within which subtle variations of individual block durations are audible. My use of silence between blocks, first witnessed in *Going Missing*, effectively articulates the block structure where musical signposts failed. In *Northfield Road* I use an alternative method where changes to the combination of instruments articulate the block structure. I employ silence, however, for the majority of compositions as it most effectively provides a consistent audible contrast to the other material within each block. Using silence to articulate the structure within

multiple independent block structures allows each block to ‘breathe’, drawing attention to which part has rested momentarily, for example in *Balaclava*. The use of a small collection of durations effectively achieves subtle variations of both duration and all other material within each block, for example in *The Main Complaint* where the sliding figure is subtly stretched and compressed. In the portfolio I employ two methods of notating block durations, standard time signatures (with a constant metronome marking) and minutes and seconds. Both are successful, although the standard time signatures often proved the most appropriate notation for the successful exploration of ideas within each composition as they allowed for more subtle variations of duration.

The role of memory vertically and linearly is explored throughout the portfolio. I explored the layering of memory through the creation of multi-layered textures where all the material and all subtle variations thereof are audible. The conclusions I made of the first question are also relevant here, in particular the exploration of subtle variations of one type of material which results in the presentation of a sound world where each layer is a subtly different memory of the same base layer, for example *The Main Complaint*. My exploration of memory linearly is achieved through the use of audible block structures; within these structures a sonic environment is created in which the listener has the opportunity to perceive for themselves subtle variations of material. As with the layering of memory, the presentation of a single type of material is the crucial factor in enabling the listener to question their memory of subtle variations of material. My focus upon one type of material means that distinctions between different types of material do not take precedence over the perception of subtle variations within one type of material.

Overall, I illustrate through the portfolio that for subtle variations of material to be perceptible, some categories of material need to remain constant and unaltered, forming a fixed base layer with which the subtle variations can be heard to interact. Also, employing a smaller collection of different categories of material for subtle variation more effectively creates a multi-layered texture where all the material and all subtle variations thereof are audible. My use of pithy material and focus upon one type of material within a composition are key developments within my work as is the integration of silence into the block structure, enabling the successful articulation, and therefore the audibility, of individual block durations.

Finally, I believe that the portfolio represents both an end and a beginning, offering a glance towards the future development of some of the ideas explored and writing this commentary has yielded an insight into ideas with potential for the future. For example, the erasure technique discovered in *Scattered Polaroids* has an effect on the density of sound events with considerable potential for further exploration, primarily as a compositional process to be used after other material has been composed.

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