PORTFOLIO OF COMPOSITIONS

by

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ABSTRACT

This is a portfolio of ten compositions composed at the Electroacoustic Music Studios at the University of Birmingham, Audio Research Lab at the Birmingham City University and my home studio during the period October 2007 – September 2010.

The commentary comprises a set of philosophical considerations about my compositions and intent for creation. Further chapters are dedicated to compositional techniques, related traditions and piece specific documentation. A recent CD release from 'diobel kiado' publishing house is attached which contains two of the presented compositions. The rest of the presented compositions are to be found on the attached DVD, along with a range of programs coded to support composition is briefly discussed in the Appendix.
All the expressed views are personal convictions; my music serves no other purpose than to reflect onto one observing it. The attached software is free to use and distribute provided it is appropriately referenced.

Dedicated to those who disagree.

ACKNOWLEDGMENTS

This work would have not be possible without the support from Scott Wilson, Jonty Harrison, Kevin Busby and my parents Munevera and Zoltan Baracskai. Expressing gratitude does not seem to compare to the immense contribution that these people have made.

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INTRODUCTION

> People who leave the obscure and try to define whatever it is that goes on in their heads, are pigs.[1]

This commentary is concerned with my music, the non-verbal outlet of the mind that should stop the internal monologue and carry the listener along non-verbal discourse. Possibly, sound and music demonstrate that a contradiction does not exist, every sound and all music exists in parallel; composed silence has long been proved musical.

A point is indivisible. An infinite set of successive points form a line. An infinite set of successive lines is a plane. An infinite set of planes is space. An infinite set of spaces is time, and an infinite set of timelines is the imagination, a dimension that humans inhabit but do not believe to be tangible; this in my view is the source of creation.

> All possible histories of the universe exist simultaneously. (Hawking, 2010)

Bearing this simultaneity in mind the introductory poetic fragment can peacefully coexist with the notion that expressing thoughts is needed. Artaud's fragment is however an attempt to define whatever was going on in his head, making himself a pig. Pragmatically though, what this statement achieves is a rather musical impact of an unexpected fleeting moment and an ever so slightly delayed mind twisting challenge with a hint of self-dismissal. This comes ever so close to what I try to achieve with my music.

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[1] Artaud, A. 1924-1937 'All Writing is Pigshit…' in (Artaud 1965: 38)

Having studied electronic composition for four years in the tradition of Gottfried Michael Koenig, the personal challenge I set myself is to abandon the acquired weapons of electronically synthesised sound. New perspectives have opened up by coming to study with Scott Wilson and Jonty Harrison. I have attempted to cover a broad range of compositional stances and techniques with their support.

Upon being interviewed for admittance to study Sonology I expressed passion for creating unheard music and sounds. Now, nine years later the interest is drifting towards actually hearing a sound, and making music that I already hear inside.

> Careful listening is more important than making sounds happen. (Lucier, 1995: 430)

Like my music, this commentary consists of many quotations, many thoughts that I have forgotten the origin of and therefore considered to be my own before I found them again. This is by no means a critical appraisal of the literature; it is merely aimed to be a meaningful and musical text about meaningful and musical sound.

COMPOSITIONS

TITLE	DISC	FORMAT	DURATION
Culpable Passage (2008)	DVD	24ch 48k 24bit	15:28
"Spoof, Skit, Take-off…" (2008)	DVD	10ch 88.2k 24bit	10:20
Shades of Brown (2010)	CD	2ch 44.1k 16bit	39:16
Brush Solo (2010)	CD	2ch 41.k 16 bit	04:39
At Least Four (2010)	DVD	2ch 44.1k 24bit	10:31
Fingertip Improv (2010)	DVD	8ch 44.1k 24bit	04:23
All Aboard (2010)	DVD	8ch 96k 24bit	02:16
Don't Listen (2009)	N/A	N/A	N/A
Herdington (2009)	DVD	24ch 44.1k 24bit	04:50
These are Your Thoughts (2009)	DVD	8ch 44.1k 24bit	04:20
		TOTAL:	96:03

Figure. 1. Table of presented pieces, format and durations.

1. OVERVIEW

This commentary consists of five chapters. Each chapter takes the reader further into detail and piece specific considerations.

In the second chapter a philosophical discussion will take place. Primary concepts that outline the processes involved in art and music will be accounted for. I shall attempt to distil and abstract the main elements of musical discourse. These ideas are reflected in all the presented music, many specific relations will not be drawn.

The discussion becomes less generic as I dissect the actions that constitute my composition in the third chapter. The key aspect is the classification of the techniques and their utilization in the presented work. The force of simplification is at work in order to gain perspective.

In the fourth chapter a few genres will be looked at that cover the range of the composed music. Key texts in the field are identified and a few interesting points are drawn upon. Relationships to compositional techniques from the previous chapter are clarified.

In the fifth chapter each piece will be briefly discussed, dealing with specific considerations and technical solutions.

In conclusion, a short evaluation of the accomplished studies will summarize the efforts and provide a glimpse into forthcoming projects and musical desires.

In overview, the variety of presented compositions is parallel to the variety of thought, intention and appearance in my work. I find that modes of listening along the lines of abstract-concrete and subjective-objective actually relate to the classification of my musical intent. Adding to these, the dichotomies of pleasing-disturbing and raw-crafted seems to make the four primary degrees of freedom for articulation in my music.

These thoughts and these pieces are my fleeting convictions rather than rigid claims; they are meant to provoke both accord and disagreement embody thesis and antithesis, becoming synthesis only to the wilful observer.

2. IT

What is it? Well, by the word *it* nothing else is implied; *it* stands observed and *it* is considered one, an entity. A piece of music is also observed and it is one, self-contained entity. And that is *it*. *It* is my music. I would not necessarily go as far as taking the implication for granted that someone created *it*[2]. I see *it* as an interplay of concepts that are distinct when reflected by thoughts but are actually misconceptions of continuity. I shall discuss *it*, the music presented, using ten concepts that appear to me to be the basic elements of *it.*

2.1. CREATION - LOVE

Your relentlessly selfish, utterly ignorant and obstinate author can easily summarise his primary necessity for creating music with the following statement: I have to love *it*. Personal mental and emotional configuration urges me to strive for and achieve love, which could shortcut the process of creation altogether as a painless human existence seems sufficient for happiness. However, the restless mind and the greedy ego make people go the long way around. Unsurprisingly, many other artists have expressed the importance of an autonomous aesthetic and the lack of consideration for audiences, some carefully while others offensively and bluntly:

[2] Although I firmly claim all the work presented to be mine.

> This is another wonderful paradox that perhaps only the arts manifest well, that by ignoring others and pleasing the self we are more able to please others more effectively.[3]

> I dare suggest that the composer would do himself and his music an immediate and eventual service by total, resolute and voluntary withdrawal from this public world to one of private performance and electronic media, with its very real possibility of complete elimination of the public and social aspects of musical composition.[4]

> I think society is one of the greatest impediments an artist can possibly have.[5]

Counterbalance to this disregard is maintained by the increasing interest in making contemporary music more accessible[6] and the blurring between popular and contemporary art (Emmerson, 2007).

It seems that creation is necessarily driven by an intent of reception, social or autonomous, although the *l'art pour l'art* movement seems to have circumvented the need for any reception at all. But, no matter how self-contained an artist may want to be he can readily be seen as a mere selection of existing human attitudes. Therefore the connection with other practices seems inevitable.

> […] no authentic work of art and no true philosophy […] has ever exhausted itself in itself alone. They have always stood in relation to the actual life-process of society from which they distinguished themselves, (Adorno, 1967: 23).

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[3] Laurie Spiegel 2007, 'Artists Statements' in Collins and d'Escrivan ed. (2007: 73)
[4] Milton Babbit 1958 'Who cares if you listen?' High Fidelity magazine quoted in Ross (2007: 442)
[5] John Cage in Kostelanetz (1991: 23)
[6] Leigh Landy (2007) devotes a whole chapter of his book to this issue.

In this sense music can be viewed as an organism that evolves (recently with immense crossbreeding and a huge expansion of the genetic pool). But, is an innovative artist an individual? Might he or she be the necessary continuation of the tradition? It might appear that the subject and the object of the creation are conceptually interchangeable, or even indistinguishable.

2.2. EMERGENCE

Let me approach the result of creation by referring to it as emergence, in order to exclude the implication of an object. Certainly, the cue of emergence is for me, after love, the second most important cue in composition. Technically, emergence is related to a perceptual threshold in the continuum; the crossing thereof is the emergence of a property, or the manifestation of the *emerging property*. This label is used in the experiment that proves the change in perceived color when the eye is presented a very fast color alteration. One could argue that, just as the sensation of a moving picture emerges from alternating stills due to the perceptual resolution, so the appreciation of arbitrary sound sources through loudspeakers is also a form of inevitable deception.

This is how I see binary perceptual emergence that is akin to the musical emergence that guides my composition. Musical emergence often results from intertwined structures that are articulated on multiple time-scales. That is the reductionist point of view, poetically; however, musical emergence is the resonance of the spirit.

To be pragmatic, let us define musical emergence as resulting from a special mixture that yields a new quality, different from the quality of its components. Such a concoction often consists of elements that become unrecognizable and inextricable from the blend. Very often these blends yield a new musical context[7] placing the musical utterance in a different light.

In dealing with musical emergence I regard the phenomenon in isolation and in its possible musical roles. Primarily my composition is the quest for love of emergence. The moment of emergence is a surprise unless one uses verified recipes; an open perception confronts it continuously.

In practical terms the search for emergence consists of experimenting with mixtures of materials and processes, always guided by the imagination let loose upon the prospects of intriguing development. This creative process is unpredictable and commonly wears labels of inspiration, divine guidance or pure chance. Let us describe it as the part of creation that allows for description and less for analysis.

2.3 PHYSICALITY

Having tried to deal surgically with the result of creation disregarding materiality, let me try to illustrate how the notion of immediate physical reaction due to human action is very important in my recent work. After being very excited by alien sounds I recently

[7] Discussed in chapter 2.4.

embraced the familiarity of the acoustic body. It excites me more to perceive a clear mental picture of physical objects, i.e. the causes of the sound. Most notably, this perception is not necessarily related to the fidelity of reproduction. Is it objectively acceptable that the *Brush Solo* algorithmic piece is more real than the unprocessed eight channel field recording *All Aboard*? The *Brush Solo* definitely relates more to the musical tradition no matter how unreal the means of production are. The acquaintance with music that does not reveal the sound source inspires me to compose by hiding sources that are nevertheless perceptually very present, physical and real.[8]

The idea is to present the sound such that it vividly evokes a virtual physical source and to take this percept to the verge of material reality using electroacoustic means. All the sounds in the works presented are derived from recordings and most of them are unprocessed.[9] The perimeter of physicality is often crossed by the use of cues for spatial movement, the use of playback speed variation as well as sequencing and layering. Surprisingly, these techniques do not seem to fundamentally shake the percept of the acoustic body.

A sound with an unambiguous identity frees the cognition to pay more attention to the musical relationships, whereas truly hidden sound sources draw attention to their spectromorphological details. The abundance of real-world sounds in my recent music contributes to the transparency thereof and carries a large historical perspective, as the

[8] This very intent has evolved through to the most recent algorithmic attempts at invoking the percept of manual composition.
[9] It is worthwhile noting here that works previous to this portfolio are largely synthetic and thoroughly processed.

musical tradition was stuck with acoustic sounds for thousands of years, while modes of listening and electroacoustic production have only been considered relatively recently.

2.4. SPACE – TIME – CONTEXT

Many of the presented pieces are more intensively articulated in time and space rather than in pitch. These three concepts appear intertwined but invoke clearly separate precepts in humans. Still, thinking processes play a major role as they can obscure the concrete engagement with space and time in art. Letting go of subjective time is crucial in experiencing the time encoded in music. Wayne Bowman describes this phenomenon very concisely when discussing Thomas Clifton's description of music's temporal foundation.

> …human events like music do not so much exist in time as carry their own time within themselves. (Bowman, 1998: 271)

Analytic abstraction is in turn aided by cognition. Of further interest is the proposition that sound itself can influence the perceived time and space.

> …the internal evolution of the spectrum of the sound-material may well affect the perceived motion. (Wishart, 1996: 192)

Consequently, my explorations of time and space are largely perceptually assessed while the analytic aspects are used for systematic exploration of the possibilities. Many spatial strategies have been implemented in multi-channel pieces. Evolving spatial configurations, static fields, multichannel recording and processing are used in an attempt to create an enveloping musical experience, to aid sound source differentiation and the transparency of the spectral detail. I have archived these in multi-channel format as well as performed them in a live diffusion setting. Other widely used spatial strategies are well defined and exemplified by Adrian Moore (2002).

Now, seemingly the time and space provide the physical context for the music, but how can this be if the music carries the time and space within itself? What about the musical context? Certainly a context is mandatory for any shape to come forth. Is the musical context the act of attendance? Is it the history of music? It is very difficult to come to a definition, but if we look at obvious instances of context change we might come closer. Context shift occurs when the artist changes intention, when the field (Emmerson, 1994) changes radically, when an unexpected extra-musical element manifests itself. Is the musical context maybe the expectancy? In music there are many expected elements that can be overthrown, including time and space. But if the context is the set of expectations and someone has none, a context still exists, i.e. the lack of expectation itself. No matter how hard I tried to seek a remote context and abruptly change it in my previous work, I am now very content about aiming at a closed finite space. This leads me to a possible analogy between the context and the constraints. It has been long projected that the composer's task is the definition of constraints, as some music seems to have lost them. Correspondingly, my recent work is often articulated within narrow constraints, for example *Shades of Brown*, which is a lengthy piece written for a single instrument in a single odd meter.

It is interesting to note that the space, time and context are simultaneously transposed in the act of reproduction. The instant of reproduction is a different point in time and a different point in space because the space changes with time, just as different moments in time necessarily yield a different context.

Let us propose a concept of *multi-coding* to approach the contemporary state of the artistic context. The term *double-coding* is used in postmodern literature (Rose, 1991) to describe the different layers of meaning present in art. However, the previously discussed simultaneity suggests that there are an infinite number of layers. An artist who is creating with this in mind and strives for articulation in different domains is *multi-coding* the message. In this sense, the inescapable context today is the historical, cultural, interpretational and perceptual multiplicity itself.

2.5. SHAPE

Shape seems to be one of the first abstract properties observed by humans. It appears to be present in all domains of existence; it comes forth as the generalization of a distinctly perceived character. This wonderfully abstract term aids the establishment of inter-connections across the whole of human awareness and sub-consciousness. One can claim similarity in shape across many domains of space, time, emotion, sound, thought etc. The question is to what extent the same shapes are identical in different people's perception. To me the interpretations seem culturally determined. Maybe future generations will regard a cube to be a softer, friendlier shape than a circle or an organic growth structure like a cauliflower. As the familiarity of the stimuli is the most prominent factor in one's emotional reaction, the overabundance of rectangular shapes around us might just provoke that.

Compositionally, the widely used instances and patterns of occurrence and recurrence, approach and departure, development and decay, and all the other conceivable trajectories bring forth shape in time. Spectral and spatial shape are the other, more recently acquired compositional concerns. These are all significant elements of existing compositional output, both of the instrumental and the electroacoustic traditions. It is very difficult to escape these commonalities, as they are typical of perception in general. Even the conceptual piece *Don't Listen* has a sense of occurrence, development and shape, even though there is no composed sound in the piece whatsoever.

The shape is omnipresent in human existence, anchored by the concepts of form, identity, causality and coherence, but even a collection of unrelated objects has a shape; everything seems to have a shape. The associational richness of shapes allows for successful composition by ear when the coherence and expression become a clear sensation rather than a formally designed feature. The structures lead the way to analysis, which may or may not be needed, but the cultural grounds of shape might obscure analysis altogether. The global homogenization of culture might blur the origins of human behaviour and perception because the cultural determinates lose variety. Shapes are becoming globally synonymic.

The correspondence of time based shapes, including movement, thought, emotion etc., is transparent, whereas the transposition of shape from space to time might appear problematic. The tradition of notating time in space hints at the possibility of abstracting properties in both domains and arbitrarily mapping them, i.e. time to horizontal position and pitch to vertical position. However, the un-abstracted, concrete, associational mapping seems artistically far more engaging.

2.6. EXPRESSION – MEANING – MESSAGE

> We sometimes say ‘This music is expressive’ without feeling that we can adequately answer the question ‘What, then, does it express?’ (Davies, 2003: 122)

In a certain sense the weight of expression is proportional to the coherence of well-articulated shapes. But what if the piece contains no sounds - no shapes? Maybe the expression is better linked to the properties of the listening context. Can environmental sound be expressive? Surely it depends on who is listening. So, if it depends on the listener as well, it seems essentially cultural. It appears to be the primary property of art to engage the audience and therefore it might be impossible to define it in terms of its content or context. The engagement is largely dependent on the perceptual correspondence between the composer and the audience. Therefore the vehicle appears to be of minor concern, which is well articulated in conceptual art, presented later.

> I am going to propose that words never ‘mean’ anything at all. Only people ‘mean’ and words merely contribute towards signifying peoples’ meanings. (Wishart, 1996: 13)

Combining the message of the two previous quotes one could conclude that expressive music carries the likely non-verbal intent of the composer. So, expression gains yet another kin – the intent. However, assuming that the expressiveness is largely cultural, the cultural distance of the composer from his audience may obscure her or his intent, which seems the major distinction between the intent and the expressiveness. The latter seems therefore to converge around perception.

2.7. PERCEPTION

> The objectivity is as fragile and ephemeral as the subjective moment of listening. (Voeglin, 2010: 16)

Instead of establishing firm theoretical ground, this philosophical enquiry poses a significant number of unanswered questions. It seems that so many commonly understood concepts are shaken loose by subjective and cultural aspects. How is it then that so many generic and specific points about music are agreed upon? I would argue that the key is in conceiving that different people are not as different, not as individual as they seem. People’s utterances might be considered subsets of opinions that are shared among many people. So, do people have opinions or do opinions have followers? In the same fashion the different modes of perceptual characterisation are shared among people. Perception might not be as individual as it seems, even without considering the social pressure to conform. Perception can be trained and explored but the remote avenues seem to lie beyond words.

Notably, the composer as the master of perception can guide it. There are plentiful active processes that constitute perception such as: revealing, focusing, reconciliation, association, distraction etc. Passive listeners hear the same piece each time it is replayed. Active perception is in turn characterized by vigorous exploration of audible content. Such exemplary behaviour has yielded a categorization of the listening modes (Schaeffer, 1966)[10], but the conviction of endless complexity in perception is mandatory, as no-one can listen through another person's ears, only his or her own.

2.8. LISTENING

Pierre Schaeffer has defined strategies for listening but not for quieting the interfering mind[11], not for omitting the verbalization of the perceived in regard to concrete properties. As a technically inspired composer it is difficult to circumvent my default listening mode, which is *listening to technology* (Smalley, 1996). I have to admit to being incapable of true reduced listening. Hearing a familiar language and not understanding the words at will would be the first sought milestone, but even when the attention fully grasps the rhythm, pattern, melody, formants and the intensity of speech, the mind will insurmountably reveal the meaning of the words to itself. Personal best attempts are

[10] these could be generalized to all the aspects of perception
[11] In contrast, R. Murray Schafer briefly points out that the quieting of the noise in the mind is the first step in improving the acoustic design of the world. Schafer, M. (1973) The Music of the Environment. In Cox et. al. (2004: 32)

characterized by a slight delay before the comprehension. However, it seems easier to discard the meaning of someone's words in his presence than on tape due to the abundance of other aspects of communication that one can focus on.

The music presented largely depends on traditionally extra-musical sounds becoming musical. Their artistic quality is something that one learns by listening and composing. But how does one learn to void the sounds of the meaning and of the associations that are subconsciously supplied? Need there be composers for ears deaf to meaning and noise? Musical awareness is a creative companion but sound source recognition seems the undefeatable enemy.

Deferring sound source recognition seems not to be invoked by thinking, rather it requires simultaneous focus and relaxation of the most serene nature. Also, the mere thought of not wanting to recognize the source is not bound to help, instead, the distraction of the thinking processes might.

Arguably my studies have altered my listening more than my composition. Recent compositional intent and output seems to continue my previous work (and also by developing its antithesis), whereas attention to listening processes has suddenly opened new paths. Recently, after revisiting texts on the physiological aspects of hearing, in particular the oto-acoustic emissions (Moore, 2003), I have devised a way of practising *reduced listening* that I named 'dancing ears': as the outer hair cells adjust both the pitch and loudness sensitivity of the ears based on the incoming sounds, one can try to become aware of this process. It appears a successful distraction for the visual senses to envisage the basilar membrane as it maps the frequency onto location. Further, the restless cognition can be occupied by modelling the continuously changing amount of dynamic compression and pitch selectivity that the outer hair cells induce. Spreading out the full audible spectrum and the two ears in cognitive space makes plentiful processing tasks that can overwhelm and thereby obscure sound source recognition. In simple terms by focusing on how one's ears 'dance' to the perceived sound, deeper levels of attentive listening might be achieved.

2.9. UNDERSTANDING – EXPLAINING

> Music presents a world inaccessible to ideas and only indirectly given to phenomenal experience. (Bowman, 1998: 127)

Could this be the ultimately revealing final statement in a commentary? If understanding is defined as the perception of intended meaning then certainly there is nothing to understand or explain about music because meaning consists of ideas. The term understanding however has multiple meanings including the "perception of the significance, explanation, or cause … [and] … being sympathetically or knowledgeably aware"[12]. Understanding seems so remote from the meaning when looked up in a dictionary.

[12] Apple Dictionary. Copyright 2005-2007 Apple Inc.

Understanding is often used as a binary class, i.e. in that one does or does not understand a piece of music. In the realm of multiplicity, however, we must consider how many possible interpretations does one understand. Even the composer might not fully understand his piece in this sense, let alone the audience. As a composer I find I have a radically different understanding of my music from others because it also includes the history of making it. Many rejected options and reasons for certain choices that have occurred during composition are encoded in this music, but only for my ears. Every composer has heard and considered his piece many more times than the listener; this I find changes the understanding of the music. Understanding is hard to define but the sense of appreciation and ability to relate to the music less so. Still, I would suggest that the music is self-contained to the degree that logical and metaphorical structures describing its content are distractive.

> […] written language, by its very form, does not have such pliable parameters as music. As a result, the 'prose-fiction' used to describe one piece of music can become dangerously similar to the prose-fiction used to describe another, often very different piece. (Shepard, 1977: 63)

Therefore I shall not attempt to poeticise the content of my music altogether. Instead, only the abstract intentions and the very concrete solutions are documented. Nevertheless there are many concepts and dichotomies that are useful in describing my music that are rather more philosophical than poetic. Presence can be analyzed according to *physical*, *psychological*, *personal* and *social presence* (Emmerson, 2007: 18). The intention regarding the audience can range from *considerate* to *inconsiderate*, from *appealing* to *disturbing* and *emotional* to *thought provoking*. Smalley's (1996: 87) descriptors of *dominance/subordination* and *conflict/coexistence* also approach musical relationships in a lucidly simplified manner. He further differentiates *gesture* from *texture* to deal with the matter of articulation that can be *local* to the listener or farther away, in the *field* (Emmerson, 1996), but a composer can also intentionally use the space inside the listeners head (Mcilwain, 2001), as I have attempted with *These Are Your Thoughts*. John Dack (2002) elaborates on Schaeffer's terminology, useful in classifying these descriptors. He extends the concepts of *typology* and *morphology* with the introduction of *characterology* that is the relational aspect of sonorous objects.

These descriptors describe the music from the phenomenal perspective; however the seemingly most appropriate manner to reveal the compositional perspective is the documentation of the tools and strategies.

Understanding is aided by the appreciation of compositional approaches, in the first instance the *bottom-up* and *top-down* (Landy, 2007: 34) approaches. The technological insight into computer-based composition can provide further understanding of the musical results. In the age of accelerating technological advance the exploration of new tools largely contributes to compositional creativity; this is definitely the case with the music in this portfolio.

2.10. REFLECTION

Reflection on music takes place after audition and is thereby not necessarily part of music. Different approaches exist, ranging from disregard to the obsession with the reflection, both personal and public. The creative freedom that an artist gains by disregarding external criticism can be both constructive and constraining. Some composers need to be left alone, some do not. Some aspire from within, some from the outside. Criticism can be constructive but might provoke a distracting protective emotional reaction as well.

Being a composer who is mostly happier during invention than inspection, I expect to remain more critical of the musical outcome than of the compositional intent and technical solutions. Being convinced that a good solution is never too tedious I always look for the shortcuts that lead to music. I am very content with some things being done with great care while others are done with less, because this matches the reality that is determined by human perception, according to which nothing is exactly perfect - the reality in which things scale from good to bad. Musical experience is rather subjective and a discussion might be concluded with the agreement on differing opinions. However, the supposition of mutable or unfinished work provides an open platform for creative discourse. It is surprising how little music is made by two or more composers. Communal creation of this type that I have sought to explore dominates among improvisers, the reflection becoming a part of immediate musical intercourse.

3. COMPOSITION

Having discussed some general concerns about art and related them to my musical stance, I shall now generalize some compositional techniques that I have used. Across the oeuvre many have been used on a variety of levels, however pieces that are largely dependent on a specific technique will be highlighted.

3.1. PERFORMANCE

I find that the most important aspect of composition is the performance; long before inventing notation, people were playing and making music. Obviously, formal procedures are well presented in my oeuvre, but the recent tendency towards physical performance in my music is clear. Let me briefly introduce performance as a compositional tool before discussing performance for an audience in the chapter entitled ‘Presentation’.

Since coming to the Electroacoustic Music Studios, University of Birmingham, new to my work is the extensive use of musical instruments and engagement in free improvisation. The available orchestral percussion, passion for creating instruments and high-quality recording equipment has prompted me to explore the palette of acquirable acoustic sound. This has resulted in a large pool of fertile sound material of which a small portion is used in the submitted works. Consequently the timbre of the pieces is largely instrumental, yet free from traditional *modi operandi*. Extended techniques are invented;

the sound is forced out of the instruments. Sounding objects were built from scrap, including rubber instruments that are thoroughly explored for their timbre in my first two pieces. Various plucking, striking and bowing techniques were applied to big and small rubber bands, a bicycle inner tyre and rubber matting. Also the small rubber excitations resonating in the mouth cavity were found to be very interesting.

Pieces that are purely instrumental are versions of *At Least Four* and the *Fingertip Improv.* These are recorded performances of an improvisers' ensemble and myself respectively. The algorithmic pieces *Shades of Brown* and *Brush Solo* have an instrumental appearance but they are performed by MIDI based algorithms and derive sounds from sampling software instruments.

Other aspects of performance include real-time software control. This has been employed in the studio and using digital diffusion setups. All manual sound handling in real-time seems to be classifiable as performance. Indeed the success of performance often comes from acquired skills. When I volunteered to play double bass on stage in a free improvisation jam, I was not concerned about not being able to play it, even without my ever having played it before.

3.2. RECORDING

Sounds in all my pieces, except for a few field recordings, were recorded at the Music Department of the University of Birmingham. Different microphones and techniques were explored, with recordings of up to eight channels being made of single sound sources to explore spatial processing possibilities. Many free improvisation sessions were arranged that were recorded on up to sixteen channels. Spherical placement of eight microphones was investigated, both in the studio and outside, in the field.

Many recordings contain musical articulation with acoustic sources as previously discussed. Field-recordings are most often done using mobile microphones and moving around locations while recording. Even an algorithmic composition like *Brush Solo* is essentially finalized by recording the 'performances' until a very engaging outcome was selected.

Attempts were made to classify recordings and create libraries that evolve around a single sound source. The goal was to obtain many samples from a single acoustic object such that splicing these samples would give the impression of improvisational performance and physical coherence. Software was developed to edit the recordings automatically and order the samples based on analyzed properties. Recording for this purpose implied that phrases are separated by silence. This contributed to the accuracy of automated cutting that was based on the amplitude of the sound. It resulted in phrases being divided into multiple short sound files. Around 1500 files were created and classified by source instrument for the piece *Culpable Passage*.

Experiments were made in recording impulse responses of multiple resonant bodies on sixteen channels. Unfortunately these have not been used so far. During my studies I have greatly expanded my library of sound material, which could thus keep me busy for another three years.

3.3. SPLICING

The main compositional tool for *Culpable Passage* and *"Spoof, skit…"* is the repetition of musical time, i.e. splicing and layering on a timeline. Arbitrarily placing sounds in looped time, the composition gains great timing precision and becomes repeated rehearsal. These tools allow freedom to organize sound arbitrarily. As having constraints implies the concept of freedom, we cannot know whether we would have the idea of freedom if we never experienced limitation.

All the submitted pieces employ an aspect of splicing; even *All Aboard* has two crucial splices, the beginning and the end. However digital splicing and layering were extensively used in *Culpable Passage* and *"Spoof, skit…"*.

Having started splicing audio using SoundForge on Windows 3.1 and DOS-based FastTracker program around 1996 I must say that it still remains my primary compositional tool. I consider this manual timeline work important to allow for intuitive musicality to gain shape, and possibly circumvent thought. No matter how technically trivial I regard this process, it does require great musical attention. The composer remains free either to consider form, structure, rules, intentions, conflicts, solutions etc. or not. The medium allows for pure composition by ear, for understanding by ear. Splicing can be used both to expose and to subvert the inner structure of the material. In both cases I derive the intent from the material, and the material is free from becoming inferior to compositional considerations.

The obtained material is explored for its qualities and musical implications. Its inherent tension and evolution are brought to fulfillment by the creation of the musical context and by imposing timeliness for their occurence. The predestined position in time, space and spectrum is sought, as in a game of puzzles. There must be a way for pieces to fit perfectly and one can find it by combination and arbitration. The judgments during the quest for existing tension and relation are so dependent on momentum that personal mood or saturation by re-listening results in different outcomes. A musical moment stripped out of time mutates when reproduced, each time. In my practice this meant that perfectly fitted pieces are bound to lose their impeccability if reconsideration is attempted. Musical threads were woven by looking ahead, not behind. Free will is exposed with spontaneous immediacy due to the improvisational approach that is not hindered by structural considerations.

The main reason I turned from manual to algorithmic splicing is that it is harder to find mystery in music that I have thoroughly constructed. Knowing the ins and outs of the material, the tricks employed and the reasoning behind choices makes the piece flat to my own perception. Algorithmically spliced material, however, maintains a sense of charm by the sense of indecipherability that it might have. Nevertheless, my algorithms allow me an arbitrary amount of compositional control that I find suited for almost any specific purpose.

3.4. PROCEDURES

I may describe the algorithmic aspects of my music as the composition of procedures rather than composition of notes or splices. I have created many programs in various languages to aid my composition. The most frequently used were the algorithmic splicing or re-sequencing and the MIDI note generation and processing algorithms, which will be discussed in chapter 4.2.

Algorithmic splicing can yield various musical gestures by redefining the rhythm. The most important controls of this process are the density of splices and the sound source pool. Changing the sound source pool while running the splicing algorithms can result in textural development; indeed, the density is high. Thanks to fast computer systems, great variety in density was explored by layering up to two hundred algorithmic passages.

I used both deterministic and random automated splicing to produce a variety of musical material from the recordings. Largely random selection and random timing yielded material resembling free improvisation. I took the challenge to push the material algorithmically up to the point where it achieves musical identity, when a strong property emerges or, poetically when the spirit appears. In order to do this all files were analyzed by a program written in SuperCollider. Extracted data consisted of duration, average amplitude and pitch estimation. Furthermore, files were analyzed for energy content in five frequency bands, such that the loudest and the quietest band were found. At this stage further programming made the definition of abstract temporal structures possible. The elements in these structures were addressed based on the extracted data. This allowed the automatic production of an unlimited number of phrase variations that correspond to the same set of rules. I was happy to indulge in this stage of composition when I sat back and waited for a musical interpretation of a programmed structure to occur.

The creation of very dense material, as can be found in the acousmatic pieces was based on controlling the ranges of random functions that determine timing, panning, density or playback rate. These basic processing techniques and a small amount of cross-modulation were the only processes used that alter timbre. I found that too much processing took away the physicality of the material and very quickly made it abstract. On multiple channels, different instances of the same process governed by the same control data were used. I collected these passages without too much presumption of their role and presence in the forthcoming music; I allowed them to lead the compositional process. The quality I sought was detail in multiple domains: presence, envelopment, articulation and motion.

The re-sequenced passages were mostly structured by random timing, which could be made musical by tuning the available parameters. But, in addition, incrementally sorting the samples according to a property and sequencing them according to that order, proved very appealing. Even if the samples were in an exact order according to the analysis data, they would not seem to be linearly organized, because of the variety and the turmoil of extended techniques and analysis inaccuracies.

3.5. FINE-TUNING

After drafting the music, very often a stage of revision follows - a very important process, especially in manual composition. For algorithmic and improvisational pieces it is, however, far less important, as the rawness and immediacy of gestures are crucial. When crafting detail, however, tuning can turn into an endless process, just as the mixing and mastering of improvisation recordings, discussed in chapter 4.3, could be ever refined.

Fine-tuning is about enhancing the musical appeal that resides in the material. The perception of new and unintended relations and movements in the piece is inevitable, each time one listens carefully. Being temperamental about my music and freely changing opinions, I sometimes find it difficult to fine-tune the details consistently, with a focused goal; rather I tend to verge off on remote exploration paths.

In the course of revision I mainly seek to establish balance. The spatial shape and evolution is considered, as well as dynamic and timbral balance. The variety of articulations is often constrained in order to reduce the distraction of focus. The dynamics are made more natural, and the activity in different registers is also likely to be evened out.

Fine-tuning can relate to the multiplicity of interpretations as well as the multiplicity of focus threads. Very often I find music to have an intended main focus guide that captures attention, as well as a focus trajectory typical of absent-minded listening, and many hidden layers requiring fully directed intention. In simple terms this signifies listening, not listening, and critical listening. So, in the process of revision, these domains are explored and the piece is adjusted to achieve the artistic appeal desired.

I have also done some revision related to social implications, based on collecting opinions about the draft of *"Spoof, Skit…"* from other composers. I was especially curious to hear the points of scorn and disapproval, in order to gain personal perception thereof and possibly do something about it. This could be seen as making the music more accessible, commonly comprehensible and more widely respected. However this was not my direct intention. Instead I was trying to experience the piece with other people's ears, as if I listened to it the very first time, trying to find the distractions and the culprits that prohibit exact comprehension of the musical intent. Conscious effort to cater for the listeners, most of whom will hear the piece only once, is quite unprecedented in my work. So far I have been led by the belief that deeper musical value requires repeated involvement. I regarded the listener to be responsible for finding meaning and depth, and this quest to be the only path to artistic experience. After composing in depth I tried to give the piece a layer of satisfactory appearance, which might give the careful listener a deceptive layer that is difficult to penetrate.

3.6. PRESENTATION

Possibly the most influential technical novelty in my works is the availability of a ring-of-eight speaker setup. The option of presenting music on a large number of speakers has triggered exploration into various diffusion techniques. The conventional use of volume faders was extended to design a piece- and venue-specific diffusion desk as will be discussed in chapter 5.1. My compositional strategies became inspired by the spatial detail and variety that is standard in BEAST concerts.

I consider the reproduction of fixed media music without site-specific interpretation an inferior listening experience to audition in the studio. To come closer to the compositional detail I would always advise auditioning the music in a similar environment to the one of the composer, i.e. the studio. Further, the convenience of studio-based playback allows for more active listening in the sense that listener has control over the presentation - not to mention that analysis requires attendance at many renditions and thereby repeated audition of the music.

As my music is a free combination of available tools and momentary intent, I envisage the presentation thereof to bear similar qualities. While preparing complex diffusion at the performance venue I always find some aspects of a piece will inevitably be emphasised and some will be lost in translation. More surprisingly the attendance of the audience already shifts the musical planes noticeably. As such, I see diffusion as a performance art in its own right.

4. TRADITIONS

The music presented in this portfolio belongs to five traditions of contemporary composition: acousmatic, algorithmic, improvisation, soundscape and conceptual. The presented list of genres is ordered to move gradually from the very concrete engagement with sounds towards the abstraction of compositional process and the music itself. This progression is a way that I see my work has developed in the past few years.

Acousmatic techniques involve the composer with all the spectral and timing detail. Algorithmic techniques allow for designing procedures that specify the timing and the spectral quality of the material, These techniques are under an arbitrary degree of control whereas involvement of improvisation might take things a step further from the detailed involvement of the composer. Setting and the context of improvisational practice still allows the composer a great amount of influence over the musical outcome. However, the prominence of field recordings in soundscape composition takes the composer yet another step further from absolute command as the occurrences of environmental sonic events are arbitrary. Still, the act of recording maintains large compositional impact in the variety of recording techniques and the contextualisation of the recorded sounds. Finally, conceptual compositions seem furthest away from the stipulation of musical content. The composer is in this case largely concerned with questioning musical practice and creating a symbolic manifestation rather than an auditory one.

Discussion of the related traditions will not attempt to analyze and exemplify them, instead it will provide for a grouping of my pieces that bear similarities.

4.1. ACOUSMATIC

The acousmatic circumstance is characterized by the absence or the invisibility of the sounding object during musical performance[13]. Therefore, technically all music reproduction is acousmatic, but the term is meant to imply the source being hidden from recognition as well. Historically certain characteristics are united to form a musical genre bearing this label or more often the one of *musique concrète.*

> *Musique concrète* is that form of electronic music which involves manipulation (usually with tape recorder and splicing block) and composition using non-electronic sound sources (i.e., electronic only in process of composition). … The process is fourfold: seeking/finding sources, recording sources, manipulating sources, and composition. (Cope, 1977: 137).

This definition describes the original tradition that has been thoroughly studied. Multiple excellent texts exist on this topic of which a few are to be found in the bibliography. Among the submitted music the pieces *Culpable Passage* and *"Spoof,skit…"* draw much inspiration from the acousmatic tradition. The digital splicing block is indeed the most intensively utilized tool. The majority of the sounds used were performed and recorded for the pieces. All four quoted stages of the process are clearly articulated.

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[13] Scheffer, P. (1966) 'Acousmatics', in Cox (2004).

The stage for my acousmatic pieces is a sonic space that is firmly rooted by unprocessed recordings that are organized into musical shapes. I find that a certain sense of corporeality arises from recognition of manual performance upon real sounding objects. The virtual presence of a performer in acoustic space was something I sought to achieve.

The composition process I used is often referred to as the *bottom-up* approach. The quoted four-fold process begins with the search for material that determines much of the whole composition, thereby building from the bottom, so to speak.

The sonic materials for my acousmatic pieces were created in three distinct ways:

1. Sound performance and recording;
2. Sound collection from personal library;
3. Algorithmic layering and sequencing.

These processes are used for opening up the space of possibilities and often lead to the revision of initial musical ideas, and to divergence from the original plans. This implies that the composition is based on trials that might be overthrown in the process of acquiring musical value. The duration of the material collection process is very dependent on the success of the achievements. Some compositions or sections enjoy momentary deliverance while others may require struggle and perseverance.

The opening up of a musical space of possibilities by collecting material is followed by the narrowing thereof, induced by decisions about the application of those materials. This closing stage is far less experimental, being directed by my musical cravings and preferences. At this point the very presence of musical entities allows for forbearance from verbalization of intentions and decisions. Judgment and execution are intertwined in this process that yields the music. Interestingly, this process of composition could be regarded as improvisation due to its open nature. Improvisation implies that "we are not always aware of the constraints that we are functioning under as we work, or why we decide upon certain actions." (Lewis, 1999: 101) This seems to hold for acousmatic composition. Nevertheless, because it incorporates out-of-time positioning of events into quantized time it very much resembles traditional composition.

Having transformed the space of possibilities to an ordered set of musical movements, structures and forms, to the draft of the piece, the revision begins. Based on substantial listening and collection of impressions and ideas, I fine-tune various aspects of the piece. I seek details that determine distinct qualities. I believe that the pursuit of detail in revision is ideally never finished because a good piece always uncovers new qualities to the careful and receptive listener. However, there comes a moment of halt; I finish a piece when the horizons of perception and interpretation suddenly appear endless.

4.2. ALGORITHMIC

In algorithmic music, formal structures, processes or sets of rules typically define the piece; different instantiations resemble different musical performances. Regardless of the fact that my acousmatic pieces have algorithmic components, the works *Shades of Brown* and *Brush Solo* are essentially MIDI sequences created algorithmically, and thereby are referred to as algorithmic. These pieces will be the sole subject of discussion, as an excellent survey of the history, theory and technical detail related to the algorithmic tradition is freely available online. (Aschauer, 2008)

My first complex musical application coded in Max/MSP almost nine years ago was a probabilistic MIDI sequencer. The ideas remained dormant and suddenly surfaced with the recent merge of Ableton Live and Max/MSP softwares that allows for easily expanding an already flexible multi-track sequencer. The algorithmic pieces are thus created and are made to expose the algorithm that is intended to appear anthropomorphic, to appear human rather than robotic. I find both attempts reasonably successful, bearing in mind that the *Shades of Brown* is manually shaped in time using a few simple controls whereas the whole *Brush Solo* is played by a constellation of algorithms that are left to run.

All the algorithms operate in real-time by processing, filtering and creating MIDI notes. They are encapsulated in simple multi purpose devices and are documented in the Appendix. The rhythmical basis is often a manually sequenced loop. The automated or controlled note processing parameters largely define the musical outcome. This approach belongs to David Cope's fifth category of indeterminate processes:

> 5. stochastic methods wherein basic parameters are determined but material enclosed is basically chosen by random selection; (Cope, 1977: 177)

Controlled probabilistic processes are by far the most often utilized ones. A more generic signal processing approach is chosen over a music theory-based one. Only a few musical concepts have been used and generalized, as in the case of the circle of fifths in the *zb.circleWalk* plugin.

> Many others [aside from Hiller and Koenig] worked on algorithmic composition systems, and they often came to similar conclusions (i.e., that the application of music theory rules is not as useful as generalized abstractions).[14]

Two opposing approaches are demonstrated in *Shades of Brown* and *Brush Solo*; in-time control and out-of-time design respectively. I have attempted to create both virtual piano performers with a few adjustable parameters and a self-sufficient polymetric soloist.

> The machine does not replace the composer. The composer must maintain an active artistic interest to coax and mold the machine output into a piece. (Tanaka, 1993: 20)

So the question is, did I compose the *Brush* Solo? Or did I engineer a soloist? I support Atau Tanaka in that interaction in algorithmic composition plays an important role as the musical variation and detail are under control, but I also attempted to develop a hierarchical constellation of algorithms to create a whole musical personality, that takes an unexpected two bar break as in *Brush Solo.*

> Chance is the most academic procedure yet arrived at, for it defines itself as a technique immediately.[15]

[14] Paul Doornbusch 2009 'Early Hardware and Early Ideas in Computer Music' in Dean (2009: 75)
[15] Feldman M., Sound, Noise, Varèse, Boulez. In Cox (2004).

Indeed there is a great amount of conceptual interest in the rule-based definition of music lurking behind my algorithmic pieces. It is like building music-making robots and their axes of freedom that can make even a simple random walk musical. The complexity of a program may suffice to support all the notions that a composer might conceive, but I chose to explore the possibilities of the tight integration of sequencing and simple algorithmic processing. In a sense this is *bottom-up* approach which first explores generative musical structures. A range of simple algorithmic devices has proved an inspiring set of constraints to achieve musically satisfying results.

The compositional process involved actually resembles the four-fold acousmatic approach, except that recording is preceded by formalisation of musical thought and programming. Further, the sequencing of the material or the composition plays a lesser role in order to expose the algorithmic structures.

4.3 IMPROVISATION

> Some musicians say, if what I'm doing is right, they should never have gone to school.[16]

In my view good improvisation is about doing the right thing at the right moment without premeditation. Aspects of studio-based improvisation with sound synthesis and composition in my early work have grown into a full-fledged passion for free instrumental improvisation. Having met inspiring improvisers in the Midlands I have

[16] Coleman, O. (1959) Liner notes to the Change of The Century CD release, Atlantic Records.

attempted to establish a regular recording session to develop an ensemble. In two years I have performed, recorded and produced nineteen *Free Elgar Sessions*. In parallel with the expectation of Ornette Coleman's critics I never studied musical performance in school. Free improvisation for me is about musical awareness and physical inventiveness. All practiced techniques are not strictly improvisatory. *Fingertip Improv* was for me the first and last occurrence of extensive fingertip squeaking on a grand piano soundboard.

> Where composition is work improvisation is play, although I'll admit it's not quite that simple. If a composer's work lacks elements of play the result is lifeless. As for improvisers, if their play lacks discipline and work the music is self indulgent.[17]

Rationally speaking the act of play relates to exploration of possibilities but it could also be seen as the surrendering of mind and body to an imaginary world. In the act of improvisation I see the role of the improviser being to articulate time; to articulate spiritual presence; to invoke the spirit, to become one with it, to play with it.

> …to say that we do something intuitively does not mean that some power of intuition is involved.[18]

Intuition is defined as "the ability to understand something immediately"[19]. Indeed, the performance can circumvent verbal understanding. Intuitive performance can utilize the power of submission and the sacrifice of oneself and one's ego.

[17] Sam Richards [CD inlay for] James Fulkerson, Mick Green and David Murphy 'In the Same Breath' FMR Records 2006
[18] M.A.Boden (1999) Computer Models of Creativity in Sternberg (1999: 362)
[19] Apple Dictionary. Copyright 2005-2007 Apple Inc.

> It is necessary to become aware of ingrown habits and musical clichés. Otherwise the so-called 'spontaneity' reveals only mental habits and the clichés of one's musical milieu. (Wishart, 1996: 104).

It can be argued that an improviser necessarily acquires habits that he has to either accept or reject which is in itself habitual. Therefore I systematically and extensively recorded performances such that I can confront the multiple layers of articulation of which some may be habitual and ignored.

In my improvisational pieces the composition is limited to the arrangement of musicians, instruments, space, context, recording, mixing and mastering of the performance. Digital processing and editing are minimal.

4.4. SOUNDSCAPE

This genre embraces field recordings presented in a musical context often using minimal processing and editing. Thereby it accentuates the musical quality of environmental sounds and their temporal occurrences. Notably, the least represented genre in the presented oeuvre evolves around pure environmental recordings, as just slightly more than two minutes are included in the portfolio. However a conceptual piece named *Don't Listen* was born out of the increased sonic awareness gained during field recording.

> Soundscape compositions are sonic works that pursue an investigative, research-driven tone, where to listen is a request rather than an ambiguous invitation. (Voeglin, 2010: 32)

It appears to me generally useful to record and audition environmental sound in order to increase sonic awareness. I find it more revealing to attend the reproduction if I attended the recording. If the listener is also the recordist then the relationship between natural and reproduced acoustics can aid in training one's perception. Aspects of environmental sound can be taken into detailed consideration in order to increase awareness of the features that reveal themselves in the act of reproduction.

> The principles of soundscape composition are:
>
> 1. listener recognizability of the source material is maintained, even if it subsequently undergoes transformation;
> 2. the listener's knowledge of the environmental and psychological context of the soundscape material is invoked and encouraged to complete the network of meanings ascribed to the music.
> 3. the composer's knowledge of the environment and psychological context of the soundscape material is allowed to influence the shape of the composition at every level, and ultimately the composition is inseparable from some or all aspects of that reality.
> 4. the work enhances our understanding of the world, and its influence carries over into everyday perceptual habits. (Landy, 2007: 106)

Acquaintance with and the application of the principles of soundscape composition have inspired my listening and composition practice. I find large durations crucial for successful immersion in a soundscape. Due to the time constraints of this portfolio, nearly ten hours of engaging field recordings have not been developed into pieces.

> The hi-fi soundscape is the one in which discrete sounds can be heard clearly because of the low ambient noise level … even the slightest disturbance can communicate interesting or vital information.[20]

[20] Schafer, M. (1973) The Music of the Environment. In Cox (2004: 32)

I find aesthetic appeal in lo-fi soundscapes, as I find great interest in noise, both acoustic and electric. The noise in *Fingertip Improv* is meant to interfere with the acoustic events and yet to remain a distinct auditory stream (Bregman, 1994). It reveals another piece if the listener is capable of continuously focusing on the background hiss instead of the squeaking sounds.

4.5. CONCEPTUAL

> In general concept musics are those ideas borne of the mind and not of actual performance in traditional terms. Concept musics can vary from one- or two-word statements […] to extensive programs in which the performer (now audience as well) creates an intricate mental environment for himself. (Cope, 1977: 273).

Conceptual music focuses on cognitive engagement and often crosses over into other art forms such as performance art, dramaturgy, poetry etc. The sound is then often a mere vehicle rather than being an end. Conceptual elements are omnipresent in my work. The finale of *"Spoof, Skit…"* is radically unmusical in order to pose a question about the boundaries of music as a phenomenon and its abuse in the post-modern society. The algorithmic piece *Brush Solo* is born of a single concept, that of an independent virtual drummer in musical isolation.

Conceptual composition is typically a *top-down* design that is firstly considered with the structure of the piece as a whole, often driven by intentions of provoking thought or action. Such is the *Herdington, These are Your Thoughts* and the purely prosaic recipe-piece *Don't Listen*. These have a very specific intent and technique and will be discussed separately.

Many pieces are produced using custom programs that necessitate the conceptualization of the compositional intent and technique. These concepts involve signal processing, generative techniques, recording techniques, visual scores, associational networks and spatial configuration.

5. PIECES

In this chapter some facts about the submitted works will be documented that might aid analysis. I find that I do not have enough distance from my music in order to see it objectively. My associative field related to these sounds is much larger than the associative field of any other listener. I much prefer an analysis that thrives upon what is in the music rather than what was meant to be in it; the type of analysis that I cannot provide.

5.1. CULPABLE PASSAGE

Culpable Passage is the first piece completed at the BEAST studios. The compositional process is closely related to *"Spoof, skit…"* and has therefore been jointly discussed previously. The spatial strategy applied is, however, unique. The piece was composed in eight channels and subsequently expanded to twenty-four to aid the multi-channel diffusion. Algorithmically spliced eight channel material remained spatially fixed. For the spatialization of stereo material the most convenient readily available tools were chosen: the built-in panorama plugins in Nuendo. These place the sound using the model of a two dimensional plane encompassed by eight speakers. Spatial gestures were created with the mouse, largely by trial and error. This often resulted in very fast movements that relate to the rhythm of the material. Without having to verbalize the relation of movement among different materials I tuned it to enhance the musical gesture and carry the spatial presence that I found personally appealing.

Musical structures could be analyzed based on differentiation between sections, relationships between the content, the durations and dynamics. However, due to these relationships having remained tacit during composition, that type of analysis will not be attempted. However the timeline of the piece is presented in Fig. 2. as a visual aid to understand how the material is organized.

The premiere of the piece took place in Birmingham at a concert to celebrate the 25th anniversary of BEAST. The venue was equipped with almost 100 speakers on more than 60 discrete channels. This allowed me to let my imagination loose upon finding the best way to present this originally eight channel piece at the concert. My first thoughts led me to experiment with musical channels or stems as a different way of encoding music compared to the tradition of spatial channels. The piece was composed for eight speakers in a ring such that the musical gestures are defined in space. I wanted to surpass the mere remapping of this space by allowing myself to invent new spatial configurations for a performance but still preserving the original gestures. In order to do this I split the piece to three musical stems, one for each of the eight spatial positions, in total 24 channels. The musical stems were named as follows: 'foreground', 'moving' and 'steady'. 'Foreground' consisted of most pronounced gestures in space, rhythm and timbre. 'Moving', short for moving background, was material moving through the speakers that mostly has an accompanying musical role. 'Steady', meaning steady background, was the dense material discretely mapped to eight spatial channels.

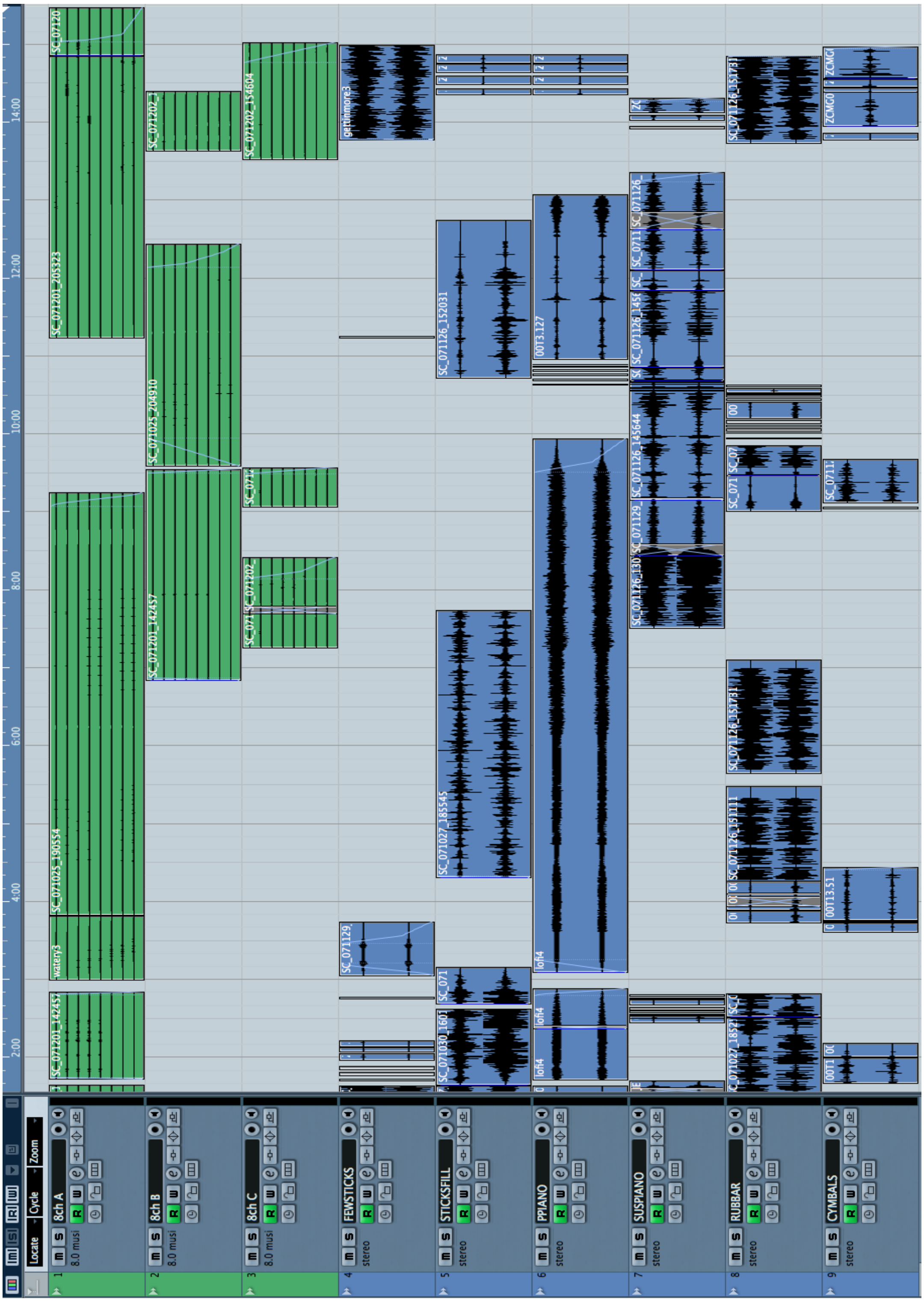

Figure. 2. The timeline of *Culpable Passage*

Now, the venue being setup to have multiple rings of eight speakers inclined the design of the diffusion desk along these lines. Having set four rings (main, high, floor and diffuse) plus a cube of eight speakers, I devised another ring from the speakers on stage and at the desk. Each of these groups was assigned a single fader for the volume of each musical channel, whose eight spatial channels were mapped to the elements of the group. A few stereo groups were used, namely tweeters, overhead and distant. To these the sums of four left and right channels were routed. Also two effects were included: the rotation of the ring and the delay. The number of faders for diffusion was quite small for the system. This led me to contemplate carefully their roles, as all the existing musical channels could not be routed to all rings together with effects, so combinations were chosen whereby the spatial availability and the effects support the musical role. Consequently the foreground was made unavailable in the tweeter, overhead, diffused and distant speakers. This is because the spatial and timbral detail of the foreground requires accurate reproduction.

The 'inaccurate' groups were to have the delay effect available in order to achieve an even more diffuse effect. Rotation effect was assigned to 'accurate' rings, except for the reference, the main ring. With maximum excursion of the fader the ring could be fully rotated twice. With this desk plenty of interesting spatial configurations became available. Dense, discretely panned material - the steady background - could be arbitrarily distributed in space, on four rings, possibly rotated and delayed, in order to decrease dramatically the correlation of duplicated channels. The spatially moving musical channels were presented on various 'accurate' rings and could be cross-faded to another ring and rotated in order to match the performance space.

H	T	R	F	M	S	R	F	M	S	D	M	S	D	M	S
Subs		High				Stage				Tweeters			Overhead		

V	F	M	S	R	F	M	S	D	M	S	D	M	S	D	S
	Main			Cube				Floor			Diffused			Distant	

Figure 3. Diffusion desk layout, 32 faders in two rows, gray fields represent effect faders, the rest are volume faders, legend: H – head (front), T – tail (rear), V - master volume, F - foreground, M - moving background, S - steady background, D - delay, R – rotate.

This desk, for this 24-channel version proved to be a successful setup. Ideally I would have spent days finding the best configuration for each passage in the piece and score it or automate it. Unfortunately this was not possible, it struck me at the rehearsal a few hours before the concert that I could really use a simple snapshot interpolating automation on top of this desk. Before the performance I had to confess not being able to do this very well at all. The complexity of the controls surpassed my ability to perform the intended diffusion accurately.

In retrospect I find the dramatic aspect of the piece overemphasized. Free will could yield a similarly bright and humorous piece without forcing the thrill and excitement. But this aspect is context-dependent, as sometimes the drama may work. The artistic value cannot be proven, but I personally find it in the interest that this piece arouses in me each time I listen. New artistic paths I chose in this piece led to conclusions that inspired further elaboration - these are the musical validity of accurately recorded instrumental sources, analysis based algorithmic re-sequencing and diffusion desk automation. I found no substantial advance in the other aspects, such as splicing, layering and structuring.

5.2. "SPOOF, SKIT, TAKE-OFF, LAMPOON AND SEND-UP"

The second piece completed at the BEAST studios is another 'manual' composition. The title is an exact quote from Richard Dyer's book 'Pastiche'. This piece takes the humour and self-reference on board and explicitly aims for them to establish a relation to other coincident musical qualities by employing predictable, but abrupt and radical context change. Vague symbolic relationships to the evolution of art can be traced, always leading to the increase in (ab)use of pastiche, distancing from 'beauty' and ultimately rendering the content inferior to appearance. The piece is constructed of predominantly instrumental sounds specifically recorded for it, but also uses a vast range of existing musics to expand the context and the web of musical relations.

I am indebted to the instrumental performers featured in the piece: Hilary Jeffrey - trombone, Andor Horvath - double-bass, James Carpenter - tuba, Rodrigo Parejo - flute, Serena Alexander - voice and Julien Guillamat - cello. Musicians were asked to improvise freely to start with and then were guided to explore a chosen aspect or technique of their playing.

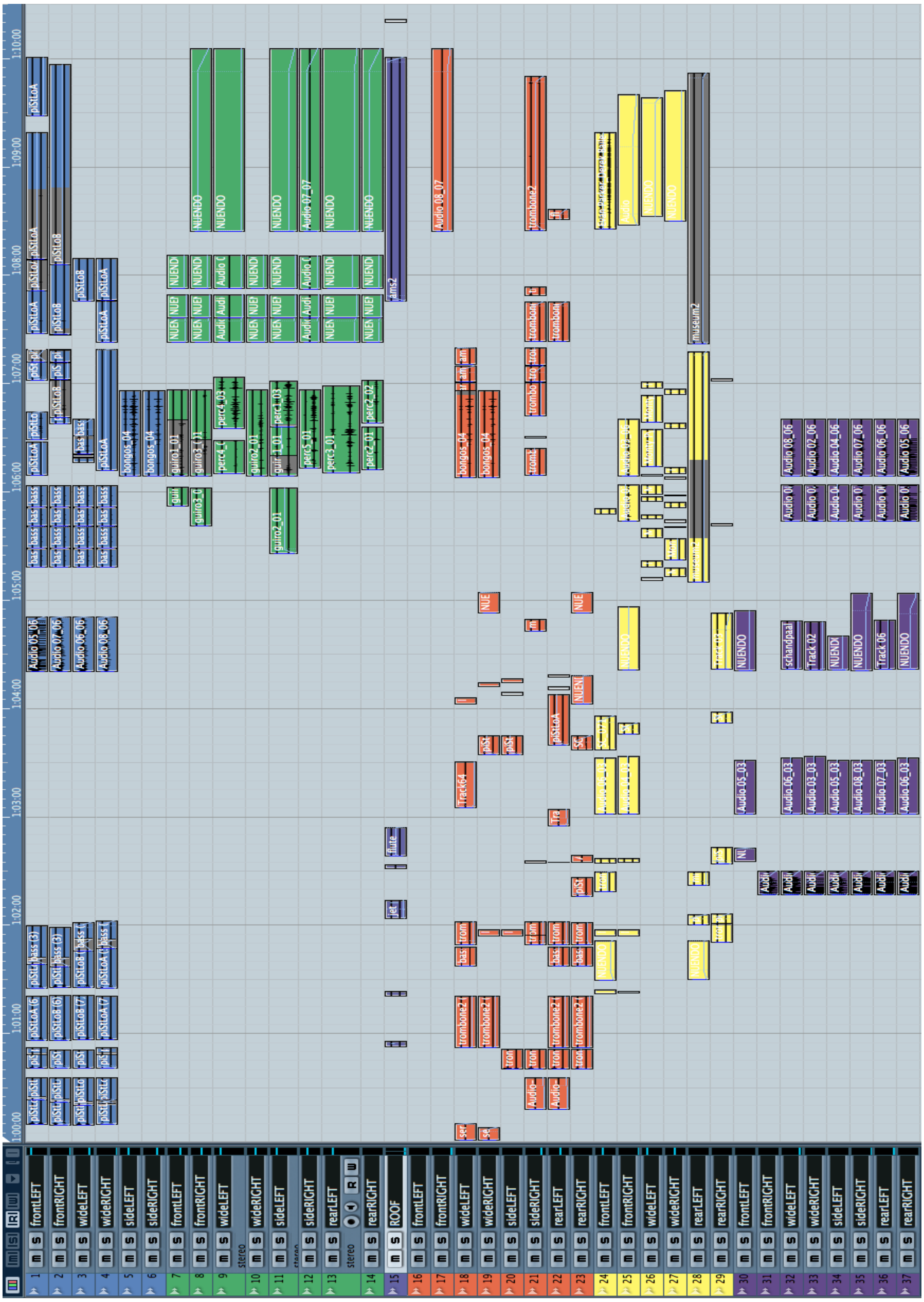

Figure. 4. The timeline of the *"Spoof, skit…"*

The structure of the piece is improvised and thereby lends itself more to in-time appreciation than structural analysis. In contrast to the first piece, all the material is statically reproduced without simulation of spatial movement. However, some eight channel recordings made for the piece have a slight sense of movement due to moving the sound source during recording.

The piece ends in an unexpected cacophony of recognizable music. This is meant to lend a sense of abandonment as the somewhat considerate artistic thread disperses. However the careful listener might appreciate the broad soundscape and the multiple points of possible focus. It seems that the abundance of musical stimuli can both open or close one's ears - it all depends on the listener.

> […] our experience of what arrives later is modified by our (perhaps inaccurate) memories of what has passed and, in this sense, there can never be a clear cut 'recapitulation'; everything is modified by the context of what went before.[21]

Creating a radical transition from acousmatic music to cacophony defines this piece. The whole piece attains different characters when listened to again, as the expectation of the finale creates a different context for the musical threads before it. So, further to the context-defining property of the past events, I seem to have identified the context-defining property of the anticipated future events.

[21] Trevor Wishart 1977 'Musical Writing, Musical Speaking' in Shepard (1997: 141).

5.3. SHADES OF BROWN

In developing algorithms for composition of traditional pitched event-based music I took on the challenge of making a piece for piano. The applied techniques appeared successful in articulating odd time signatures. Being very fond of Bulgarian and Macedonian musical traditions I have adopted the 11/8-meter in its most common 4+3+4 form. The piece consists of eleven sections of which each is in this same time signature. Regardless of the fact that the design of algorithmic MIDI devices using Max for Live is a very cognitive process, the composition of the music could be fully governed by the ear. In constructing the algorithms that largely deal with pitch and density, care was taken to select a few crucial parameters for real-time manipulation by the composer. In this manner the variations were controlled as if in a performance, reacting to the musical content as it plays. In Daphne Oram's (1972: 87) terms this is indeed 'indeterminacy-regulated-towards-individuality'.

During the course of composition various ideas were implemented and revised to yield the zb.m4l library of devices that is described in the appendices. Eleven musical études were developed in isolation such that they each 'paint' a shade. These became the eleven sections of the piece. All the sections were put in sequence to describe a musical motion. Once in place the sections were revised to form fluent continuation throughout except when musical intuition dictated a break.

The rhythmical foundation of the piece is composed of simple MIDI sequences. Processing algorithms were used to populate notes and spread them out accordingly. Many sections are articulated by the control of note density on top of the same underlying algorithmic structure.

5.4. BRUSH SOLO

In contrast to the thoroughly controlled note generation of the piano piece, *Brush Solo* is an algorithmic constellation let loose. A recurring rhythmical pattern in 15/4 was composed to be the pulse for the soloing computer. Three layers of rhythmic patterns were superimposed to define events on a brushed drumkit virtual instrument. Each layer had four to five underlying sequences that were swapped at random each bar. There were empty sequences incorporated to provide for greater density variation. The sequences were created in a variety of superimposed meters to provide polymetric articulation. Finally a very slowly moving noise modulation was applied to the overall note-filtering device to provide for slow development in the solo.

I managed to create a virtual drummer that plays rhythmical phrases I enjoy but that I cannot dissect, because of complex polymetrics.

Curiously, the same algorithmic constellation would sometimes play an engaging solo and sometimes an obviously random one. When the first few bars of the solo intrigued my sense of rhythm then the continuation would also make sense, whereas if it started off randomly it never really formed a coherent musical thread.

5.5. AT LEAST FOUR

I started composing for improvisers back in 2006. My first piece comprised a set of symbols that described instructions determining register, dynamic and density for the performers to improvise with. Each performer was shown an instruction and cued when to follow it. This resulted in a performance by the Maarten Altena Ensemble that was rather successful; the piece was entitled *Cue*. Coming to Birmingham and getting acquainted with local improvisers further inspired this thread of thought. I have established a monthly recording session named, in accordance with the performance space (Elgar Concert Room), the Free Elgar Sessions, abbreviated here to FES. Many musicians have contributed, some regularly some not, on occasion the whole Birmingham Improvisers Orchestra was invited, involving more than twenty musicians at a time. A variety of experiments was carried out before arriving at the video scores for different versions of the piece entitled *At Least Four.*

These pieces are essentially algorithmic in that the time is divided algorithmically and the instructions are constructed and assigned at random. The sections are derived by what I named *random offset division.* A given amount of time is divided in two with a specified maximum error i.e. one of the halves was slightly shorter. By recursively applying the algorithm to the results of each division one can arrive at a number of sections that will be a power of two. The resulting durations approximate a pink noise pattern. For each of these sections, performer-instructions were assembled by combining a noun and an attribute at random. The possible attributes were as follows: monotonous, intermittent, extrovert, ugly, beautiful, lazy, revolting, absent, obscure, aggressive, jolly, sad, consonant, dissonant, staccato, legato, slow, fast, high, low, sparse, dense, dirty, soft, loud, advancing, retreating, fearsome, erotic, decieving, happy, heavy, light, convincing, occasional, steady, muted, open and bashful. The action could be one of the following: stop, halt, disappear, exit, high pitches, single pitch, low pitches, unvoiced, whisper, shout, squeak, rumble, roll, multiphonics, subharmonics, melody, chords, arpeggios, rhythm, nonsense, solo and invention.

I found it far too challenging as a performer actually to follow a random instruction like ‘heavy subharmonics’ or ‘fearsome chords’, especially playing percussion. Nevertheless my fellow performers found it interesting and rewarding to attempt to follow the instructions. For each section one out of four groups would get an instruction that would not be composed as described but would address the group to establish a certain relationship to another group. The relations were randomly selected from the following: follow, accompany, counterpoint, mock, contradict, contrast, overthrow, suppress, imitate, shadow, disturb, reinforce, approach and strike. To support the intent of obscure instructions establishing a relation to oneself was not excluded. In this manner a piece consisted of a given number of sections, within each of which the four groups had an instruction in green writing on the screen. The next upcoming instruction was displayed in red along with the countdown timer that indicates the moment of transition. Fig. 5. Is a still from the video score that can be viewed both with and without performance on the attached DVD.

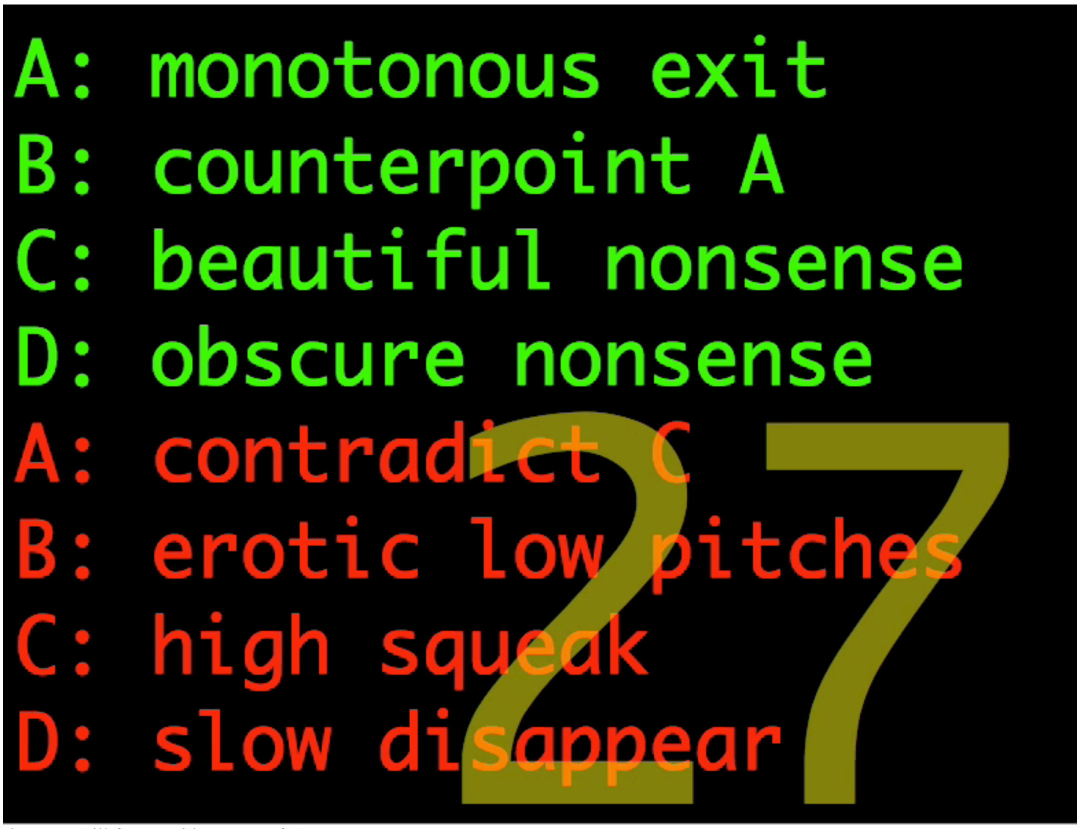

Figure 5. Still from a video score of *At Least Four*

Initially, six versions of the piece were made into a video score, half of these were the duration of 300 and half were of 200 seconds. Longer pieces had 16 sections and shorter ones had 8. The random error in the algorithm yielding the section durations was varied for each version. The submitted pieces are the very first attempts at interpretation. The musicians were grouped as follows: A – Mark Summers and Alan Jenkins on clarinets and saxophones; B - Jim Rothnie on tenor and bass trombone; C – Edward Lawes on piano, flute, piccolo, clarinet and concert bass drum; D – Walt Shaw and Zlatko Baracskai on percussions and electronics.

These pieces have a multitude of other determinant factors beside the score itself. Most importantly the musicians' characters and their instruments greatly influence the resulting music. It would be interesting to compare two performances of the same piece interpreted by a different set of improvisers. However the likely most crucial factor contributing to the success of the pieces is the acquaintance of the improvisers with each other and the performance space, which is due to this performance taking place at the eighteenth FES session in March 2010.

I personally find that the audience is better off not seeing the score in order to engage fully with the music. However, on discussing possible performances with the director of the MAE ensemble I understand that it might indeed be more revealing for the audience to see the video score as well. This being a piece made for improvisatory interpretation, I am happy to allow anyone to do whatever they please, as long as they employ at least four musicians.

5.6. FINGERTIP IMPROV

This is the only pure free improvisation piece in this portfolio. It was initiated by the idea of hanging a constellation of eight microphones (see Fig. 6.) that can freely swing in the air to produce coherence in movement on eight channel reproduction systems. In order to have a large area of excitation available for improvisation the inside of the piano was chosen. Pieces were made using snooker balls and various other objects as shown in Fig. 7. It was anticipated that the rolling balls would have a great sonic impact in this setup.

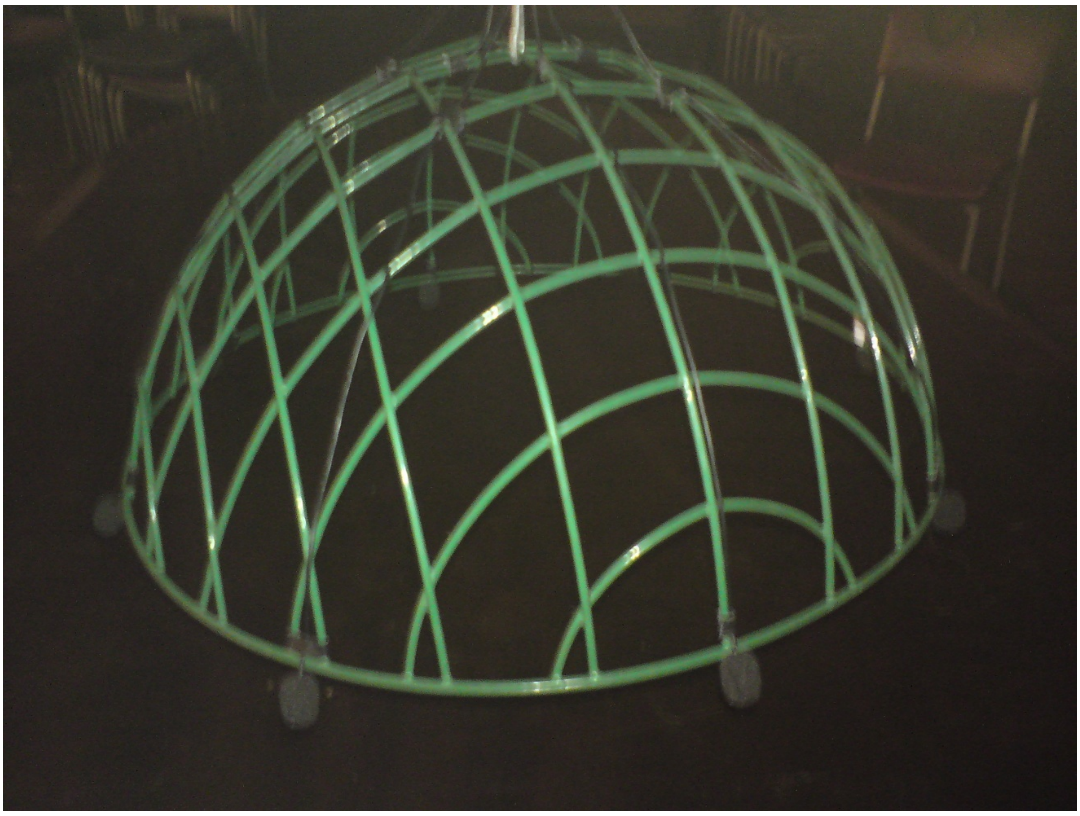

Figure 6. Array of eight microphones hanging from the ceiling on a hanging basket frame.

Figure 7. Recording setup for improvisation at the Elgar Concert Room.

However, a certain musical inspiration was lacking in the performance so further exploration took place. The sound of the recording seemed too surgical, it lacked physicality. Lowering of the recording levels increased the natural noise floor and gave it the charm that I was looking for. Engaging in experimentation, after rolling a few snooker balls off the lid suddenly it occurred to me that very rich sounds came from squeaking my fingertips on the soundboard. Immediately I realised that a whole piece can be performed as each of the eight fingertips were making pitched squeaks and could be used to produce various degrees of polyphony as well as spatial gesture.

The microphone constellation was also used as an instrument, although the actual difference this made was not audible during performance. The performance was recorded at the sampling rate of 96kHz and resampled to 44.1kHz such that it lowered in pitch and gained in duration. It is curious that towards the end of the piece one could recognise a shouting voice. This is a very peculiar occurrence due to complex and transposed formants in the material; all the sounds in the piece come from squeaking fingertips.

5.7. ALL ABOARD

This very short recording, an unedited eight channel piece is a demonstration of octophonic field recording. Microphones were placed on the perimeter of a sombrero for mobility and high quality recording equipment was fitted into a rucksack. The main purpose of this setup is to increase the envelopment and the spatial detail of a soundscape. Based on preliminary converstions with Enzo de Sena (2010) I expected less accurate localization due to having only omni-directional microphones. However, the sonic immersion resulting from playback of eight microphone signals to eight speakers in a ring proved satisfactory.

Figure 8. Sombrero mounted with 8 DPA 4060 and 4061 microphones connected to an RME Quadmic preamp and two SoundDevices 744T portable recorders.

This piece is clearly a soundscape composition. It deals with the phenomenon of context change. Very simply, the displacement of the listener into the train changes all the audible content, semiotic and contextual. I find it very interesting to experience it thoroughly and repeatedly. The transposition of the soundscape into a controlled listening environment excludes distracting circumstances. The act of replay, just as it made music from train sounds in 1948 continues to do so in 2010. The title of the piece connects to the history of train travel. The words ‘All aboard’ are meant to be heard with the ears of collective past awareness, exactly at the moment when the more contemporary buzzer alert of closing doors sounds.

Figure 9. Recording setup on site at the University train station in Birmingham UK used in *All Aboard*.

5.8. DON'T LISTEN

This is a truly conceptual piece that bears no specific sound at all. Listeners are presented with the following recipe which provides a musical experience. The listeners who are too lazy to create this piece for themselves may consider themselves not very active listeners.

'Don't Listen'
Listener Instructions by: Zlatko Baracskai

1. Acquire a portable recorder and pick an arbitrary spot rich in environmental sound.
2. Make a recording standing still at the spot while attentively listening to the surroundings.
3. Take the recording to a studio.
4. Don't listen.
5. Erase it.
6. Go back to the spot and listen to a new piece.

5.9. HERDINGTON

This piece is fully preconceived and thereby seen as conceptual in essence. Technically however it is very improvisational. A recording of a mastered FES performance was given to around a hundred Sound Engineering students at BCU as a part of the following assignment:

1. Radical processing exercise

    a) take the multichannel recording from the Making Music forum[22]
    b) create a submix channel for the 3 precussion tracks by using
    a gate on each source track separately
    c) process the 5 instruments to achieve one of the following

[22] A moodle based platform used to distribute teaching material

results for each instrument
c1) space out/smear/very long decay
c2) stagger/random cuts in the audio
c3) random repeats with beat repeat
c4) control another track with an autofilter and a vocoder
c5) make it unrecognizable any other way you want
d) master the track using panning and compression
e) upload the track to Making Music Forum

Around fifty submissions were selected and distributed across 24 channels for diffusion performance and eight channels for studio listening. I find the spatial density achieved the best in my work so far. An interesting option in articulation would be the shrinking or collapse of this space but the sought immersion is being achieved exactly by this monotonous dense space.

Figure 10. BCU students in the laboratory where they complete their assignments.

5.10. THESE ARE YOUR THOUGHTS

The title of this piece is crucial to understanding the idea that it addresses. Namely, when experimenting with extreme granular time compression of FES recordings, the quality of the music struck me as remotely familiar. It had the granularity of thought. The shapes were defined at a fast repetitive pace resembling constant thinking. Questions and answers are paired instantly and superficially; every thought is followed by another, ever so short one. The monotonous quality of the piece is crucial for its confronting quality. In order to place the music into the listeners' head all eight channels of the piece contain an identical monophonic mix. I hope that this piece will increase the awareness of thought granularity and thereby further one's command of one's mind.

CONCLUSION

During my studies at University of Birmingham many explorative paths have been taken. Many pieces are left unfinished and a great deal of material has been collected. Extensive use was made of the available facilities and the equipment.

The music presented is a selection of pieces that demonstrate the variety of work accomplished. It is anticipated that the multi-channel pieces will be presented at a mini-BEAST concert. I hope that my association with the BEAST community will continue in both research and practice.

In retrospect, this commentary seems to resemble my piece *These Are Your Thoughts*, in that I find it a similarly unstoppable stream in which thoughts are very densely spaced. Reading it through does not leave a good impression, personally; I find it more satisfying to read a subchapter at a time and give myself time to contemplate the meanings embedded.

APPENDIX

PROGRAMMING

During the course of my studies I completed pieces of software for various purposes. Two programming languages were used. Max/MSP was useful in expanding the Ableton Live music production software through the Max for Live application programming interface as described in B.1. All the other coding was done in SuperCollider. An effect library was created using the SCAU framework that allows for rendering Audio Unit plugins. An application that automatically estimates the position of multiple speakers using three microphones was implemented and recently further developed by Scott Wilson. At the request of David Hindmarch a speaking modular framework for granulation and spatialisation was developed. Finally a preset based multi-channel playback engine for spatialisation will be briefly presented.

1. zb.m4l Max for Live Device Library

The submitted devices, implemented in Max/MSP for the Ableton Live framework, are generally useful for either full-scale algorithmic composition or subtle algorithmic variation. Most devices process MIDI notes; however there are 'modulation' devices that allow for controlling any parameter in the Ableton framework. The MIDI effects are categorized into 'probability', 'pattern', 'geometric', 'recursive' and 'filtering' devices. Some devices employ multiple concepts. No matter how simple some devices are they are very useful building blocks when stacked in series or parallel using MIDI effect racks. Bear in mind that chords are processed similarly because there are no exactly simultaneous notes in MIDI; also unpitched instruments and drum racks can be controlled, providing for algorithmic variations in timbre rather than in pitch. Of further interest are the streamlined and flexible automation and mapping features of the Ableton framework that makes it an excellent creative companion.

Probabilistic devices

Basic note generation devices that use different types of probabilistic implementations are shown in Fig.11. These are based on simple random processes. Note processing devices will alter the pitch of the notes regardless of the incoming note number. Velocity processor will, however, preserve the pitch but change the dynamics.

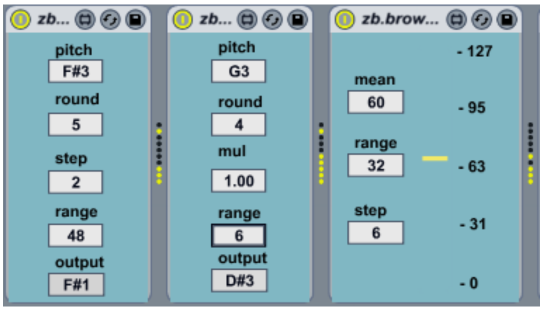

Fig.11. zb.brownNote, zb.randomNote and zb.brownVel user interfaces

zb.brownNote device picks the next note based on a randomly chosen step constrained by the maximum step size parameter called *step*. The chosen step is taken from the previously selected pitch such that the melodic progression is constrained in step size resembling the spectrum of brown noise. The random walk is based on the *drunk* Max object and is constrained in a range that can be set with the *range* parameter. If the *step* is equal to the range, the device will produce uniform distribution (i.e. white noise); if larger, the extremities of the range will be selected more often. The 'round' parameter rounds the note numbers to allow for uniform step scales other than the chromatic – e.g. major second, minor third, etc... The *output* box serves display purposes only.

zb.randomNote is very similar to the above, only it exhibits uniform distribution and has an extra *mul* parameter. This multiplier is used on the note number and can be a floating point number. The inevitable truncation of the outcome can induce scales and change the distribution.

zb.brownVel alters the dynamics of the MIDI notes; otherwise parameters are identical to the zb.brownNote discussed previously. A yellow horizontal line is used to display the assigned velocity. Large *range* and small *step* values will create slowly, expressively moving dynamics.

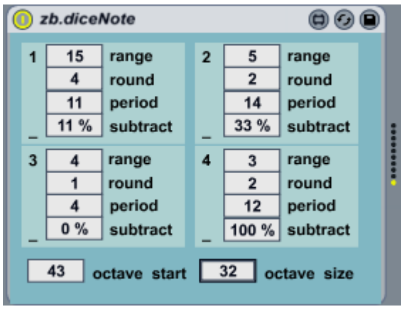

Fig.12. zb.diceNote user interface

zb.diceNote in Fig.12. is another probabilistic MIDI note pitch transformer that moves between brown and white noise distributions. Specifically it is based around the Voss algorithm for pink noise. However the available parameters are designed for musical purposes. The device contains four random generators that add up to produce an outgoing pitch. Each dice has the same parameters available to control it. *Range* and *round* parameters are the same as described before. *Period* specifies the number of notes that need to pass before a new number is chosen. *Subtract* specifies the chance that the chosen value will be subtracted rather than added to the other values. The resulting number is transposed by the *octave start* value and is reflected back in case it exceeds the *octave size* parameter. Two distinct strategies for creating melody are firstly, to have large random ranges for large period generators, which resembles the original Voss algorithm, and essentially transposes small interval phrases; or vice versa, to get frequent large leaps and less often small interval changes.

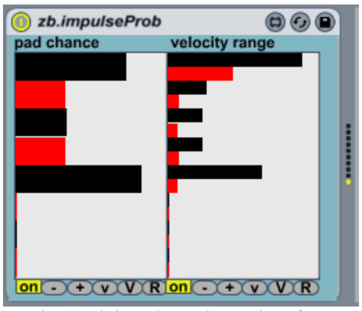

Fig.13. zb.impulseProb user interface

zb.impulseProb is a probabilistic pad chooser for the Ableton built-in impulse sampling instrument. It outputs one note with altered pitch for each incoming note; durations are preserved. Each bar in the *pad chance* multislider represents a single available sample, whereas the length of the bar represents the likelihood of the incoming note being transposed to trigger that specific sample. Further, each pad has a distinct velocity range that is used to generate the dynamic. The range is specified by the two boundaries in the *velocity range* multislider. The device in Fig.13. will most likely choose pads 1 and 5, sometimes pads 2, 3 and 4, but it will never pick pads above 5. Pad 1 will have the largest velocity, though each pad will demonstrate dynamic variation. The *on* toggle below the multisliders will temporarily turn the pad off and back on. The '-' and '+' triggers will respectively decrease and increase all the slider values. Button 'v' will induce a small and 'V' a large variation for each of the sliders. The 'R' trigger will randomise all the slider values. The device outputs notes of the C major scale starting from C3, and can be used to create melodies as well.

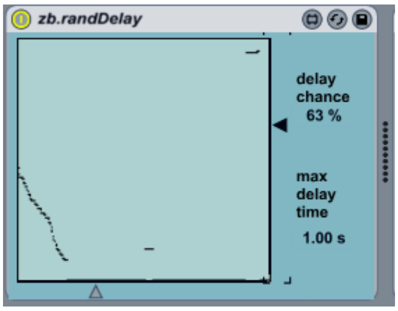

Fig.14. zb.randDelay user interface

zb.randDelay is a note delaying device that allows for drawing the distribution of the randomly chosen delay times. The horizontal and vertical axes of the graph represent the time and the likelihood respectively. The horizontal slider beneath the graph controls the delay time that corresponds to the right edge of the graph. The vertical slider controls the chance of any delay being introduced at all. These are useful as they can be automated and modulated within the framework as opposed to the distribution graph.

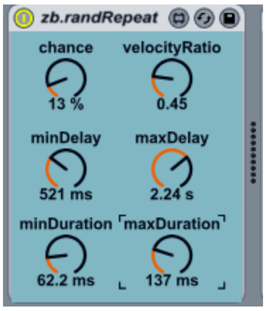

Fig.15. zb.randRepeat user interface

zb.randRepeat is a note repeating device. *Chance* controls the likelihood of a repetition occurring. The velocity of the repeated note will be scaled according to the *velocityRatio.* The delay before the repetition will be a random number between the *minDelay* and the *maxDelay* parameters. The duration of the repeated note is controlled in an analogous fashion by *minDuration* and *maxDuration.*

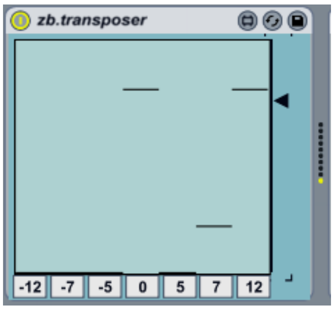

Fig.16. zb.transpose user interface

zb.transpose has seven variable transposition slots represented in the graph. The height of a bar represents the likelihood of that specific interval being chosen. Each interval can be adjusted with the corresponding number box beneath the graph. The default intervals are harmonically related as it is useful for melodic variations; however this proves an excellent tool for timbral variation in algorithmic beat sequencing applications.

Pattern effects

The few pattern based devices presented here are building blocks of *zb.multiPattern* that can prove useful as separate devices.

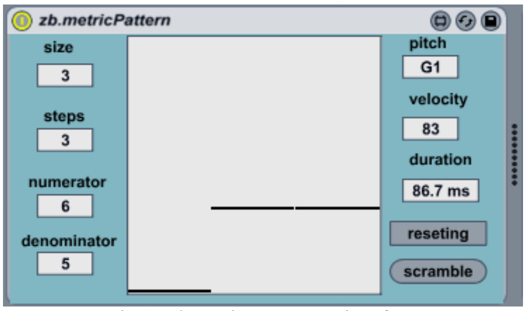

Fig.17. zb.metricPattern user interface

zb.metricPattern is a device that can generate rhythmical patterns in arbitrary divisions of the bar. The bars of the graph represent the rests in the pattern - zero i.e. the bottom of the graph specifies no rest, meaning that the next note will be triggered at the next pulse. The example in Fig.17. is a pattern that recurs each five pulses, triggering a note on the first, second and the fourth pulse. The underlying pulse is controlled by the *numerator* and the *denominator* that divide the bar. The length of the pattern is determined by the bars in the graph as well as the number of bars displayed, which can be controlled by the *steps* parameter. *Size* allows for extending the vertical range of the graph, allowing for longer rest times. The pattern will be generated while the note at the input is held. Triggered notes have a controllable *pitch, velocity* and *duration*. The device has two modes of operation - if it is *resetting* then each new input note will restart the pattern, otherwise the pattern will run continuously. The *scramble* button will randomly exchange the position of the bars, changing the pattern but retaining the rhythmical cycle.

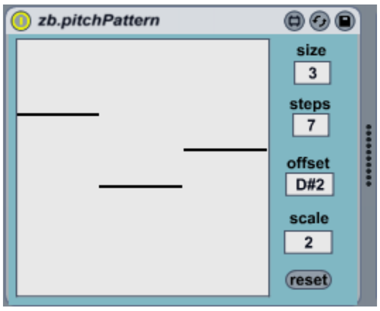

Fig.18. zb.pitchPattern user interface

zb.pitchPattern changes the pitch of the incoming notes according to the graph. The vertical axis of the graph represents pitch. The *steps* of the graph determine the number of available pitches. The lowest value will correspond to the *pitch* of the offset parameter. Further bars will represent higher pitches based on on the *scale* multiplier. In the example above one step on the graph corresponds to two semitones. The *reset* button allows for restarting the pattern at an arbitrary point in time. The length of the pattern, i.e. the number of bars, can be chosen with the *size* parameter.

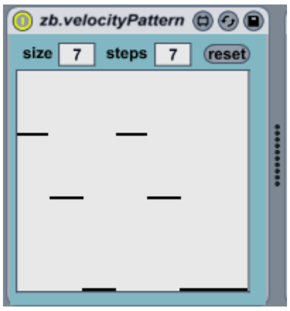

Fig.19. zb.velocityPattern user interface

zb.velocityPattern is very similar to the previous device except that it alters the velocity of the incoming notes according to the specified pattern. The *step* parameter controls the velocity resolution of the graph, however the full range i.e. 0 – 127 is always available.

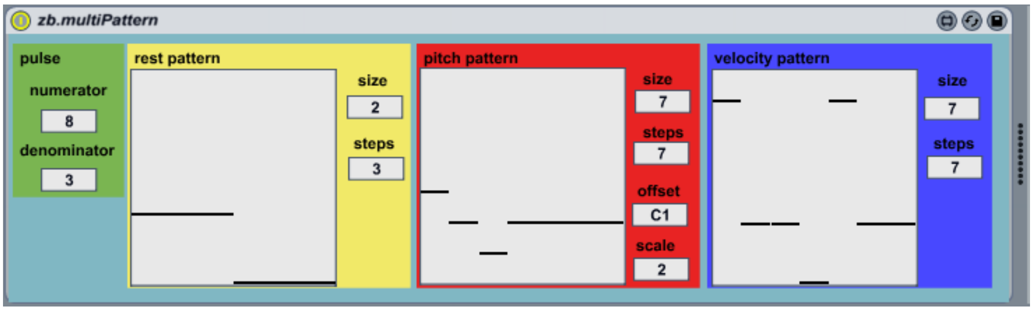

Fig.20. zb.multiPattern user interface

zb.multiPattern is a device comprising the three above. It works in the continuous mode only, as described above. However the resetting of the patterns is linked for all three aspects.

Geometric

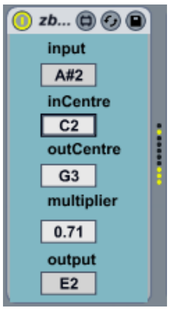

Fig.21. zb.noteTriangle user interface

zb.noteTriangle implements triangle mapping to alter the pitch of the incoming notes. It is a combination of two linear mappings. The range from zero to *inCentre* is linearly mapped and truncated to the range of zero to *outCentre.* Similarly the range from *inCentre* to 127 becomes the range from *outCentre* to 127. An additional *multiplier* can be used to compress or expand the range. *Input* and *output* boxes serve display purposes.

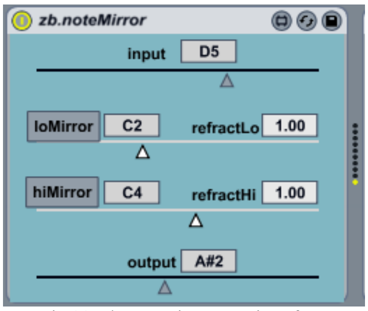

Fig.22. zb.noteMirror user interface

zb.noteMirror changes the pitch of the notes if they fall outside the two boundaries controlled by the white sliders. Incoming notes will be reflected back into the specified range linearly if the refraction parameters are at their default value of one. Otherwise the reflected note will reflect off the mirroring point differently. Both mirrors can be turned into filters instead to discard the notes that are out of range. This is achieved with the *loMirror* and the *hiMirror* toggles respectively. Light gray boxes and black sliders are used for display purposes.

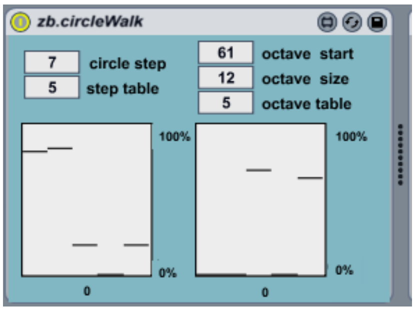

Fig.23. zb.circleWalk user interface

zb.circleWalk is a random walk machine that threads the circle of fifths by default. It allows the specification of different probabilities for choosing different steps. This is achieved by the left graph, of which the middle bar represents the likelihood of repeating the same note. Bars to the right and to the left represent steps up and down respectively. *Circle step* parameter allows the user to change the circle to an interval other than the pure fifth which is seven semitones. The right probability distribution graph controls the likelihood of choosing different octaves. All the walking along the circle is transposed into a single octave starting with *octave start* number. However the size of the octave in intervals can be altered to provide alternative harmonic structures. The probability tables can be adjusted in size using *step table* and *octave table* parameters.

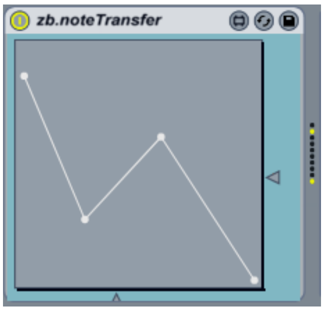

Fig.24. zb.noteTransfer user interface

zb.noteTransfer is a simple graphical tool that allows for pitch modification based on a transfer function. Horizontal and vertical sliders display the incoming and the outgoing pitches respectively, to which the axes correspond.

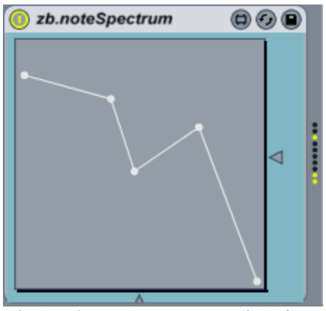

Fig.25. zb.noteSpectrum user interface

zb.noteSpectrum deterministically assigns a velocity to each different MIDI pitch based on the breakpoint function view. This essentially alters the spectral balance of the MIDI material based on the note numbers. The horizontal and vertical axes represent pitch and velocity respectively.

Recursive

The following are recursive algorithms capable of interpolation between random, chaos, patterns and stable orbits.

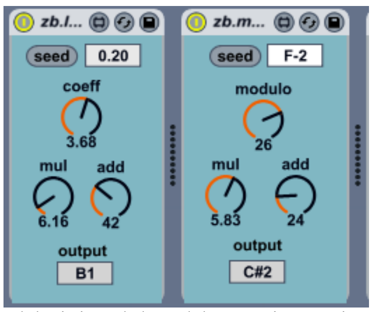

Fig.26. zb.logistic and zb.moduloRecursion user interfaces

Two basic recursive algorithms are shown in Fig.26. They both alter the pitch of incoming notes. The *zb.logistic* device implements the logistic equation that has a single coefficient that drives the system from a fixed value through oscillatory into chaotic behavior. Both devices have *mul* and *add* parameters to fix the output range, also they can be reseeded at any moment using the seed buttons which will restart the recursion with the specified value. Gray output boxes are used for display purposes.

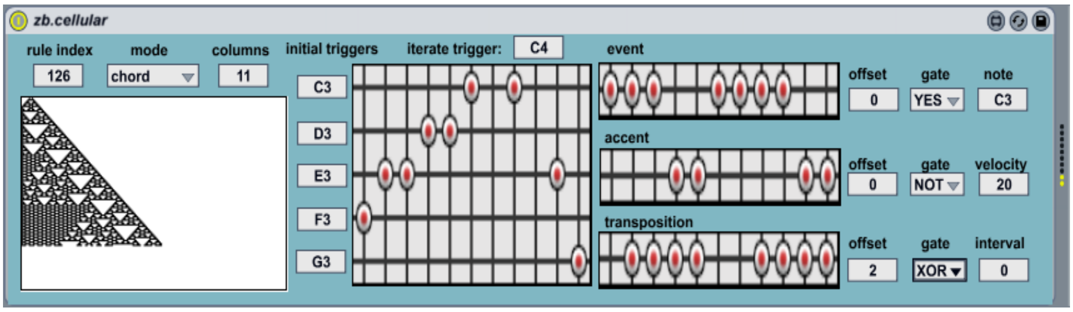

Fig.27. zb.cellular user interface

zb.cellular is a fairly complex and flexible implementation of cellular automation for both vertical *(chord)* and horizontal *(sequence)* arrangement of notes. These can be switched between with the *mode* pop-up menu. The *columns* parameter sets the number of cells that are traced within the graph that is drawn on the left. *Rule index* of the automaton is numerically specified. Many rules have simple or uninteresting behavior; consult the literature for further theoretical background about CA. The device responds to only six different pitches that are variable. A single pitch, the *iterate trigger* is used to iterate the automaton. The other five pitches are used to restart the automaton with the cell state represented in the corresponding row of the large grid. The three small grids represent the way the cell state information is used at each iteration. They provide control over the *offset* that allows the used cells to be shifted to the right. Further they have a *gate* pop-up menu that specifies the logical operation used to derive the represented cell state. *Yes* and *not* gates use the actual cell state or the inverse respectively. Other gates are the possible logical operations that are used to derive a state based on the unoffset and the offset set of states. In this way rather than just using different cell states one can use this type of logical autocorrelation as well. Cell states derived in this manner are displayed.

Each of these controls a different aspect of the throughput MIDI notes. The *event* row controls the occurrence of events in the sequence mode and the selection of pitches in the chord mode. The specified *note* is output or serves as the base pitch in the two modes respectively. The *accent* row controls the velocity of the notes with two possible states accented or unaccented. Finally the *transposition* row allows for shifting the note in pitch, based on the derived cell state, with a specified *interval*.

Filtering

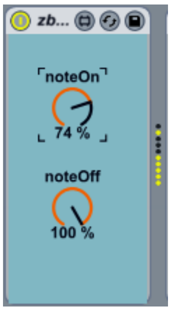

Fig.28. zb.randomPass user interface

Arguably the simplest and the most frequently used device in the collection is the *zb.randomPass*. It stops note on and note off events based on the probability of stopping them specified with the available knobs.

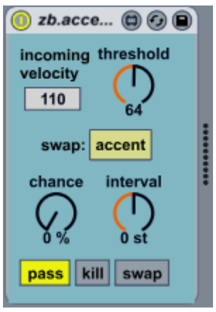

Fig.29. zb.accentPass user interface

zb.accentPass is another note stopping device that relates the probability to the velocity of the note. Originally conceived to induce variation in the ghost notes of the snare drum but always keep the accented hits. If the velocity falls below the threshold than the probability of stopping it is its distance below the threshold. Based on the same threshold, accented or ghost notes can be swapped, i.e. transposed. The *chance* and the *interval* of the swapping can be adjusted below the *swap* toggle. *Incoming velocity* and *pass/kill/swap* serve display purposes.

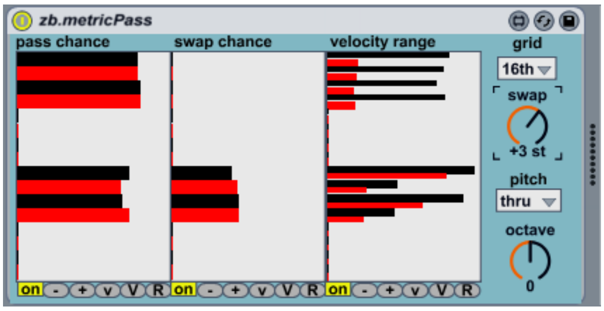

Fig.30. zb.metricPass user interface

zb.metricPass device stops notes based on their position within the bar. Different *beats* or *16ths* can have different pass probabilities as specified using the bars in the graphs. Each bar represents another temporal position in the bar. The leftmost graph defines the pass probabilities, the middle the swap (transposition) probability and, finally, the rightmost allows control of the velocity range of each temporal section. The controls under the graph are identical to the ones defined for the *zb.impulseProb* device. The *pitch* menu allows the user to switch between the modes of passing the incoming pitches or to have a fixed pitch output that can be specifeid with the menu and the *octave* knob. The *swap* knob defines the interval of the transposition.

Modulation

These are devices that enable adaptive and cross-adaptive processing strategies by controlling an arbitrary parameter across the whole software framework. Each device uses a specific analysis procedure and allows the resulting signal to be applied as a modulator. They all have two menus that allow the user to link the resulting signal to a parameter. The top menu selects any device within the framework and the lower one selects any of the parameters of that device. When new devices are added to the set then the menus have to be refreshed manually with the *get devices* button. Spectral analyses are implemented using the zsa.descriptors library.

Fig.31. zb.noiseMod user interface

The only modulator in the collection that does not rely on an input signal is the *zb.noiseMod.* It produces a random number each specified time *interval* that can be randomized using the *jitter*. The *lag* control smooths this staircase function. The output range can be adjusted in extent using the *scale,* in absolute deviation using the *offset* and in curvature using the *exp* controls. The output box serves display purposes.

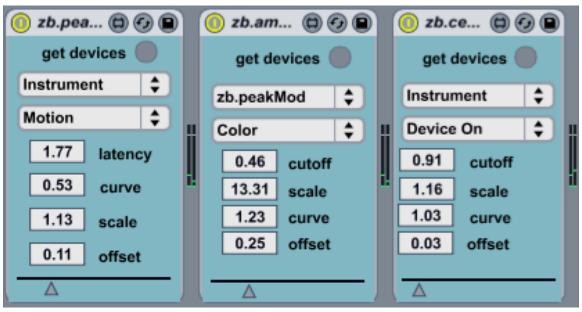

Fig.32. zb.peakMod, zb.ampMod and zb.centroidMod user interfacess

In Fig.32. and Fig.33. there are six simple analysis procedures. The *latency* and *cutoff* controls alter the time grain of the process and smooth the control signals respectively. The lowpass filter's cutoff frequency is specified in Hertz (bear in mind that very low values will smooth the control signals). The range, offset and the curvature of the control signals are manually controlled. The *scale* parameter can be negative to invert the signal. The output signal is represented by the slider at the bottom of the device.

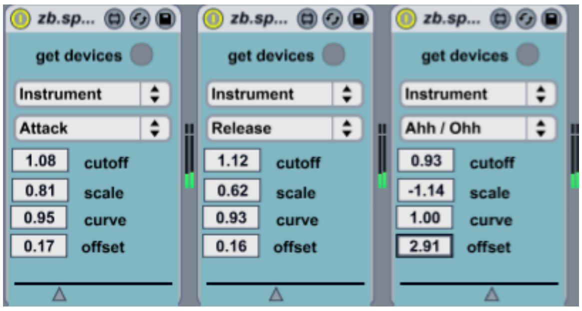

Fig.33 zb.specPeakMod, zb.specPeakRatio and zb.specFluxMod user interfaces

zb.peakMod analyses the peak amplitude of the signal. *zb.ampMod* uses the Hilbert transform based instantaneous amplitude estimation for modulation. *zb.centroidMod* uses spectral centroid estimation. *zb.specPeakMod* finds the loudest bin in the spectrum and outputs its frequency. *zb.specPeakRatio* calculates the amplitude ratio of the loudest and the second loudest bin in the spectrum. Finally, *zb.specFluxMod* uses the spectral flux estimation, i.e. the difference between two spectral frames (peaks correlate to onsets).

Fig.34. zb.noteNoiseMod user interface

zb.noteNoiseMod is identical to the *zb.noiseMod* except that new random values are chosen each time a MIDI note is sent to the device.

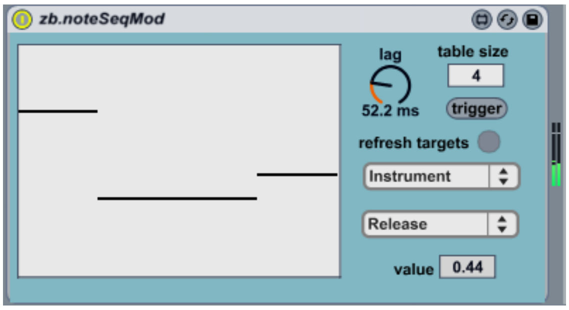

Fig.35.. zb.noteSeqMod user interface

zb.noteSeqMod is also triggered by incoming MIDI notes upon which it cycles through the sequence of values specified in the graph.

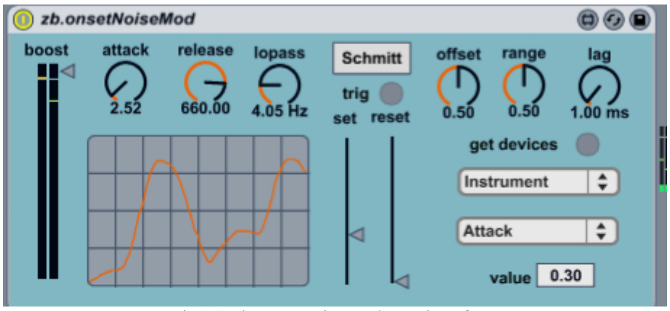

Fig.36. zb.onsetNoiseMod user interface

zb.onsetNoiseMod is identical to the *zb.noteNoiseMod* except that it uses onset detection of an audio signal to trigger the random value. Using the *boost, attack, release* and *lopass* parameters, the user should try to fix an unambiguous amplitude estimation of the signal that is displayed on the oscilloscope. This signal can be thresholded with a Schmitt trigger or using a single threshold value to detect the onset. The instance of triggering is displayed with the *trig* button, which is also useful to check the noise modulation manually.

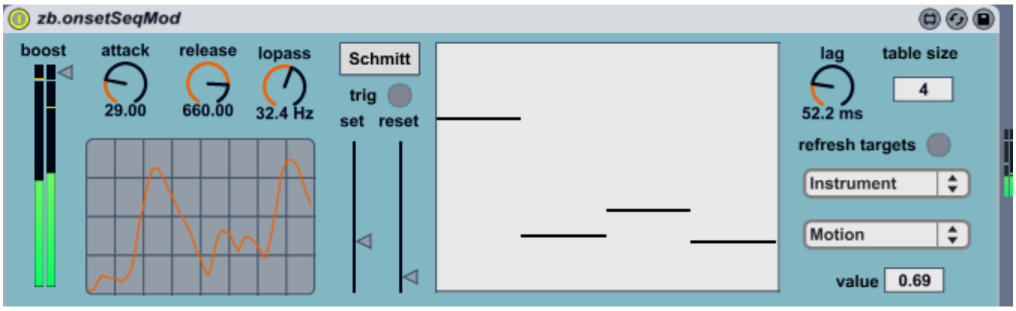

Fig.37. zb.onsetSeqMod user interface

zb.onsetSeqMod modulates a parameter using a set of values that are sequenced through based on onset detection of an audio signal, as described for the *zb.noteSeqMod* and the *zb.onsetNoiseMod* devices.

2. zb.scau Audio Effect Library

Many experimental audio signal processing patches have been developed and used in my compositions. An article was published in the Proceedings of AES conference 2010 on implementation and analysis of existing and self-invented subharmonic distortion algorithms (Baracskai and Stables, 2010).

Distortion

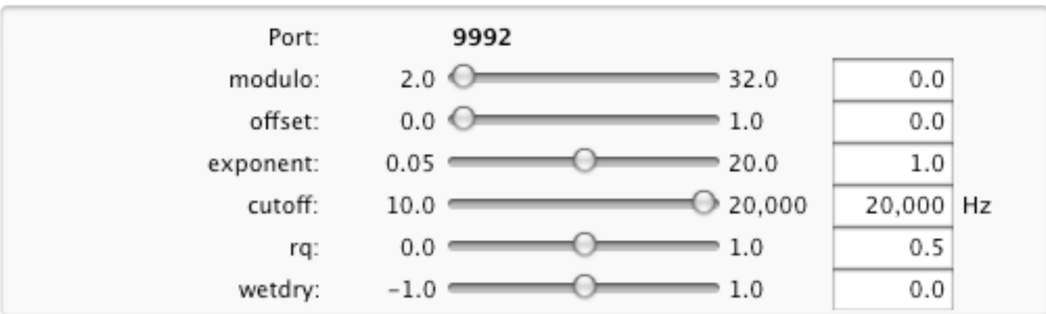

Fig.38. zb.subharmonic user interface

zb.subharmonic is a plugin based on phase inverting wavesets and it is capable of creating different subharmonics controlled by the *modulo* parameter. The subharmonics are very clean on synthetic sounds but quasi-harmonic and noisy signals may become heavily distorted. The ratio determines the offset of phase-inverted wavesets and is usable only with a higher ratio. The *exponent* defines the decay of the wavesets and functions best with higher modulo values. The plugin contains a resonant low pass filter to keep the rumble and remove the distortion. This plugin can actually make the violin play sub-bass frequencies.

Fig.39. zb.halver user interface

zb.halver allows switching between three different octave division algorithms (Baracskai and Stables, 2010).

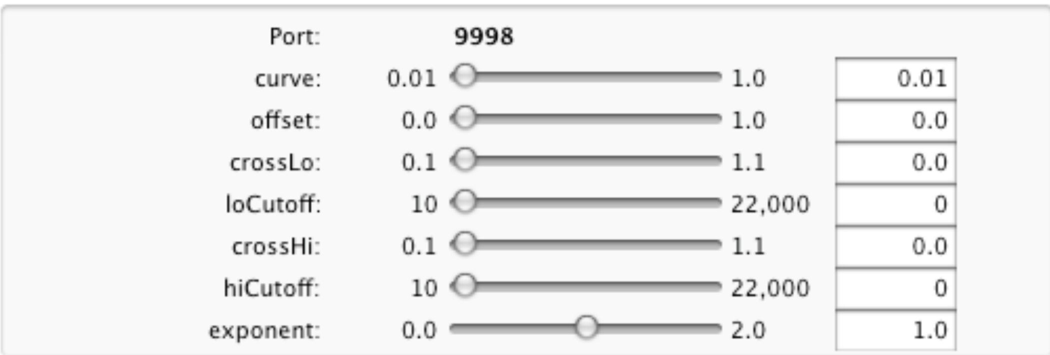

Fig.40. zb.valve user interface

zb.valve implements a quadratic transfer that has two parameters used to specify the input and the output ranges. The *curve* will zoom into the parabola near value 1 to yield almost linear transfer at the default value of zero. The *offset* will tilt the transfer up to yield an asymmetrical output and therefore more even harmonics. It also contains asymmetrical zero-crossing distortion that uses a low-pass filtered control signal such that the brightness can be controlled. Finally an exponential transfer allows for raw compression with exponent values below 1 and expansion for values higher than one. This is a versatile non-linear component in order to produce a more realistic sound by adding some resonances to simulate bodies.

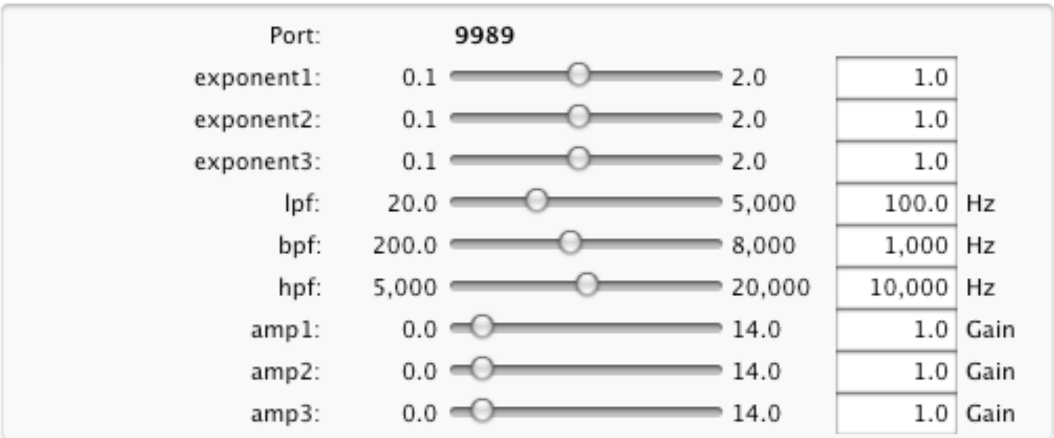

Fig.41. zb.mbDistortion user interface

zb.mbDistortion uses the exponential transfer to invoke distortion on three frequency bands. Exponent values above 1 will produce expansion and below 1 compression as well as plenty of distortion in both cases. For subtle effects, parallel processing and filtering before and after the plugins is highly recommended. Running on higher sample rates is likely to reduce aliasing.

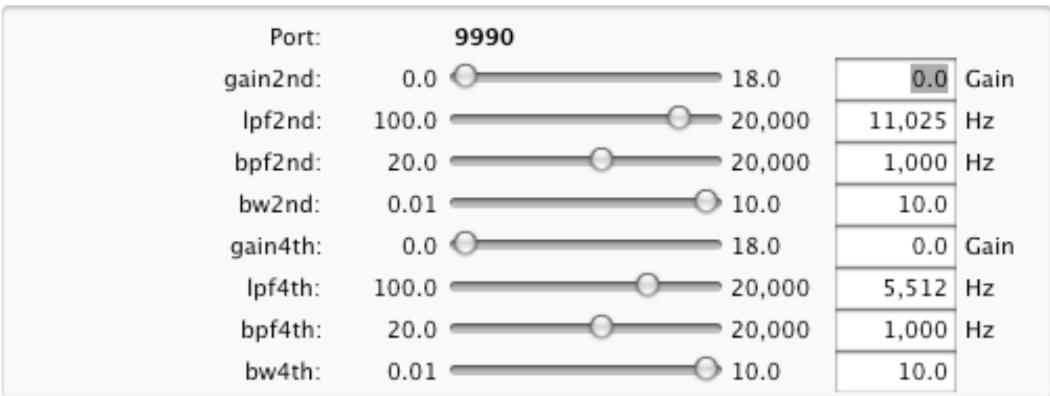

Fig.42. zb.evenHarmonics user interface

zb.evenHarmonics allows for fine tuning harmonic distortion of the first four even components. Chebyshev polynomials are used to produce the appropriate output values with 32-bit resolution and no interpolation. The input signal is by default filtered at a frequency to avoid aliasing for the specific component, but it can be readjusted. Each harmonic uses a band-pass filter to enable customization. Sine waves produce remarkably clean harmonics but complex signals do not. There might be a significant amount of inter-modulation distortion but this has yet to be researched.

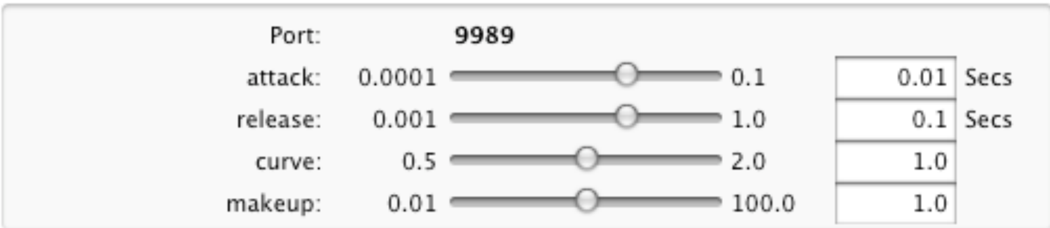

Fig.43. zb.dynInv user interface

zb.dynInv is an experimental implementation trying to invert the dynamic of a signal, such that loud sounds are attenuated and the soft ones boosted. It uses fast, Hilbert transform-based amplitude following, allowing high modulation rates. Always put a limiter after this effect as it might produce dangerous spikes.

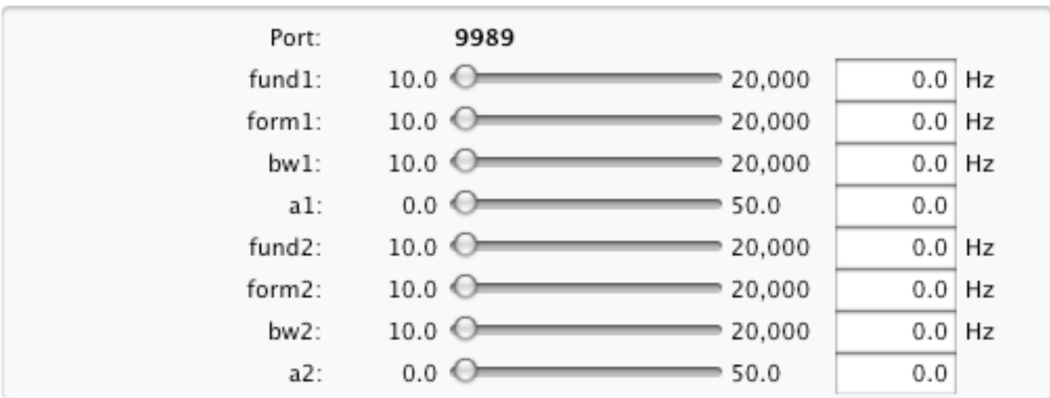

Fig.44. zb.formMup user interface

zb.formMup implements cross-modulation between two formant filtered versions of the incoming signal. Amplitude controls have a very big range to allow for very narrow bandwidths. Always put a limiter after this effect as it might produce dangerous spikes.

Spatial Processing

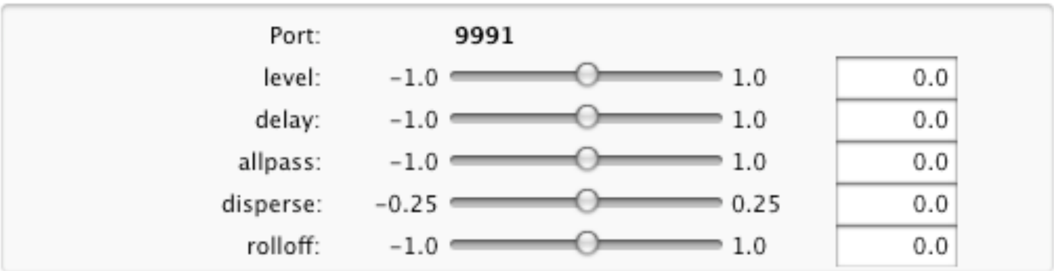

Fig.45. zb.psychoPan and zb.psychoBal user interface

zb.psychoPan implements panning of monophonic signals based on various psychoacoustic findings. It enables one to explore how contradictory cues overrule one another. Panning is achieved by amplitude change, tiny delays, fine decorrelation with all-pass filtering, coarse decorrelation with time dispersion and head shadow simulation with low pass filtering. *zb.psychoBal* implements balancing of stereophonic signals based on the same principles as the previous plugin.

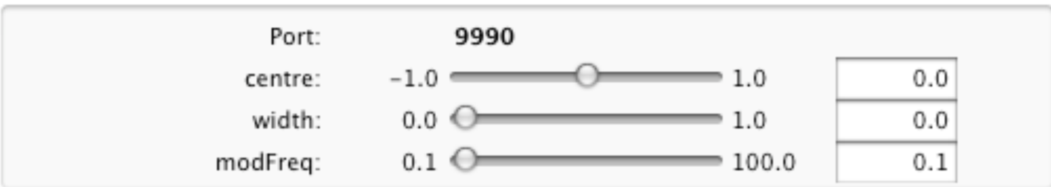

Fig.46. zb.panMod user interface

zb.panMod uses a triangle wave to move the input signal within a specified range in the stereo image, based on equal-power panning law. The speed of the movement can be specified to be audible or produce amplitude modulation. Left and right input signals are shuffled out of phase. Aside from controlling the source width, this plug-in produces unwanted artefacts and needs further development and research.

Fig.47. zb.width user interface

zb.width is the simplest plug-in in this collection. It has a single parameter and is based on mid-side conversion and attenuation of the side signal.

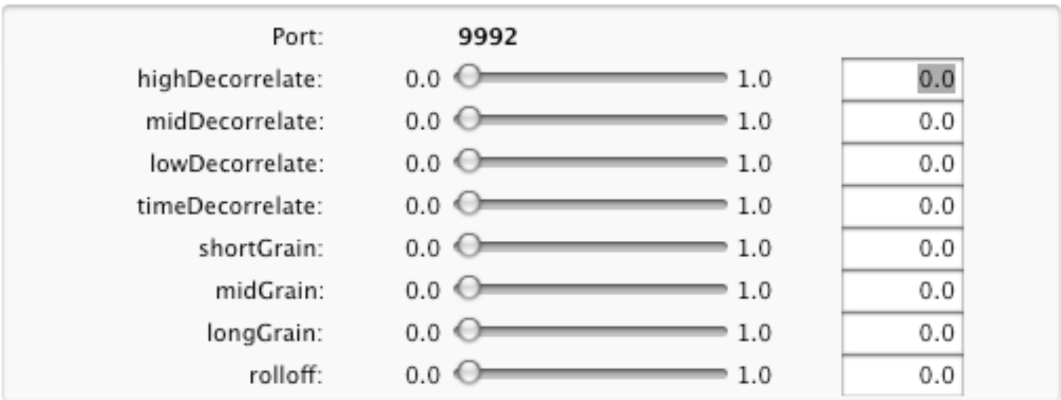

Fig.48. zb.distance user interface

zb.distance is a decorrelation (Kendall, 1995; Vaggione, 2001) plugin that distorts the phase and gives the impression of distant and reverberant sources. It uses spectral phase randomisation and granulation with different time resolutions. It appears that some hosts do not support extreme delay times; this plugin has a latency of more than a second.

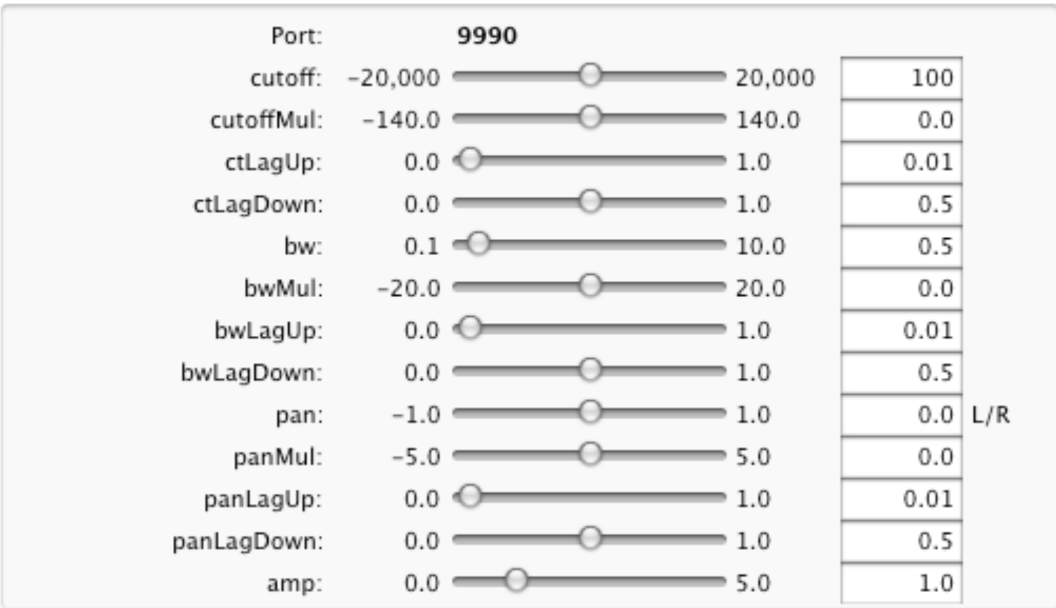

Fig.49. zb.adFilter user interface

zb.adFilter achieves sweeps of a band-pass filter's cutoff frequency, bandwidth and stereo balancing. Scaling the amplitude-follower signal produces all three sweeps. Each sweep signal has a multiplier that allows a negative value for range inversion. Variable attack and decay (lag up and lag down) times are available for smoothing the control signal for each sweep.

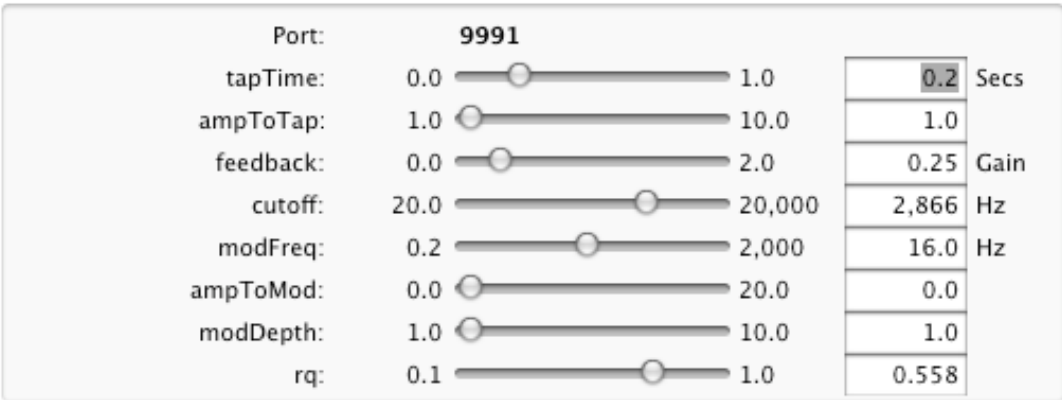

Fig.50. zb.bpFeedback user interface

zb.bpFeedback allows for using amplitude following to modulate a delay line, producing pitch shifting effects and the modulation frequency of a band-pass filter. The modulation is done using a sine wave. The feedback parameter is allowed values greater than 1 to compensate for band-pass filter attenuation and can also cause severe feedback.

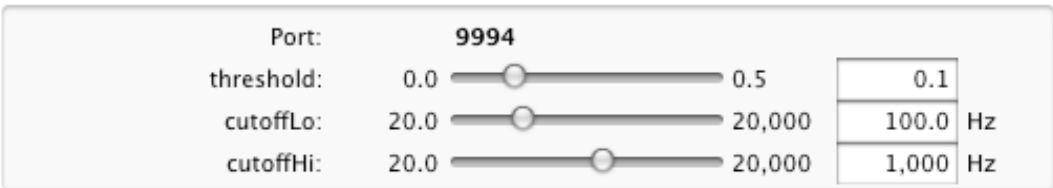

Fig.51. zb.tFilter user interface

zb.tFilter implements a simple band-pass filter. Upon detecting a trigger based on the amplitude threshold, a new value for the cutoff frequency is chosen at random between the lower and the higher boundary.

Fig.52. zb.tNoiseMod user interface

zb.tNoiseMod implements band-pass filtered noise modulation. Upon detecting a trigger based on the amplitude threshold a new value for the band-pass cutoff frequency is chosen at random between the lower and the higher boundary.

Fig.53. zb.tRing user interface

zb.tRing implements a simple ring modulation. Upon detecting a trigger based on the amplitude threshold, a new value for the sine wave frequency is chosen at random between the lower and the higher boundary.

Fig.54. zb.tShift user interface

zb.tShift implements a simple frequency shifting algorithm. Upon detecting a trigger based on the amplitude threshold, a new value for the frequency is chosen at random between the lower and the higher boundary.

Pitch Processing

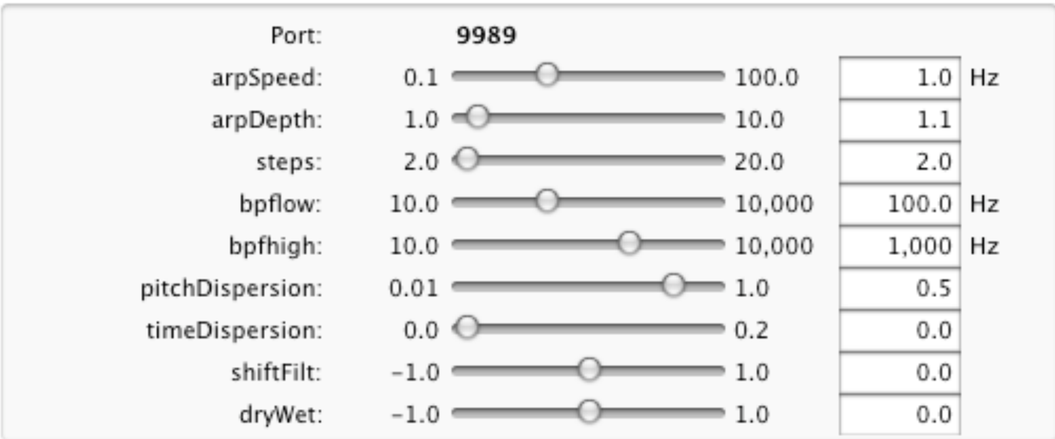

Fig.55. zb.arpeggiator user interface

zb.arpeggiator modulates an incoming audio signal by pitch shifting. It uses quantization of a triangle wave to control the pitch shift and the cutoff frequency of a band-pass filter. It is a fairly inaccurate and experimental implementation

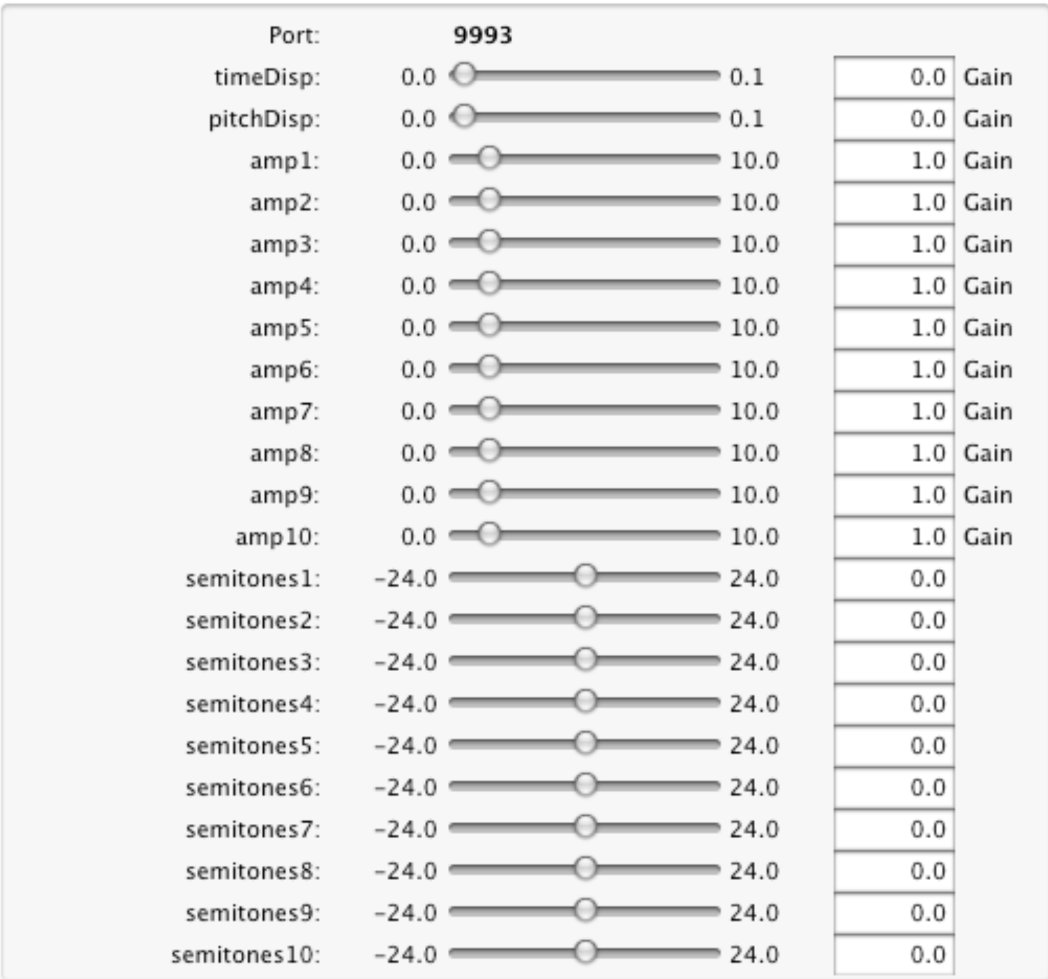

Fig.56. zb.tenBandShift user interface

zb.tenBandShift splits the incoming audio signal into ten frequency bands and implements pitch shifting on each band that can be specified in semitones. Useful for harmonizing material.

3. zb.speakPos Loudspeaker Position Estimation

My first programming challenge in my postgraduate studies consisted of an attempt to implement automatic loudspeaker position estimation. Based on the speed of sound in the air and the system latency, a distance from a microphone to the loudspeaker can be calculated; this describes a sphere around the microphone where the speaker might be. Using two microphones the loudspeaker position is constrained to the intersection of two spheres which is a circle. By adding a third microphone, a third sphere is introduced that intersects the circle in two points because of the perpendicular arrangement of microphones. After the user specifies whether the speaker is in front of or behind the plane of the three microphones, the system estimates three coordinates of the loudspeaker position.

The system implemented three impulses for each loudspeaker. The median of the three distance estimates was used. The system proved capable of the task, though user tweaking and understanding of the code seemed mandatory.

4. zb.granpa Speaking Modular Framework for Granulation and Spatialisation

A complex framework was developed to allow for granulation and spatialisation of sound files without the need of visual computer feedback for the blind composer David Hindmarch. The framework consists of three types of modules: playback modules with a variety of granulation procedures, audio effects and panning modules for ‘ring of eight’ speaker setups. The framework allows for arbitrary patching of the modules using keyboard shortcuts and speech synthesis based feedback. The parameters of all the modules were automatically lined up for a Doepfer controller with 64 knobs. The function of each knob could be auditioned. The development was halted due to heavy teaching workloads but is anticipated to continue once I complete my postgraduate studies.

5. zb.stemPiece Multi-channel Playback and Spatial Processing Application

A SuperCollider based application was developed for the diffusion of multi-channel pieces supplied in stems. The diffusion desk is created based on the supplied speaker system definition. It is aimed at large setups consisting of multiple ring-of-eight arrays typical for BEAST performances. Each stem can placed on any of the rings; useful effects for the purpose, such as decorrelation, delay, filtering etc., could be placed in the processing chain. The primary interest in this framework was automatic preset storage based on the sections in the piece. It makes possible automated rehearsal of each section that is looped for the time of configuration and seamlessly continues on to the next section storing the current preset.

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