

University of Wollongong - Research Online

Thesis Collection

Title: Text manipulation: voice with audio or acoustic augmentation.

Author: Wendy Suiter

Year: 2007

Repository DOI:

Copyright Warning

You may print or download ONE copy of this document for the purpose of your own research or study. The University does not authorise you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site.

You are reminded of the following: This work is copyright. Apart from any use permitted under the Copyright Act 1968, no part of this work may be reproduced by any process, nor may any other exclusive right be exercised, without the permission of the author. Copyright owners are entitled to take legal action against persons who infringe their copyright. A reproduction of material that is protected by copyright may be a copyright infringement. A court may impose penalties and award damages in relation to offences and infringements relating to copyright material.

Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.

Unless otherwise indicated, the views expressed in this thesis are those of the author and do not necessarily represent the views of the University of Wollongong.

Research Online is the open access repository for the University of Wollongong. For further information contact the UOW Library: research-pubs@uow.edu.au

University of Wollongong Thesis Collections

University of Wollongong Thesis Collection

University of Wollongong

Year 2007

Text manipulation: voice with audio or
acoustic augmentation.

Wendy Suiter
University of Wollongong

Suiter, Wendy, Text manipulation: voice with audio or acoustic augmentation,
M.C.A.-Res. thesis, School of Music and Drama, University of Wollongong, 2007.
<http://ro.uow.edu.au/theses/684>

This paper is posted at Research Online.
<http://ro.uow.edu.au/theses/684>

NOTE

This online version of the thesis may have different page formatting and pagination from the paper copy held in the University of Wollongong Library.

UNIVERSITY OF WOLLONGONG

COPYRIGHT WARNING

You may print or download ONE copy of this document for the purpose of your own research or study. The University does not authorise you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site. You are reminded of the following:

Copyright owners are entitled to take legal action against persons who infringe their copyright. A reproduction of material that is protected by copyright may be a copyright infringement. A court may impose penalties and award damages in relation to offences and infringements relating to copyright material. Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.

BACKGROUND

Although I learnt some basic techniques in computer music composition during my undergraduate years, most of my compositional work since graduation, has been with acoustic instruments. This was for two reasons: firstly, it was the medium I knew best, and secondly, I didn't have the resources or the confidence to pursue computer music by myself. Perhaps it should be noted that in this thesis I use the term 'computer music' to include anything that includes pre-recorded sound, or sound synthesis, or manipulation of audio signals to derive new sounds which become part of the musical fabric.

However, I am keen to make music using contemporary technology. So I undertook this study in order to learn more about computer music and how to incorporate it into my work. In practice, this has meant a great deal of reading and listening, in order to gain an understanding of the field, both aesthetically and technically. Much of my work has been taken up with clarifying my questions and then finding partial answers to some of these questions.

As a focus for this intensive effort, my research has been concerned with this underlying question: "Can digital sound be used to compose substantial works which are intended to engage with an audience while challenging their cultural assumptions?" Underlying this question is my set of beliefs about music. Firstly, my belief that music exists for functional reasons: to celebrate, honour, mourn, evoke, entertain and challenge. Music for public presentation is not written in a self-absorbed vacuum. The composer, by publicly presenting their music, enters into a relationship with the audience. Consequently, music must be seen within a broad social context, where music both influences, and is influenced by its social and cultural context. Secondly, musical art is primarily a sounding phenomenon, taking place through time, rather than being score based or concept based. Consequently, experimental methods that explore new compositional ideas and technology do not necessarily, in themselves, produce aesthetic results. Once tools have been invented, ways of using them to create works of art need to be developed.

The original question leads in two directions: the philosophical and the technical. Wider philosophical questions include issues such as the relationship between composer and audience, and the interplay between art music and wider society. As well, there are further questions concerning art music as an autonomous art form, and the possibility of it regaining functionality. Then, what would it require to be intelligible, meaningful, coherent and expressive? Although typical musical analysis of conventional music throws little light on these questions, computer music has the potential to provide new responses.

Technically, I have worked to become familiar with some of the hardware and software, as well as areas of interest and exploration of technology by other composers by becoming familiar with existing works, including issues in the presentation of computer music.

As a result of my reading and listening, I decided to focus my folio on text-based works in both the audio and conventional domains. This document records the progress of this research and provides insight into the creative intentions and decisions behind my folio of works.

MODELLING MUSIC AS COMMUNICATION

My initial aim was to create a conceptual model of music composition and reception, which I intended to explore through my folio of compositional work. While the model would not provide a guide to originality or the aesthetic qualities of a work (what ever that means), it would provide a way to view how challenging a particular work might be to an audience, and what steps could be taken, within the music itself, to assist the listener to appreciate the composer's intention. Although it might seem to state the obvious, there are diverse reasons for the creation of a musical work. Not all music is produced for general public consumption. My model would enable discussion and critique of any of these types of work, should they be presented to an audience as a work of art.

During my research, I came across a number of existing models concerned with concepts of music and communication. The primary ideas of each theory are summarised below. Some other theories have been explored more fully in my essays that are included as Appendices to this document. As a result only concepts explored more recently are briefly outlined here.

1. Information Theory.

Models based directly on Information Theory are regarded as simplistic and have been well argued against by Budd (1985:151-176). Akmajian, Demers et al (2001:370-386), have discussed Information Theory in the context of linguistic communication and have good arguments against its direct application in determining meaning in language, let alone music.

2. Conceptual Information Theory

I developed this model redefining concepts, and broadening the sources of information available to the listener. The model is also based on concepts contained in Shannon's original description of Information Theory (Shannon, 1948; unknown, 2006). However, it does not assume *a priori* knowledge of style, as do earlier theorists such as Meyer (1956). This idea was elaborated in a paper presented to the Higher Research Degree conference at the University of Wollongong in September 2006. This paper is attached as an Appendix.

3. Relationship Theory

Andrew Ford, in his recent book *In Defence of Classical Music* (2005:4), states that by the audience listening to the music, they are engaging in a relationship with the composer, whereby they undertake to concentrate, memorise and engage thoughtfully with the music. This model could possibly be developed further into a model of communication using a linguistic model of meaning inference developed by Akmajian, Demers et al (2001).

4. Doctrine of Affections

Music in the Baroque Period was written using this theory of music that posits that particular musical elements can represent various moods, which are not as complex as emotions, and communicate these to the listener. The goal of both composer and performer is to portray these 'affections' accurately. Various codes of signification have been developed which cover not only performance practice but also compositional practice, and suggestions as to how an enlightened listener may judge the value of a musical work (Bukovzer, 1947; Strunk, 1965; Palisca, 1991). Bukofzer (1947:4-5), has suggested that Classical music overtook Baroque music as a result of changes in broader philosophical outlook with the Enlightenment, which began to explore the convoluted notion of emotions.

5. Music as a representation of the emotions

Carolle C. Pratt (cited in Budd, 1985:39ff) posits that music generates an emotional response because it is a representation of those emotions. He identifies musical elements that together represent those emotions including rhythm, pitch, articulation, and melodic shape. While Susan Langer (also cited in Budd, 1985:106ff) has suggested that the formal structure of a movement represents the morphology, that is, the evolution and complexity of an emotion.

6. Semiotics

Following my earlier study of semiotics in music, I began reading about linguistics. Linguists themselves remain unclear about how words, and sentences actually communicate meaning, and have some elements of theory but it is by no means complete (Akmajian, Demers et al., 2001; Power, 2006). Gillette and Wit (1998) are linguists who agree that there is much more to the use of language than the words themselves. They have concluded that a number of features, outside the meaning of the words themselves, are important for the understanding the work.

7. Divertissement De Luxe

Ravel (cited in Ford, 2005:114), suggests that art music is nothing more than expensive entertainment, and does not have any greater meaning. This view is also supported by Habermas (1980:9ff), in his discussion about the arts and modernity. Yet other musicologists support the idea that musical form and content reflects the philosophy of the wider society, as well as the prevailing social norms regarding race and gender (Bukovzer, 1947; Habermas, 1980; Barkin, 1997; Dal Farra, 2003; Schloss, 2004; Katz, 2005). These ideas are discussed in more detail in one the essays in the Appendix.

8. Using sampled sounds as musical source material

Various musical schools have used sampled sounds from the beginning of Musique Concrète to modern day Hip-Hop. While other strands have been the creation of evocative soundscapes' and 'Cinema for the Ear'. The ideas behind the various schools range from using the samples as a representation of the real world (Reich, 1966; Rush, 1971/73; Harvey, 1980; Loy, 1980; Bayle, 1983; Schindler, 1984; Yuasa, 1984; Risset, 1984/5; Jaffe, 1985; Reynolds, 1985; Smalley, 1985; Appleton, 1986; Berger, 1986; Smalley, 1986; Karpen, 1987; Oppenheim, 1987; Teitelbaum, 1987; Rosenboom, 1988; McLean, 1989; Piekarski, 1991; Rue, 1992; Pichelin, 1997; 15 enfants and Pallandre, 1998; Roll and Charles, 1999; Berezan, 2000; Berezan, 2000; Rodgers, 2002; Cummings, 2006; Electronic Music Foundation, 2006; Hamilton, 2006; Soddell, 2006; Marinetti, date unknown; Moravec, date unknown), to using them abstractly as sounds to be manipulated and transformed during the composition (Risset, 1968; Villalpando, 1973; Harvey, 1980; Loy, 1980; Schindler, 1984; Risset, 1984/5; Reynolds, 1985; Smalley, 1985; Appleton, 1986; Berger, 1986; Smalley, 1986; Karpen, 1987; Oppenheim, 1987; Teitelbaum, 1987; McLean, 1989; Piekarski, 1991; Rue, 1992; Del Buono, 1993; Schafer, 1994; 15 enfants and Pallandre, 1998; Roll and Charles, 1999; Cummings, 2006; Electronic Music Foundation, 2006; English, 2006; Soddell, 2006; Marinetti, date unknown; Moravec, date unknown; Russolo, date unknown; Schottstaedt, date unknown).

The effect of using sampled sound abstractly relies on the applicability of the previously mentioned models to the music in question, while using sounds representationally is bound to be evocative to the listener in some way. In the 19th century programme music was written with the overt intention of referring to extra musical events (Scholes, 1970). These are likely to be works that are structured as narratives, or evocations of particular places or events. While many traditional composers use this structuring device and some traditional music is also very imitative of some real sonic environments, the use of sampled sounds and field recordings permits computer music to be more realistic in its picturing of events. My listening included a wide variety of these programmatic works (Varèse, 1918-21; Amenabar, 1957; Berio, 1968; Risset, 1968; Ferrari, 1969; Maxwell Davies, 1969; Maxwell Davies, 1974; Grela, 1979; Lansky, 1983; Schindler, 1984; Berger, 1986; Free, 1986; Wishart, 1986; Wolman, 1986; Oppenheim, 1987; Teitelbaum, 1987; Austin, 1988; Rosenboom, 1988; Kabat, 1989; Birmstein, 1990; Keefe, 1990; Ridout, 1990; Rogers, 1990; Jisse, 1991; Piekarski, 1991; Z and Imhoff, 1991; Etant donnees, 1994; Marchetti, 1995; 15 enfants and Pallandre, 1998; Berezan, 2000; Berezan, 2000; Love, 2001; Finsterer, 2002; Roll, 2003; De Jong and Bobis, 2006; Tsabary, 2006; Marinetti, date unknown).

Summary of Results

Many of the theories are inadequate for explaining how music engages with, affects, and communicates with an audience. Adapting these theories to a broad contextual model for instrumental music composition and reception thus requires some further investigation and adjustment. Firstly it is necessary to examine the conditions for which each theory was created in order to elucidate the underlying assumptions. These assumptions may possibly need to be altered when applied to music. Secondly, some of the theories were originally generalisations of other applications in a specific context. These theories are difficult to simply transfer to large-scale musical forms, especially without readjustment of some of the terminology to reframe the concepts in a manner more consistent with the way music is discussed and analysed.

Finally, many of the theories individually account for some elements of meaning in music, but suffer their own limitations even within their own framework. These limitations need to be addressed for that theory to be fully functional in itself. As well, each one is individually, to some extent incomplete in considering all aspects of meaning creation. Consequently, creating an overarching theory of meaning and communication needs the useful elements of each theory to be drawn together in some way. This overview indicates just how big this task would be.

I find that the questions of meaning, context and audience, are especially relevant to abstract timbral music, because of its nature. The abstract nature of the music obscures definite meaning, relative to text-based music, as the text itself, may give clarity to the communicative intention of the music. Of course in some music, either the actual language may be meaningless to speakers of other languages, or the particular setting of the text may make it unintelligible.

MUSIC FROM ENVIRONMENTAL SOUNDS

Making music from sampled, complex, autonomously produced, environmental sounds offers a potential way of engaging and communicating with an audience, without relying on text. I am drawn to these sounds, particularly those that occur in ‘sound masses’ like the sound of breaking glass, or a chorus of frogs, or the circular saws on the housing project near my home. These sounds are interesting for a number of reasons.

Firstly, they exist independently of the composer or any musical thought, while containing a variety of rich timbres. Secondly, the way the sounds both individually and en masse, naturally evolve over time make each of them engaging in their own right. Thirdly, they come built in with cultural and thus meaning associations, although these associations will to some extent vary between listeners. While finally, if desired, the sounds can also be manipulated in the audio domain to create other sounds and virtual instruments which are not audibly related to the original sounds.

A work which stands out as being particularly significant, in that it is very close to my conceptualising for this type of music is “*M-vil II, (Viols), for Violin and magnetic tape*” (Enriquez, 1969-72). It is a composed work, consisting entirely of discrete samples of violin sounds, which are edited, processed, cut and pasted, juxtaposed and spatialised. It has no melody or rhythm, no series of notes, they are sounds, which occur in three separate voices: Left ear, right ear, and a middle position, which were distinctly contrapuntal. It could not have been played in any fashion on a traditional violin. It relies completely on the technology for its realisation, yet distinctly remains the sound of the violin.

In contrast, another sampled instrument was used to create a particularly thought provoking minimalist work. “*axene*” (Guinnet, 1989), is made from the recording of a performance of an unidentifiable instrument. Since there were no program notes accompanying the music, it all depends on the listener’s interpretation. The work took the most minimal elements of the performance, such as clapping; the sound of the air moving through the instrument; and two high pitched soft notes, (perhaps six sounds in total). These sounds were rearranged temporally, their durations altered, and occasionally two sounds were overlaid, to create a work that lasted 16 minutes. The work was rather long, yet it was so simple and it remained with me for days. Again, no acoustic instrument could ever have produced this performance. It depended on the technology for its realisation.

While I had begun to explore the techniques of digital sound, in order to create music using samples of these types of sound masses, several issues concerning both the technicalities of audio processing, as well as the compositional process and documentation in the audio domain became apparent.

In searching for a means of thoroughly understanding the principles of computer sound synthesis and audio manipulation, I revisited Csound, a program I had started to learn as an undergraduate. However, I have decided to continue my study of Pd, for several reasons. Firstly, it is possible in Pd to hear the results of manipulations instantly, while still being able to edit code if necessary. Secondly, the graphic interface shows the signal flow between unit generators very clearly.

Thirdly, the graphical programming environment makes it quite user-friendly in obtaining some kind of result, unintended or otherwise. The easy access to the underlying text code of a particular patch permit, once the conventions of the language have been learnt, a relatively easy editing of the commands to produce a more desirable result. This is particularly true when using the ‘basic’ objects of Pd to create sound synthesis patches, or as a control mechanism. Note that one of my major projects in 2005 was to explore the possibilities of controlling seven different musical aspects of a small set of sounds in Pd, while another project in Pd was a composition using MIDI instruments, I presented in a Laptop concert in May 2005. These works are on CD included in the Supplementary Material at the end of this document.

My researches into the background and uses of Pd, informed me that it was a very clumsy means of audio recording and processing of sound samples compared to other programs, like Cool Edit, which have been specifically designed for these tasks. (This was based on my own explorations noted above, and conversations with Mark Havryliv.) Pd, however, has been designed for real time control of the flow of audio (and video and anything else that is digitally controllable like lighting). This makes it a very good program in which to compose/realise the final work through controlling the timing, volume levels, texture and spatialisation of the individual sound events once they have been created.

Consequently I have spent some time learning how to use ‘Cool Edit’. Two items in my folio reflect my learning of some of Cool-Edit’s capacities. *Wise Woman* focuses on sound effects processing, while *Litany for Refugees* focuses on audio processing such as phase vocoding, speeding up and slowing down sections of the work, and the manipulation of elements of the work to form various new sounds that are then used as accompaniments to the main text of the work. Both works have been studies in recording and microphone techniques as well as audio engineering, including spatialisation, and timing the sounds for the final audio mix. Both the works were composed/realised in Cool-Edit as final stereo mixdown of the processed voice recordings.

Summary of Results

My use of Cool-Edit for realising the final form of the two voice works provided me with insight into the problems of using the program for controlling the timing of events. It is much harder to control the precise timing of a large number of events, especially when there are multiple layers and a strong use of spatialisation. The decisions I made regarding the algorithms for the precise timing of phrases in *Litany for Refugees*, meant hours in the studio manually synchronising words accurately. An overall control mechanism would have meant that changes in the algorithms could have been implemented much faster. Additionally, it is not easy to trace the control and flow of the small samples in time, which means that ultimately there is no 'score' created as part of the final stereo mix. A picture of multiple sound waves does not indicate the aural contents of the audio files.

The ultimate conclusion is to use Cool-Edit to make a large range of small audio files derived from an original naturally occurring sound source. Each of these small audio files would remain aurally related both to the original sound, and thus to each other. This is similar to the way a clarinet can produce a range of different sounds, which nearly all are still identifiable as a being produced by a clarinet. These files would then be used by Pd to realise a composition.

TEXT-BASED MUSIC

In the meantime, I had been continuing my project of listening to many computer music works, and other instrumental music that has been influential in the development of abstract and experimental art music in the 20th century. The goal of this listening is to gain perspective on the field, both by hearing some of the historically significant works, including instrumental music which uses similar structural and generative techniques, and to hear music from the variety of genres that have been included in the broad field of computer music. This listening covered a range of music from the Italian Futurists, to early musique concrète, electro-acoustic works considered to be significant contributions to the genre, to anything else I could get my ears near, which has been created over the last 80

years. One of my projects was to document and consider some of the analytical and critical issues arising from listening to computer music. This survey is also included as an Appendix to this document.

A number of the more interesting works were created from human utterances, which broadened my horizons, beyond my simple ideas of performance poetry. Indeed it turned out that not all of the works even used text as the generator of vocal sound. The works using vocal sounds were quite modern and only available as recordings (Martinez, 1970; Quintanar, 1972; Chion, 1973; Creswell, 1979; Foss, 1982; Lanza, 1983-iv; Moss, 1991; Z and Imhoff, 1991; Finsterer, 1992; Chopin, 1992-93; Dutton, 1993; Hutchinson, 1993; Wishart, 1993; Rzewski, 1996; Joy, 1998; QuintetAvant, 2001). Each of these works was influential in its own way, some by making it clear they were territories I did not wish to enter. These include works that rely on words with no apparent context, as well as those made from simple sounds that come out of the mouth. These sounds, such as burping and retching, have such strong unpleasant associations with other bodily sensations that they are difficult to listen to comfortably.

However, I was inspired by two pieces of acousmatic music, both of which make use of the composer's disability. The first of these pieces is Alvin Lucier's "*I am sitting in a room*" (Lucier, 1970). This work is structured around an unaccompanied reading of a text outlining the process of the work. This text is recorded and played back into the room and then re-recorded. This process occurs 32 times before all the words become inaudible in a hum of resonant frequencies created by the reverberance of the particular room. All the versions are then spliced together in chronological order. The intention of the work was to explore and create music from the resonance of the room. However, in reading it himself, his stuttering becomes obvious and is a significant feature that structures the work, in that without the stutter the number of iterations of the recording process would probably have been halved.

The second of the pieces is by Robert Ashley, “*Automatic Writing*” (Ashley, 1996). This recording was made to acknowledge the impact of Tourette’s Syndrome on Ashley’s life. The predominant effect of the condition for Ashley is uncontrollable, but generally very quiet vocal utterances. He used his own utterances to create the work, bearing in mind the unpleasantness of the sound, and the complete unpredictability of events (Ashley, 1996, liner notes).

As a result of this listening, I decided that for this folio I would concentrate on creating music that relies on text because of my own reliance on the spoken, or written, word as a conveyor of meaning in everyday communication. This decision was reinforced by my earlier research that showed that what gives ‘abstract timbral’ music meaning is too difficult and nebulous to define in general terms.

My folio contains a variety of work, created in both digital and acoustic domains. This, more subtly, reflects my investigation into various ways of using text to create music, by studying means for transforming sounds: digitally, including sound effects and spatialisation, and acoustically, including voice and instruments. Indeed, one of the features of my folio is the way that the digital and acoustic techniques have influenced each other in the various works of my folio. Some of these works are useful studies to guide my future work on making music from sampled, complex, autonomously produced, environmental sounds.

In addition, I also studied a range of art music scores for ideas on notation and text usage. I was interested in how the texts were delivered, whether spoken or sung, and how the text and accompanying music (often orchestral) was combined. I also looked at details of how the text entries might have been cued by the music, and other details of ensemble work. Some of these works were available on recordings, while others were only available in score form. The works using text were composed in a variety of genres ranging from narrator and orchestra, to an acousmatic opera (Schoenberg, 1912; Prokofieff, 1936; Schoenberg, 1942; Schoenberg, 1947; Babbitt, 1963; Ashley, 1967; Ferrari, 1969; Maxwell Davies, 1969; Orellana, 1971; Villalpando, 1973; Maxwell Davies, 1974; Babbitt, 1975; Metal Urbain, 1977; Rzewski, 1985; Karpen, 1987; Birmstein, 1990; Ridout,

1990; Ferrari, 1991; Smith, 1991; Schersjanoi, 1993; Stewart, 1993; Etant donnees, 1994; Sebille, 1994; Marchetti, 1995; Sassi and Pallandre, 1997; erikm, 1999; Chadabe, 2001; Burt, 2006; De Jong and Bobis, 2006).

However, three in particular stand out for attention because the materials and techniques resulted in works I found very interesting. These works significantly influenced my compositional approaches for my folio. *Reflections* was influenced by “*To the Earth*” (Rzewski, 1985). This nine minute work is for live performance, with simple instrumentation, namely, flowerpots and text recited by the performer. The text is recited straightforwardly without effects and but with some dynamics. The pots are played in text rhythm and pitch inflexion with nouns and other key words always appearing on a regular long note, so some times only one single long note occurs for a word like 'now'. Verses are separated by interludes of free percussive melody.

Each verse has a different style of rhythmic accompaniment, but the text is still enunciated and timed as before. The types of accompaniment include: sparse and empty, regular off beat ticks of sticks clicking, and rapid trilling/ringing of pots (like a triangle trill) as well as more complex rhythms. The music was passionate, delicate but strong. The text meaning is obviously important, which carried the work along, as did the percussive melodic interludes.

Litany for Refugees was influenced by Amanda Stewart’s acousmatic improvisation for four recorded voices titled “*=/=*” (Stewart, 1993). This eight minute work uses two worlds of speech sounds: composed verbally derived phrases that explore language and syntax, as well as, non-verbal utterances and potential manipulations through improvisation and electronic means. A composed text was recorded first. Then, as this recording was played back Stewart laid down three other tracks that record her improvised responses to the initial text in both words and vocal sounds.

Litany for Refugees, *Wise Woman*, and some of the items in *Reflections* are also influenced by “*Simultaneity*” (Smith, 1991). This is a short work of three minutes for spoken voice and transformed samples. The goal of this work is to explore semantic and associative possibilities of the word 'simultaneity'. The basis of this work is the expressive repetition of the word 'simultaneity' over and over via a played back sample. This spoken word is notated in musical rhythms that are used with similes for the word that go through two complete cycles. Eventually, in second cycle (akin to a second verse) improvised transforms of the sampled word accompanies the spoken voice.

Litany for Refugees is not improvised but it does take the concept of using the initial words as the stimulus for the resulting overall work, as well as the notion of using sounds from the words and phrases as accompaniments to the original list of words. Also *Litany for Refugees* uses similar concepts to my other vocal works as the accompanying parts are also derived from the text, both in rhythm, pitch envelope, and articulation.

Litany for Refugees is an acousmatic piece entirely created from words and the sounds of those words, while *Wise Woman* is a hybrid form which reverses the usual format of computer generated sound with live performers, in that the vocal part is pre-recorded, while the instrumental parts are performed live. *The Goddess Lives* is entirely acousmatic, being a mobile phone ring-tone, comprising pre-recorded text and MIDI instruments. Another stand-alone work, *Sunflowers*, is for three part women's chorus, in which both vocalise and regular text form the contrapuntal melodic lines. However, the major work in the folio is the 'voice sequence' *Reflections*.

In all the works in this folio, the music is directly and indirectly derived from the text itself. Firstly, the audio works depend on various elements of the spoken text, which determine their frequency range, the outcome of the application of sound effects, as well as their structure and small scale phrasing, including spatialisation. The final effect on the audio works is the derivation of sounds from samples of the original recorded texts, which are used to accompany the delivery of the text.

This particular effect has been used extensively in *Litany for Refugees*. Each of these extra ‘instruments’ in *Litany for Refugees* was created by stretching, pitch shifting, and filtering the words or phrases, according to my intuitive taste, and, how the result was needed to fit into the overall texture of the work, so that the underlying words remained clear and the other instruments added interest without dominating.

These additional ‘instruments’ are:

1. A bass percussive rhythm derived from ‘oh! to be un-australian’
2. A very high pitched rhythm derived from ‘dinky di ocker’
3. A low melodic shape made from a stretched version of ‘antipodean’
4. A high melodic shape made from ‘oh! to be un-australian’
5. A midrange melodic shape made from ‘dinkum aussie’

A different type of manipulation has occurred in *Wise Woman*. Two texts have been fragmented into phrases and then these phrases have been compiled sequentially into one long text. This has both destroyed some meaning and flow of the originals, replacing it with new bolder meaning. The read text is then subject to various audio effects and spatialisation, which are intended to project this particular implication from the text. It is worth noting that the idea of voice and instrumental accompaniment has been maintained for this work, however a reversal of normal computer music practice has occurred via the voice part being pre-recorded, while the instrumental parts are played live.

Reflections is scored for female voice, mandolin (or guitar) and cello. Each one of the eight individual items has been composed using different combinations of the elemental materials available from the three performers. Thus the use of text includes a range of sung styles, to making music from the sounds of phonemes, to having a simple spoken narrative, to combining spoken and sung words within one item, to making registral distinctions only in the voice part.

This extension of traditional techniques has been replicated in the instrumental parts, where various sound producing methods on the instruments have been used in each one of the individual works. Thus one of the major compositional elements has been performance technique as much as pitch and rhythm. Some of the instrumental techniques include tremolo, chords, bowing with the wood, extended glissandos, tapping rhythms on the sound box of the instrument. For instance in *Life's Gifts*, the bowing technique, *col legno tratto* is specified. This bowing with the wood gives an eerie and delicate, relatively 'unclean' sound. Meanwhile, the mandolin simply taps out rhythms on the soundboard, and the text is to be only semi-sung by being placed into high, low and middle registers of the voice for the durations specified.

Secondly, the instrumental parts in all the works, as well as the sung vocal parts, depend on rhythms derived from their associated texts. Most often these have been used canonically, although, in a variety of ways. Some rhythms have diminished, or augmented durations, some have been temporally displaced in various relativities to the words.

And finally, both the acoustic voice and the instrumental parts in all the acoustic works use pitch sets derived from the titles of the texts, or names of the people to whom they are dedicated. For example, *Wise Woman* uses a combination that provides an 11-note scale that is used for both melody and harmony. The scale is used melodically to give shifting tonal centres. The chords themselves do not show any conventional harmonic and cadential movement.

Reflections uses one or more of eight predetermined pitch sets in various combinations for each item. Each of the eight pitch sets contains pitch collections that not only vary in size, but also the number of repeated pitches and the actual pitch classes themselves. These pitch cells are manipulated in different ways for each item in the complete sequence. For example, one item, *Life's Gifts*, uses pitch set 2 from which three additional sets are derived.

The additional sets were derived by inverting the original set around each of the pitches in the set. As the original set contains the notes B, E, G, the second set is inverted around B, while the third is inverted around E, and the final set is inverted around G.

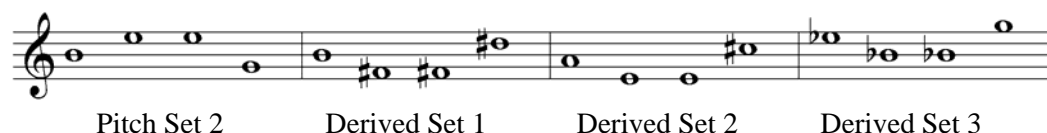


Figure 1: Pitch Cells for *Life's Gifts*.

The pitch sets are applied isorhythmically throughout the derived rhythmic line. The chords for mandolin are also derived from the pitch sets, maintaining the isoharmonic framework by using the sets sequentially.

The concept of functional harmony is irrelevant. However, controlling the dissonance in the harmony, while providing voice leading both between the chords and between melody and accompaniment, was an important principle. This has been effected from the very first phrase in bb1-4, and can be seen in all the following phrases as well.

If the sets in order are called O (for original order), R (for the original order reversed), and some half pairings H1 (set 1-set 2), and H2 (set 3-set 4), then it can be seen that the final chord progressions are quite orderly, while achieving the goal of good voice leading.

bb1-4	O
bb5-8	H1
bb9-12	R
bb13-14	H2
bb15-20	O ¹ (some sets are used for two bars instead of one)
bb21-24	O ² (the final set is used for two bars instead of one)

Figure 2: Use of sets for harmonic progressions in *Life's Gifts*.

In contrast, *The River of Life* uses Pitch Set 3 for the cello part, and to indicate the vocal register. Use the following mapping: C is lowest note, A is middle note, and E is highest note.

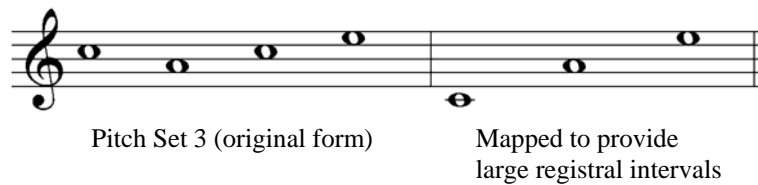


Figure 3: Pitch Cells for *The River of Life*.

The registrally distributed pitch set has been used freely in the vocal line. Freely, meaning at my discretion, rather than in a serial manner, as in some of the other items. The pitches from the vocal line are duplicated in the cello notes, but their register is not. This has been chosen freely to compliment movement in the vocal line. Cello plays only the alternate events of the voice line, except that rests in the vocal line are always included. The events in the cello line are double in duration those of the vocal line, consequently the cello is playing at half speed. This means that in general the spacing between the text and the cello part is maintained.

This is another example of some simple algorithms being applied to generate some of the materials for the works in the folio. Not only my listening, but also my own work as presented in this folio has led me to ask the following question. Can algorithms alone work to produce expressive music, as far as the listener is concerned, or is artistic intervention required to produce a satisfactory outcome?

ALGORITHMIC MUSIC

Algorithms are useful for doing or creating something without having to attend to every single detailed sound event. Rowe, in the documentation of his algorithmic music system, cites Loy, who points out that Western music has always included algorithmic elements (1993:32-36). Isorhythms, talea and color, are algorithmic devices which have been in use since at least the early medieval times (Bent, 2006, accessed 15/01/2007; Sanders, 2006, accessed 15/01/2007; Sanders and Lindley, 2006, accessed 15/01/2007).

Algorithmic music, historically, includes canonic and fugal forms as well as isorhythms, as well as atonal and serial music. Computer music has developed these ideas even further, since the digital domain is extremely suited to algorithmic iterations and decision making.

Some composers, such as James Tenney, have used formulae from Information Theory as algorithms for composition (cited in Overill, 2006, accessed 06/08/2006), while others have used formulae from Chaos Theory for theirs (Celona, 1987; Degazio, 1987; Degazio, 1988; Nelson, 1988; Austin, 1991; Ciamaga, 1992; Foster, 1992; Del Buono, 1993), while still others have developed their own algorithms (Ghent, 1970/71; Rush, 1971/73; Heller, 1978; Petersen, 1978; Loy, 1980; Braxton, 1982; Barrier, 1983; Heller, 1983; Heller, 1984; Heller, 1984; Austin, 1985; Baitz, 1985; Dodge, 1985; Lorrain, 1985; DeLio, 1985/6; Free, 1986; Tipei, 1986; Boesch, 1987; Celona, 1987; Chafe, 1987; Heller, 1987; Scaletti, 1987; Goebel, 1987/88; Hunt, 1988; Koenig, 1988; Oliveros, 1988; Winsor, 1988; Chadabe, 1989; Heller, 1989; Waschka, 1989; Keefe, 1990; Winsor, 1990; Austin, 1991; Heller, 1991; Chadabe, 2001; Chadabe, 2001; Chadabe, 2001; Burt, 2003; Hamilton, 2003; Schiemer, 2005; Burt, 2006; Lewis and Scheidt, date unknown).

The relatively recent investigations into sonification provide a few interesting turns on the idea of algorithmic music. Firstly, the scientists who are developing sonification methods are aiming to find ways to highlight features in the data, but much work remains for this to be effective. In reverse, some composers now accustomed to aleatoric and other types of algorithmic music, are delighted to have a new way of forming a sound work, simply by finding sounds to amplify a particular data set. These sets have ranged from the movement of the planets to changes in wind velocity (Keefe, 1990; Ariza, 2000; Hamilton, 2003; Burke and Norman, 2005; Burt, 2005; Ferrari, 2005; Monro, 2005; Paine, 2005; Tamez, Arnold et al., 2005; Tamez, Arnold et al., 2005). But my subjective experience in listening indicates that algorithms alone cannot create interesting music for sustained listening. The human creation of the unpredictable but related event, or the need for voice leading and shaping, makes the difference between music and an unfolding sheet of sound. This has also proved to be the case in the acoustic music I composed for this folio.

I am interested in the idea of algorithmic music as a labour saving device, and have explored the use of simple algorithmic devices in my folio. Particular devices have included the derivation of pitch sets from the titles of the texts, or other people associated with the works, as well as the derivation of rhythms and canonic forms from the text itself. For example, in *Sunflowers*, the text is set freely using a pitch collection derived from the name of the song. The method involves an algorithm by which particular letters are matched up with particular pitch classes. Thus the most common letters can become 'tone centres'. Taking this feature into account, the whole set is then transposed to the most suitable 'tone centre' for the voices or instruments.

I found this a useful way of proceeding, since I find that 'tone centres' ground the music, by giving some goal points and a sense of arrival, that can be compounded by the use of other musical elements such as shaping of dynamic levels, duration, and voice leading. I have used the term 'tone centre' since these pitches often function as local melodic tonal centres. However, because the vertical harmony is created through different means, it is not 'functional' in the normal tonal sense. Thus tonal cadences of any sort are rare, more often stronger consonances and caesurae replace cadences.

Sunflowers was one of the first to use this method, and as a result I discovered that my original matching procedure, tended to produce more melodic dissonance, and minor thirds and sixths than I had originally intended. This resulted, for this song, in a kind of extended D minor harmony. This gave a flavour that, to me, was undesirable for this kind of idyllic song. As a result at two places in the introduction I sharpened two of the notes to introduce major thirds, into the music, which changed the whole mood sufficiently for my purposes.

Following the creation of this folio, I have restructured the matching algorithm, taking more consideration of probability information regarding the likely occurrence of letters in words and phrases (i.e. the likely occurrence in the titles of poems). I anticipate this will produce a greater variety of major thirds as well as the interesting, unpredictable, variety of intervals and pitch classes that are generated by this method.

Different kinds of algorithms have been used in *Litany for Refugees*. The algorithms have also been applied more strictly. For example, the finale consists of the phrase 'oh! to be un-australian' reworked through a magic square serial process to remix the voices with respect to pitch shifting and timing.

In the original recording for the finale, the phrase 'oh! to be un-australian' was spoken five times. Each one of these phrases was pitch shifted according to my taste. Then each pitch shift was assigned a number, so the newly manipulated recording could be represented as 0, 2, 1, 3, 1. This row was transposed to each of the other pitch levels using a numbering system of four (rather than 12 as is used in twelve tone serial music). This produced a matrix of the phrase being repeated in different combinations of pitches.

Each unique row of this matrix was used to provide an extra voice in the finale at the transpositions defined by the earlier process. The timing of the entry of each of the additional three voices was determined by the first number in the row for that voice, which was matched with the pitches in the original row (i.e. manipulated recording). Thus the transposed row that started with 2, entered immediately the original voice with pitch 2 concluded, while the transposed row that started with 1, entered immediately the original voice with pitch 1 concluded, and so on for the third voice. Once each voice had entered, it unfolded at its new transposition in exactly the same way as the original recording.

Other algorithms have been used to implement ideas throughout both major sections of the work. The first section of the entire work is built from out of phase elements that gradually come into phase. As well, the pace of this section gradually increases as the space between words gets smaller and smaller until practically non-existent by the end of the section, although the length of the words remains unchanged. This has been achieved by application of the following algorithms to the first four layers in this section.

Algorithm 1a: Voice1:

Firstly to space the words accurately, and to introduce the increase in tempo by shortening the space between words over the course of the piece. I decided to divide it into 22 phrases, and each phrase was introduced by the same header words in this case 'dinkum aussie' which was always pitch shifted down by 3 semitones. Each phrase was then sped up with a shorter interval between words, although the lengths of the words themselves remain constant. Then the file was divided into L and R channels randomly for the further changing of phases between the next two voices.

Algorithm 1b: Voice 2:

The second voice in section 1 is out of phase initially by 0.42 seconds delay and this is reduced by 0.022 seconds per phrase until the end of section 1 when the voices are very closely in phase again. This occurs in both channels that are kept the same as for the first voice.

The remainder of the manipulations on this section are worked out in different ways, similar to some serial manipulations, depending on the phrase length. The reason for doing this is to introduce some variation into the changes that are occurring between voices. This seemed the easiest way to derive a set of varied outcomes that have some kind of internal coherence, even if this logic not audible to the listener.

Algorithm 2a:

Firstly a T0 row was derived from the phrase lengths in the following manner. Each phrase contains between 3 and 14 words, so there are 12 possible variations. The first phrase of section 1 contains 13 words so this is mapped to 0 as the starting point. The remainder are mapped sequentially starting from 0 through to 12. This is shown in the following table:

Phrase length	3	4	5	6	7	8	9	10	11	12	13	14
Element number	2	3	4	5	6	7	8	9	10	11	0	1

Figure 4: Mapping of phrase lengths in *Litany for Refugees*.

Thus a row using the actual phrase lengths is derived as:

0	6	5	5	9	2	0	3	11	5	6	8	8	1	4	11	6	10	7	6	11
---	---	---	---	---	---	---	---	----	---	---	---	---	---	---	----	---	----	---	---	----

Figure 5: Row T0 derived from phrase lengths in *Litany for Refugees*.

Then these numbers are used to partition the row into two groups: 0-5 are in Group 1, which thus contains nine elements, and 6-11 are in Group 2, which thus contains 12 elements. The Group 2 elements are shaded in the above table.

V3: The third voice in section 1 alters the timing of the phrases that fall into Group 2. This voice is out of phase initially by 0.7 seconds delay and this is reduced throughout the section by an amount of 0.059 seconds at 12 points throughout the section, which cancels out the initial delay by the end of the section. The channels for this section remain the same as for V1 and V2.

Algorithm 2b:

V4: The fourth voice in section 1 is based on the retrograde of the row used for V3. This is detailed in the table below. This voice has phrases in a different ordering brought about by using the R0 version of the row. This voice is similar to V3 by being initially out of phase by 0.7 seconds delay, however in V4 this is reduced by 0.07 seconds at 9 points, for each of the Group 1 phrases, throughout the section, which cancels out the initial delay by the end of the section. The channels for this voice are the reverse of V1, V2, and V3.

11	6	7	10	6	11	4	1	8	8	6	5	11	3	0	2	9	5	5	6	0
----	---	---	----	---	----	---	---	---	---	---	---	----	---	---	---	---	---	---	---	---

Figure 6: Row R0 derived from phrase lengths in *Litany for Refugees*.

Algorithm 3:

In order to provide more variation within this section, not all phrases will be heard all the time in every voice. At this stage there are four voices occurring in each channel, although at different and out of phase times.

The rules I have used to choose which the voices to silence are as follows:

1. The numbers in the row T0 determines the channel in which the silence is to occur, so that odd numbers relate to the left channel, and even numbers relate to the right channel. So the silences will occur in the channels as shown in Figure 7.

R	R	L	L	L	R	R	L	L	L	L	R	R	R	L	R	L	R	R	L	R	L
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Figure 7: Row ST0 determines silenced channels in *Litany for Refugees*.

2. The number of voices to be silenced in that channel is determined by the numbers in the row R0 according to the following mapping:

Row element	0,1	2,3,4	5,6	7,8,9	10,11
Number silenced	none	one	two	three	four

Figure 8: Mapping of number of silenced voices in each channel.

So the number of voices to be silenced for each phrase in the single channel determined previously, and shown in Figure 7, becomes:

4	2	3	4	2	4	1	0	3	3	2	0	2	4	1	0	1	3	2	2	2	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Figure 9: Actual number of silenced voices in each channel as shown in Fig.7.

These numbers are applied sequentially to the voices, thus if the number of voices to be silenced is 1, then V1 in that channel is silenced; if the number of voices to be silenced is 2, then both V1 and V2 in that channel are to be silenced.

The second section of the work is constructed differently, based on different algorithms that are summarised here. Essentially the second section is polymetric with nine different voices in two different meters, a meter of 15 and a meter of 11. These were chosen because the number of words 165 in the whole section divided into these lengths neatly, and each of them could be subdivided further into a number of interesting rhythms. Each of the voices, except the original, which is placed in both channels, occurs in only one of the channels.

Algorithm 1:

Each voice uses a different accent pattern to define rhythm within the meter.

V1: in both channels at original pitch accented the lead word of each phrase.

V2: in L channel only +1 semitone raised, by means of stretch effect, while keeping at same length, accents lead word and every 15th word.

V3: in R channel only +1 semitone raised, accents on lead word and every 11th word.

V4: in L channel only –2 semitones lowered, accents on lead word and 7-1-7 pattern of accents.

V5: in R channel only –1 semitone lowered, accents on lead word and 6-3-6 pattern of accents.

V6: in L channel only –1 semitone lowered, accents on lead word and 5-5-5 pattern of accented words.

V7: in R channel only +2 semitones raised, accents on lead word and 5-5-1 pattern of accents.

V8: in L channel only +2 semitones raised, accents on lead word and 3-5-3 pattern of accents.

V9: in R channel only –2 semitones lowered, accents on lead word and 3-3-3-3-3 pattern of accents.

Algorithm 2:

Each voice comes in sequentially through the course of the section to build up a dense texture. All the voices except V1 enter at a different time throughout this section, when the next one of the major polymeters starts again on 1, so the texture builds up slowly. By the end, nearly every word is accented. Each voice is also pitch shifted in a range of plus or minus two semitones from the original.

In all sections of this work, the algorithms build up the texture in a straightforward way leaving the underlying text clearly audible, while providing variety in the patterning of the layers. Very recently, I have been advised that this work is to be included in a CD to be produced by the Australasian Computer Music Association, which will be distributed internationally to promote Australian computer music.

FUTURE WORK

In conclusion, my folio work indicates that algorithms alone do not work effectively, and I would like to explore them further, to develop more complexity. I continually found that algorithms that came to mind from acoustic music composition did not usually give good expressive outcomes and needed to be modified continually to expressively reflect new developments in the text.

As a result of my pursuing my original question with its multiple lines of enquiry, my thoughts have gradually become narrower in focus to ask a set of more specific questions. These questions are based on the acknowledgement that compositional materials and compositional methods are separate aspects of creating music. They are designed to further my explorations into creating expressive music from sampled, complex, autonomously produced, environmental sounds. In fact, elements of my folio can be seen as studies for my future work on making this kind of music.

There are questions around the capacity and means of computer music to be expressive, including issues around what makes any music expressive, and what is it expressing? What is the role of timbre, attack, duration, decay, articulation, spatialisation, register, texture, voicing, entries and timing, rhythm, tempo, meter, process and structure? How can musical forms, structures, or processes contribute to expressiveness?

Expressiveness in conventional art music occurs not only through compositional practice, but also performance practice. Over time both these practices have changed. Are there performance practices that would contribute to the expressiveness of computer music?

Is it possible to design digital algorithms complex enough to be expressive by being able to bring variety and development of an idea into the music? For example, it could be said that the functional harmonic framework by prescribing harmonic progression and cadential resolution, is a kind of large-scale algorithm, in which the details are left to the composer. Yet digital algorithms may be able to provide more detail within a given structure, than has been historically possible with traditional music. For instance, it becomes possible to apply algorithms to musical elements other than pitch and duration. It would be interesting to explore what would happen if, for example, these algorithms were applied to any or all of the musical elements of timbre, attack, duration, decay, articulation, spatialisation, register, texture, voicing, entries and timing, rhythm, tempo, meter, process and structure.

Finally I would like to continue my investigation of using Pd, as a control mechanism, and Cool Edit, as a sound processor, as compositional tools for creating expressive music using samples of complex autonomously produced environmental sounds.

REFERENCES CITED

- 15 enfants and Jean Pallandre (1998). "Quai no.3/souffles". (accessed 04/05/2006), <<http://crossfade.walkerart.org>> 33rpm: 10 hours of sound from France >06 microphones and loudspeakers.>
- Akmajian, Adrian, Richard A. Demers, Anne K. Farmer and Robert M. Hamish (2001). *Linguistics: an Introduction to Language and Communication*. (5th Edition), MIT Press, Cambridge, Mass.
- Amenabar, Juan (1957). "Los Peces (The Fish), for magnetic tape". *Latin American Electroacoustic Music Collection*. ed. R. Dal Farra, Fondation Daniel Longlois. (accessed 15/09/2006), <<http://www.fondation-langlois.org/flash/e/index.php?NumObjet=15750&NumPage=556>>
- Appleton, Jon (1986). *Brush Canyon*. CDCM Computer Music Series Vol 6: Compositions by Jon Appleton, David Evan Jones, Paul Moravec, and Christian Wolff. Recording. Centaur Records, USA. CRC 2052.
- Ariza, Christopher (2000). "guido's windchime: algorithmic composition for midi instruments". (accessed 29/08/2005), <<http://www.flexatone.net/consumable.html#babel>>
- Ashley, Robert (1967). *She was a visitor*. Automatic Writing. CD recording. Lovely Music, New York. LCD 1002.
- Ashley, Robert (1996). *Automatic Writing*. Automatic Writing. CD recording. Lovely Music, New York. LCD 1002.
- Austin, Larry (1985). *Montage: Themes and Variations for Violin and Computer Music on Tape*. CDCM Computer Music Series Vol 10: The Virtuoso in the Computer Age--1. Recording. Centaur Records, USA. CRC 2110.
- Austin, Larry (1988). *Sinfonia Concertante: a Mozartean Episode*. CDCM Computer Music Series Vol 1: Compositions by Larry Austin, Thomas Clark, Jerry Hunt, Phil Winsor. Recording. Centaur Records, USA. CRC 2029.
- Austin, Larry (1991). *Beachcombers: for four musicians and computer music*. CDCM Computer Music Series Vol 9: ...musics, metaphors, machines... Recording. Centaur Records, USA. CRC 2078.
- Babbitt, Milton (1963). *Philomel*. Electro Acoustic Music: Classics. CD recording. Neuma Records, Acton, Mass. 450-74.
- Babbitt, Milton (1975). *Phonemena*. Electro Acoustic Music: Classics. CD recording. Neuma Records, Acton, Mass. 450-74.
- Baitz, Rick (1985). *Kaleidocycles for Synclavier*. CDCM Computer Music Series Vol 2: Compositions by Richard Teitelbaum, Martin Bresnick, Neil B

- Rolnick, Rick Baitz, Scott Lindroth. Recording. Centaur Records, USA. CRC 2039.
- Barkin, Elaine (1997). *e: an anthology: music texts & graphics (1975-1995)*. OPEN SPACE, New York.
- Barrier, Jean-Baptiste (1983). *Chreode I*. Computer Music Currents 4. Recording. Wergo, Mainz, W.Germany. WER 2024-50.
- Bayle, Francois (1983). *Le Sommeil d'Euclide*. Computer Music Currents 3. Recording. Wergo, Mainz, W.Germany. WER 2023-50.
- Bent, Margaret (2006). "Isorhythm". *Groves Music Online*. ed. L. Macy. (accessed 15/01/2007), <<http://www.grovemusic.com>.>
- Berezan, David (2000). "Unheard Voices Ancient Spaces". (accessed 27/04/2006), <<http://www.zen31575.zen.co.uk/unheardvoices-excerpt.mp3>.>
- Berezan, David (2000). *Unheard Voices Ancient Spaces*. (M.Mus. thesis) Music, University of Calgary.
- Berger, Jonathon (1986). *Diptych*. CDCM Computer Music Series Vol 8: Compositions by Jonathon Berger, Chris Chafe, David Jaffe, Dexter Morrill, Allan Schindler. Recording. Centaur Records, USA. CRC 2091.
- Berio, Luciano (1968). *Sinfonia (for eight voices and orchestra)*. Recording. Erato, W.Germany. 2292-45228-2.
- Birmstein, Phillip Kent (1990). *Garland Hirschi's Cows*. From a to z. CD recording. Starkland, Boulder, Colorado. ST 203.
- Boesch, Rainer (1987). *Clavirissima: for piano and real-time processing*. Computer Music Currents 8. Recording. Wergo, Mainz, W.Germany. WER 2028-2.
- Braxton, Anthony (1982). *Composition No. 7 (excerpt)*. CDCM Computer Music Series Vol 10: The Virtuoso in the Computer Age--1. Recording. Centaur Records, USA. CRC 2110.
- Budd, Malcolm (1985). *Music and the Emotions: the Philosophical Theories*. (Reprinted 1994), Routledge Inc., New York.
- Bukofzer, Manfred F. (1947). *Music in the Baroque Era: From Monteverdi to Bach*. JM Dent and Sons, London.
- Bukovzer, Manfred F. (1947). *Music in the Baroque Era: From Monteverdi to Bach*. JM Dent and Sons, London.
- Burke, Brigid and with Ann Norman (2005). "Fractions of Illumination". (accessed 19/01/2006), <<http://home.vicnet.net.au/~aaf/sonic9.htm>.>

- Burt, Warren (2003). *Poems of Rewi Alley (2003). On the Wings of a Butterfly.* CD recording. Move Records, Australia. MD 3297.
- Burt, Warren (2005). *Someone Moved In A Room: Computer Music from Sonified Movement Data.* CD. Self Published.
- Burt, Warren (2006). "Radio Namings". (accessed 03/08/2006),
<http://kunstradio.at/2005B/30_10_05.html.>
- Celona, John (1987). *Pacific Rims. The Devil's Staircase: Composers and Chaos.* Recording. Soundprints, Toronto, Canada. M 55.
- Chadabe, Joel (1989). *Modalities: for interactive computer music system. CDCM Computer Music Series Vol 7: Compositions by Neil B. Rolnick, Pauline Oliveros, Julie Kabat, Barton McLean, Joel Chadabe.* Recording. Centaur Records, USA. CRC 2047.
- Chadabe, Joel (2001). *Many Times Benjamin. Many Times.* CD recording. Electronic Music Foundation, New York. EMF CD 50.
- Chadabe, Joel (2001). *Many Times Chris. Many Times.* CD recording. Electronic Music Foundation, New York. EMF CD 50.
- Chadabe, Joel (2001). *Many Times Esther. Many Times.* CD recording. Electronic Music Foundation, New York. EMF CD 50.
- Chafe, Chris (1987). *Quadro: for Piano Trio and tape. CDCM Computer Music Series Vol 8: Compositions by Jonathon Berger, Chris Chafe, David Jaffe, Dexter Morrill, Allan Schindler.* Recording. Centaur Records, USA. CRC 2091.
- Chion, Michel (1973). "Libera Me". (accessed 21/03/2006),
<<http://crossfade.walkerart.org>.> 33rpm: 10 hours of sound from France
>01 Musique concrète.>
- Chopin, Henri (1992-93). *Le souffle et la langue (breathing with my tongue). Vocal Neighbourhoods.* CD recording. Leonardo/ISAST, Cambridge, Mass. ISAST 3.
- Ciamaga, Gustav (1992). *Four Microclips. The Devil's Staircase: Composers and Chaos.* Recording. Soundprints, Toronto, Canada. M 55.
- Creswell, Lyell (1979). *Organic Music. Windows in Time.* CD recording. Tall Poppies Records, Australia. TP 039.
- Cummings, Jim (2006). "An Introduction to Acoustic Ecology". Electronic Music Foundation. (accessed 03/08/2006),
<<http://www.eartoeearth.org/resources/introacousticecology.html>.>

- Dal Farra, Ricardo (2003). "Latin American Electroacoustic Music Collection". Fondation Daniel Langlois. (accessed 15/09/2006), <<http://www.fondation-langlois.org/flash/e/index.php?NumPage=542>>
- De Jong, Sarah (Music) and Merlinda (Text) Bobis (2006). "River, River - a fable, a lament, a love story". (accessed 26/03/2006), <ABC Radio National Broadcast.>
- Degazio, Bruno (1987). *Heatnoise. The Devil's Staircase: Composers and Chaos*. Recording. Soundprints, Toronto, Canada. M 55.
- Degazio, Bruno (1988). *On Growth and Form. The Devil's Staircase: Composers and Chaos*. Recording. Soundprints, Toronto, Canada. M 55.
- Del Buono, Robert (1993). *Night Voices (Variations of a Recurring Dream). The Devil's Staircase: Composers and Chaos*. Recording. Soundprints, Toronto, Canada. M 55.
- DeLio, Thomas (1985/6). *Against the silence...(for percussion ensemble and four-channel computer generated tape)*. Computer Music Currents 9. Recording. Wergo, Mainz, W.Germany. WER 2029-2.
- Dodge, Charles (1985). *Roundelay. Computer Music Currents 4*. Recording. Wergo, Mainz, W.Germany. WER 2024-50.
- Dutton, Paul (1993). *Metalogos: Suite in Two Parts (A+B). Vocal Neighbourhoods*. CD recording. Leonardo/ISAST, Cambridge, Mass. ISAST 3.
- Electronic Music Foundation (2006). "An Ear to the Earth: A Festival of Music, Sound and Ecology". Electronic Music Foundation. (accessed 03/08/2006), <<http://www.eartoearth.org/>>
- English, Lawrence (2006). "Ghost Towns". (accessed 30/03/2006), <<http://cajid.com/empirical/notes.htm>>
- Enriquez, Manuel (1969-72). "M-vil II,(Viols), for Violin and magnetic tape". *Latin American Electroacoustic Music Collection*. ed. R. Dal Farra, Fondation Daniel Longlois. (accessed 15/09/2006), <<http://www.fondation-langlois.org/flash/e/index.php?NumObjet=15810&NumPage=556>>
- erikm (1999). "MAoLik". (accessed 03/05/2006), <<http://crossfade.walkerart.org>> 33rpm: 10 hours of sound from France >09 Improvisation and beyond.>
- Etant donnees (1994). "aime-moi". (accessed 04/05/2006), <<http://crossfade.walkerart.org>> 33rpm: 10 hours of sound from France >04 some bands.>

- Ferrari (2005). "Harmonic Mercy". Muse-eek. (accessed 27/01/2006),
<<http://www.muse-eek.com/record/record.html>.>
- Ferrari, Luc (1969). "Music Promenade Part 1". (accessed 21/03/2006),
<<http://crossfade.walkerart.org>.> 33rpm: 10 hours of sound from France
>01 Musique concrète.>
- Ferrari, Luc (1991). "L'Escalier des aveugles". (accessed 04/05/2006),
<<http://crossfade.walkerart.org>.> 33rpm: 10 hours of sound from France
>05 Radio.>
- Finsterer, Mary (1992). *Omaggio alla Pieta*. Catch. 2 CD set. ABC Classics, Australia. 476-176-0.
- Finsterer, Mary (2002). *Sleep*. Catch. 2 CD set. ABC Classics, Australia. 476-176-0.
- Ford, Andrew. (2005). *In Defence of Classical Music*. ABC Books, Sydney.
- Foss, Lukas (1982). *Round a Common Center*. CD recording. Intersound Inc, Minneapolis. CDD 120.
- Foster, Campbell (1992). *Sheet Metal Music*. The Devil's Staircase: Composers and Chaos. Recording. Soundprints, Toronto, Canada. M 55.
- Free, John (1986). *A Conversation with John Cage - A Work Untitled in Advance*. The Devil's Staircase: Composers and Chaos. Recording. Soundprints, Toronto, Canada. M 55.
- Ghent, Emmanuel (1970/71). *Phosphones*. Computer Music Currents 2. Recording. Wergo, Mainz, W.Germany. WER 2022-50.
- Gillette, Marie and Ernst-Jan C. Wit (1998). "What is Linguistic Redundancy?" (accessed 29/05/2006), <<http://galton.uchicago.edu/~wit/redundan.html>.>
- Goebel, Johannes (1987/88). *Vom Übersetzen über den Fluss*. Computer Music Currents 3. Recording. Wergo, Mainz, W.Germany. WER 2023-50.
- Grela, Dante (1979). "Glaciaci-n, For electronic sounds". *Latin American Electroacoustic Music Collection*. ed. R. Dal Farra, Fondation Daniel Longlois. (accessed 15/09/2006), <<http://www.fondation-langlois.org/flash/e/index.php?NumObjet=15900&NumPage=556>.>
- Guinnet, Jean-Luc (1989). "axene". (accessed 21/03/2006),
<<http://crossfade.walkerart.org>.> 33rpm: 10 hours of sound from France
>02 Musique concrète today.>
- Habermas, Jurgen. (1980). "Modernity versus Postmodernity." New German Critique (Winter 1981) **22**: 3-14.

- Hamilton, Sam (2006). "We demand rigidly defined areas of doubt and uncertainty". (accessed 30/03/2006),
<<http://cajid.com/empirical/notes.htm>.>
- Hamilton, Tom (2003). *London Fix*. Recording. MUSE-EEK, New York. MSK 118.
- Harvey, Jonathon (1980). *Mortuous Plango, Vivos Voco*. Computer Music Currents 5. Recording. Wergo, Mainz, W.Germany. WER 2025-2.
- Heller, Barbara (1978). *MMM-Meer (mehr) Musik als Malerei*. CD recording. Wergo, Mainz, Germany. WER 6610-2.
- Heller, Barbara (1983). *Anschlusse*. CD recording. Wergo, Mainz, Germany. WER 6610-2.
- Heller, Barbara (1984). *Currants-Johannisbeeren*. CD recording. Wergo, Mainz, Germany. WER 6610-2.
- Heller, Barbara (1984). *Scharlachroter Buchstaben*. CD recording. Wergo, Mainz, Germany. WER 6610-2.
- Heller, Barbara (1987). *Intervalles*. CD recording. Wergo, Mainz, Germany. WER 6610-2.
- Heller, Barbara (1989). *Das Quintenbuch*. CD recording. Wergo, Mainz, Germany. WER 6610-2.
- Heller, Barbara (1991). *Un Poco*. CD recording. Wergo, Mainz, Germany. WER 6610-2.
- Hunt, Jerry (1988). *Fluud*. CDCM Computer Music Series Vol 1: Compositions by Larry Austin, Thomas Clark, Jerry Hunt, Phil Windsor. Recording. Centaur Records, USA. CRC 2029.
- Hutchinson, Brenda (1993). *Long Tube Trio. Vocal Neighbourhoods*. CD recording. Leonardo/ISAST, Cambridge, Mass. ISAST 3.
- Jaffe, David (1985). *Telegram to the President: for string quartet and tape*. CDCM Computer Music Series Vol 8: Compositions by Jonathon Berger, Chris Chafe, David Jaffe, Dexter Morrill, Allan Schindler. Recording. Centaur Records, USA. CRC 2091.
- Jisse, David (1991). "Metropolis". (accessed 04/05/2006),
<<http://crossfade.walkerart.org>.> 33rpm: 10 hours of sound from France
>05 Radio.>
- Joy, Jerome (1998). "Duo Vocal". (accessed 21/03/2006),
<<http://crossfade.walkerart.org>.> 33rpm: 10 hours of sound from France
>02 Musique concrète today.>

- Kabat, Julie (1989). *Child and the Moon-Tree: for vocalist and electronics*. CDCM Computer Music Series Vol 7: Compositions by Neil B. Rolnick, Pauline Oliveros, Julie Kabat, Barton McLean, Joel Chadabe. Recording. Centaur Records, USA. CRC 2047.
- Karpen, Richard (1987). *Il Nome: for soprano and tape*. Computer Music Currents 7. Recording. Wergo, Mainz, W.Germany. WER 2027-2.
- Katz, Mark (2005). "Making Beats: the Art of Sample-Based Hip-Hop (review)." Notes: Quarterly Journal of the Music Library Association (June 2005) **61** (4): 1028-1030.
- Keefe, Robert (1990). *The Ephemerides for Harp and Percussion: Moon, 1650-1657*. CDCM Computer Music Series Vol 9: ...musics, metaphors, machines... Recording. Centaur Records, USA. CRC 2078.
- Koenig, Gottfried Michael (1988). *Three ASKO Pieces (for live ensemble)*. Computer Music Currents 2. Recording. Wergo, Mainz, W.Germany. WER 2022-50.
- Lansky, Paul (1983). *as it grew dark*. Computer Music Currents 11. Recording. Wergo, Mainz, W.Germany. WER 2031-2.
- Lanza, Alcides (1983-iv). "interferences III, for chamber ensemble and computer generated sounds". *Latin American Electroacoustic Music Collection*. ed. R. Dal Farra, Fondation Daniel Longlois. (accessed 15/09/2006), <<http://www.fondation-langlois.org/flash/e/index.php?NumObjet=15910&NumPage=556>>
- Lewis, George and Scheidt (date unknown). *Norm 'n George*. Home Recording.
- Lorrain, Denis (1985). *...black it stood as night: loudspeaker music*. Computer Music Currents 2. Recording. Wergo, Mainz, W.Germany. WER 2022-50.
- Love, Karlin Greenstreet (2001). *Composing for the Big Ones: a study of scoring and structure in the slow movements from Karel Husa's Concerto for Wind Ensemble and Concerto for Orchestra*. (M.A. (Hons). thesis) Creative Arts, University of Wollongong.
- Loy, Gareth (1980). *Nekyia*. Computer Music Currents 5. Recording. Wergo, Mainz, W.Germany. WER 2025-2.
- Lucier, Alvin (1970). *I am sitting in a room (for voice on tape)*. CD recording. Lovely Music, New York. LCD 1013.
- Marchetti, Lionel (1995). "Tue-moi". (accessed 21/03/2006), <<http://crossfade.walkerart.org>> 33rpm: 10 hours of sound from France >02 Musique concrète today.>

- Marinetti (date unknown). *Five Radiophonic Scintesi*. Home Recording.
- Martinez, Ariel (1970). "El Glot-n de Pepperland, for tape". *Latin American Electroacoustic Music Collection*. ed. R. Dal Farra, Fondation Daniel Longlois. (accessed 15/09/2006), <<http://www.fondation-langlois.org/flash/e/index.php?NumObjet=15820&NumPage=556>>
- Maxwell Davies, Peter (1969). *Eight Songs for a Mad King*. CD recording. Unicorn Records, United Kingdom. DKP 9052.
- Maxwell Davies, Peter (1974). *Miss Donnithorne's Maggot*. CD recording. Unicorn Records, United Kingdom. DKP 9052.
- McLean, Barton (1989). *Visions of a Summer Night*. CDCM Computer Music Series Vol 7: Compositions by Neil B. Rolnick, Pauline Oliveros, Julie Kabat, Barton McLean, Joel Chadabe. Recording. Centaur Records, USA. CRC 2047.
- Metal Urbain (1977). "Panik". (accessed 04/05/2006), <<http://crossfade.walkerart.org>> 33rpm: 10 hours of sound from France >04 some bands.>
- Meyer, Leonard B. (1956). *Emotion and Meaning in Music*. University of Chicago Press, Chicago.
- Monro, Gordon (2005). "Evochord". (accessed 30/08/2005), <<http://www.gordonmonro.com/pieces/evochord.html>>
- Moravec, Paul (date unknown). *Devices and Desires*. CDCM Computer Music Series Vol 6: Compositions by Jon Appleton, David Evan Jones, Paul Moravec, and Christian Wolff. Recording. Centaur Records, USA. CRC 2052.
- Moss, David (1991). *conjure. Vocal Neighbourhoods*. CD recording. Leonardo/ISAST, Cambridge, Mass. ISAST 3.
- Nelson, Gary Lee (1988). *Fractal Mountains: for MIDI-horn*. Computer Music Currents 10. Recording. Wergo, Mainz, W.Germany. WER 2030-2.
- Oliveros, Pauline (1988). *Lion's Tale: for digital sampler*. CDCM Computer Music Series Vol 7: Compositions by Neil B. Rolnick, Pauline Oliveros, Julie Kabat, Barton McLean, Joel Chadabe. Recording. Centaur Records, USA. CRC 2047.
- Oppenheim, Daniel V. (1987). *Round the Corners of Purgatory*. Computer Music Currents 1. Recording. Wergo, Mainz, W.Germany. WER 2021-50.
- Orellana, Joaquin (1971). "Humanofonia". *Latin American Electroacoustic Music Collection*. ed. R. Dal Farra, Fondation Daniel Longlois. (accessed

- 15/09/2006), <<http://www.fondation-langlois.org/flash/e/index.php?NumObjet=15840&NumPage=556>>
- Overill, Richard E (2006). "Information Theory". *Groves Music Online*. ed. L. Macy. (accessed 06/08/2006), <<http://www.grovemusic.com>>
- Paine, Garth (2005). "Metrosonics". (accessed 8/9/05), <<http://www.meterosonics.com>>
- Palisca, Claude V. (1991). *Baroque Music*. (Third Edition) ed. H. W. Hiscock, Prentice Hall, Englewood Cliffs, N.J.
- Petersen, Tracy L. (1978). *Digital Tantra I. Computer Music Currents 7*. Recording. Wergo, Mainz, W.Germany. WER 2027-2.
- Pichelin, Marc (1997). "Nuit". (accessed 04/05/2006), <<http://crossfade.walkerart.org>> 33rpm: 10 hours of sound from France >06 microphones and loudspeakers.>
- Piekarski, James (1991). *Dreamfile. CDCM Computer Music Series Vol 9: ...musics, metaphors, machines...* Recording. Centaur Records, USA. CRC 2078.
- Power, Ted (2006). "The description of language". self published. (accessed 21/05/2006), <<http://www.btinternet.com/~ted.power/esl0124.html>>
- Prokofieff, Sergei (1936). *Peter and the Wolf*. Score. Boosey and Hawkes, London.
- Quintanar, Hector (1972). "Voz (Voice), 1972For soprano and electronic sounds". *Latin American Electroacoustic Music Collection*. ed. R. Dal Farra, Fondation Daniel Longlois. (accessed 15/09/2006), <<http://www.fondation-langlois.org/flash/e/index.php?NumObjet=15860&NumPage=556>>
- QuintetAvant (2001). "Les Clous mous". (accessed 03/05/2006), <<http://crossfade.walkerart.org>> 33rpm: 10 hours of sound from France >09 Improvisation and beyond.>
- Reich, Steve (1966). *Come Out. Steve Reich Early Works*. Recording. Electra/Asylum/Nonesuch Records, USA. 979 169-2.
- Reynolds, Roger (1985). *Transfigured Wind IV: for flute and tape. Electro Acoustic Music: Classics*. CD recording. Neuma Records, Acton, Mass. 450-74.
- Ridout, Alan (1990). *Ferdinand*. CD recording. Chandos Records, Colchester. CHAN 8748.
- Risset, Jean-Claude (1968). *Computer Suite from Little Boy. Selections*. Recording. Wergo, Mainz, W.Germany. WER 2013-50.

- Risset, Jean-Claude (1984/5). *Sud. Selections*. Recording. Wergo, Mainz, W.Germany. WER 2013-50.
- Rodgers, Jonathan D. (2002). *Found Sound: Music from Non-traditional Sources*. (M.F.A. thesis) College of Imaging Arts and Sciences, Rochester Institute of Technology.
- Rogers, Rowell (1990). *Cenotaph. CDCM Computer Music Series Vol 9: ...musics, metaphors, machines...* Recording. Centaur Records, USA. CRC 2078.
- Roll, Kristoff K. (2003). "Zucalo masque". (accessed 04/05/2006), <<http://crossfade.walkerart.org>> 33rpm: 10 hours of sound from France >05 Radio.>
- Roll, Kristoff K. and Xavier Charles (1999). "Lavomatic". (accessed 04/05/2006), <<http://crossfade.walkerart.org>> 33rpm: 10 hours of sound from France >06 microphones and loudspeakers.>
- Rosenboom, David (1988). *Systems of Judgement. CDCM Computer Music Series Vol 4: Systems of Judgement*. Recording. Centaur Records, USA. CRC 2077.
- Rowe, R (1993). *Interactive Music Systems - Machine Listening and Composing*. MIT, Cambridge, Mass.
- Rue, Rik (1992). *Three Nocturnal Windows. Windows in Time*. CD recording. Tall Poppies Records, Australia. TP 039.
- Rush, Loren (1971/73). *A Little Travelling Music: for keyboard and tape. Computer Music Currents 2*. Recording. Wergo, Mainz, W.Germany. WER 2022-50.
- Russolo (date unknown). *Awakening of a City*. Home Recording.
- Rzewski, Frederic (1985). *To the Earth. New and Recent Works*. CD recording. Music and Arts Programs of America, Berkeley, CA. CD-1000.
- Rzewski, Frederic (1996). *The Road (for solo piano). New and Recent Works*. CD recording. Music and Arts Programs of America, Berkeley, CA. CD-1000.
- Sanders, Ernest H. (2006). "Talea". *Groves Music Online*. ed. L. Macy. (accessed 15/01/2007), <<http://www.grovemusic.com>>
- Sanders, Ernest H. and Mark Lindley (2006). "Color". *Groves Music Online*. ed. L. Macy. (accessed 15/01/2007), <<http://www.grovemusic.com>>
- Sassi, Laurent and Jean Pallandre (1997). "Berger d'Aubrac/5". (accessed 04/05/2006), <<http://crossfade.walkerart.org>> 33rpm: 10 hours of sound from France >06 microphones and loudspeakers.>

- Scaletti, Carla (1987). *sunSurgeAutomata: realised using the Platypus Digital Processor*. CDCM Computer Music Series Vol 3: Compositions by Salvatore Martirano. Recording. Centaur Records, USA. CRC 2045.
- Schafer, R. Murray (1994). *The Soundscape: Our Sonic Environment and the Tuning of the World*. (Reprint of 1977 Edition), Destiny Books, Rochester, Vermont.
- Schersjanoi, Valeri (1993). *Sense-non-Sense: A phonetic-semantic opera for two voices*. Vocal Neighbourhoods. CD recording. Leonardo/ISAST, Cambridge, Mass. ISAST 3.
- Schiemer, Greg (2005). *Tempered Dekanies*. Recording.
- Schindler, Allan (1984). *Tremor of Night and Day: for Cello and tape*. CDCM Computer Music Series Vol 8: Compositions by Jonathon Berger, Chris Chafe, David Jaffe, Dexter Morrill, Allan Schindler. Recording. Centaur Records, USA. CRC 2091.
- Schloss, Joseph G. (2004). *Making Beats: the Art of Sample-Based Hip-Hop.*, Wesleyan University Press, Middletown, CT.
- Schoenberg, Arnold (1912). *Pierrot Lunaire*. CD recording. Hungaraton Recording, W. Germany. HCD 11385-2.
- Schoenberg, Arnold (1942). *Ode to Napoleon Buonaparte Op.41*. CD recording. Deutsche Grammaphon, W. Germany. 415982-2.
- Schoenberg, Arnold (1947). *A Survivor from Warsaw*. CD recording. Sony Classical, Holland. S2K 44751.
- Scholes, Percy A. (1970). "Programme Music". *The Oxford Companion to Music*. (ed. J. O. Ward), Oxford University Press, London. pp.834-836.
- Schottstaedt, William (date unknown). *Leviathan*. Computer Music Currents 3. Recording. Wergo, Mainz, W.Germany. WER 2023-50.
- Sebille, Christian (1994). "Miroir abandonne". (accessed 04/05/2006), <<http://crossfade.walkerart.org>> 33rpm: 10 hours of sound from France >05 Radio.>
- Shannon, C.E. (1948). "A Mathematical Theory of Communication." The Bell System Technical Journal (July-October 1948) **27**: 379-423, 623-656.
- Smalley, Denis (1985). *Clarinet Threads: for amplified clarinet and tape*. Computer Music Currents 6. Recording. Wergo, Mainz, W.Germany. WER 2026-2.
- Smalley, Denis (1986). *Wind Chimes*. Computer Music Currents 5. Recording. Wergo, Mainz, W.Germany. WER 2025-2.

- Smith, Hazel (1991). *Simultaneity. Windows in Time*. CD recording. Tall Poppies Records, Australia. TP 039.
- Soddell, Jacques (2006). "Empirical Soundings:soundscapes from the Commonwealth". (accessed 30/03/2006), <<http://cajid.com/empirical>
<http://cajid.com/empirical/notes.htm>.>
- Stewart, Amanda (1993). =/= *Vocal Neighbourhoods*. CD recording. Leonardo/ISAST, Cambridge, Mass. ISAST 3.
- Strunk, Oliver (ed.) (1965). *Source Readings in Music History, Volume 3: The Baroque Era*. W W Norton and Company, New York.
- Tamez, Omar , Bruce Arnold and Tom Hamilton (2005). "Access Denied". Muse-eek. (accessed 27/01/2006), <<http://www.muse-eek.com/record/record.html>.>
- Tamez, Omar , Bruce Arnold and Tom Hamilton (2005). "Harmonic Mercy". Muse-eek. (accessed 27/01/2006), <<http://www.muse-eek.com/record/record.html>.>
- Teitelbaum, Richard (1987). *Golem 1: for computer music performance system*. CDCM Computer Music Series Vol 2: Compositions by Richard Teitelbaum, Martin Bresnick, Neil B Rolnick, Rick Baitz, Scott Lindroth. Recording. Centaur Records, USA. CRC 2039.
- Tipei, Sever (1986). *Cuniculi, for five tubas*. CDCM Computer Music Series Vol 3: Compositions by Salvatore Martirano. Recording. Centaur Records, USA. CRC 2045.
- Tsabary, Eldad (2006). "Creatures of the Ice". (accessed 30/03/2006), <<http://cajid.com/empirical/notes.htm>.>
- unknown (2006). "Information Theory". Bell Laboratories. (accessed 18/05/2006), <<http://www.lucent.com/minds/infotheory>.>
- Varèse, Edgar (1918-21). *Ameriques (full orchestra with added percussion)*. Recording. Sony Classical, USA. SMK 45 844.
- Villalpando, Alberto (1973). "Bolivianos!, for tape." *Latin American Electroacoustic Music Collection*. ed. R. Dal Farra, Fondation Daniel Longlois. (accessed 15/09/2006), <<http://www.fondation-langlois.org/flash/e/index.php?NumObjet=15870&NumPage=556>.>
- Waschka, Rodney (1989). *A Noite, Po'rem, Rangeu E Quebrou (At Night However It Creaks and Breaks)*. CDCM Computer Music Series Vol 9: ...musics, metaphors, machines... Recording. Centaur Records, USA. CRC 2078.

- Winsor, Phil (1988). *Dulcimer Dream*. CDCM Computer Music Series Vol 1: Compositions by Larry Austin, Thomas Clark, Jerry Hunt, Phil Winsor. Recording. Centaur Records, USA. CRC 2029.
- Winsor, Phil (1990). *Anamorphoses: for trumpet ensemble*. CDCM Computer Music Series Vol 9: ...musics, metaphors, machines... Recording. Centaur Records, USA. CRC 2078.
- Wishart, Trevor (1986). *VOX-5*. Computer Music Currents 4. Recording. Wergo, Mainz, W.Germany. WER 2024-50.
- Wishart, Trevor (1993). *Vocalise*. Vocal Neighbourhoods. CD recording. Leonardo/ISAST, Cambridge, Mass. ISAST 3.
- Wolman, Amnon (1986). *A Circle in the Fire: for bass clarinet and tape*. Computer Music Currents 6. Recording. Wergo, Mainz, W.Germany. WER 2026-2.
- Yuasa, Joji (1984). *Towards "The Midnight Sun" - Homage to Ze-Ami: for piano and quadrasonic computer generated tape*. Computer Music Currents 9. Recording. Wergo, Mainz, W.Germany. WER 2029-2.
- Z, Pamela and Barbara Imhoff (1991). *Obsession, Addiction and the Aristotlean Curve*. From a to z. CD recording. Starkland, Boulder, Colorado. ST 203.

APPENDIX A:

Essays from 2005

Computer Music as Social and Political Commentary Essay 1

This essay explores the discontinuity between conventional music analysis and listener's perceptions, and the place of computer music in this deliberation.

Computer Music as Social and Political Commentary Essay 2

This essay explores the relationship of music to broader society, and some contemporary Art Music composers' thoughts on communication with the listener.

A Survey Of Sonic Art Through Listening

This is an annotated discography and accompanying essay that looks at some of the issues in theorising/writing about computer music.

Computer music studies from 2005

When we grow up?

A PD project to explore and develop control over the output resulting from filtering a series of random MIDI pitches.

MIDI2vox_ultimate

A study in PD concerned with controlling a number of musical parameters in order to compose music with two layers from pre-existing sounds. In this case the sounds were from general MIDI, in some cases manipulated beyond any recognisable MIDI instrument. The concepts are directly applicable to multiple layers of audio samples. What remains to be done is the conversion of this study into the audio domain. This will require extensive programming and experimentation with the basic audio control objects.

A CD has been appended which includes more information on these PD projects.

MUS 910: Essay 1

Autumn Session 2005

Electro Acoustic Music as Social and Political Commentary

Part 1.

Wendy Suiter

Student ID: 2841824

“Music is a code in which the deepest secrets of humanity are written...[and] the study of music should be the key to understanding man’s [sic] nature.” (Cook, 1987:1).

This is the first of two essays which, together, aim to explore the aesthetics of Electro-Acoustic music, from the perspective of examining its possibilities for providing social and political commentary. This is a broad attempt, through a brief survey of the literature, to look at the fact that Western art music does not exist in a vacuum, but is a social activity between composers and audience, taking place in the contemporary real world. While at first glance this question may have little to do with typical music analysis, it is indeed simply a different way of looking at the ideas behind conventional music analysis, and how does analysis relate to the actual activities of music making, the way music might communicate with the listener, and the intended content of the communication.

This first essay will explore general ideas around the purpose of Western art music, what does typical analysis do including whether this can be useful for analysing Electro-Acoustic music. Then the essay will consider whether analysis illuminates the purpose of the music and the means by which music might communicate with the listener.

The second essay will then go on to explore theories of meaning in music, from the listener’s perspective, the aesthetics of Electro-Acoustic music, and how Electro-Acoustic music situates itself in relation to other art movements, particularly by looking at the intentions of a number of Electro-Acoustic music composers from the perspective that “...music itself is a political activity.”(McLary, 1991:26).

Typically in writing about Western art music, genres are discussed and classified in a very sterile way, removed from not only historical social contexts, but from any broader concept that a musical work being part of human culture, either condones, promotes or challenges the cultural milieu in which is created and presented.

Typically Art music is described by the means whereby the music is produced, that is, either the compositional methods, some of which may include the input of performers as well as the composer, or the means whereby it is realised. For instance, some of the genres are known as ‘minimalism’, ‘process music’, ‘micropolyphony’, ‘counterpoint’, ‘aleatoric’, ‘improvisation’, and ‘serial’ music describe compositional process, while

other descriptors such as 'Electro-Acoustic', 'symphony', 'string quartet', or 'oratorio', which also usually implies some sort of form, more specifically, describe the means of realisation into sound. Yet, none of this procedural typology locates the music in any other kind of wider context, whether looking at performance issues, audience reception or the wider social, cultural and political contexts in which the activity is taking place.

However, in general, Western art musical thought is generally organised around the composer, as musical artist, who is concerned with the satisfactory combination of the materials typical of the genre of music, with the underlying social assumption that the music itself is intended to be beautiful and/or expressive although not necessarily intelligible by the audience, so it has both aesthetic and communicative functions. (Nettl, accessed 10.03.2005).

Indeed, in the 17th and 18th century music was typically discussed in terms of 'affect' and 'rhetoric', that is that it was a discourse with emotional meanings and signification (McLary, 1991:20). Thus by implication, the audience at least, is important as the object of emotion communicated through the music.

However, in contradiction to the notion of communication, it is true that some modern composers attend to the elements of music using rational principles, while others minimize the purpose and aesthetic considerations of their work, which is affirmed by a statement by Stravinsky (cited in Nettl, accessed 10.03.2005) that "Expression has never been an intrinsic trait of music, because it is essentially unable to express anything, whether it be feeling, attitude, psychic state, or natural phenomenon."

In some ways, the divergence of these views is simply echoing the debates commenced in 19th Century German music, around the values of Programme Music, which is informed by external referencing to ideas, narratives, sounds of nature, emotions or mental pictures, and Absolute Music, ie music written entirely for its own sake without any external reference, instead aiming to develop the music through pure abstract musical means (Scholes, 1970:2).

However, Scholes does go on to say that even Absolute Music brings about a play of emotional contrasts, and that "...some play of emotions seems to be inseparable from the act of musical creation,....so that any piece of music is capable of having a story or series of pictures read into it by the imaginative listener..." (Scholes, 1970:836-7).

There was however, no doubt that advocates from both sides of the debate recognised that it was all music, the debate was rather concerning the relative values and merits of each type of music. This contrasts significantly with contemporary Western culture, in which there is no unanimous definition of music, and the boundaries of what is considered music, are drawn individually by each listener. Most people would agree that Haydn's work is music, but not all would include John Cage, or Electro-Acoustic music. (Nettl, accessed 16.03.2005).

Richard Vella suggests that, currently, there can be no general definition of music, but it can only be defined in the context of the music one is listening to at any particular moment (Vella, 2000:20). Thus tastes, preferences and experiences will allow individuals to make their own distinctions between sound, music and noise (Vella, 2000:38).

In a wide ranging survey of the definitions of Western art music in music dictionaries, Nettl summarised the concepts considered significant in defining Western art music, which reinforce the notion of Music as Art. These values are: the inclusion of all types of sound, organised by the composer in a manner to represent the world, nature and emotion, becoming both meaningful and meaning creating through the ordering of the sounds, affecting the listener through intellectual response creating mental images and emotions (Nettl, accessed 16.03.2005).

Yet, from the beginning of the 20th Century a number of instrumental composers (eg Debussy, Busoni, Stravinsky, Ives) championed the idea that any sound could go together with any other and this would constitute music (Chadabe, 1997:22).

John Cage extends the concept of music even further to include all sounds as musical events even those which occur despite not having been specified by the composer. Thus Cage makes no distinction between music and sound (Vella, 2000:39). Indeed, Cage suggested that over time the use of 'noise' to make music will continue and expand, and

that discussions about music will change emphasis from dissonance and consonance to what is 'noise' and what is 'musical' (Chadabe, 1997:26). Vella makes the point that noise has always been an essential part of music through the use of percussion, while more explicitly the Italian Futurists and Musique Concrete have made noise an integral part of the sound world (Vella, 2000:20-21).

It is to be noted that the dictionary concepts of Western art music, do not include any judgement or specification of beauty or connotations of pleasure. However this is complicated by the other common uses of the word 'music' in everyday language. The difficulty here being that the word 'music' is often used as a metaphor for beautiful, welcome or desirable sounds, and the concept of music signifies harmony and co-operation. As well, it is generally thought that if Music is classified as an Art then, being an artform, its aesthetic aspects are an essential part of its definition, so that each musical work must have varying degrees of beauty and value (Nettl, accessed 16.03.2005).

Yet Vella makes it clear that despite music taking on new sounds, extending sonic gestures and techniques, and using new compositional processes, it is simply exploring new means of emotional expression (Vella, 2000:84). This is reinforced by Toop's suggestion that sound is used to express 21st century Western social values where "...the solid melts into aether in everyday life, where everything is transient and individual, in a frenetic and discordant world where there is no certainty." (Toop, 1995:11).

Electro Acoustic music can be described as a the process "...in which electronic technology, now primarily computer based, is used to access, generate, explore and configure sound materials, and in which loudspeakers are the prime medium of transmission." (Emmerson and Smalley, accessed 08/03/2005). This is a typical definition of a genre of art music, the authors of this article, however, somewhat unusually, continue by making the point that this definition simply describes the means of production, but does not even describe even the sound world or the distinctive idioms made possible by this technology, let alone any extra musical contexts.

There are two main approaches to sound in Electro-Acoustic music which are, in some sense, a continuation of previous debates around the values of programme music and abstract music. “The first, more programmatic, approach is the use of recognisable real world sounds, including other music to create ‘radiophonic’ works which can border on documentary, while the second is more abstract, simply creating discourse of sound types and timbres.” (Emmerson and Smalley, accessed 08/03/2005).

The use of the word ‘discourse’ here should be noted, because it too refers to an act of communication. Bayle (cited in Chadabe, 1997:35), also makes the point that the style of music known as Musique Concrete uses recordings of the naturally occurring sounds of life, which do contain meaning, because they record and show life as it is experienced.

“Music as it appears to the analyst and the listener might not be quite the same thing. The relationship between the two is one of the most problematic issues...in music analysis” (Cook, 1987:16). Or a more graphic way of putting the question: “How is it that particular images and responses are invoked by specific musical details, yet examining scores and pitch class sets does not lead to the discovery of meaning.” (McLary, 1991:20)

Nicholas Cook in his book, *A Guide to Music Analysis*, which surveys a large number of analytical methods, states that the purpose of analysis is to examine individual musical works to decide how they work, ie what gives unity and coherence to a musical work, through examination of their formal structures (Cook, 1987:4). As formal analysis stresses the structure of the music, the process of analysis has just, by definition, omitted any consideration of the wider purpose of the work, or the effect of the music on the listener, despite Cook’s later assertion that analysis should give a compelling account of the music as it is heard (Cook, 1987:114).

A further step from the real world has occurred as the development of analytic methods for tonal music, which are precise and sophisticated has become an end in itself, rather than a means to see how the music works (Cook, 1987:3). As well, Namour, (cited in Rowe, 1993:106), suggests that the individual characteristics of a musical work are lost as the analysis moves to higher and higher levels, so that ultimately what makes the music work is lost.

Note that traditional musical analysis of formal structures concentrate on pitch and harmony, because these are apparently the only musical parameters amenable to rational thought, so timbral structures are completely omitted (Cook, 1987:4). Vella argues that the freedom of generating and manipulating sound through Electro-Acoustic music has meant the development of structure by either algorithmic forms, or "...for those who like feeling (sic) in their work, the sounds themselves became the inspiration for the form." (Vella, 2000:205).

So where does this leave the analysis of Electro-Acoustic music, given the changes that have taken place in music since the 1950's, so that the main feature of nearly all genres of music, whether instrumental or Electro-Acoustic music, in recent times has been the exploration of the timbral qualities of sound.

Where sound shapes and timbral articulation have become motivic constructs, while development occurs through the juxtaposition and variation of sonic shapes. While the development of recording has meant that sounds can be included in music which cannot be achieved with conventional notation (Vella, 2000:26), and that any sound can now become a compositional input, and that through composition the sounds can be manipulated and recombined in an infinite number of ways (Vella, 2000:81).

As it is quite clear that Electro-Acoustic music operates not only through different technologies and hence media than previous music, but also works in a variety of different sound worlds, but still primarily focussed on timbre, it is possible that finding a way to analyse Electro-Acoustic music might be more productive in explaining how music affects and communicates with the listener.

Some earlier analysts, have developed theories which, although in their original explication were centered around score based, pitch and harmonic analysis, are immediately transferable to the analysis of Electro-Acoustic music, while Schenkian analysis can also be very broadly reframed to ask similar questions of the music.

Meyer's analytical method (cited in Cook, 1987:71-77), is not tied to any particular style of work, but requires the knowledgeable listener who is aware of the norms of the style of the work being examined. If the listener is knowledgeable, then they know when 'openness' and 'closure' are occurring within the music, and this will generate a sense of movement.

Meyer, uses in particular, the idea of the 'generative event' which will imply and thus require (by listener expectation) the continuation of some pattern until resolution occurs, at which point the pattern has become complete and stable (Cook, 1987:74). In any piece of music, there may be more than one pattern occurring at any one time, but may not be occurring simultaneously, so there will be inbuilt tension between the patterns. Once the overlaid patterns are brought into line with each other, this will be a higher level resolution, which may be the place for a satisfactory conclusion to the piece.

Meyer's analytical method also rests on the idea of underlying rhythmic structures, in which certain small and large scale events are accented "...marked for consciousness in some way...", which he specifically mentions will include timbre, duration, repetition as well as dynamic stress. These rhythmic accents are used as a means to clarify and notate the form and other responses to the music in question (Cook, 1987:77).

Lehrdahl and Jackendoff, in contrast to Meyer's search for patterning and the development of listener's expectations, aim to find a structural description that the experienced listener can hear. In many ways the general idea of their work is very similar to Meyer.

They have specifically claimed that, despite their method being developed using tonal music, their analytical method could apply to all styles of music, because their theory describes how the listener mentally organises the music they hear, ie how the listener relates the surface details of what they hear to the underlying structure of the music (Bent and Pople, accessed 19/04/2005).

Lehrdahl and Jackendoff propose structural descriptions using four different perspectives on the music: 1. grouping of motives, phrases and sections; 2. regular alternation of weak and strong accents at different structural levels in the music; 3. which pitches are significant over the time span of the piece; and 4. the continuity and progression of the music, through the use of harmonic and melodic tension and relaxation (Rowe, 1993:104).

These can easily be reframed to include non pitched music such as 1. grouping of sounds and sections within the work; 2. alternation of weak and strong accents at different structural levels in the music; 3. which sounds are significant over the span of the piece; and 4. the continuity and progression of the piece through intensification and relaxation.

Schenker originally cast his theory with psychological and metaphysical foundations, but these have been stripped away by later analysts who have built on his work (Cook, 1987:27). Schenkerian analysis focuses on structure at a number of different levels, foreground, middleground, and background, aiming to find the background structure which he says should show directed motion towards a goal, usually defined in harmonic terms, for the music to work.

In fact, as the three structural levels are not usually analysed at the level of the single note, motif or phrase, except in some foreground maps of the music, Schenkarian analysis could easily be reframed as a dialectic between the goal directed continuity of the fundamental line of the piece and the articulated surface of the piece with its disjunctions and repetitions (Cook, 1987:53).

Cook also suggests that the atonal repertoire has been composed quite intuitively, and is thus intractable to traditional analytical methods, but he suggests his own analytical approach which is similar to Meyer's patterns of rhythmic accentuation of large and small scale structures in the work (Cook, 1987:343).

Cook, similar to Vella, suggests questions which can be asked of any piece of music, based on listening to the music, as well as looking at the score (Cook, 1987:237-249). He also cites a list of questions posed by La Rue which were specifically targeted towards sonata form, but can also be generalised (Cook, 1987:266-276).

One might think that Electro-Acoustic music could be analysed by means of some of the score based analysis methods being broadened out to the listening aspect of music, but there seems to be an ongoing problem that it is not possible to ensure that most listeners hear the underlying structures of the music (if they exist) because they are too often obscured by the surface detail of the music (Rowe, 1993:204).

Vella proposes a method for analysing Electro-Acoustic music by asking a series of questions. The questions are directed towards determining the function of each sound in relation to the other sounds, and to construct a model of how the sound events relate to each other, through analytical listening (Vella, 2000:31-2).

This broad approach is simply a reframing of functional harmony into more generic language, for soundworks that are not based on triadic harmony. The more important point here is the emphasis on analysis by listening.

Despite this seeming to be the only logical way to proceed, it is actually a dramatically different approach to the conventional score based analytical methods, which are used to infer significant moments in the music when it is realised into sound. Indeed the equivalent approach in the study of Electro-Acoustic music would be to study the software and specific programs and algorithms, altogether ignoring the actual sounds produced.

Vella does make the point that the answers will be subjective because it depends on the listener. However some of the questions such as “Does it work?” “How does the treatment of the sound source affect the way you listen?” and “Can you understand the music without external references?” seem to be designed to expose the more subjective experiences of the individual listener.

Yet one of the main features of composing music with computers is in using their rigour, speed and accuracy, so that they are excellent for composing algorithmic music ie where the music is composed purely through specifying procedures to generate and manipulate small sound elements such as pitch or rhythmic events (Rowe, 1993:163).

Of course the advantage of algorithmic composition is that the composers do not need to concern themselves with the production of every minute detail (each note and its parameters) of the work, but can rather concentrate on the overall end result as a listener, (if necessary) remaking the algorithm to provided the desired final musical product. While all composers are concerned with the final product of their efforts, more traditional composers must attend to and create every small musical detail. Should they then decide to make changes to the work, they will be required to rewrite every of the notes. By comparison, algorithmic music is (potentially) labour saving all round, as a method for generating a final music product.

As electronic technology has evolved, so have ideas about what constitutes music (Chadabe, 1997:ix-x). Even the aesthetics of Electro-Acoustic music have changed over time. In the early days of tape music, the music was exploratory and were not intent on embodying traditional values of beauty in music, so that the medium and the music were identified as one and the same.

Compared with acoustic music, Electro-Acoustic music is still in its infancy, and as time passes the work becomes less about electronics and more about music (Vella, 2000:208). In the USA, electronic music studios were at least as much concerned with research and technical innovation as with musical products, which may be contrasted with the work of the European studios which always produced music for concerts and broadcasts (Emmerson and Smalley, accessed 10/03/2005).

As the developments in technology have meant both that 'music' has been able to incorporate new sounds, since any sound (including those of traditional acoustic instruments and naturally occurring sounds) can be produced electronically, as well as the extension and development of compositional methods, Electro-Acoustic music has become a medium rather than a style (Chadabe, 1997:x-xi).

This essay has examined the nexus between music and its analysis, concluding that analysis is content to work with surface details without going deeper into meaning, perhaps because musical thought is male dominated, and it has not been typically masculine to admit that anything, in this case music, generates an emotional response (McLary, 1991:18). It is clear, however, that conventional music analysis only looks at structure, and completely ignores the effect the music has on the listener (Cook, 1987:119).

Cook suggests that the rise of scientific thinking has affected music analysis, because before prior to the 18th century, theorists looked at overall concepts of structure derived from many works, rather than the minute details of individual works (Cook, 1987:7-8). Yet, the principal types of music analysis in current use do not have much scientific validity because they are not rigorous; the ambiguous bits are always left out as not important; the analysis of any particular work is not necessarily repeatable by other practitioners because some of the basic decisions are so subjectively individual, without being clearly stated as such; and it is hard to apply the current methods to all music. Consequently it is important to rethink what analysis can really tell us about the music (Cook, 1987:224).

It is impossible to study music without looking at the social world in which it operates, meaning is dependant on the available syntax, sound forces and genres, so analysis must go beyond the present practice of looking at the details of a work to look at the whole views of different styles of music (McLary, 1991:30). More work needs to be done on placing of Electro-Acoustic music as an artform, in the wider social and political context.

REFERENCES

- Bent, I. D. and A. Pople, "Analysis" *Groves Music Online*. ed. L. Macy, (accessed 19/04/2005, 21/04/2005), <<http://www.grovemusic.com>>
- Chadabe, J. (1997). *Electric Sound: The Past and Promise of Electronic Music*. Prentice Hall, Upper Saddle River, NJ.
- Cook, N. (1987). *A Guide to Music Analysis*. Oxford University Press, Oxford.
- Emmerson, S. and D. Smalley, "Electro-acoustic Music" *Groves Music Online*. ed. L. Macy, (accessed 08/03/2005, 10/03/2005), <<http://www.grovemusic.com>>
- McLary, S. (1991). *Feminine Endings: Music, Gender and Sexuality*. University of Minnesota Press, Minnesota.
- Nettl, B., "Music" *Groves Music Online*. ed. L. Macy, (accessed 08/03/2005, 10/03/2005, 16/03/2005), <<http://www.grovemusic.com>>
- Rowe, R. (1993). *Interactive Music Systems - Machine Listening and Composing*. MIT, Cambridge, MA.
- Scholes, P. A. (1970). "Absolute Music". *The Oxford Companion to Music*. ed. J. O. Ward. Oxford University Press, London. p. 2.
- Scholes, P. A. (1970). "Programme Music". *The Oxford Companion to Music*. ed. J. O. Ward. Oxford University Press, London. pp. 834-836.
- Toop, R. (1995). *Oceans of sound: aether talk, ambient sound, and imaginary worlds*. Serpents Tail, London.
- Vella, R. (2000). *Musical Environments: A Manual for Listening, Improvising and Composing*. Currency Press, Strawberry Hills, NSW.

MUS 910: Essay 2

Autumn Session 2005

Electro Acoustic Music as Social and Political Commentary

Part 2.

Wendy Suiter
Student ID: 2841824

Introduction

This is the second of two essays which together, aim to explore the aesthetics of Electro-Acoustic music, and whether it may be meaningful to listeners. The first essay concluded that ‘music’ is commonly conceptualised as an art form which communicates with the listener. However, typical analysis, for example Schenkarian or Alan Forte’s pitch class analysis, refuses to engage with issues of communication. Through the application of analysis to Electro-Acoustic music it is possible that some analytical methods may reveal how music may work as a means of communication. However, this still leaves unresolved the questions of whether music is meaningful and what the music may be communicating.

This essay will explore meaning in music, ie the content of the communication, from several perspectives. These aspects examine whether contemporary Western art music is comprehensible to the listener. The first section looks at several theories of meaning from a purely musical point of view. The second section looks at the development of art music in the broader social context and the implications this has had for communication through Electro-Acoustic music. The final section examines how Electro-Acoustic music situates itself as a medium of expression, through comparing composer’s motivation(s) with those of contemporary visual art.

1. Music in its Self Defined Context

Music is often described as a language. This metaphor is often used to discuss how music might communicate with the audience. For example, Herbert Brun says that a new musical language will remain unheard and not understood until it has become commonplace and can be understood in its own terms (Brun, 2004:99-100).

Semiotics is the study of signs and symbols and what they denote in both artificial and natural languages. Thus semiotics may provide the answers to the question of how music might communicate with the listener. Semiotics, has been applied to music, through the work of Nattiez (1990) and others, but has turned out not to be very useful for a number of reasons.

Firstly, language is used in many contexts. One use is to make literary art, while another is to make everyday speech. Yet music is analysed by semioticians as if it were the analogue of speech, that is at the level of phoneme, rather than a crafted work of art (Nettl, accessed 16/03/2005). Secondly, semiotics of music takes tiny motivic elements and looks at how they are formed into the large scale melody lines. Consequently, it has only been useful for the analysis of monophonic music (Bent and Pople, accessed 21/04/2005). Indeed it has been argued that despite music being written according to a code determined by the composer, despite theoretically being knowable by a listener, music cannot be equated with a language because it is unclear what it specifically signifies (Attali, 1985:25).

Finally, Max Neuhaus points out that spoken language operates on two levels. Both of these levels are important in determining the meaning of what is said. The first is the level of the phoneme and the word, which gives the literal meaning. Tone of voice is a second layer superimposed on the first. Tone of voice is a continuum of inflection and intonation as the person is speaking, which provides highly accurate information about the person and what they are trying to tell us. Often tone of voice is the final arbiter of the meaning of the words themselves. Semiotics in music, since it has been taken to the level of the phoneme, does not consider how the second level might operate in music (Neuhaus, accessed 05/05/2005).

An alternative theory of meaning in music which relies on expectation and predictability, has been developed by Leonard Meyer. His theory is that music can be thought of as a process by which heard patterns become experienced as emotions, which are given meaning by the listener (Meyer, 1956:3-4). He says that music is a 'closed system' in that there are no signs and symbols which refer to the material world of objects, concepts and human desires, so it has no intrinsic meaning (Meyer, 1956:vii). It can be meaningful if, and only if, the listener is familiar with the style of the music (Meyer, 1956:35). Meyer is clear that musical meaning and communication take place within a social situation or cultural context. He states that it is an absolute necessity that there is a "...common universe of discourse in art: a common set of gestures known to the group, and a common understanding of the meaning of those gestures." (Meyer, 1956:42)

Meyer distinguishes between felt emotion which is transient, and mood which is more permanent and stable. He says it is clear how music affects mood through musical elements such as tempo, timbre, texture, and dynamic levels. He points out that mood is what is often discussed when people write about meaning in music (Meyer, 1956:7). Chadabe provides an example of this confusion when he says that Cage's music conveys a 'happy anarchy' where all things can just be themselves, so his music has elements of surprise, exuberance and adventure (Chadabe, 1997:83).

Meyer explains that emotions are highly subjective, and cannot be measured or observed in any scientific way (Meyer, 1956:12). Additionally, it has been said that all listening is subjective, even analytical listening, because, even at the most basic acoustic level, two people in the same room will not physically hear the same sound because they are in different locations with respect to the sound source (Vella, 2000:30). Let alone individual differences in musical perception, such as the ability to separate, decode and group sounds into categories such as useful, useless, meaningful or meaningless (Vella, 2000:38). Meyer asserts that for a whole piece of music to be meaningful, every part of it must be meaningful (Meyer, 1956:42). If all this is true, then it would be very difficult to determine that listeners have similar understanding of the music.

2. Music as an Aspect of Social Relations

Rather than looking at gestures as the shared level of understanding, Susan McLary takes the view that the exploration of meaning in music requires an exploration of the social and cultural values dominant at the time the music was written (McLary, 2000:1-2). She says that there are underlying social and cultural assumptions, which although unspoken, are shared between composer and audience. These assumptions allow the music of any specific time to 'make sense' (McLary, 2000:5).

In an example which is particularly relevant to this essay, McLary suggests that tonal music is based on the idea of narrative in which the individual is subjected to group consensus. This is a story of potentially antagonistic forces ultimately moving together to achieve a single long range goal [the tonal centre] (McLary, 2000:80-1). This music suited the needs of the ruling class and the growing bourgeoisie, who wanted to maintain social control. Attali agrees that music is both a mirror of society and its

dominant way of perceiving the world. For example, Mozart reflects the dominant bourgeois dream of harmony and co-operation (Attali, 1985:4-5).

Then at the end of the 19th century, in German speaking regions, this apparently benign social order was challenged by the intelligentsia. They defied the rule bound aristocratic society in which they lived. Among other things, tonality, through its association with a particular cultural narrative was declared bankrupt. Instead, the intellectuals declared that individualistic expression of the inner self was primary in a composer's work (McLary, 2000:111).

This was only one of several things occurring relatively simultaneously which, together, had very significant consequences for music and its communicative possibilities. Firstly, the change in emphasis from the listener as communal being, to composer's self expression, meant that overthrowing of musical convention became an end in itself. While this may have reflected the autonomy of individual artists, it also resulted in the dissolution of any convention that might assist in communication (McLary, 2000:116). Secondly, the rise of capitalism had brought composition and performance into the realm of the market place. Thus serious music entered the realm of entertainment. So the critical approach to serious music changed to preserve the special place of this music. The new way of listening to art music, was to find its 'true meaning', which could only be found in the musical work itself, rather than simple enjoyment of surface details (McLary, 2000:114).

The final break in communication occurred because of the beginnings of psychoanalytic thought. Thus, in German speaking regions, the notion of genius was defined in ways which made it indistinguishable from madness. Consequently, in trying to break away from notions of music as a consumable commodity artists of all types, including Schoenberg and other composers, used insanity as a model. This had the specific intention of denying intelligibility. Serialism is the epitome of this idea, because a very subjective, idiosyncratic [autonomous] but rigorously integrated idea [genius] controls the music, however incoherent it may actually sound (McLary, 2000:135-6).

Electronic music composition, which began in the early 1950's in Europe, was closely linked to serial music. These were composers from the post Webern generation, such as Stockhausen, who embraced serialism as the compositional technique of the moment

(Randel, 1978:154). In the USA, the development of electronic music studios were at least as much concerned with electronic and digital research and technical innovation as with musical product. The musical products were often the result of a new technical procedure rather than composition intended to communicate with an audience (Emmerson and Smalley, accessed 10/03/2005). Povall (1995) confirms that composers of Electro-Acoustic music have not developed compositional theory or philosophy of their work, because they are too involved with how the technology works.

Some writers such as Boretz are clear that if music is not rationally coherent then what grounds do we have for caring about and for it (cited in Cook, 1987:223). A number of other authors have remarked on the break in communication which has occurred in contemporary Western art music. For example, Lehrdahl suggests that modern music has discarded the connection, or common understanding, between the way the music is constructed, and the way the audience forms a mental idea while listening (cited in Rowe, 1993:104). James Tenney says that familiarity with the music is not the main issue, but rather ascribes the changes in perception of contemporary Western art music to its increasing aural complexity (Tenney, 1992:4). He suggests that the music has become more difficult to listen to because it is more dissonant. Schoenberg has succinctly summed up the issue “What distinguishes dissonance from consonance...is a greater or lesser degree of comprehensibility” (cited in Tenney, 1992:8).

All the approaches mentioned so far, conclude that contemporary Western art music, and Electro-Acoustic music in particular, is probably not able to communicate anything meaningful to the listener. However, perhaps a meaningful purpose for Electro-Acoustic music can be found by comparing its methods with those of several contemporary visual arts practices: Modernism, Abstract and Conceptual Art.

3. Music in Artistic Contexts

As can be seen, the following descriptions of these arts practices are all quite explicit about the relationship of their work to contemporaneous political and economic circumstances. Some genres directly challenge the social and economic precepts of the society in which they are located.

- Modernity, which stems from the progress of capitalism during 19th century, is centred on the idea that incessant change is a fact of life. However the agenda for change is concentrated in the hands of relatively few. It seems to be occurring due to immutable forces outside of ourselves, while its effects are largely arbitrary and unpredictable (Smith, accessed 14/04/2005).

Modernism is art which depicts modernity. The philosophical underpinning of modernist art practices are: that the shock of the new is desirable, the present is replete with self evident value, and reclaiming the distant past as a generalised precedent for contemporary work. Further, the artists in this genre insist that their work is autonomous, insisting on critical distance from everyday life and the material world. They see their art as a space for unbridled creativity, pure experimentality and exploration of possibility. Abstraction is thought to be inevitable, as the underlying aesthetic results in the production of largely arbitrary and unpredictable work. Meanwhile, the relationship between artist and viewer is fixed.

Modernism has been subject to devastating criticism by conceptual, Marxist and feminist artists and critics, as well as those concerned with racism, so that many visual artists have rejected it for the last few decades. However its ideas persist both in art institutions and art education, and has become standard way of thinking for the educated consumers of art (author unknown, *Groves Art Online*, accessed 12/04/2005).

- Abstract art is a 20th century art form that rejects representation, and is consciously self referential. The movement came about as a response to World War 1 embracing a new and less devastating future. The movement is explicit about its affective properties, as well as having the explicit goal of raising human consciousness to improve the quality of life. Abstract art uses colour and shape to evoke emotion in the viewer, while the formal content is determined by the artist's internal response to an object (Moszynska, accessed 12/04/2005).
- Conceptual art began in the second half of the 20th century. It is overtly critical of the political and economic systems that sustain mainstream

Western art. It dismisses or eliminates working with objects, but rather engages with ideas, and the artist's intentions. The concept of the work is valued more than its execution. It explicitly rejects the link between aesthetic and monetary value of a work of art. It encourages the role of the spectator in creating the meaning of the work (Craven, accessed 12/04/2005).

In order to compare the aesthetics of Electro-Acoustic music to visual art practices, I have classified the work of a broad cross-section of composers. The information is compiled from the sources used during my research for this essay. Thus the composers mentioned will not necessarily include all those who work in Electro-Acoustic music. However, due to the nature of the sources, it is likely that most of the major composers have been included¹. Altogether the work of 101 composers were used for this summary, which is provided Appendix A. There are some inherent issues in this summary.

Firstly, because this work is based on secondary sources, the actual descriptions of individual composers used to classify the style of work will have focussed on aspects of the composer's work relevant to the original author, thus some other features relevant to this summary may have been omitted.

Secondly, I have classified the work in specific ways related to the sound sources and the composer's intention. As this was not always the focus of the original author, this classification depends entirely on my interpretation of the original author's interpretation of the composer's work.

The final issue is that of course, many of these composer's have completed a number of works, some of which could be placed under different classifications. For simplicity, I have put each composer in one category only, using more general

¹ The sources used for this summary are: Chadabe (1997); *Groves Music Online* composer biographies listed under Electro-Acoustic music; Jenkins (2004) summarises 10 contemporary Australian composers talking on their work; Neuhaus via *Auracle* website; Rowe (1993); Schiemer (1998); Sitsky (2002) has edited biographies of many important 20th century composers; and Toop (1995).

descriptors of their motivations as my guide, rather than the descriptions of individual works.

Contemporary art music genres are defined and discussed as the means whereby the music is produced. For instance, some of the genres are known as ‘minimalism’, ‘process music’, ‘micropolyphony’, ‘counterpoint’, ‘aleatoric’, ‘improvisation’, ‘Electro-Acoustic’ and ‘12 tone’ music, to use examples discussed in a recent book on contemporary music (Vella, 2000:186-232). None of this procedural typology locates the music in any kind of relationship to the audience, nor any broader social context.

Appendix A to some extent replicates this typology, because this is the way the music has been discussed in the literature. However, I have used the terms ‘Representational’ and ‘Non-Representational’ because in some cases it is clear that the music is designed to be an aural picture of a specific place or phenomenon. One could safely assume that the five composers whose music is representational are clearly attempting to communicate with the audience.

There are, however, composers working in styles which are Hybrid between Representational and the Non-Representational. Of these, five composers have all explicitly stated their intention to convey political and social messages through their work. Commentaries on their music always make a point of mentioning this fact, which by implication is enormously significant in the context of Electro-Acoustic music. An example of this is the *Groves Music Online* article on Luigi Nono, which states that Nono was convinced that “...all artistic activity must be motivated by ethical and political considerations.” (Borio, accessed 06/04/2005).

In a wide variety of the other styles, classified here as Non-Representational, and some of the styles classified as Hybrid, the way specific objects are represented, and sounds are presented to an audience may refer to meaningful things, whether the composer explicitly states this, or simply ‘lets the music to speak for itself’. Brun defines composition as the making of connections between things that would not otherwise be connected, so that they have a meaning that without those connections they would not have (Brun, 2004:77). Johnson suggests that without imagination, nothing in the world could be meaningful, and it would not be possible to make sense of experience.

Imagination is essential to rationality. This is because people use metaphor, which requires imagination, to grasp things as meaningful (Johnson, 1987:ix-x). Thus, in these classifications, without hearing the music itself, it is not clear whether the composer attempts to, or succeeds in, communicating something meaningful or displays any social or political awareness in their work.

In contrast, there are styles where the composers are purely working with technological developments both to create the music they have in mind, or by writing music to test the evolving technology rather than writing the music as an end itself. It would be difficult to imagine that the latter had any extra-musical agenda to their work, as it would be for those composers who work solely with synthesising and manipulating the resulting sounds. For example, the composers of *Musique Concrete*, one of the early forms of Electro-Acoustic music, explicitly stated that sounds should be believed and appreciated for their abstract properties rather than being attached to meanings or narratives associated with their source (Emmerson and Smalley, accessed 08/03/2005). This technical problem solving procedure is far less aberrant involving 20 (plus a probable 19) out of the 101 composers. Thus it appears that around one third of composers have no explicit social or political comment to make through their music, while for the majority of others, their intentions at meaningful communication are not immediately clear. Perhaps this is evidence that despite the composer's intention, the system on which a work is produced crucially determines its musical aesthetic (Schiemer, cited in Jenkins, 1998, accessed 03/03/2005).

Mary Ashley (cited in Chadabe, 1997:92) says that in the 1960's there was a strong need to make music but there were few material resources so conceptual ideas of imaginary music became the thing, including radical notions of music production that probably could never be realised because the ideas were highly conceptual rather than realistic. She gives the example of the concept of making music from icebergs melting. Eventually, this trend stopped, as most of the composers concerned wanted to hear their music, and focussed on building their own electronic instruments which were purpose built to enable them to produce the sounds in the contexts of their choice (Chadabe, 1997:103).

However, composers who explicitly wish to create a style at the same time as they create an individual work, means that the work becomes more abstract, so meaning disappears (Attali, 1985:113). Brun acknowledges that it is far more difficult to discern the composer's intentions compared with how the composition is organised, while many confuse complexity of means with complexity of purpose, so that composers need to find completely new ways to make themselves understood (Brun, 2004:95-98).

Contemporary Western art music is more than likely to be Modernist. This is because even though Modern music may convey information within a composer's code, it exists without meeting listeners demands. This reflects the pure Modernist ideology which values change in the name of progress even if it destroys communication (Attali, 1985:116).

Kramer defines Modernist Music as art for arts sake, speaking to a small cultural elite, usually divorced from political, social and cultural contexts. This he contrasts with Avant-Garde Music which explicitly challenges cultural values, through shaking listeners out of their complacency, by challenging their conceptions of music (Kramer, 2002). An example of this Avant-Garde attitude is provided by Alvin Lucier who said that sometimes their work was so different it that the audience just could not process it as music (cited in Chadabe, 1997:102-3). Another is provided by Pierre Henry and Pierre Schaeffer, who performed their opera *Orphee* in Germany in 1953, but it was not well received. This dismal reception merely made them more determined to continue composing Electro-Acoustic music until the public understood it (Chadabe, 1997:31).

Many writers on music admit to its Modernism, such as Vella, who states that one of the driving forces in Western art music is to make music in new ways and to use new materials (Vella, 2000:202). Another aspect of Modernism, reclaiming heritage from the distant rather than recent past, is underlined by Rowe. He points out that compositional formalism, ie using rules to create some or all of the work, as the basic unifying structure which organises the musical whole, has been used throughout Western music history especially since the composition of isorhythmic motets (Rowe, 1993:36)

However, McLary claims that some composers, since the 1960's have been again trying to communicate intelligibly with the audience, through use of narrative devices, sampling real world sounds, and using familiar styles of music (from movies and cartoon soundtracks). Richard Toop also describes the current state of music as searching for new relationships between composer and listener, composer and machine, sound and context (Toop, 1995:21-2).

McLary gives Zorn, a composer who works using only electronic sources, both sampled and synthesised sound, as an example of a composer who uses explicit signifiers in his work (McLary, 2000:141-148). She says that the public critique and debate of his work in the USA, indicates that his music communicating. Otherwise the public would not be able to engage with the work sufficiently to be able to examine and discuss it (McLary, 2000:150).

Chadabe notes that sounds and musics are loaded with time and history, which will affect the listener's response to their use and manipulation (Chadabe, 1997:41). Indeed, the contemporary art music focus on timbre has helped some music break away from the self referential aesthetic to an unprecedented degree, because now music can become representational by using the sounds of everyday life (Boyle, 1997:8).

4. Summary

Contemporary Western art music, and Electro-Acoustic music in particular, will be perceived as predominantly culturally trivial, if it claims to be autonomous, that is purely and solely concerned with musical and technical procedures, while remaining separate and detached from the material world (McLary, 2000:66). McLary is one of a number of authors who agree that music is only meaningful if the actual meaning is agreed to collectively, it is not inherent in the music (McLary, 1991:21).

It is thus clear that the possibility exists of meaning being communicated by music. However, at present most contemporary Western art music is not likely to be meaningful. There is also the further question regarding the actual content of the message, which may go beyond the communication of the composer's inner soul, to communication of some larger ideas. For example, visual art movements all refer to

the cultural and social climate in which they operate, and comment on this in some way. Brun is one of the few composers who think that composers should be responsible for commenting on society, "...an input which should be directed against the state of affairs, be critical, rebellious and negative." (Brun, 2004:79). Despite the ideas of composers like Brun that music should provide a social critique, many composers continue to work in a self absorbed, self referential manner. The few who work to explicitly communicate an social or political message, are the exception.

Music without text can seem to be independent of any political or social agenda, however the representational powers available in Electro-Acoustic music open up the possibility that it can reengage with the external material world in a way that may not be so easily available to other contemporary art music.

APPENDIX A:

Table 1: Classification of Composers of Electro-Acoustic Music.

<p>REPRESENTATIONAL</p> <p>ie uses actual real world sounds as primary elements of music.</p> <p><i>Has clear extra musical references.</i></p>	<p>No explicit social or political comment</p>	<p>Sampled sounds from specific physical locations, which are used to represent the places, and possibly the history of those places</p>	<p>R Murray Schafer</p> <p>Barry Truax</p> <p>Ros Bandt</p> <p>Manuel Roche Iturbide</p>
<p>REPRESENTATIONAL</p> <p>ie uses actual real world sounds as primary elements of music.</p> <p><i>Has clear extra musical references.</i></p>	<p>No explicit social or political comment</p>	<p>Sampled real world sounds are used to create sound narratives.</p>	<p>Roxanne Turcotte</p>
<p>HYBRID</p> <p>ie uses actual real world sounds as elements of music.</p> <p><i>Has clear extra musical references.</i></p>	<p><i>Explicit social, and political commentary</i></p>	<p>Uses combinations of sampled and synthesised sounds.</p>	<p>B. Neill</p> <p>Luigi Nono</p> <p>Sun Ra</p> <p>Luigi Dallapiccola</p> <p>Priscilla McLean</p>
<p>HYBRID</p> <p>ie uses actual real world sounds as elements of music.</p> <p><i>Has clear extra musical references.</i></p>	<p>No explicit social or political comment</p>	<p>Cross media work such as opera or dance, to assist in communicating with audience.</p>	<p>Mary Ashley</p>
<p>HYBRID</p> <p>ie uses actual real world sounds as elements of music.</p>	<p>No explicit social or political comment</p>	<p>Sampled sounds from specific physical locations, used to accompany live performance on acoustic instruments.</p>	<p>Claude Shryer</p> <p>Malcolm Goldstein</p> <p>J Ryan</p> <p>J Hunt</p>

<p>HYBRID</p> <p>ie uses synthesised and instrumental sound as elements of music.</p>	<p>No explicit social or political comment.</p>	<p>Restructuring and emphasising specific elements of music, such as rhythm, spatial location, the nature of music and sound.</p> <p>Taking music past the limitations of its human performers.</p>	<p>John Cage</p> <p>Milton Babbitt</p> <p>Frances Dhomont</p> <p>L Busoni</p> <p>Conlon Nancarrow</p> <p>Percy Grainger</p> <p>Harry Partch</p> <p>I Darrig</p> <p>G Antheil</p> <p>Stelarc</p> <p>Alistair Riddell</p> <p>Jacob Druckman</p> <p>Alvin Lucier</p> <p>David Rosenboom</p>
<p>HYBRID</p> <p>ie uses synthesised and instrumental sound as elements of music.</p>	<p>No explicit social or political comment.</p>	<p>Extending the sounds of individual traditional instruments past their original limitations, through use of sound synthesised from the original instrument.</p>	<p>Gordon Mumma</p> <p>Johnathon Harvey</p> <p>Johannes Goebel</p> <p>Machover and Chung</p> <p>R Teitelbaum</p> <p>B Neill</p> <p>R Berry</p> <p>D Jaffe</p>
<p>HYBRID</p> <p>Multi media.</p> <p>Actual sound world not specified</p>	<p>No explicit social or political comment</p>	<p>Uses computers specifically to control other elements in the performance.</p>	<p>Don Ritter</p> <p>Roger Dannenburg</p> <p>L P Demens</p>
<p>HYBRID</p> <p>ie uses synthesised sound as elements of the music</p>	<p>No explicit social or political comment</p>	<p>Uses movement sensing devices to trigger the synthesised sounds in performance.</p>	<p>S Favilla</p> <p>C Barlow</p> <p>R Gelhaar</p> <p>M Waisvisz</p>

<p>Non REPRESENTATIONAL</p> <p>ie uses actual real world sound as primary elements of music.</p> <p>Electro-acoustic music is a self referential world.</p>	<p>No explicit social or political comment</p>	<p>Actual sounds are recorded and manipulated as if they were synthesised sounds.</p>	<p>David Tudor Pierre Henry Pierre Schaeffer I Xenakis L Berio Robin Rimbaud Jose Asuar</p>
<p>Non REPRESENTATIONAL</p> <p>ie uses actual real world sound and synthesised sounds as elements of music.</p>	<p>No explicit social or political comment</p>	<p>Combines and manipulates both synthesised sounds and sampled sounds to explore qualities of sound on the continuum from natural to synthetic.</p>	<p>K Stockhausen Edgar Varese Elaine Radique J Chowning Gier Jensen Juraj Duris Warren Burt Paul Lansky</p>
<p>Non REPRESENTATIONAL</p> <p>ie uses synthesised sound as primary elements of music.</p> <p>Electro-acoustic music is a self referential world.</p>	<p>No comment</p>	<p>Concerned primarily with programming and development of technological processes for making music.</p>	<p>Charles Ames Mario Davidovsky David Wessel Jean Claude Risset Garry Lee Nelson Tim Kreger Joel Chadabe Ron Kuivila Barry Vercoe Phil Burk R Moore Larry Polonsky Robert Rowe Trevor Wishart Max Neuhaus S Martarino L Hiller G M Koenig</p>

<p>Non REPRESENTATIONAL</p> <p>ie uses synthesised and instrumental sound as elements of music.</p>	<p>No explicit social or political comment</p>	<p>Synthesised sounds are used to accompany live performance on acoustic instruments.</p>	<p>George Lewis</p> <p>David Jaffe and Andrew Schloss</p> <p>Cort Lippe</p> <p>David Behrman</p>
<p>Non REPRESENTATIONAL</p> <p>ie uses synthesised sound as primary elements of music.</p> <p>Electro-acoustic music is a self referential world.</p>	<p>No comment</p>	<p>Pure sound synthesis and its manipulation.</p>	<p>Denis Smalley</p> <p>Louis and Bebe Barron</p> <p>Gabriel Bncic</p> <p>Madeleine Isakson</p> <p>H J Roedelius</p> <p>I Tcherepnin</p> <p>Bischoff, Gold, Norton</p> <p>G W Raes</p> <p>N Collins</p> <p>R Dudon</p> <p>J B Barriere</p> <p>X Rodet</p> <p>Pousseur</p> <p>Digicom Night Satellite Project (3 composers)</p>

REFERENCES

- Attali, J. (1985). *Noise: The Political Economy of Music*. trans. B. Massumis, Manchester University Press, Manchester.
- Bent, I. D. and A. Pople. "Analysis". *Groves Music Online*. ed. L. Macy. (accessed 19/04/2005, 21/04/2005), <<http://www.grovemusic.com>>
- Borio, G. "Nono, Luigi". *Groves Music Online*. ed. L. Macy. (accessed 06/04/2005), <<http://www.grovemusic.com>>
- Boyle, D. R. (1997). *Musical Analysis of Works for Performers and Electronics-an Alternative Approach*. MA (Hons), University of Wollongong.
- Brun (2004). "Against Plausibility". *When Music Resists Meaning: The Major Writings of Herbert Brun*. (ed. A. Chandra), Wesleyan University Press, Middletown, CT. pp.89-100.
- Brun (2004). "Toward Composition". *When Music Resists Meaning: The Major Writings of Herbert Brun*. (ed. A. Chandra), Wesleyan University Press, Middletown, CT. pp.77-88.
- Chadabe, J. (1997). *Electric Sound: The Past and Promise of Electronic Music.*, Prentice Hall, Upper Saddle River, NJ.
- Cook, N. (1987). *A Guide to Music Analysis*. Oxford University Press, Oxford.
- Craven, D. "Conceptual Art". *Groves Art Online*. Oxford University Press. (accessed 12/4/05), <<http://www.groveart.com>>
- Emmerson, S. and D. Smalley. "Electro-acoustic Music". *Groves Music Online*. ed. L. Macy. (accessed 08/03/2005, 10/03/2005), <<http://www.grovemusic.com>>
- Jenkins, J., (1998). "Greg Schiemer". *22 Contemporary Australian Composers*. NMA. (accessed 03/03/2005), <<http://www.rainerlinz.net/NMA/22CAC/schiemer.html>>
- Johnson, M. (1987). *The Body in the Mind: The Bodily Basis of Meaning, Imagination and Reason*. University of Chicago Press, Chicago.
- Kramer, J. D. (2002). "Foreword". *Music of the Twentieth Century Avant-Garde: a Biocritical Source Book*. (ed. L. Sitsky), Greenwood Press, Westport, CT. pp.xi-xviii.
- McLary, S. (1991). *Feminine Endings: Music, Gender and Sexuality.*, University of Minnesota Press, Minnesota.
- McLary, S. (2000). *Conventional Wisdom: The Content of Musical Form*. University of California Press, Berkeley.

- Meyer, L. B. (1956). *Emotion and Meaning in Music*. University of Chicago Press, Chicago.
- Moszynska, A. "Abstract Art". (accessed 12/04/2005), <<http://www.groveart.com>>
- Nattiez, J. (1990). *Music and Discourse: Toward a Semiology of Music*. trans. C. Abbatte, Princeton University Press, Princeton, NJ.
- Nettl, B. "Music". *Groves Music Online*. ed. L. Macy. (accessed 08/03/2005, 10/03/2005, 16/03/2005), <<http://www.grovemusic.com>>
- Neuhaus, M. "The Broadcast Works and Audium". (accessed 05/05/2005), <<http://www.auracle.org/history.html>>
- Povall, R. (1995). "Compositional Methods in Interactive Performance Environments." *Journal of New Music Research* **24**(2): 109-120.
- Randel, D. M. (1978). "Electronic Music". *Harvard Concise Dictionary of Music*. Belknap Press, Cambridge, Mass. pp.154-5.
- Rowe, R. (1993). *Interactive Music Systems - Machine Listening and Composing*. MIT, Cambridge, Mass.
- Schiemer, G. M. (1998). *MIDI Toolbox: an Interactive System for Music Composition*. Ph.D., Macquarie University.
- Sitsky, L. (ed.) (2002). *Music of the Twentieth Century Avant-Garde: a Biocritical Source Book*. Greenwood Press, Westport, CT.
- Smith, T. "Modernity". *Groves Art Online*. Oxford University Press. (accessed 14/4/2005), <<http://www.groveart.com>>
- Tenney, J. (1992). *META/HODOS and META Meta Hodos: A Phenomenology of 20th Century Musical Material and an Approach to the Study of Form*. (2nd Edition), Frog Peak Music, Lebanon, NH.
- Toop, R. (1995). *oceans of sound: aether talk, ambient sound, and imaginary worlds*. Serpents Tail, London.
- unknown. "Modernism". Oxford University Press. (accessed 12/04/2005), <<http://www.groveart.com>>
- unknown. "Places". *CD Sales Catalogue*. CDeMusic. (accessed 05/05/2005), <http://www.cdemusic.org/cde_search.cfm?keywords=about%20places>
- Vella, R. (2000). *Musical Environments: A Manual for Listening, Improvising and Composing*. Currency Press, Strawberry Hills, NSW.

MUS 915: Essay 1

Spring Session 2005

An Survey of Sonic Art Through Listening

Wendy Suiter

Student ID: 2841824

Introduction

Using electronics and computers in the creation of music has opened up of new worlds of synthetic and sampled sounds which are then available for inclusion in composition. It then becomes necessary to answer the question "...if one can do anything, then what is worth doing?"(Wishart, 1996:332). This question has resulted in a journey to find at least a partial answer to this question by listening to many of the standard works in the electronic music repertoire. Listening is necessary not only because most of the works only currently exist in recorded form but also because as Wishart goes on to say "...only the ear can validate or criticise music composition" (Wishart, 1996:339).

This venture is supported by Jean-Claude Risset in the liner notes to the CD *Selections*. He states that "...the validity of a work of art is by no means guaranteed by the scientific or technical apparatus it resorts to. Pieces of music realised with a computer should be evaluated as such, not as experiments: for which responsibility and artistic commitment rests upon the author. The music should speak for itself " (Risset, 1988:5)

Most of the works included in this survey have come from two sets of CDs compiled as surveys of computer and electronic music since the early 1980s. The *Computer Music Currents I-XI* produced by Wergo, and the *CDCM Computer Music Series 1-10* produced by Centaur Records. Other works have been included on an ad hoc basis primarily dependent on their availability. These other works have been referred to in the contemporary electronic music literature as being significant because of some element of their compositional process.

The starting points and processes cannot determine the aural product, as different processes can produce works that sound quite similar. In reverse, using the same materials and methods will end up with very different sounds. In addition, "...we must have enough personal musical integrity to admit there is a distinction between the arbitrary manipulation of materials according to some preconceived plan and the construction...of valid sonic experiences." (Wishart, 1996:332). In this context, I suggest that a valid listening experience is one in which the work sounds coherent to the listener. This listening survey has been a quest to discover the effective use of an array of methods as they have been used in the 20th Century to create sonic art.

For one reason or another most of the methods commonly used to describe and catalogue electronic works, are not useful when writing about the aural experience of the composer's work. Predominantly, throughout the writing about electronic and computer music there is no attempt so far, to define categories which provide insight into the structure and sonic materials of the work. Mostly there is reference to the technology or compositional process, rather than the final product. Indeed, even the titles of works do not provide much of a guide to the work's aural world. For example Scott A. Wyatt has titled his work *Still Hidden Laughs: for Synclavier and Yamaha Systems* (Wyatt, 1988). This title reveals very little about the music. This is very different than the names historically given to musical works. The historical categories and titles offer some suggestion to the listener about how the work is to be understood.

In writing about what I have heard, a number of issues seemed to need clarification. The first two are the intertwined notions of music and composition. These notions are related to other questions of how to describe and organise the results of the listening. Setting up categories is important in identifying, understanding and appreciating the art works. Given that the experience of listening is subjective, it can be an important way of communicating expectations about the aural experience.

Terminology

Firstly, although it is common to use the term ‘Music’ when referring to electronic and computer generated sound compositions, this is ultimately confusing when it comes to writing about the works. Our typical music terminology refers to musical parameters of pitch, meter, rhythm, tempo, dynamics, articulation, texture, instrumentation, harmony, expression markings, motif, melody, phrasing, form, and occasionally spatialisation to describe the music. However, most of these ideas cannot be directly applied to writing about electronic works. Despite the fact that these parameters can be redefined, in general they are not really relevant to what Wishart terms ‘Sonic Art’ (Wishart, 1996:4). Indeed, one of the essential features of sonic art works is the stepping away from these musical parameters.

Secondly, these parameters have really come to be thought of as what defines ‘Music’. While this has been challenged by composers over the 20th Century, the concept of ‘Music’ persists for many listeners. Thus “...when the focus is on the structure and structuring of sound...[and]...the art of organising sound events in time...”(Wishart, 1996:4) it may be preferable to use the term ‘Sonic Art’. Another reason for using the term ‘Sonic Art’ is the use by a number of

composers of concepts derived from other artforms to describe the processes that are used to make works in sound. For example, the term ‘soundscape’ is derived from the visual art notion of ‘landscape’, while the act of creation includes the idea of using electronics and computers to ‘sculpt’ sound, (Risset, accessed 28/05/2005), (Wishart, 1996:5). As these concepts derive from another artform it seems appropriate to use the word ‘Art’ in referring to works in the realm of sound.

5. Organisational Methods

The CD liner notes and descriptions in knowledgeable books often refer to the technology used, or the synthesis techniques, or even the materials and processes used to compose the music. Examples of this style abound on liner notes to every CD containing electronic works studied for this essay. After listening to many pieces of electronic sound art, and some instrumental music that used similar compositional techniques, it is very clear that the technology or compositional process, do little to define or describe the aural result of the work.

The challenge then becomes one of finding ways to organise the list of works which refers to their aural result, rather than their technological and compositional inputs. Risset sums up the problem when he notes that while the sounds produced by acoustic instruments are relatively stable and known, while “... programming allows indefinite variations and unlimited flexibility. The process thus promises access to an unbound world of sonic material, amenable to a huge range of transformations.” (Risset, 1988:3). Any means of organization would need categories which simplify and contain this “unbound world”, in a way that relates to the final artistic product.

With a view to finding some guideposts, selected discographies, bibliographies and texts on electronic music, were researched for means of organising their materials. As only a small number of electronic music references could be located, the research was broadened to include other discographies and catalogues which documented various aspects of music and sound. Of the 21 discographies and catalogues researched, 19 used one of five ways to organise the information. These classification methods are: alphabetically by name, usually the composer's; chronologically; by genre; by technology; or by sound source. One book, *Electric Sound: the Past and Promise of Electronic Music*, was a mixture of composers, description of works, and the history and use of technology. The remaining book, *Cobbett's Cyclopedia of Chamber Music*, was an alphabetic collection of short articles on any topic the editor thought relevant to his subject, chamber music. Consequently, this book includes articles which cover all five categories. 12 of the books also contained short comments concerning the works listed.

Many discographies take the simple approach of listing Composers alphabetically by name, followed by title and dates of work. Then, if relevant, this is followed by recording, performer, and/or publishing details. Examples of this approach are *The Music Educators Journal* which contains a single page called "An annotated sampler of electronic Music Recordings" (unknown, Nov 1968, p.93), *The Gramophone Shop Encyclopedia of Recorded Music* (Leslie, 1942), *The American Record Guide*, In the *Anthology of Twentieth Century Music*, (Wennerstrom, 1969), *Catalogues of Australian Compositions VIII: Jazz* (1978), *A Critical Guide to the Best Recordings of Classical Music on Compact Disc* (Herring, 1986:13), and *The Penguin Guide to Compact Discs, Cassettes and LP's* (Greenfield, Layton et al., 1986:57).

This style of alphabetical listing by name seems to be very common, but the name used will change depending on the purpose of the publication. Thus in *Conductors on Record* (Holmes, 1982), where the listings is by conductor's names, while in *Australian Jazz on Record 1925-80* (Mitchell, 1988) the listing is in alphabetical order of Band name. A further example of the alphabetic approach by name is *Electronic and Computer Music: an Annotated Bibliography* which contains a chapter called 'Electronic Music Composition'. This chapter lists books by alphabetical order of the author's name (Wick, 1997:57).

Two of the sources are organised by genre. The *British Music Catalogue 1945-1981 Volume 1: Works for Piano* (Griffiths, 1983:32) is organised in major categories of genre such as 'Piano Solo', 'Piano and Electronics' and 'Concertos'. *The History of Music in Sound Vol IX: Romanticism (1830-90)* contains only selected works which are organised by genre such as 'Opera' and 'Concerto' (Abraham, 1958:37) .

A slightly more popular choice is chronological order. There are three works organised in this way. *The Norton Anthology of Western Music: Vol II Classic, Romantic, Modern*, (Palisca, 1980) is organised by period: 'Classic', 'Romantic', and 'Modern', then by genre such as 'Orchestral' or 'Solo and Chamber music'. *Women Composers: the Lost Tradition Found* is also organised by Historical Period, then each Composer in chronological order (Jezic, 1994). In *Classical Music: A Critics Guide to the 100 Most Important Recordings* presents the composers and their works by date of composition (Kozinn, 2004:83).

In *Electric Sound: the Past and Promise of Electronic Music* (Chadabe, 1997) the materials are presented in a sort of chronological order, but the chapter headings are based on technology. Some of the chapters are generalised, for example Chapter 3 “Tape Music” and Chapter 5 “Computer Generated Music”. Still others refer to particular types of equipment, for example Chapter 7 “Synthesisers” and Chapter 6 “The MIDI World”. Through the course of discussing the technology he refers to some individual composer’s ideas and some specific works, but always from the point of view of the technology.

Some writing is organised by the type of technology used to create the music. For example Cary has broken his chapter on “Live Performance of Electronic Music” into the following categories: I: ‘Tape plus’ [instrument] Music; II ‘Real Time’ Performance; III Live Analogue Electronics; and IV ‘Hybrid’ and Digital Live Performance (Cary, 1992:249-252). While Schiemer has used five main categories which, for example, include purpose-built live electronic instruments and software instruments with two subcategories of synthesis and sequencing (Schiemer, 1998:1).

Another method is to organise the materials by sound sources. The two books which do this are *The Sound Effects Catalog* (Sound Ideas, 2000) and *On Sonic Art* (Wishart, 1996). *The Sound Effects Catalog* provides an alphabetical listing by generic type of sound such as “acoustic door” followed by additional descriptions of the sounds such as “heavy door with acoustic seal: open” (*Sound Ideas*, 2000:23). Wishart is somewhat different in that his book is primarily concerned with ideas about sonic art, rather than a catalogue or discussion of large numbers of works in this art form. Thus, he looks at the idealised sound sources, for example ‘real’ ie sampled, or ‘unreal’ ie synthesised (Wishart, 1996:146) and how they are organised through time. He always

relies on the aural perception of the sound event in its description. For example he describes sound envelope types as ‘turbulence’, ‘wave break’, ‘open-close’, or ‘explosion’ (Wishart, 1996:182-3). However, there is no listing of works.

At the other extreme, by aiming to be completely comprehensive, is *Cobbett’s Cyclopedia of Chamber Music* has articles arranged alphabetically covering a broad range of topics from the pitch “A” for tuning, to “Brahms”, to “Clarinet in Chamber Music” (Cobbett, 1963). Under each major heading is a variety of information concerning the instrument, and a listing of scores organised by form, such as sonata or suite, which include this instrument. Under each of these subheadings, as well as the composer’s name, completed instrumentation, and publication details, there will be a single sentence giving the author’s opinion of the work. For example: “Clarinet in Chamber Music” (Cobbett, 1963:279-281), contains “Suites or extended movements with piano” with the subheading “Berg, Alban, op.5. Four Pieces. U.E. 1920. Very outré, interesting as studies in effects.” (Cobbett, 1963:280). This book provides many examples of this type of subjective writing, such as “His *Flute de Pan* is remarkably well written for the instrument. But its subtitle of ‘sonata’ seems rather arbitrary, the piano part...being reduced to mere accompaniment.” (Cobbett, 1963:403)

A number of other books also included opinions on the music, the performances and the recordings, if these were relevant to the task at hand, along with the factual details described previously. The style of the opinions fell into two categories. Five of the books contained fairly factual comments. The remaining seven were more subjective in their language, even while attempting to be descriptive offer opinions.

Those writings which are more factually based include the *Music Educators Journal* (Nov 1968, p.93) which includes a brief paragraph describing the technological aspects of the music, with no comment on the musicality. *Electronic and Computer Music: an Annotated Bibliography* contains a chapter called 'Electronic Music Composition'. This chapter contains factual paragraphs for each book cited which states that book's objectives and layout. Interestingly, in the introduction to this chapter, Wick clearly states that he has omitted books relating to composition using a specific type of computer (Wick, 1997:57). Cary briefly mentions the technical problems involved in "Live Performance of Electronic Music", and how they have been addressed in major works of this type (Cary, 1992:249-252). While (Schiemer, 1998) simply provides a single paragraph factually describing the technology each instrument builder used or developed. Chadabe (1997), occasionally refers to some individual composer's styles and some specific works, but always from the point of view of the technology.

Styles of writing subjective opinions vary considerably, but most are quite moderate, and simply attempt to be descriptive. An example of this is "The final movement, the Allegro, is preceded by a short, slow introduction of eight measures, based on a dominant pedal point. When the Allegro begins, the melody is first presented in the violin and then the flute. The few harmonic surprises are limited to shifts to the parallel minors... Concluding in the tonic key, the codetta makes a passing reference to ...before ending ...with brilliant passage work" (Jezic, 1994:124).

Herring in *A Critical Guide to the Best Recordings of Classical Music on Compact Disc* has been clear about intentions to evaluate the recordings for both technical and artistic merit. So he provides both comments and a star rating system for both

performance and recording. His ratings are 3 stars: outstanding; 2 stars: very good; 1 Star: acceptable (Herring, 1986:13). An example of his commentary, following the rating is "There are generally good performances from Hans Otto-...has impact and virtuosity in abundance, although a slightly slower, gentler pulse...would have been preferable. He misses some of the warmth in the other pieces too. Mechanical noise from the organ is audible during the quieter passages" (Herring, 1986:19).

The History of Music in Sound Vol IX: Romanticism (1830-90) also includes a subjective commentary such as "Although Mendelssohn's chamber music is closer than that of most of his contemporaries to the classical ideal, it is at its best in isolated movements, whereas the complete works are often disappointing"(Abraham, 1958:37).

The Penguin Guide to Compact Discs, Cassettes and LP's has a one paragraph commentary about the recording and music including subjective reactions. For example "A delightful record. The opening is a transcription of...modifying a few bars of the horn's part...oboe playing is eloquent...Indeed the obbligato playing throughout gives much pleasure..."(Greenfield, Layton et al., 1986:57).

Those with less moderate commentaries include not only *Cobbett's Cyclopedia of Chamber Music*, but also *The Anthology of Twentieth Century Music*. For each composer Wennerstrom has provided a one paragraph biography of composer and a subjective statement about their work. For example "His larger works have a tightness of construction and an exciting and convincing melodic and rhythmic development; these works place Bartok among the great composers..."(Wennerstrom, 1969:1). In *Classical Music: A Critics Guide to the 100 Most Important Recordings*, Kozinn also boldly presents his opinions. For example "Similar vivid effects illuminate the whole work, and the choruses remain deeply felt...Yet as vivid as 'the Creation' is, to modern

ears it also carries a sense of classical orderliness that makes it rather quaint, as if God...presided over creation wearing powdered wigs...and brocade coats" and "...qualities that give this performance a real impact and make its tone painting as vivid and powerful as the subject matter demands."(Kozinn, 2004:83).

Wishart is quite exceptional to most of the other sources examined in that he develops detailed descriptions both the sound sources and the way sound events are organised through time. Thus one may expect that this would lead to some generic terms to describe types of 'Sonic Art'. Yet he simply describes individual sound events and how they interact with each other. For example he suggests ways of describing adjacent sonic gestures as 'parallelism', 'interaction', 'independence', 'triggering' (Wishart, 1996:121-2). However, Wishart stops short of defining categories which describe the work as a whole. This is at odds with historical categorisations such as 'flute sonata' which describes much about a particular work, without going into specific details.

The information summarised by the historical categorisations can be seen by examining the category name "flute sonata". This describes not only the expected timbral and textural world, but also its large scale form (ie the likely number, form and character of movements) as well as its likely small scale content, such as gestures which are melodic. Ultimately the issue is that there are no equivalent terms yet defined for sonic art. This highlights a difference between sonic art and music.

During the 20th century new ways of composing music have brought new sounds and new forms. This has not been accompanied by new terminology to help listeners predict or understand the work. Additionally, there seems to have been increasing pressure for composers to be new and original, to do things their own way, which may lead commentators to imagine that it is not possible to apply generic descriptions to the works. The liner notes of the CDs seem to be quite typical of the way that this music is described. Reference is given only to the composer's idea and the media or technology involved in production. For example, the notes to *Lady Neil's Dumpe*, composed by Bresnick in 1987, "...[the work] takes its title from a number of sources...the earliest known English keyboard composition...a Renaissance dance...Jazz tradition...a storage location for files in a computer memory." (Bresnick, 1987). Yet this does not prepare the listener for the sound world of the work.

The notes to *Sud* are more preparatory. The notes open with "The piece is built up from a few sounds, mostly natural sounds recorded near Marseille, and also some computer sounds synthesised in Marseille. These sounds have been processed by computer, using a set of programs developed at GRM by Benedict Maillard and Yann Geslin." These notes continue, for three paragraphs, to detail the kinds of sounds used and the ways they are manipulated and linked with each other concluding with "The arrangement in time of the many sounds implies several levels of rhythm and a logic of fluxes" (liner notes to Risset, 1984/5). Yet all this detail, rather than a generic category, still does not give the listener a way of placing this work in the context of other sonic art works.

It should be noted that the old generic descriptions could never detail every individual approach to that form, or the how the composer has used the materials in this specific work. None the less, the old generic labels went beyond the production technology to also give broad details about the musical product. Similarly any new generic descriptions would have to be both general enough to encompass a number of works, and specific enough to be a useful entry point to a particular work.

In thinking about my own classificatory scheme, the term ‘Sonic Art’, also provides ideas for alternate means for organising the works which are more aligned to visual and radio arts classifications. Firstly, the idea of sound allows notions of other media in which sound is an important element, such as radio, film, and theatre, which can provide genres like documentary, reality, commentary, fictional, drama, comedy, or narrative.

Secondly, the idea of art allows notions related to genres in visual arts such as representational, still life, portrait, abstract, landscape, sculpture, experimental, or conceptual. This is not an entirely novel concept in writing about music. For example, one music critic, Kyle Gann, has described Rolnick’s sonic art performances as “...wide ranging landscapes...” (cited liner notes for Rolnick, 1985), while Jones has actually titled one of his works *Still Life Dancing* (Jones, 1989). Yet there is a key difference between sonic and visual art. Visual art works are simply present as a whole at any moment, while sonic art takes place through time.

Consequently, a clearly audible structure needs to be present, to help the listener find coherence in the events as they unfold over time. This has been an important result of my listening investigation. The works which engaged and maintained my attention all had a clearly perceivable structure. This structure provided a framework for the existence of individual sound events and gestures which then illuminated and filled out the structure.

It is clear from the preceeding discussion that although it is difficult to find a means of classifying computer music works, it is also necessary if they are to be discussed in any kind of useful way. As a result I have developed three categories of my own namely: Narrative, Evocation, and Abstract. Many of the works used one or more structuring methods which I have called Pulsing, Sectional, and Threaded.

1. Narrative

These works are those structured around a pre-existing story. The story is evoked and underlined by the work. This story may be a commonly known myth, or other text selected by or written by the composer. The works are likely to include voice, text, sampled or synthesised instrumental and natural sounds.

2. Evocation

These works are ‘soundscapes’ of places or events. Commonly the works evoke the atmosphere of the place or event by using particular natural sounds either real, sampled or synthesised. Additional instrumental or synthetic timbres and gestures are likely to be used to evoke the mood.

3. Abstract

These works are pure exploration of a sonic concept, such as timbre. The works are likely to include sampled or synthesised vocal, instrumental and natural sounds which have then been digitally manipulated. Each of these works used one or more structuring methods. I have used these structuring methods as a further way of classifying the Abstract works.

- Pulsing

These works were given momentum by an underlying pulse which may or may not be audible, on occasions it may simply be felt. Many of the works include small scale rhythmic gestures and groups of repeating staccato attacks which push the work along.

- Sectional

These works have clearly identifiable sections. Some have clearly defined movements as indicated by the program notes, which are delineated by silences. Others, which are programmed as one movement works, have significant points clearly articulated through use of specific sonic gestures, such as a sound event with particular timbre, texture and envelope.

- Threaded

These works have clearly differentiated simultaneous 'voices' (similar to contrapuntal parts) through operating in well defined pitch spaces, mostly with very different timbre, articulation and gesture. The varied interweaving of these voices gives continued momentum to the works

Appendix A presents examples for each of these categories based on my listening investigations. These works are included quite subjectively on the basis of my listening and my opinion as to whether they worked artistically. A number of the works used more than one structuring method, but will only appear once in the first relevant category with references to other categories in brackets. A significant number of the works listed are, in my opinion, are much longer than interest generated by the materials. However, these works maintained their structural integrity.

A number of works been omitted from the following listing. These works used one, or more, of the structuring devices some of the time but not sufficiently to structure the work overall. About one fifth of the works surveyed did not use any of these structuring devices or were planned as experiments. This resulted in works that were quite indistinguishable from each other.

Appendix B is a full listing of the works and their technical specifications as derived from the record liner notes. This listing also includes technical details, analytic and subjective reactions to each piece.

REFERENCES

- Australian Music Centre. (1978). *Catalogues of Australian Compositions VIII: Jazz*. Australian Music Centre.
- Sound Ideas. (2000). *Sound Ideas: Sound Effects Catalog*. Brian Nemers Corp., Richmond Hill, Ontario.
- Abraham, G. (ed.) (1958). *The History of Music in Sound Vol IX: Romanticism (1830-90)*. Oxford University Press, London.
- Bresnick, M. (1987). *Lady Neil's Dumpe: for Yamaha TX816 MIDI rack and Macintosh Computer*. CDCM Computer Music Series Vol 2: Compositions by Richard Teitelbaum, Martin Bresnick, Neil B Rolnick, Rick Baitz, Scott Lindroth. CD Recording. Centaur Records, USA. CRC 2039.
- Cary, T. (1992). *Illustrated Compendium of Music Technology*. Faber and Faber, London.
- Chadabe, J. (1997). *Electric Sound: The Past and Promise of Electronic Music.*, Prentice Hall, Upper Saddle River, NJ.
- Cobbett, W. W. (ed.) (1963). *Cobbett's Cyclopedia of Chamber Music*. (reprinted 1986). Oxford University Press, Oxford.
- Greenfield, E., R. Layton, et al. (1986). *The Penguin Guide to Compact Discs, Cassettes and LP's*. Penguin Books, Harmondsworth.
- Griffiths, P. (1983). *British Music Catalogue 1945-1981, Volume 1: Works for Piano*. The Warwick Arts Trust, London.
- Herring, P. (1986). *A critical guide to the best recordings of Classical Music on Compact Disc*. Salamander Books, London.
- Holmes, J. L. (1982). *Conductors on Record*. Victor Gollancz, London.
- Jezic, D. P. (1994). *Women Composers: the Lost Tradition Found*. (2nd Edition) ed. E. Wood, The Feminist Press, City University of New York, New York.
- Jones, D. E. (1989). *Still Life Dancing: for Percussion Ensemble and Tape*. CDCM Computer Music Series Vol 6: Compositions by Jon Appleton, David Evan Jones, Paul Moravec, and Christian Wolff. CD Recording. Centaur Records, USA. CRC 2052.
- Kozinn, A. (2004). *Classical Music: A Critics Guide to the 100 Most Important Recordings*. Times Books: Henry Holt and Company, New York.
- Leslie, G. C. (ed.) (1942). *The Gramophone Shop Encyclopedia of Recorded Music*. Simon and Schuster, New York.

- Mitchell, J. (1988). *Australian Jazz on Record 1925-80*. Australian Government Publishing Service, Canberra.
- Palisca, C. V. (ed.) (1980). *Norton Anthology of Western Music: Vol II: Classic, Romantic, Modern*. WW Norton and Co, New York.
- Risset, J.-C. "Computer Music: Why?" (accessed 28/05/2005),
<http://www.utexas.edu/cola/france-ut/archives/risset_2.pdf>
- Risset, J.-C. (1984/5). *Sud. Selections*. CD Recording. Wergo, Mainz, W.Germany. WER 2013-50.
- Risset, J.-C. (1988). *Selections* Recording. Wergo, Mainz, W.Germany. WER 2013-50.
- Rolnick, N. (1985). *What is the Use? for computer performance system*. CDCM Computer Music Series Vol 2: Compositions by Richard Teitelbaum, Martin Bresnick, Neil B Rolnick, Rick Baitz, Scott Lindroth. CD Recording. Centaur Records, USA. CRC 2039.
- Schiemer, G. M. (1998). *MIDI Toolbox: an Interactive System for Music Composition*. Ph.D., Macquarie University.
- unknown "An annotated sampler of Electronic Music Recordings." Music Educators Journal (Nov 1968): p.93.
- Varese, E. (1922). *Offrandes (soprano and instrumental ensemble)*. CD Recording. Sony Classical, USA. SMK 45 844.
- Wennerstrom, M. H. (1969). *Anthology of Twentieth Century Music*. Prentice Hall Inc, Englewood Cliffs, NJ.
- Wick, R. L. (1997). *Electronic and Computer Music: an Annotated Bibliography*. Greenwood Press, Westport, CT.
- Wishart, T. (1996). *On Sonic Art*. (revised edition) ed. S. Emmerson, Harwood Academic Publishers, Amsterdam.
- Wyatt, S. A. (1988). *Still Hidden Laughs: for Synclavier and Yamaha Systems*. CDCM Computer Music Series Vol 3: Compositions by Salvatore Martirano. CD Recording. Centaur Records, USA. CRC 2045.

Appendix A:

CLASSIFICATION OF WORKS BY STRUCTURING DEVICE.

1. Narrative

- Austin, L. (1988). *Sinfonia Concertante: a Mozartean Episode*. [4,5]
- Garton, B., R. Kostelanitz, et al. (1987). *Wasting*. [5]
- Jaffe, D. (1985). *Telegram to the President: for string quartet and tape*. [3,4]
- Kabat, J. (1989). *Child and the Moon-Tree: for vocalist and electronics*. [4]
- Lansky, P. (1983). *as it grew dark*.
- Risset, J.-C. (1968). *Computer Suite from Little Boy*. [4]
- Teitelbaum, R. (1987). *Golem 1: for computer music performance system*. [2,5]
- Wishart, T. (1986). *VOX-5*. [5]
- Wolman, A. (1986). *A Circle in the Fire: for bass clarinet and tape*.

2. Evocation

- Bayle, F. (1983). *Le Sommeil d'Euclide*.
- Berger, J. (1986). *Diptych*. [4,5]
- Karpen, R. (1987). *Il Nome: for soprano and tape*.
- Keefe, R. (1990). *The Ephemerides for Harp and Percussion: Moon, 1650-1657*.
- McLean, B. (1989). *Visions of a Summer Night*.
- Piekarski, J. (1991). *Dreamfile*. [3,5]
- Risset, J.-C. (1984/5). *Sud*. [4]
- Rogers, R. (1990). *Cenotaph*. [4,5]
- Schindler, A. (1984). *Tremor of Night and Day: for Cello and tape*.
- Rush, L. (1971/73). *A Little Travelling Music: for keyboard and tape*. [5]

Smalley, D. (1986). *Wind Chimes*.

Varese, E. *Ameriques (full orchestra with added percussion)*. [4,5]

White, F. (1985). *Ogni pensiero vola*.

3. Abstract

1. Pulsing

Appleton, J. (1986). *Brush Canyon*. [4,5]

Appleton, J. (1986). *Degitaru Ongaku*. [4,5]

Baitz, R. (1985). *Kaleidocycles for Synclavier*.

Bennett, G. (1987). *Kyotaku: for shakuhachi and tape*. [5]

Braxton, A. (1982). *Composition No. 7 (excerpt)*.

Cage, J. *First Construction (in Metal)*.

Cowell, H. (1916). *Quartett Pedantic (String Quartet no. 1)*. [4,5]

Cowell, H. (1917). *Quartet Romantic (two flutes, two strings)*. [4,5]

Cowell, H. (1919). *Quartet Euphometric*.

Cowell, H. (1928). *Polyphonica (instrumental ensemble)*.

Cowell, H. (1939). *Return (for percussion)*.

Fulton, D. (1985). *Bowling for Blood*. [4]

Garton, B. (1987). *Approximate Rhythms*.

Ghent, E. (1970/71). *Phosphones*. [4,5]

Harvey, J. (1980). *Mortuous Plango, Vivos Voco*. [5]

Haynes, S. (1977). *Prisms: for piano and tape*. [5]

Jones, D. E. (1983). *Still Life in Metal and Wood*. [5]

Jones, D. E. (1989). *Still Life Dancing: for Percussion Ensemble and Tape*.

Kabelac, M. *8 Interventions, op. 45 (for percussion only)*. [5]

Krupowicz, S. (1986). *Farewell Variations on a Theme by Mozart: for amplified string quartet and computer generated tape.*

Lansky, P. (1987). *just-more-idle-chatter.*

Lindroth, S. (1985). *Syntax: for Synclavier.*

Milburn, A. (1987). *Elmore.* [5]

Moravec, P. *Devices and Desires.*[5]

Oliveros, P. (1988). *Lion's Tale: for digital sampler.*[5]

Reich, S. (1966). *Come Out.*

Reich, S. (1972). *Clapping Music.*

Reich, S. (1965). *It's Gonna Rain.*

Reich, S. (1966). *Piano Phase.*

Rolnick, N. (1985). *What is the Use? for computer performance system.* [5]

Rolnick, N. B. (1987). *A Robert Johnson Sampler: for computer music performance system.* [5]

Rolnick, N. B. (1988). *Vocal Chords: for voice and digital processors.*[4,5]

Scaletti, C. (1987). *sunSurgeAutomata: realised using Platypus Digital Processor.* [5]

Teruggi, D. (1985). *E Così Via: for piano and tape.* [4,5]

Vaggione, H. (1985). *Thema.* [4]

Varese, E. (1927). *Arcana (full orchestra with added percussion).*

Varese, E. *Ionisation (for 13 percussionists).*

Waschka, R. (1989). *A Noite, Po'rem, Rangeu E Quebrou (At Night However It Creaks and Breaks).*[5]

Warren, A. (1987). *Contraption.* [5]

Winsor, P. (1988). *Dulcimer Dream.* [5]

- **Sectional.**

Chafe, C. (1987). *Quadro: for Piano Trio and tape.*

Chafe, C. (1981). *Solera.*

Cowell, H. (1935). *Mosaic Quartet (String Quartet No. 3).*

Cowell, H. (1934). *Suite for Woodwind Quintet.*

Cowell, H. (1962). *Quartet for flute, Oboe, Violincello, Harp.*

Cowell, H. (1963). *26 Simultaneous Mosaics (ensemble and percussion).* [5]

DeLio, T. (1985/6). *Against the silence...(for percussion ensemble and four-channel computer generated tape).* [5]

Dodge, C. (1980). *Any Resemblance is Purely Coincidental: for piano.*

Hunt, J. (1988). *Fluud.*

Lansky, P. (1981/2). *As If: for string trio and computer synthesised sound.*

McTee, C. (1989). *Metal Music.*

Melby, J. (1984). *Concerto No.1 for Flute and Computer Synthesised Tape.*

Rai, T. (1986). *Five Inventions Accompanied by Computers: for clarinet, cello, piano, and computers.* [5]

Rosenboom, D. (1988). *Systems of Judgement.*[5]

Stroppa, M. (1982/4). *Traiettorie: for piano and computer-synthesised tape.*

Varese, E. *Integrales (instrumental ensemble and percussion).* [5]

Varese, E. *Octandre (instrumental ensemble).*

Wessel, D. (1977). *Antony.*

Winsor, P. (1990). *Anamorphoses: for trumpet ensemble.*

Wolff, C. (1989). *Mayday Materials.*[5]

Wyatt, S. A. (1988). *Still Hidden Laughs: for Synclavier and Yamaha Systems.* [5]

Yuasa, J. (1987). *A Study in White.* [5]

- **Threaded.**

Albright, W. (1985). *Sphaera: for piano and tape*.

Berio, L. *Sinfonia (for eight voices and orchestra)*.

Bodin, L.-G. (1984). *Anima: for soprano and computer generated tape*.

Boesch, R. (1987). *Clavirissima: for piano and real-time processing*.

Chavez, C. *Toccata (for percussion only)*.

Decoust, M. (1977). *Interphone*.

Hunt, J. (1988). *Fluud*.

Jones, D. E. (1986). *Scritto*.

Karpen, R. (1986). *Eclipse*.

Martirano, S. (1985). *Sampler: Everything Goes When the Whistle Blows*.

Risset, J.-C. (1983). *L'autre face: for soprano and computer generated tape*.

Rosenboom, D. (1966). *A Precipice in Time*.

Stockhausen, K. (1955/56). *Gesang der Junglinge*.

Teitelbaum, R. (1983). *Run Some By You: for one human-played and two computer-played acoustic pianos*.

Yuasa, J. (1984). *Towards "The Midnight Sun" - Homage to Ze-Ami: for piano and quadraphonic computer generated tape*.

ANNOTATED DISCOGRAPHY

Appleton, J. (1986). *Brush Canyon*. CDCM Computer Music Series Vol 6: Compositions by Jon Appleton, David Evan Jones, Paul Moravec, and Christian Wolff. CD Recording. Centaur Records, USA. CRC 2052.

Technical Keywords:

Sample manipulation
Synthetic timbres
Sampled natural sounds

Details:

reflects physical and audio properties of a place called 'Brush Canyon'
used Synclavier

My Thoughts:

used a huge variety of timbres
clearly delineated timbres in different pitch spaces
fast unfolding of events
repeated gestures at different pitches
melodies lyrical
regular metric pulse and
not too dissonant
quite pleasant

Appleton, J. (1986). *Degitaru Ongaku*. CDCM Computer Music Series Vol 6: Compositions by Jon Appleton, David Evan Jones, Paul Moravec, and Christian Wolff. CD Recording. Centaur Records, USA. CRC 2052.

Technical Keywords:

Real time processing of instrumental sound
Sample manipulation
Synthetic timbres
Synthesised Instrumental timbres
Improvisation by performer

Details:

all timbres are created using digital oscillators
used Synclavier
the performer plays and records and remixes sounds in real time during performance

My Thoughts:

used a huge variety of timbres
clearly delineated timbres in different pitch spaces
fast unfolding of events
repeated gestures at different pitches

melodies lyrical
regular metric pulse and
included gliding tones
and tuning changes
not too dissonant
a parade of timbres and possibilities
as events overlapped and moved from one thing to another
with some repeated gestures in different timbres
quite pleasant

Albright, W. (1985). *Sphaera: for piano and tape*. Computer Music Currents 9. CD Recording. Wergo, Mainz, W.Germany. WER 2029-2.

Technical Keywords:

Acoustic Instrument
Extension of instrumental possibilities through computer part
Found objects
Sample manipulation
Sampled instrument
Specialisation
Spectral evolution

Details:

Computer part extends the sounds possible from piano by prolonging some of the spectral components of the sound.

My Thoughts:

quite dense
the synthetic part was organ-like by being continuous and swelling
no apparent rhythm or background pulse
not dissonant
but some of the synthetic timbres were very edgy and hard to listen
clear separation between the piano and synthetic sounds
slow unfolding until a bit just before the end
where there were suddenly lots of really fast higher pitched events
which were quite rhythmic and it suddenly came to life for that moment
got really boomy in the middle
overall, events seemed a bit too disconnected and aimless

Austin, L. (1985). *Montage: Themes and Variations for Violin and Computer Music on Tape*. CDCM Computer Music Series Vol 10: The Virtuoso in the Computer Age--1. CD Recording. Centaur Records, USA. CRC 2110.

Technical Keywords:

Acoustic Instruments

Algorithmic composition (of some elements)
Morphing timbres
Probability used to create rhythm (occurrence of sound events)
Synthetic timbres
Synthesised Instrumental timbres

Details:

Two themes composed intuitively which are successively varied by the algorithmic computer program
computer timbres are resynthesized and altered from original sound types.

My Thoughts:

too dissonant
the synth bass sounds were boomy and ugly
synthetic timbres were clearly different
the actual events seemed too unfocused, aimless and drifting
with no obvious rationale for their creation
the rate of change was too slow and tedious

Austin, L. (1991). *Beachcombers: for four musicians and computer music*. CDCM Computer Music Series Vol 9: ...musics, metaphors, machines... CD Recording. Centaur Records, USA. CRC 2078.

Technical Keywords:

Algorithmic composition (of some elements)
Acoustic Instruments
Actual voice
FM Synthesis
Fractal/chaos creation of melodic contours
Tuning timbres to a specific scale

Details:

for some live performers using electronic instruments
chanting and computer part

My Thoughts:

there was too much bass sustained and boomy
the events seemed undirected and aimless
the timbres were not interesting
was unfocused
and did not evolve sufficiently to sustain interest for its entire duration

Austin, L. (1988). *Sinfonia Concertante: a Mozartean Episode*. CDCM Computer Music Series Vol 1: Compositions by Larry Austin, Thomas Clark, Jerry Hunt, Phil Winsor. CD Recording. Centaur Records, USA. CRC 2029.

Technical Keywords:

Acoustic Instruments
Actual voice
Narrative structure
Text excerpts
Synthetic timbres
Synthesised voice

Details:

interplay of chamber orchestra and computer narrative

My Thoughts:

the narrative made it interesting
but voice part was hard to hear sometimes
this was frustrating
the chamber orchestral Mozartian interludes made for easy listening.

Baitz, R. (1985). *Kaleidocycles for Synclavier*. CDCM Computer Music Series Vol 2: Compositions by Richard Teitelbaum, Martin Bresnick, Neil B Rolnick, Rick Baitz, Scott Lindroth. CD Recording. Centaur Records, USA. CRC 2039.

Technical Keywords:

Algorithmic composition
Spacialisation
Synthetic timbres
Tape loops

Details:

symmetrical structure of cycles

My Thoughts:

most of the timbres were light and
steady rhythmic interest
and the discrete higher pitched sounds were nice
and the interlocking event patterns were quite fast
All of which gave the music quite a bit of impetus, but it did not evolve sufficiently to sustain interest for its entire duration

Barrière, J.-B. (1983). *Chreode I*. Computer Music Currents 4. CD Recording. Wergo, Mainz, W.Germany. WER 2024-50.

Technical Keywords:

Morphing timbres
Algorithmic composition
Formants of a sound used to generate new timbres
Synthetic timbres

Details:

investigation of relation between sonic materials and their organisation
used CHANT sound synthesis program.
used vocal sounds as model for the synthetic timbres

My Thoughts:

great opening with really attention grabbing louder repetitive staccato sounds then some male vocal sounds emerge.
the staccato sounds like the tape bubbling which is an unpleasant kind of sound, like the sound is frustrated in coming out, and its tiring for the listener
middle section muffled and too different without any clear reason for being like that.
The music did not sustain any interest when the middle section started, and the sound got too muddy and unclear

Bayle, F. (1983). *Le Sommeil d'Euclide*. Computer Music Currents 3. CD Recording. Wergo Mainz, W.Germany. WER 2023-50.

Technical Keywords:

Sampled natural sounds
Sampled voices
Morphing timbres

Details:

used special machine to process the sounds.
a concern with form
based on idea of 'antidreams'

My Thoughts:

quite sectional, with each section fading out to nothing, then a strongly contrasting entry to the next...this made for interesting and engaging music.
collection of high pitched short sounds at about 6mins was quite grabbing after the first section had died to nothing,
and this maintained itself for a couple of minutes as it died down.
Overall it manifested the idea, but musically tedious

Bennett, G. (1987). *Kyotaku: for shakuhachi and tape*. Computer Music Currents 9. CD Recording. Wergo, Mainz, W.Germany. WER 2029-2.

Technical Keywords:

Acoustic Instrument
Morphing timbres
Spectral evolution
Synthesised bells
Synthetic timbres
Tuning timbres to a specific scale

Details:

synthesised using DMX-1000 sound processor
structure, tuning and phrasing is taken from a traditional shakuhachi piece

My Thoughts:

the very low bell sounds were really lovely and resonant timbres
very sparse texture
event rarely overlap with a lot of space between
no apparent rhythm or background pulse
not dissonant
clear separation between the shakuhachi and synthetic timbres
slow unfolding
(not sure how it maintained interest,
perhaps the unfolding of the shakuhachi line which was a really strong presence,
and the gentleness of the synthetic accompaniment)
quite pleasant despite the length.

Berger, J. (1986). *Diptych*. CDCM Computer Music Series Vol 8: Compositions by
Jonathon Berger, Chris Chafe, David Jaffe, Dexter Morrill, Allan Schindler. CD
Recording. Centaur Records, USA. CRC 2091.

Technical Keywords:

Synthetic timbres
Sampled natural sounds
Actual voice
Acoustic Instruments
Sample manipulation

Details:

setting of 3 poems on the atrocities of war

My Thoughts:

each poem was set in a different style
I: regular pulse articulated by string and synth so each occurrence had shape even
though they were mostly identical
the pulse died out during the singing parts
which were slow moving and atmospheric
sometimes echoed in the string playing of
long legato duration notes in close harmony
clearly articulated timbres, although at times they were very closely pitched
II: more angular melodic gestures, and no pulse
III: more of the same
very evocative setting

Berio, L. *Eindrücke*. CD Recording. Erato, W.Germany. 2292-45228-2.

Technical Keywords:

Acoustic Instruments

My Thoughts:

Starts as any modern piece except there are repeated orchestral chords which occur regularly, with slight changes of instrumentation.

The fullness of the chords means they sound dark and heavy (full spectrum).

Then string melody over the chordal accompaniment, with winds providing decoration.

Reminiscent of the Rite of Spring, except no decent melodic lines, and the chords are quite a bit more regular, so the odd rhythms are not occurring.

The regularity and repetitive timbre of chords breaks down in the middle, and string melody becomes interspersed with brass melody.

There are repetitive shapes in the pitch progressions, and the chords.

Then towards the end the timbral textures thin out a bit, and it fades to nothing.

Analytical listening made this interesting,

superficial listening it was tedious, the sound was heavy and the repeated chords were not quite insistent enough.

Berio, L. *Sinfonia (for eight voices and orchestra)*. CD Recording. Erato, W.Germany. 2292-45228-2.

Technical Keywords:

Actual voices

Acoustic Instruments

Text excerpts

Found objects

Details:

Based on idea of simultaneous sounding of parts: voices and instruments. ie interplay of things, situations, and meanings. search for identity between voice and instruments, the words and the overall structure. The unintelligibility of the text is essential to the musical process. Uses text excerpts from a variety of authors.

Five movements.

I: Text from C. Levi-Strauss on structure and symbolism of Brazilian myths about water, presented as images.

Mostly static pitches. Vocal sounds with instrumental explosions and interjections which extend into an accompaniment and then voices die out. Instrumental sounds are quite forbidding and gloomy.

II: Sounds from Martin Luther's name.

Repeated atonal arpeggios, new pitch on new event. Vocal sounds each quite static are always accompanied by an instrument also static. More gentle.

III: Fragments of Samuel Beckett's 'The Unnamable'. Uses 3rd movement of Mahler's second symphony to generate the instrumental material for this section, which becomes figures from many composers from Bach to Pousseur, used like found objects. Both

text and figures are combined and transformed as the movement unfolds, which because of new contexts give new meanings.

IV: Mimics fragments from the earlier movements. ie the arpeggiation, the long static vocal sounds from II, start unaccompanied, but then instruments join in. Piano starts with chords just before the end.

V: Develops the texts from earlier movements into a narrative based on the original text of 1st movement. Overall this movement is to develop the latent unity of the preceding movements. Starts with piano, and solo voice enters like modern song, and then piccolo over, spoken voices

Similarities in structure between movements:

first three movements start with a loud crash of varying timbres and then soft voices also varied . fourth starts with soft voices only while fifth starts with piano strings of notes which are somewhere in between the two other openings.

not harmonically dissonant vertically, but the atonal nature meant that successive pitches did not sound so agreeable.

My Thoughts:

Took 4 listenings over 3 hours for anything to start to make sense, except for III, which disintegrated as it got more familiar.

I: Still sounds gloomy but grew on me with repeated (3) listening and study of liner notes.

II: More gentle, got tedious about 2/3rs through, and still not really harmonically pleasant to listen to.

III: Grabbed me at first hearing. I really liked this one because it had a definite waltz rhythm and tonal melodic shape and the text excerpts are short phrases which permit some kind of interpretation, even though not narrative, and somewhat incoherent, although as waltz disintegrates turns into voice over description of the actual performance and performers. On repeated and close listening started to sound scary and unpleasant (atonal chords sound really quite at odds) about 1/3 of the way through and then redeemed itself at half way with recurrence of the waltz, and then towards the end the description of the performance focuses attention away from the ugly music.

IV: gentle and much more pleasant than II. Just the right length for the ideas in this movement.

V: different opening was interesting, however it was disconnected and aimless music. the voices even though not singing as such, actually held it together by being a continuously evolving sound while the instruments played around

voices give a focal point. (all this is after listening for the 4th time, first listening it all sounded too erratic and unpredictable).

Bodin, L.-G. (1984). *Anima: for soprano and computer generated tape*. Computer Music Currents 7. CD Recording. Wergo, Mainz, W.Germany. WER 2027-2.

Technical Keywords:

Actual voice

Synthetic timbres

Synthesised voice

Tuning timbres to a specific scale

Details:

Synthesised with CHANT program

My Thoughts:

vocalise,
however synthetic timbres were dominant
the thing unfolded with very clear sounds following each other which made it easy to concentrate and listen
the actual sounds occurring seemed a bit disconnected and aimless which perhaps fits into them of piece about coming to consciousness about one's personality
some of the sounds were really interesting (specifically some very fast glides at high pitches repeated)
pleasant to the ear,

Boesch, R. (1987). *Clavirissima: for piano and real-time processing*. Computer Music Currents 8. CD Recording. Wergo, Mainz, W.Germany. WER 2028-2.

Technical Keywords:

Acoustic Instrument
Real time processing of instrumental sound
Algorithmic composition (of some elements)

Details:

based on real time processing of instrumental sound along 20 different parameters.

My Thoughts:

instrumental music which sounded unstructured and aimless
repeated polyrhythms in tone clusters
with a lot of energy in the opening
broke down to something much quieter, strong contrast
which then evolved into loud crashes
a lot of variety but the discrete clarity of the events
with underlying rhythms really helped give impetus to the piece
quite nice for an abstract work

Braxton, A. (1982). *Composition No. 7 (excerpt)*. CDCM Computer Music Series Vol 10: The Virtuoso in the Computer Age--1. CD Recording. Centaur Records, USA. CRC 2110.

Technical Keywords:

Acoustic Instruments
Synthetic timbres
Interactive performance
Improvisation by performer
Algorithmic composition (of some elements)

Details:

realised using HMSL

"to establish a dry and glass like sound universe that sculpts its events into music"

My Thoughts:

Simple textures provided some aural relief.
sounded like a very crazy jazz band with extra timbres
the actual events seemed too unfocused, aimless and drifting
with no obvious rationale for their creation
yet everything unfolded so fast one sound event after another
things were repeated, or changed
often there was a clear sense of pulse
which worked as a very wild crazy energy

Bresnick, M. (1987). *Lady Neil's Dumpe: for Yamaha TX816 MIDI rack and Macintosh Computer*. CDCM Computer Music Series Vol 2: Compositions by Richard Teitelbaum, Martin Bresnick, Neil B Rolnick, Rick Baitz, Scott Lindroth. CD Recording. Centaur Records, USA. CRC 2039.

Technical Keywords:

Synthesised Instrumental timbres

Details:

MIDI harpsichord, playing
the earliest known English keyboard composition
decorated with composer's fancies

My Thoughts:

opening seemed traditional keyboard music, but the
harpsichord sounds were not very accurate reproductions of an acoustic instrument.
then slowly other timbres like bells and bass guitar notes were introduced and slowly
became a major part of the music
consonant,
and the interlocking event patterns were quite fast
the harpsichord ground became a bit monotonous
as the work took too long to evolve.
but the timbres were nice
and the harpsichord timbre provided continuity throughout the piece..

Brun, H. (1981). *Project SAWDUST Nr.6: i toLD YOu so! for computer generated tape*. CDCM Computer Music Series Vol 3: Compositions by Salvatore Martirano. CD Recording. Centaur Records, USA. CRC 2045.

Technical Keywords:

Synthetic timbres

Details:

buries another cliché so he says

My Thoughts:

the nearly synthetic voices were an item of interest
the rest of the timbres were tiresome
many of the timbres are now commonplace in computer games, so they have little intrinsic interest to a 21st century listener.
sounded experimental
too long.

Butler, M. (1987). *Night Machines*. CDCM Computer Music Series Volume 5: Music from the Winham Laboratory at Princeton University. CD Recording. Centaur Records, USA. CRC 2076.

Technical Keywords:

Synthesised Instrumental timbres
Synthetic timbres

Details:

composed using two commercial synthesisers

My Thoughts:

opening was ok, but uninspiring.
the middle section was too gloomy with the wild sort of organ timbres, and the really long reverb bass notes.
which eventually kind of came together sounding like a really crazy organist.
By the end of the piece the use of upper registers made it easier to listen to, and the rhythms became more present as well, which helped to give it a bit of impetus.

Cage, J. *First Construction (in Metal)*. CD Recording. Philips, Japan. 420 233-2.

Technical Keywords:

Acoustic Instruments

Details:

quite rhythmic, and various timbres are used as the work unfolds

My Thoughts:

rhythms kept interest and the timbres and textures changed frequently so also kept interest. first section ended after 4 minutes and it could have finished there quite well.
but went on and seemed to just become more chaotic,
rhythms broke down,
the dissonance and deep sounds created a quite unpleasant mood.
at the end the rhythms came together and increasingly large number of instruments playing created a very intense ending that was great to hear.
concluded by slowing down and dying out.

Carlos, W. (1982). *Tron*. DVD Video Recording. Walt Disney Home Video, USA. P02200/1-2.

Technical Keywords:

Acoustic Instruments
Synthetic timbres

Details:

sound track for animation about computer programs
included orchestral scoring and electronic timbres for the computer parts

My Thoughts:

the electronic parts were quite minimal
many of the timbres are now commonplace in computer games, so they have little intrinsic interest to a 21st century listener.
a typical Hollywood film score
pleasant but really only setting the mood for the action.

Chadabe, J. (1989). *Modalities: for interactive computer music system*. CDCM Computer Music Series Vol 7: Compositions by Neil B. Rolnick, Pauline Oliveros, Julie Kabat, Barton McLean, Joel Chadabe. CD Recording. Centaur Records, USA. CRC 2047.

Technical Keywords:

Improvisation by performer
Algorithmic composition (of some elements)
Synthesised Instrumental timbres
Synthetic timbres

Details:

uses software "M"
sampled and processed in real time using effects processor

My Thoughts:

bass pulse and repeated gestures make compelling opening
clearly delineated timbres and pitch spaces
sounds percussive
texture is often more than one line
but after several minutes settles into a particular framework which seems both static and relentless, because bass pulse just keeps on until just before the end
and the upper instruments seem to play out their notes with minimal change to the ordering.
music was lively and interesting to start with but was but did not evolve sufficiently to sustain interest for its entire duration.

Chafe, C. (1987). *Quadro: for Piano Trio and tape*. CDCM Computer Music Series Vol 8: Compositions by Jonathon Berger, Chris Chafe, David Jaffe, Dexter Morrill, Allan Schindler. CD Recording. Centaur Records, USA. CRC 2091.

Technical Keywords:

Algorithmic composition
Acoustic Instruments
Sample manipulation
Synthetic timbres
Morphing timbres
Sampled instruments

Details:

samples spliced onto synthetic timbres
same sound events moved around in time and timbre

My thoughts:

bass sounds were too boomy
clear separation in timbres between instruments and synthetic sounds
at times it seemed undirected and aimless but
there were moments of repeated notes and gestures which managed to give it some coherence and meant the work did not become too tedious to the listener.

Chafe, C. (1981). *Solera*. Computer Music Currents 6. CD Recording. Wergo, Mainz, W.Germany. WER 2026-2.

Technical Keywords:

Morphing dynamic envelopes
Spectral manipulation
Sample manipulation
Sampled instrument
Synthesised Instrumental timbres

Details:

uses a single sample of a clarinet tone, whose spectrum and envelope was analysed and used for resynthesis.
synthetic timbres are generated using envelopes derived from the poem.

My Thoughts:

the unity of timbres made the piece sort of hang together,
but with a very slow unfolding
Once I kind of settled to the pace, my attention did wander at times, however it was renewed by either by a new type of event, or when a significant aural event interrupted the flow.

Chavez, C. *Toccata (for percussion only)*. CD Recording. Philips, Japan. 420 233-2.

Technical Keywords:

Acoustic Instruments

My Thoughts:

the clarity of the snare drum and the timpani with drum rolls and strong rhythms was great at the beginning. And the clarity of instrumental parts was delightful. Even though each section had its charm, the strongly discrete sections meant that concentration had to start all over again with each section. I found this disruptive and annoying, preventing immersion in the flow of the music.

Clark, T. (1988). *Peninsula*. CDCM Computer Music Series Vol 1: Compositions by Larry Austin, Thomas Clark, Jerry Hunt, Phil Windsor. CD Recording. Centaur Records, USA. CRC 2029.

Technical Keywords:

Acoustic instruments

Synthetic timbres

Algorithmic composition (of some elements)

Synthesised Instrumental timbres

Details:

for piano and tape

mapping of land contours onto musical parameters of numbers of notes in chords

My Thoughts:

mostly sounded disorganised and chaotic, with with no obvious rationale for the creation of specific sound events.

the piano sound gave something to hang onto

but after 2 mins wondered what the point was

and if it would ever go anywhere

piano chords were not dissonant, but sounded nice

meandering not aimless

computer part seemed dislocated and

at odds with the piano part

Overall the work did not evolve sufficiently to sustain interest for its entire duration.

Cowell, H. (1916). *Quartett Pedantic (String Quartet no. 1)*. CD Recording. Mode Records, New York. Mode 72/73.

Technical Keywords:

Acoustic Instruments

Details:

two movements

complex rhythm-harmony method of composition which is atonal, but polyphonic, with dissonant counterpoint, highly dissonant unrestrained independence of each voice

My Thoughts:

I: rhythmic and fairly stolid, despite the legato lines, the bass is too present droning along, dissonance is very noticeable and the piece is quite stagnant.

Not very interesting as the ideas are too constant with not enough change, the last part of the first movement suddenly had more driving rhythms and this gave much more interest to the conclusion.

II: block chords driving the music. voice leading and dynamics gave it movement. short and to the point.

This movement was continually stimulating.

Cowell, H. (1917). *Quartet Romantic (two flutes, two strings)*. CD Recording. Mode Records, New York. Mode 72/73.

Technical Keywords:

Acoustic Instruments

Partials of sound used to generate rhythms

Details:

two movements

complex rhythm-harmony method of composition which is atonal, but polyphonic, with dissonant counterpoint, but melodic lines are conjunct and there is consonance in the vertical harmony, and chords are not resolved traditionally.

intended to be flowing and lyrical

My Thoughts:

1. rhythmic and lyrical, dissonance is not terribly noticeable and the piece moves along nicely. although the ideas are too constant with not enough change, the main interest in the music is due to the lyrical melodic line.
2. second movement is really legato lyrical countermelodies. delicious, high pitched and moving around in the sound space, clearly delineated timbres and voices. This movement was continually stimulating.

Cowell, H. (1919). *Quartet Euphometric*. CD Recording. Mode Records, New York. Mode 72/73.

Technical Keywords:

Acoustic Instruments

Details:

complex rhythm-harmony method of composition which is atonal, but polyphonic, with dissonant counterpoint, but melodic lines are conjunct and there is consonance in the vertical harmony, and chords are not resolved traditionally. intended to be flowing and lyrical

My Thoughts:

rhythmic and lyrical, while dissonance is not terribly noticeable and the piece moves along nicely.

Reflecting the simplicity of its ideas, this work was short enough to remain constantly engaging.

Cowell, H. (1928). *Movement for String Quartet (String Quartet No. 2)*. CD Recording. Mode Records, New York. Mode 72/73.

Technical Keywords:

Acoustic Instruments

Details:

dissonant counterpoint was strictly applied

My Thoughts:

the dissonance was not difficult, it gave a particular quality to the music.

the varying styles of the fragments and their brevity gave structural interest.

however the whole work seems disconnected and aimless, with no obvious rationale for the occurrence of specific events.

However, the lovely lyrical melodies and full rich chords gave the work some sustaining interest.

Cowell, H. (1928). *Polyphonica (instrumental ensemble)*. CD Recording. Mode Records, New York. Mode 72/73.

Technical Keywords:

Acoustic Instruments

Details:

dissonant counterpoint

projects planes of sound identified by timbre

multiple levels of simultaneous events

My Thoughts:

very soft opening which was nice.
rhythmic and lyrical, dissonance is not terribly noticeable and the piece moves along nicely

Cowell, H. (1934). *Suite for Woodwind Quintet*. CD Recording. Mode Records, New York. Mode 72/73.

Technical Keywords:

Acoustic Instruments

Details:

contains movements of varying textures and forms. Each fragment is quite short from 1 to 2 minutes long.

My Thoughts:

the dissonance was not difficult, it gave a particular quality of being off key, to the opening chorale.
the varying styles of the fragments and their brevity gave structural interest.
however the whole work seems disconnected and aimless, with no obvious rationale for the occurrence of specific events.
However, the lovely lyrical melodies and full rich chords gave the work some sustaining interest.

Cowell, H. (1935). *Mosaic Quartet (String Quartet No. 3)*. CD Recording. Mode Records, New York. Mode 72/73.

Technical Keywords:

Acoustic Instruments
Random ordering of movements
Extended instrumental techniques

Details:

five self contained fragments of varying textures and forms, and amounts of dissonance, which can be played by the musicians in any order and any number of times. Each fragment is quite short from 1 to 3 minutes long.

My Thoughts:

the dissonance was not difficult, it gave a particular quality to the opening chorale
the varying styles of the fragments and their brevity meant that the work is structurally interesting,
however the whole work seems unfocused because it is so fragmented,
with nothing (no melody or anything, although sometimes some common sounds)
leading one to the next event.
However, despite being aimless, the lovely lyrical melodies and full rich chords gave the work some sustaining interest.

Cowell, H. (1939). *Return (for percussion)*. CD Recording. Mode Records, New York. Mode 72/73.

Technical Keywords:

Acoustic Instruments

Actual voice

Details:

voice at end is a wail, and very different than what came before which was simple percussion

My Thoughts:

repeated rhythms with varying timbres,

very soft which was nice

The dynamic level is the most notable feature of the piece, which was pleasant but unremarkable.

Cowell, H. (1962). *Quartet for flute, Oboe, Violincello, Harp*. CD Recording. Mode Records, New York. Mode 72/73.

Technical Keywords:

Acoustic Instruments

Details:

Four movements varying in length from 2 to 6 mins.

My Thoughts:

very soft pleasant lyrical consonant introduction which was nice, and it stayed like this. using the higher end of the pitch spectrum too.

The music sounds really light and delicate, which is the most notable feature of the music.

dance like with regular pulse and lyrical, which makes the music really engaging.

Cowell, H. (1963). *26 Simultaneous Mosaics (instrumental ensemble and percussion)*. CD Recording. Mode Records, New York. Mode 72/73.

Technical Keywords:

Acoustic Instruments

Random ordering of movements

Random ordering of instrument voices

Extended instrumental techniques

Details:

each individual part contains self contained fragments of varying textures and forms, and amounts of dissonance, which can be played by the musicians in any order and any number of times.

Each fragment is quite short from 1 to 3 minutes long.

My Thoughts:

the dissonance was not difficult,
the varying styles of the fragments and their brevity meant that the form kept its interest,
however the whole work seems unremarkable,
Despite being aimless, it contains lyrical melodies and full rich chords, varying timbres
and textures which change quite fast. there are points of repose and some solos. so the
music is constantly changing.
legato melodies and the strong rhythms in percussion when they play.
Gongs present at the ending make for an engaging conclusion.
The regular tempo and underlying pulse both give this work impetus.

Davidovsky, M. (1988). *Synchronisms No.9*. Computer Music Currents 2. CD
Recording. Wergo, Mainz, W.Germany. WER 2022-50.

Technical Keywords:

Acoustic Instrument
Sampled instrument
Synthetic timbres

Details:

violin with tape accompaniment, based on sampled violin and synthesised timbres using
Csound as well as MIDI piano

My Thoughts:

The tape events don't seem to follow any predictable pattern even though they do sort of
unfold one from the other if one is listening closely.
Ultimately the work is disconnected and aimless, with no obvious rationale for the
occurrence of particular events, nor any clearly delineated structure.

Decoust, M. (1977). *Interphone*. Computer Music Currents 4. CD Recording. Wergo,
Mainz W.Germany. WER 2024-50.

Technical Keywords:

Sampled voices
Text complete
Text excerpts
Synthetic timbres

Details:

uses Music V
structure, including breath (which is often missing from electronic music) determined
by the poem.
synthetic timbres are generated using envelopes derived from the poem.

My Thoughts:

I couldn't hear the poem,
the synthetic sounds dominated and the text was really broken up.
really clear texture, and the bass sounds were really delightful,
clear not muddy like single organ notes
and each of the timbres had an organic shape so
even though long duration they kept their interest.
Even though there were many things which were stimulating to the listener, overall the
work did not evolve sufficiently to sustain interest for its full duration.

DeLio, T. (1985/6). *Against the silence...(for percussion ensemble and four-channel computer generated tape)*. Computer Music Currents 9. CD Recording. Wergo, Mainz, W.Germany. WER 2029-2.

Technical Keywords:

Acoustic Instruments
Synthetic timbres
Algorithmic composition (of some elements)
Morphing dynamic envelopes
Spacialisation

Details:

in two movements
a study in discontinuity
silence plays a crucial role in the structural and expressive design of piece
highly organised structure of parts

My Thoughts:

started from nothing and the sound came very slowly came into space
very sparse texture
events rarely overlap with a lot of space between
no apparent rhythm or background pulse
not dissonant
clear separation between the percussion and synthetic timbres
the unfolding was too slow and too abstract, so tended to tedious
but the quietness and dynamic shaping of the sounds actually helped one to listen
the long silences after 3 mins of second movement made it sound like the end and
should have stopped there

Dodge, C. (1980). *Any Resemblance is Purely Coincidental: for piano*. Computer Music Currents 11. CD Recording. Wergo, Mainz, W.Germany. WER 2031-2.

Technical Keywords:

Acoustic Instrument
Sampled voice
Synthesised voice

Details:

analysis of Enrico Caruso's voice, and resynthesis of voice which is then searching for an accompaniment and this tape is a variety of such accompaniments, both instrumental and synthetic timbres and voices.

My Thoughts:

imitation by piano of voice part was really interesting
the singing voice really gave it a hook for the listener to follow
because of the melodic and gestural contours
This piece continually sustained interest throughout its entire length.

Dodge, C. (1985). *Roundelay*. Computer Music Currents 4. CD Recording. Wergo, Mainz W.Germany. WER 2024-50.

Technical Keywords:

Actual voices
Fractal/chaos creation of spectra
Algorithmic composition
Text complete
Text excerpts
Synthetic timbres

Details:

Vocal lines double the computer part

My Thoughts:

the poem was not audible, the synthetic timbres dominated and the text was really broken up into just vowel sounds.
the bass sounds were really muddy and repetitive, making them tiring and overwhelming.
There wasn't anything that really gave this work any impetus, consequently the work became uninteresting very quickly.

Fulton, D. (1985). *Bowling for Blood*. Computer Music Currents 11. CD Recording. Wergo Mainz, W.Germany. WER 2031-2.

Details:

composer has completely omitted any reference to himself or how the music was created.
the two sentence program notes refer only to death and taxes

My Thoughts:

wild opening with various instrumental timbres, which along with the strong rhythm gave the opening a vaguely south american feel
middle section had organ-like timbres and gestures which were slow and meditative
the piece could have satisfactorily ended with the silence following the middle section but instead it broke into a new solid 4/4 rhythm with synth riffs over the top, which was just as crazy and joyful as the opening. This ended really unexpectedly before the ideas had played themselves out, leaving the listener with a desire to hear more.
The music was engaging due to its rhythms and timbres, while its content and structure clearly expressed the implied program of the music.

Garton, B. (1987). *Approximate Rhythms*. CDCM Computer Music Series Volume 5: Music from the Winham Laboratory at Princeton University. CD Recording. Centaur Records, USA. CRC 2076.

Technical Keywords:

Sampled instruments

Probability used to create rhythm (occurrence of sound events)

Synthetic timbres

Details:

general purpose computer used to simulate drum machine with computer generated rhythms based on known drum patterns

My Thoughts:

the regular high hat was an unpleasant sound because it wasn't crisp, but the way the rhythms unfolded to sound like tabla was realistic,
the extra synthetic sound events sounded odd and erratic,
sort of an added extra, without any obvious rationale for their existence.
A particularly stimulating moment in the work was when a new rhythm pattern emerged out of one of the flowing synthetic noise timbres (like it swooped down and suddenly transformed seamlessly into a rhythm with pitches and with drum timbres that simply and suddenly emerged from the noise).
However, again the ending section came out of nowhere, which despite being a really nice combination of bell sounds, contrasted so strongly with the rest of the piece, that it should have been in a different work.
The piece sustained interest because the timbres and the interacting rhythms were good and active, while the synthetic timbres were quite high pitched and realistic sounds

Garton, B., R. Kostelanitz, et al. (1987). *Wasting*. CDCM Computer Music Series Volume 5: Music from the Winham Laboratory at Princeton University. CD Recording. Centaur Records, USA. CRC 2076.

Technical Keywords:

Acoustic instrument
Text complete
Effects (digital)
Sampled voice
Sample manipulation
Synthetic timbres

Details:

a poem read straight through but in the piece the voice was varied to reflect aspects of the text, and then there were synthetic timbres and live guitar sounds added around the text

My Thoughts:

interesting how the voice changed and as the text became more comprehensible, this gave the music impetus.
The whole work was light hearted and entertaining.

Ghent, E. (1970/71). *Phosphones*. Computer Music Currents 2. CD Recording. Wergo, Mainz W.Germany. WER 2022-50.

Technical Keywords:

Theatre lighting synchronized with music and choreographed movements
Algorithmic composition
synthetic timbres
Tuning timbres to a specific scale

Details:

sounds are generated via Max Matthews 'resons' which are electronic circuits which have been tuned and adjusted for damped ringing, and all come out sounding percussive.
the lighting component is as composed as is the music
uses GROOVE (a real time system)

My Thoughts:

clear sounds generally in higher pitch register,
transparent texture.
Rhythms make the music flow, contrasting with repeated notes which become insistent
This piece remains stimulating and engaging throughout.

Goebel, J. (1987/88). *Vom Übersetzen über den Fluss*. Computer Music Currents 3. CD Recording. Wergo, Mainz, W.Germany. WER 2023-50.

Technical Keywords:

Noise generators and filters

Effects (delay)

Algorithmic composition (but composer has final say in events)

Fractal/chaos creation of spectra

Tuning timbres to a specific scale

Details:

composer has final say over the results of the algorithms, and coherence is achieved faster 'by hand' than by programming an algorithm. (does this mean that computer music is constrained to be incoherent if algorithmic?)

logic is opposed to dialectics

because not notated the analysis and judgement has to be based on what the ear hears, the final acoustic result will always incorporate the composer's stand to the medium, and how they regard the medium in relation to other possibilities for creating music. The listener however always listens in an existentially determined context.

My Thoughts:

the actual music was very ominous and gloomy, and a lot of it was really slow moving and repetitive.

The full spectrum of sounds were too dense and not enough space anywhere in the texture.

Although the sudden cuts at the end made for a startling return to awareness of the music, this highlighted how monotonous and tedious the music had become.

Harvey, J. (1980). *Mortuous Plango, Vivos Voco*. Computer Music Currents 5. CD Recording. Wergo, Mainz, W.Germany. WER 2025-2.

Technical Keywords:

Partials of a sound used to generate pitch movement

Sample manipulation

Sampled instrument

Sampled voice

Spacialisation

Spectral manipulation

Synthesised bells

Synthesised voice

Tuning timbres to a specific scale

Details:

written using CHANT and MUSIC V

everything is based on spectrum of original bell, which provides the harmony for the work based on the 8 lowest partials, which also make for 7 new bells using each one as the fundamental.

work has 8 sections with duration proportional to the freq of fundamentals of the bells

My Thoughts:

Great idea, because the bell timbre from the church is great but very strongly contrasts with the boy soprano. Layering of the boys voice does good imitation of choir.

the end where the bell tolls continuously so its rich timbre and the rhythm of the tolling is good, nice at this point.

Verging on being rather undirected and unfocussed musically, but I think the natural sound of voice and bell give this piece life.

Haynes, S. (1977). *Prisms: for piano and tape*. Computer Music Currents 8. CD Recording. Wergo, Mainz, W.Germany. WER 2028-2.

Technical Keywords:

Synthetic timbres

Acoustic Instrument

Additive Synthesis

FM Synthesis

Synthesised Instrumental timbres

Details:

reinterpretation of materials from an earlier tape piece 'Pyramids'
used Music 5 and Music 10 sound synthesis program.

My Thoughts:

the sounds were really clear,

high rhythmic energy in piano opening

great similarity between piano and tape part like good counterpoint

middle section rumbling around the lowest register

not dissonant

well formed structurally

had movement and connection between the parts

the ending seemed disjoint and unnecessary although I think it was an inversion of the opening, it would have been better without it.

This abstract work was stimulating, maintaining interest throughout.

Hunt, J. (1988). *Fluud*. CDCM Computer Music Series Vol 1: Compositions by Larry Austin, Thomas Clark, Jerry Hunt, Phil Windsor. CD Recording. Centaur Records, USA. CRC 2029.

Technical Keywords:

Acoustic Instruments

Algorithmic composition

Synthetic timbres

Details:

sound part of an aural-visual performance

two synclaviers

an original work from 1622 was duplicated to provide two parts which together produces a set of patterns which are highlighted in various ways

My Thoughts:

lively opening

clearly separated timbres

repeated sound events

had two complete silences after 2 and 6 mins, both of which could have been a successful end to the work. In fact the silences really spoilt the flow of the sound.

Ultimately the music was too repetitive and relentless because of the rapid tempo and so many repeated and repeated events.

Although the pitch bending and prolongation of bell sounds was interesting

Overall the work seemed out of control and manic, and it just never seemed to stop.

Jones, D. E. (1983). *Still Life in Metal and Wood*. CDCM Computer Music Series Vol 6: Compositions by Jon Appleton, David Evan Jones, Paul Moravec, and Christian Wolff. CD Recording. Centaur Records, USA. CRC 2052.

Technical Keywords:

Acoustic Instruments

Synthesised voices

Morphing timbres

Sampled voice

Synthesised Instrumental timbres

Extension of instrumental possibilities through computer part

Details:

for percussion ensemble and tape

idea is to morph percussion sounds with vowel sounds to provide an intermediate material. Perceptual ambiguities are an important structural aspect.

My Thoughts:

took off with strong percussion sounds which started flying as their timbre and duration extended with gliding tones.

instruments overlapped and extended but not too dominant

suddenly synthetic vocal sounds possibly appear-illusory

the rhythm and continuous fast staccato events keep things moving

percussion and synthetic sounds contrast in articulation and shape

This work was stimulating and interesting.

Jones, D. E. (1989). *Still Life Dancing: for Percussion Ensemble and Tape*. CDCM Computer Music Series Vol 6: Compositions by Jon Appleton, David Evan Jones, Paul Moravec, and Christian Wolff. CD Recording. Centaur Records, USA. CRC 2052.

Technical Keywords:

Acoustic instruments

Sample manipulation

Sampled instruments

Synthesised voices

Synthetic timbres

Details:

uses percussion and vowel sounds
uses CHANT and Synclavier

My Thoughts:

Rapid number of staccato events gives momentum
the synthetic vowel sounds gliding engages the listener's curiosity about whether the sounds will begin to make sense/form into words
Although the work had some momentum, it would have benefited from a bit more structural variety.

Jones, D. E. (1986). *Scritto. Computer Music Currents 4*. CD Recording. Wergo, Mainz W.Germany. WER 2024-50.

Technical Keywords:

Sample manipulation
Sampled instruments
Sampled voices
Formants of a sound used to organise sounds into a scale
Partials of sound used to generate chords

Details:

concerned to integrate diverse aspects of sound, structure and meaning in a musical/verbal language
(Vedic scholars study effect of phonemes and syllables on the human nervous system, thus mantras)
strong affect often generated by use of the human voice.
uses structure of speech sound to generate musical structure.
uses second formants of vowel sounds to construct a scale (organise them into a scale) and use this scale for the instrumental sounds
organise speech sounds according to timbre (rather than phoneme) and use related instrumental timbres and associated pitch structures.
this work plays upon the boundaries of speech and non-speech

My Thoughts:

a bit odd because using glottal clicks as the main instrument in the opening. Although this is interesting as a pseudo percussive sound, because of its physical associations with the human body, this is rather distasteful.
The music is consonant, the selection of pitches works well.
rhythms provide good delicate texture
a lot of nice features but the music was not satisfying, because of the unpleasantness of the opening glottal clicks. Since the speech had lost its meaning, the piece was ultimately nice sounding but unfocused music.

Kabat, J. (1989). *Child and the Moon-Tree: for vocalist and electronics*. CDCM Computer Music Series Vol 7: Compositions by Neil B. Rolnick, Pauline Oliveros, Julie Kabat, Barton McLean, Joel Chadabe. CD Recording. Centaur Records, USA. CRC 2047.

Technical Keywords:

Narrative structure
Effects (digital)
Sample manipulation
Sampled voices
Sampled instruments

Details:

inspired by Noh theatre
this is excerpt from much longer performance
uses only vocal sounds
sampled and processed in real time using effects processor

My Thoughts:

sectional
each section has something that maintains interest
first section is words as part of the story
second section is rhythmic and engaging
third section is song with computer accompaniment, passionate
and so on
each section being about 2 mins long
but there seemed no apparent reason for the sound world of each to be what it was, and so different from what had occurred before.
Perhaps this reflected the odd nature of the story, however it ultimately made the work incoherent and meaningless.

Kabelac, M. *8 Interventions, op. 45 (for percussion only)*. CD Recording. Philips, Japan. 420 233-2.

Technical Keywords

Acoustic Instruments

Details:

each of the eight sections has its own title, a usual movement title like scherzo, and lasted somewhere between 2 and 3 minutes.

My Thoughts:

I: the bass drum and harmonies on marimba sounded gloomy/depressing, unpleasant.
II: vigorous rhythms gave it a sense of movement, but again
harmony and timbre sounded ominous at times
III: slow mysterious start, soft and gentle short and to the point: very slow to evolve but the short duration meant this movement did not become tedious.

IV: very insistent rhythms on snare drum, and countermelody on marimba, certainly attention grabbing opening. The most engaging movement of these early movements.

V: slow like III but the crashing gongs were dissonant and the bass was too gloomy, creating a very unpleasant affect.

VI: melody on xylophone was a new feature which provided interest, which was sustained by the interplay between it and the bass drums. The recurring rhythms also gave this movement impetus.

VII: ambient with tam tam ringing in the background. Pleasant and gentle music

VIII: really insistent with rhythmic canons and unisons, really frenetic, but only 3 instruments so the sound was not muddy: this movement was very interesting and continually engaging. This made a lovely contrast to some of the other movements, and a grand conclusion to the work as a whole.

Karpen, R. (1986). *Eclipse*. Computer Music Currents 3. CD Recording. Wergo, Mainz W.Germany. WER 2023-50.

Technical Keywords:

Specialisation

Synthesised Instrumental timbres

Synthetic timbres

Synthesised voices

Details:

large scale work for computer generated sound

a concern with form, and something like counterpoint ie how the voices evolve and how this affects the form.

My Thoughts:

conceived symphonically with themes and formal areas 2 divided into 2

instrumental sounds seemed disconnected and unfocussed, and then the synthetic part sounds really down/gloomy/ominous, not nice-like a horror movie.

Much of this piece seemed quite cliched, but it is evocative of gloom and doom.

There is some textural interest because there are some clear sounds moving as another voice weaves in and out of the gloomy parts.

Karpen, R. (1987). *Il Nome: for soprano and tape*. Computer Music Currents 7. CD Recording. Wergo, Mainz, W.Germany. WER 2027-2.

Technical Keywords

Actual voice

Sample manipulation

Sampled instruments

Sampled natural sounds

Sampled voice

Synthetic timbres

Text excerpts

Details:

is based around a poem of memory for an ordinary woman killed in a terrorist bombing, which is fragmented and then sung completely at the end of the piece.
the middle of the piece contains a quote from L'Orfeo

My Thoughts:

the sound events and the sounds chosen set the atmosphere of fear, death and devastation which is quite appropriate to the text.
vocal line continues throughout the breaking glass and the bombs
however these sounds became tiring after after 4 1/2 mins of continuous listening.
A new section starts with ambient torture sounds, which is also unpleasant.
The reference to L'Orfeo was too oblique.
Despite the nifty ideas inspiring this work, altogether it was too laboured and prolonged.

Keefe, R. (1990). *The Ephemerides for Harp and Percussion: Moon, 1650-1657*.
CDCM Computer Music Series Vol 9: ...musics, metaphors, machines... CD
Recording. Centaur Records, USA. CRC 2078.

Technical Keywords:

Algorithmic composition (of some elements)
Acoustic Instruments
Sonification

Details:

for harp and percussion
musical analogue of actual planetary motion
in ABCDB' form
where A is the complete sonification
the remaining sections continue the analogue but the rhythms are composed intuitively

My Thoughts:

very pleasant and light texture
delicate, evocative of moonlight
until the cymbals entered and they were too dissonant, contrasting too strongly with the other timbres.
The work just managed to sustain enough interest throughout its length.

Kessler, T. (1989). *Flute Control*. Computer Music Currents 6. CD Recording. Wergo,
Mainz W.Germany. WER 2026-2.

Technical Keywords

Acoustic Instrument
Interactive performance
Extended instrumental techniques
Sample manipulation
Sampled instrument

Extension of instrumental possibilities through computer part

Details:

one of a series of pieces which extend the possibilities of a traditional instrument.

Once the computer is programmed, the instrumental performer controls the rest in performance.

My Thoughts:

quite a lot of activity with quite discrete sounding events,
some of the actual events are quite interesting, and the work concentrates on just about everything the flute traditionally is not, i.e. it isn't lyrical, or even playing conventional notes most of the time,
however, the work gets tedious very quickly, the music has no flow, events seem too disconnected and esoteric, without any evolutionary reason for being there.

Koenig, G. M. (1988). *Three ASKO Pieces (for live ensemble)*. Computer Music Currents 2. CD Recording. Wergo, Mainz, W.Germany. WER 2022-50.

Technical Keywords:

Acoustic Instruments

Algorhythmic composition

Random changes of musical parameters (such as register)

Details:

computer generated score (algorhythmic based on some rules and some randomisation of decisions) played by live ensemble.

My Thoughts:

arhythmic and atonal, events don't seem particularly coherent even though, with close listening it is apparent that they do unfold one from the other in various ways.

The music doesn't seem to have much focus or direction.

The timbres are pleasant, but the music is not really very engaging or individual.

Krupowicz, S. (1986). *Farewell Variations on a Theme by Mozart: for amplified string quartet and computer generated tape*. Computer Music Currents 11. CD Recording. Wergo Mainz, W.Germany. WER 2031-2.

Technical Keywords:

Acoustic instruments

Sampled instruments

Details:

specifically concerned with pulse and rhythm and how these are generated by repetition of fragments and superposition of rhythms and variation

used two Yamaha sythesisers and two Sony tape recorders

My Thoughts:

the Mozartian gestures were realistic, but the interruptions seemed arbitrary, with no obvious purpose or reason for them to be there.

Although this may have been the composer's idea of a joke, it made the music seem very ominous.

The music seemed incoherent with no particular flow, and very quickly became tedious.

Lansky, P. (1981/2). *As If: for string trio and computer synthesised sound*. CDCM Computer Music Series Vol 10: The Virtuoso in the Computer Age--1. CD Recording. Centaur Records, USA. CRC 2110.

Technical Keywords:

Acoustic Instruments

Synthetic timbres

Synthesised Instrumental timbres

Details:

four movements each of which attempts to create a new angle for the listener

I: In Preparation (tuning up)

II: At a Distance

III: In Practice

IV: In Distinction

My Thoughts:

string playing beautifully articulated

synthetic timbres were clearly different with different articulations

however each of the movements was too long, as each of the actual events seemed to have no obvious rationale for their creation. Rather they were sounds looking for music to happen in, but this was not it, as the music itself seemed unfocused, aimless and drifting

the final movement with its jazz like syncopations and regular rhythm finally had something which gave it impetus

Lansky, P. (1983). *as it grew dark*. Computer Music Currents 11. CD Recording. Wergo Mainz, W.Germany. WER 2031-2.

Technical Keywords:

Additive Synthesis

FM Synthesis

Narrative structure

Sample manipulation

Sampled voice

Text excerpts

Synthetic timbres

Effects (digital)

Details:

Sampled voice, with sound effects provided by the synthetic timbres

My Thoughts:

voice very difficult to hear at some times, so listening for meaning became impossible but then the clapping going gave the music some impetus and the overlayed voices provided an interesting textural contrast. However, anything interesting was repeated too many times, consequently, there is not enough variety or narrative progression to maintain interest.

Lansky, P. (1987). *just-more-idle-chatter*. CDCM Computer Music Series Volume 5: Music from the Winham Laboratory at Princeton University. CD Recording. Centaur Records, USA. CRC 2076.

Technical Keywords:

Actual voices
Synthesised voices

Details:

scattered synthesised phonemes against sustained choral background, like slow granulation

My Thoughts:

strong rhythm, and voice leading by choir which the synth voices accomodate. This was engaging and pleasant to the ear, yet the abrupt and sudden changes between sections significantly disrupted the flow of the work, Those sections which were morphing into and out of seemed to work better, Overall, the changes did not seem organic but rather arbitrary and did not make sense, which made them disturbing. Although the initial ideas behind the work are interesting, the work itself did not sustain any interest because of its lack of coherence.

Lindroth, S. (1985). *Syntax: for Synclavier*. CDCM Computer Music Series Vol 2: Compositions by Richard Teitelbaum, Martin Bresnick, Neil B Rolnick, Rick Baitz, Scott Lindroth. CD Recording. Centaur Records, USA. CRC 2039.

Technical Keywords:

Tape loops
Sample manipulation
Sampled instruments
Sampled voice
Synthetic timbres

Details:

various layers of the recorded sample were brought out at various times real time performance with composer at the synthesiser keyboard interacting with prerecorded sequence.

My Thoughts:

the voice even though an unusual timbre provided a continual point of reference throughout the work
the rhythm of the voice too was interesting
the quiet long timbral less rhythmically defined middle section initially contrasted too strongly with the first section, but this evolved and became more interesting through the gradual layering of timbres and pitch regions creating a kind of counterpoint.
However, this did not continue to evolve, and became tedious.
Again there was a huge change between sections, with the end being so different than the middle section, however the momentary disruption of these sectional changes did not create enough interest in the work.
Overall the work took too long to evolve and needed more variety to sustain interest.

Lindwall, C. (1986). *Points*. Computer Music Currents 1. CD Recording. Wergo, Mainz W.Germany. WER 2021-50.

Technical Keywords:

Synthesised voices
Synthetic timbres

Details:

voices synthesised using Chant, and then subjected to sound processing: stretching

My Thoughts:

very gloomy sounds which are just like my idea of souls lost in purgatory, range of pitches and stretched and distorted sounds, especially vocal sounds and laughter, which just float in and out of space.
These sounds have nothing to attach to, and have no apparent meaning, except for my metaphor above, which was self generated.
soft middle section is barely audible.
Altogether I found this work incoherent, unfocussed and tedious.

Lorrain, D. (1985). *...black it stood as night: loudspeaker music*. Computer Music Currents 2. CD Recording. Wergo, Mainz, W.Germany. WER 2022-50.

Technical Keywords:

Algorhythmic composition
Morphing dynamic envelopes
Sampled instruments
Spectral manipulation
Synthetic timbres
Probability used to arrange components of complex synthesised timbres

Details:

based on the idea of opposites: eg loud soft, sustained staccato, uses VLISP, FORMES, and C

My Thoughts:

explosive events are scattered throughout and sound really alive.
 starts with really loud tam tam crash which is instantly engaging, which takes 2 minutes to die out, then another happens.
 some other attention grabbing moments but the interludes using synthetic timbres were unremarkable and tedious as nothing really happened in those interludes.
 very sectional, and the quiet spots are dead
 Overall the work was quite unsatisfying.

Loy, G. (1980). *Nekyia*. Computer Music Currents 5. CD Recording. Wergo, Mainz, W.Germany. WER 2025-2.

Technical Keywords

Spacialisation
 Algorithmic composition (of some elements)
 Synthetic timbres
 Sample manipulation
 Sampled natural sounds

Details:

written using original sound generating software made for specific computer and synthesiser which are no longer available

My Thoughts:

rich timbres which are given their space to expose their particular qualities
 middle section with soft repeated sounds makes more sense, and there is a sense of pulse underlying this section as well,
 things slowly evolve out of this background which was momentarily interesting.
 Ultimately, however the music was unfocused and aimless, without any sense of direction.

Maiguashca, M. (1981/84). *FMelodies II: for cello, percussion and computer sounds*. Computer Music Currents 5. CD Recording. Wergo, Mainz, W.Germany. WER 2025-2.

Technical Keywords:

Acoustic Instruments
 FM Synthesis
 Partial of a sound used to generate pitch movement
 Tuning timbres to a specific scale

Details:

uses FM synthesis with two carrier frequencies represent tonic and subtonic, while the modulating freq glides over 10 octaves, and from this are chosen 120 discrete spectra which are harmonic with the fundamental (because they form integer ratios with the fundamental)
 32 sections each using only one spectrum.

My Thoughts:

Good idea trying to present something tuned, and harmonious, and really rigourously conceived from the materials. However it didn't really work all that well in terms of music,
its synthetic sounds present nothing new,
the piece does have specific movements which seem to revolve around different ideas of texture and gesture. Some gestural unison between parts.
the gestures overlap, so the piece does not sound sectional.
Ultimately, however the music was unfocused and aimless, without any sense of direction, and sounded too gloomy for my taste.

Martirano, S. (1985). *Sampler: Everything Goes When the Whistle Blows for Zeta Violin and MIDI orchestra*. CDCM Computer Music Series Vol 3: Compositions by Salvatore Martirano. CD Recording. Centaur Records, USA. CRC 2045.

Technical Keywords:

Acoustic Instrument
Synthesised bells
Synthesised Instrumental timbres
Synthetic timbres
Tape loops
Sample manipulation
Improvisation by performer

Details:

violin with synthesiser
material improvised, recorded and played back in real time while other material was layered on the top

My Thoughts:

some nice timbres with clear separation
the bells had some lovely vibrato
a moment where the violin and synthesiser were perfectly in tune in unison was quite spellbinding
and the jazz parts combined great melody and playing technique
however the first half seemed rather aimless and unfocused.
ultimately the whole work became a mere parade of possibilities

McLean, B. (1989). *Visions of a Summer Night*. CDCM Computer Music Series Vol 7: Compositions by Neil B. Rolnick, Pauline Oliveros, Julie Kabat, Barton McLean, Joel Chadabe. CD Recording. Centaur Records, USA. CRC 2047.

Technical Keywords:

Sampled instruments
Sampled natural sounds
Sample manipulation

Spectral manipulation
Synthesised bells

Details:

two movements

depicting emotional and psychological impressions of midsummer evenings in NY

My Thoughts:

timbres were piercing and unpleasant, mostly high pitched

too screechy and I was nearly tormented.

This music gave the impression that midsummer evenings must be endured rather than enjoyed.

McTee, C. (1989). *Metal Music*. CDCM Computer Music Series Vol 9: ...musics, metaphors, machines... CD Recording. Centaur Records, USA. CRC 2078.

Technical Keywords:

Synthesised bells

Synthetic timbres

FM Synthesis

Details:

used Macintosh computer, Yamaha tone generators, MIDI software and Opcode.

16 different metallic voices presented through 5 movements

each movement quite short between 1 and 3 mins

My Thoughts:

contrasting articulations in movements

each one had a different gestural idea along with the timbral variation

sometimes the variations were a bit slow to develop

nice timbres and good ideas,

this music sustained interest throughout.

Melby, J. (1984). *Concerto No.1 for Flute and Computer Synthesised Tape*. CDCM Computer Music Series Vol 10: The Virtuoso in the Computer Age--1. CD Recording. Centaur Records, USA. CRC 2110.

Technical Keywords:

Acoustic Instrument

Synthetic timbres

Details:

structured on one movement concerto form

uses Music 360 program

My Thoughts:

flute playing beautifully articulated
the flute gestures were clear and passionate
synthetic timbres worked in the concerto format
a variety of odd sometimes that together made an orchestra
sometimes taking their own material and
sometimes echoing the flute
while atonal it was not particularly dissonant or ugly
contemporary music: no legato stepwise melodic lines
but repeated gestures helped it to stay connected
Overall this was an interesting excursion between genres

Melby, J. (1985). *Chor der Waisen: for computer generated tape*. CDCM Computer Music Series Vol 3: Compositions by Salvatore Martirano. CD Recording. Centaur Records, USA. CRC 2045.

Technical Keywords:

Synthetic timbres

Details:

Informed by "Chorus of the Orphans" by Nelly Sachs
synthesised with Music 360

My Thoughts:

some nice timbres with clear separation
bass timbres were too boomy
no coherence or reason why timbres came and went
or how the music actually unfolded
quite quickly the whole work became unfocused and tedious

Milburn, A. (1987). *Elmore*. CDCM Computer Music Series Volume 5: Music from the Winham Laboratory at Princeton University. CD Recording. Centaur Records, USA. CRC 2076.

Technical Keywords:

Synthetic timbres
Sampled instruments
Sampled voices
Sample manipulation

Details:

a piece that was composed by fragmenting and gluing together elements of a rock song,
with layers of synthetic timbres floating around.

My Thoughts:

the vocal and other recognisable instrumental timbres provided a continual point of reference throughout the work, and the eventual rhythm of the events gave it some coherence.

the opening was quite ambiguous and ugly because of the messy full spectrum sounds, it did not provide any information regarding the creative impetus of the work.

The point of listening was never revealed, leaving the work too undirected and aimless.

Moravec, P. *Devices and Desires*. CDCM Computer Music Series Vol 6: Compositions by Jon Appleton, David Evan Jones, Paul Moravec, and Christian Wolff. CD Recording. Centaur Records, USA. CRC 2052.

Technical Keywords:

Sample manipulation

Sampled natural sounds

Details:

structured according to hymn tunes

My Thoughts:

used a huge variety of timbres which overlapped and carried the work forward because of the rhythmic patterns and pitched melodic gestures

This work sustained interest for its entire duration.

Morrill, D. (1985). *Quartet: for Violin, Cello and Two Loudspeakers*. CDCM Computer Music Series Vol 8: Compositions by Jonathon Berger, Chris Chafe, David Jaffe, Dexter Morrill, Allan Schindler. CD Recording. Centaur Records, USA. CRC 2091.

Technical Keywords:

Acoustic Instruments

Sampled instruments

Sample manipulation

Synthetic timbres

Tuning timbres to a specific scale

Details:

loudspeakers to replace the missing members of the quartet

uses DMX-1000 to synthesise timbres and DX-7 to process recorded string sounds

three movements

each movement uses a different rhythmic approach but all have underlying pulse

My Thoughts:

at times the music sounded undirected and aimless but

underlying sense of pulse carried it along, but whenever the pulse died out it was lost

the textures were often too sparse to provide much interest in themselves.

The music became tedious very quickly as there was not sufficient variety or evolution.

Motz, W. (1982). *sotto pressione: for 2 oboes and computer sounds*. Computer Music Currents 10. CD Recording. Wergo, Mainz, W.Germany. WER 2030-2.

Technical Keywords

Acoustic instruments
Extended instrumental techniques
FM Synthesis
Sampled instrument
Synthesised Instrumental timbres
Tuning timbres to a specific scale
Additive Synthesis

Details:

means 'under pressure' and includes political as well as private meanings
wanted the computer part to sound alive
used Music V program
sampling rate of 10kHz

My Thoughts:

striking opening by using really unusual synthetic sound (nearly like ducks quacking)
very strident timbres
if it weren't for the pure oboe tones coming through sometimes
it would be really unpleasant, it was not restful music.
well researched piece
and the unity of the sound world was really interesting

Nelson, G. L. (1988). *Fractal Mountains: for MIDI-horn*. Computer Music Currents 10. CD Recording. Wergo, Mainz, W.Germany. WER 2030-2.

Technical Keywords

Fractal/chaos creation of melodic contours
Tuning timbres to a specific scale
Interactive performance
Algorithmic composition (of some elements)

Details:

used MIDI-Horn, and DX7 synthesiser
interactive program is MOXC

My Thoughts:

sound events were completely unpredictable and incoherent
low sounds were really muddy timbres
the music was completely disconnected and aimless, without anything to provide musical focus.
there was no apparent movement in the work until about 2 mins before the end
when it got quite frantic with a lot of activity.
Overall, this work was musically tedious.

Oliveros, P. (1988). *Lion's Tale: for digital sampler*. CDCM Computer Music Series Vol 7: Compositions by Neil B. Rolnick, Pauline Oliveros, Julie Kabat, Barton McLean, Joel Chadabe. CD Recording. Centaur Records, USA. CRC 2047.

Technical Keywords:

Algorithmic composition
Sample manipulation
Sampled instruments

Details:

uses only Gamelan sounds
polymetric and polyrhythmic
patterns change at every performance

My Thoughts:

bell sounds are beautiful
rapid notes and rhythms repeating
clearly differentiated voices in pitch space
music is evolutionary as the gestures overlap and grow out of each other
music is lively and is interesting much of the time, although perhaps a bit long

Oppenheim, D. V. (1987). *Round the Corners of Purgatory*. Computer Music Currents 1. CD Recording. Wergo, Mainz, W.Germany. WER 2021-50.

Technical Keywords:

Effects (digital)
Phase shifting
Sample manipulation
Sampled natural sounds
Spacialisation
Spectral manipulation
Tape loops
Ring Modulation

Details:

sampled sounds recorded from pipes and poles, sequenced tightly

My Thoughts:

In the second movement, the rapidly repeating sounds and the way they moved around the pitch space gave a sense of movement, although not really a sense of progression. the slow parts with continuous noise were gentle and evocative, but pretty ordinary use of gliding tones, however it was unusually restful for music using these types of timbres.

However the work did not sustain interest for more than a short time, and there was no apparent reason why these sounds had been used, as they rarely seemed to relate to the title.

Petersen, T. L. (1978). *Digital Tantra 1. Computer Music Currents 7*. CD Recording. Wergo Mainz, W.Germany. WER 2027-2.

Technical Keywords

Synthesised voice
Algorithmic composition (of some elements)
Linear predictive coding

Details:

experiments with various speech synthesis models: formants, homophonic, linear predictive modelling

My Thoughts:

gentle and soft.
each event is clearly audible, and lasts for a few seconds,
thin texture which is also quite nice
arhythmic
at times use of LorR speaker to project a sound: also clear.
While the timbres are pleasant to the ear, the music unfolds too slowly and the actual events seem rather arbitrary, so the work seems aimless and undirected.

Piekarski, J. (1991). *Dreamfile. CDCM Computer Music Series Vol 9: ...musics, metaphors, machines...* CD Recording. Centaur Records, USA. CRC 2078.

Technical Keywords:

Sample manipulation
Sampled natural sounds
Synthesised voices
Synthetic timbres
Tuning timbres to a specific scale

Details:

uses dreams as inspiration for sonic imagery
used sampler, synthesisers and computer

My Thoughts:

sectional
vowel sounds ambiguous as to whether synthetic or real
non the less they gave a kind of melodic impetus to this work
interesting mix of timbres articulated in very different ways
to produce a variety of sound events
regular bell tinkling gave it a forward momentum
evocative
the music sustained interest throughout.

Rai, T. (1986). *Five Inventions Accompanied by Computers: for clarinet, cello, piano, and computers*. Computer Music Currents 8. CD Recording. Wergo, Mainz, W.Germany. WER 2028-2.

Technical Keywords:

Synthetic timbres
Acoustic Instruments
Sampled instruments
Real time processing of instrumental sound
Interactive performance

Details:

in 5 movements

My Thoughts:

each movement was between 2 and 4 minutes long apparently arhythmic, but with a lot of energy in the opening
the synthetic timbres were really clear and different than the instrumental sounds, the individual sounds were allowed to stand alone and be heard through a very clear and open texture
really interesting sounds, even from the acoustic instruments
instrumental sounds dominate, but are not strident or dissonant
the unusual sounds, quite staccato and clear maintained the interest, although the music itself seemed aimless and unfocussed.

Reich, S. (1965). *It's Gonna Rain*. Steve Reich Early Works. CD Recording. Electra/Asylum/Nonesuch Records, USA. 979 169-2.

Technical Keywords

Sampled voice
Tape loops
Phase shifting

Details:

the piece is created by using first two, and then up to 8 tape loops of the speaker's voice which go out of phase with each other and sometimes move back into unison with each other, and sometimes result in controlled chaos.

My Thoughts:

opens with enough text to give a context to the words used for the loops, and then uses different bits of it to make different loops, which fade in and out of each other, so not always the same loop playing at the same time.
speed again keeps the interest and how the sounds come out of the words provides a slowly changing variety to the sound which is great. and started to make new words by themselves which repeated over and over and gave new meanings (such as 'maybe' formed out of two phonemes).

the sudden stop after the first section was a good place to conclude the work, because the second section simply repeated the ideas of the first, and added nothing new, even though it was using a different part of the text.

Reich, S. (1966). *Come Out*. Steve Reich Early Works. CD Recording. Electra/Asylum/Nonesuch Records, USA. 979 169-2.

Technical Keywords:

Sampled voice
Tape loops
Phase shifting

Details:

the piece is created by using first two, and then up to 8 tape loops of the speaker's voice which go out of phase with each other and sometimes move back into unison with each other, and sometimes result in controlled chaos.

From liner notes: "By using recorded speech the speech-melody and meaning are presented as they naturally occur. By not altering pitch or timbre, the original emotional power is maintained. Melody and meaning are intensified through repetition and rhythm. Speech has its own rhythm which cannot be replicated in typical musical settings, except with constantly changing meters. These pieces are another way of making vocal music"

My Thoughts:

opens with complete text
mesmerising and the two words start to lose meaning and the sounds become the most significant thing, and then even the phonemes disappear, and turn into percussive like sounds generating rhythms, and starts to sound really electronic as the tape speeds are all slowed down and pitch drops.
This work sustains interest throughout both from the point of view of hearing the effects of the generative process, and the actual musical evolution of the piece itself.

Reich, S. (1966). *Piano Phase*. Steve Reich Early Works. CD Recording. Electra/Asylum/Nonesuch Records, USA. 979 169-2.

Technical Keywords:

Acoustic instruments
Phase shifting

Details:

Two pianists use the same score, but one changes tempo to get slightly out of phase with the other which continues until they get back together and then move onto the next section and repeat the process.

From liner notes: The performers must listen carefully, the score is simple and can be memorised. Everything is worked out, yet the performers are deeply immersed in the moment of performance and the production of the sound.

My Thoughts:

The pitch in and above the staff in the treble clef, means the sound is clear, and the speed of the fragment means there is never a quiet moment, it has a lot of movement, which sort of keeps the attention, and is sometimes quite mesmerising but small things happen which kind of call the attention back again. eg a sudden increase in tempo of one of the parts.

However, overall it became too tedious and repetitive of the underlying idea, without enough variety, after the first ten minutes.

Reich, S. (1972). *Clapping Music*. Steve Reich Early Works. CD Recording. Electra/Asylum/Nonesuch Records, USA. 979 169-2.

Technical Keywords:

Body Percussion

Phase shifting

Details:

Two musicians use the same rhythmic fragment. One repeats it over and over, while the second changes at predetermined times to get one or more beats out of phase with the original fragment, thus we cannot hear that the second one is playing the same pattern as the first but starting in a different place.

My Thoughts:

The rhythm moved around sometimes synchronous events which were syncopated, and then hocketed, which generated musical interest. The tempo made it alive as well, while the repetition of some beats made it restful at moments, letting the ear rest from the constant stimulation. Overall it was quite frenetic and tiring, through the continual variety and introduction of new rhythms.

Reynolds, R. (1986). *The Vanity of Words: for computer processed vocal sounds*. Computer Music Currents 4. CD Recording. Wergo, Mainz, W.Germany. WER 2024-50.

Technical Keywords:

Actual voices

Effects (phase vocoding)

Text excerpts

Spacialisation

Sample manipulation

Details:

uses taped voice to create everything in the work.

My Thoughts:

the spacialisation (in this case the panning) didn't make that much difference on my computer speakers.
recognisable real world sounds provided a point of reference for the listener, but it was a bit disconnected and undirected and unfocused musically
the text itself didn't have intrinsic coherence, and this was made more difficult as the voices were too quiet for most of the first half, so there was not much point in listening intently.
The second half was audible, but still was incoherent and musically unfocussed.

Risset, J.-C. (1968). *Computer Suite from Little Boy. Selections*. CD Recording. Wergo, Mainz, W.Germany. WER 2013-50.

Technical Keywords:

Narrative structure
Synthetic timbres
Synthesised Instrumental timbres
Synthesised natural sounds
Shepard tones
Spectral evolution

Details:

incidental music for play about mental health of bomber pilot.
in three movements.

My Thoughts:

the swirling around of the sounds fitted the dreamlike unconscious of the hero
the synthetic jazz band was amazing in its realism
as a soundscape this worked well because of the music's narrative and evocative qualities, which gave the music focus.
this work sustained interest for its short duration

Risset, J.-C. (1979). *Songes. Selections*. CD Recording. Wergo, Mainz, W.Germany. WER 2013-50.

Technical Keywords:

Morphing timbres
Partials of sound used to generate chords
Sampled instruments
Shepard tones
Spacialisation
Synthesised bells
Synthesised Instrumental timbres
Synthetic timbres

My Thoughts:

Rich timbres of bells and other synthesised sounds
Music had flow and progression from one part to another,
Sustained interest for the entire duration, by the changes slowly evolving out of each other.

Risset, J.-C. (1982). *Passages II-III. Selections*. CD Recording. Wergo, Mainz, W.Germany. WER 2013-50.

Technical Keywords:

Acoustic Instrument
Synthetic timbres

My Thoughts:

II: Very nice modern flute part, but the synthesised accompaniment seemed artificial, unpredictable and unrelated to flute part. The synthetic sounds varied from white noise to bells. Although bell sounds are nice, it all seemed rather arbitrary.

III: Rhythmic unison between flute and synthetic drum was great beginning, but changed too suddenly into the dreamy where everything swirled around ephemerally. Very strongly contrasting intro with the rest of the piece.

Risset, J.-C. (1983). *L'autre face: for soprano and computer generated tape*. Computer Music Currents 7. CD Recording. Wergo, Mainz, W.Germany. WER 2027-2.

Technical Keywords:

Improvisation by performer
Extended vocal techniques
Text complete
Actual voice
Sample manipulation
Sampled instruments
Synthetic timbres
Synthesised voice

Details:

synthesised with Music V program

My Thoughts:

vocalise, with voice as main thing, the synthetic sounds are minimal and soft.
Gentle, pleasant to the ear, but unfolds too slowly
perhaps if I could understand the text, and the notes give no indication, so musically this work quickly became tedious because there were no clues as to its meaning.

Risset, J.-C. (1984/5). *Sud. Selections*. CD Recording. Wergo, Mainz, W.Germany.
WER 2013-50.

Technical Keywords:

Morphing dynamic envelopes
Sampled natural sounds
Sample manipulation
Spacialisation
Synthetic timbres
Tuning samples to a specific scale

Details:

Three movements.

I: Opens with samples of natural sea sounds which became a bit tedious as they morphed, then a strongly contrasting section with bell sounds growing and decaying which was lovely because sounded organic, with movement and rich organic timbres, except for the really strong opening contrast, which then blended into the final section where the morphed natural sounds kind of imitated the movement generated in the second section.

II: Where the synthesised sounds take on the dynamic and rhythmic shapes of the natural sounds, so sound for example like wave sculptures of white sound. Interesting timbres and sound events which sustained some interest because of the idea, but somehow the work itself did not contain enough structural or evolutionary interest.

III: Opens with melding of natural and synthetic sounds, which was nice then purely synthetic sounds flow because of movements in pitch and dynamic levels, when natural sounds occur they are like interruptions to the flow, then morphed bird song comes in and also flows.

Some sounds like bent triangles, rich spectra, but out of tune and no bass.

Rogers, R. (1990). *Cenotaph*. CDCM Computer Music Series Vol 9: ...musics, metaphors, machines... CD Recording. Centaur Records, USA. CRC 2078.

Technical Keywords:

Text excerpts
Synthesised voices
Morphing timbres
Sampled voices

Details:

in memory of astronauts on Challenger

three movements

synthetic timbres are also derived from the vocal synthesis

My Thoughts:

a-rhythmic with lots of gliding tones
some sounded like vowel sounds
many were just heavy and glum
a bit relentless but evocative of the event and the finality of death

however the work was too long, simply repeating the initial ideas until they became tedious

Rolnick, N. B. (1987). *A Robert Johnson Sampler: for computer music performance system*. CDCM Computer Music Series Vol 7: Compositions by Neil B. Rolnick, Pauline Oliveros, Julie Kabat, Barton McLean, Joel Chadabe. CD Recording. Centaur Records, USA. CRC 2047.

Technical Keywords:

Effects (digital)
Sample manipulation
Sampled instruments
Real time processing of instrumental sound

Details:

samples sounds from another recording
manipulated and processed in real time

My Thoughts:

regular repeating events with discrete timbres
and rhythms give the work momentum
it starts to lose energy but is saved by
the introduction of the vocal sounds about 3/4s of the way through
then reverts to odd sounding blues for finale
Interest is sustained throughout the work because of the way new events refer to the
earlier music, and the unfolding is fast enough, while the rhythm provides a continuous
point of reference.

Rolnick, N. B. (1988). *Vocal Chords: for voice and digital processors*. CDCM
Computer Music Series Vol 7: Compositions by Neil B. Rolnick, Pauline
Oliveros, Julie Kabat, Barton McLean, Joel Chadabe. CD Recording. Centaur
Records, USA. CRC 2047.

Technical Keywords:

Effects (digital)
Improvisation by performer
Real time processing of vocal sound
Sample manipulation
Sampled voice

Details:

uses only vocal sounds
sampled and processed in real time using effects processor

My Thoughts:

the blues gestures and authentic vocalise gave the music immediate interest
rhythms and repeated gestures provide coherence.
texture is often more than one vocal line but also changes
sectional, each section ends with severe processing
each section starts again in a similar style until concludes with synthetic sounds
music is lively and engaging, and sustains interest.

Rolnick, N. (1985). *What is the Use? for computer performance system*. CDCM Computer Music Series Vol 2: Compositions by Richard Teitelbaum, Martin Bresnick, Neil B Rolnick, Rick Baitz, Scott Lindroth. CD Recording. Centaur Records, USA. CRC 2039.

Technical Keywords:

Acoustic instruments
Actual voice
Effects (digital)
Extension of instrumental possibilities through computer part
Real time processing of instrumental sound
Sampled instruments
Sampled voice
Text excerpts
Synthetic timbres

Details:

real time performance and computer effects

My Thoughts:

the clear spoken voice part at the beginning is engaging
then the rhythmic part kept it going, dancelike but became really macabre and bizarre, increasingly incoherent,
however, interest was revived by the insistent tom tom beats getting faster which then morphed back into the dance groove
this music was continually engaging, continually evolving sufficiently to sustain interest throughout the work.

Rosenboom, D. (1966). *A Precipice in Time*. CDCM Computer Music Series Vol 10: The Virtuoso in the Computer Age--1. CD Recording. Centaur Records, USA. CRC 2110.

Technical Keywords:

Acoustic Instruments
Improvisation by performer
Interactive performance
Sampled instruments
Synthetic timbres
Synthesised Instrumental timbres

Details:

large percussion set up with a number of groupings
jazz trio
used 12 tone magic square for pitches and temporal groupings of events
sampling and resynthesis with Csound

My Thoughts:

opening gesture of loud crashes was certainly attention grabbing
sometimes sounded unfocussed and directionless
the large variety of timbres and gestures occasionally generated interest in themselves
and there was much variation in dynamics and texture
events seemed to evolve out of other things
the jazzy instrumental sounds gave a continuous recognisable point of reference for the listener.
Overall the work was like a strangely distorted jazz track, which meant that some of the time it was interesting and coherent and some of the time it seemed a bit vague and directionless.

Rosenboom, D. (1988). *Systems of Judgement*. CDCM Computer Music Series Vol 4: Systems of Judgement. CD Recording. Centaur Records, USA. CRC 2077.

Technical Keywords:

Acoustic instruments
Morphing timbres
Narrative structure
Probability used to arrange components of complex synthesised sounds
Real time processing of instrumental sound
Sampled natural sounds
Synthetic timbres

Details:

In 7 movements only 3 are longer than 5 minutes, and these are quite long 22, 8 and 12 mins
composed as dance music
used 3 alternate theories of creation interwoven to create a contrapuntal form

My Thoughts:

different movements had different timbral worlds
some sounded orchestral
some sounded jazzy
all had percussion and synthetic sounds fading in and out
rhythmic patterns fade in and out
clearly delineated timbres provided different voices
some of the recognisable musics were pleasant on the ear
the state of the cosmos swirling was represented by the music being often a bit chaotic and unpredictable
this finally came to a unified sound including synthetic vowel sounds which I suppose represented evolution/arriving
this implied narrative and knowing it had been composed for dance meant that the work had a reason for its evolution, however it was too tiring by the fifth movement., with the continual new sounds and new events, and became overwhelming while simply listening.

Rush, L. (1971/73). *A Little Travelling Music: for keyboard and tape*. Computer Music Currents 2. CD Recording. Wergo, Mainz, W.Germany. WER 2022-50.

Technical Keywords:

Acoustic Instrument
Sampled natural sounds
Spatialisation
Spectral evolution
Synthesised bells
Tuning timbres to a specific scale

Details:

uses MUS10 program computer generated score (algorithmic based on some rules and some randomisation of decisions) played by live ensemble.
7 limit just intonation

My Thoughts:

musically the work seemed undirected and unfocused, with no clear rationale for the occurrence of particular events,
dense sonic texture is continuous throughout, many events occur very rapidly
several distinct voices that weave slow melodies of sorts through the dense repeated accompaniment.
quite minimalist but not the same harmonic movement as glass
gets a bit monotonous
ending with water wave sounds was a restful conclusion to a frenetic piece.
it does have a distinctive sound, which gives this work interest and value.

Saariaho, K. (1984/5). *Jardin Secret-1*. Computer Music Currents 5. CD Recording. Wergo Mainz, W.Germany. WER 2025-2.

Technical Keywords

Synthetic timbres
Spectral evolution
Spectral manipulation

Details:

synthesised using CHANT
idea is gradual interpolation between two points simultaneously on a range of musical and physical parameters. However, each parameter will be varied by a differing amount, and some sudden change is introduced.

My Thoughts:

this way of tying things together although sounds rigorous, did not, in practice, give much audible coherence to the music
overall this piece was musically unfocused

Savouret, A. (1980/81). *Don Quixotte Corporation: A Loud Speaking Melodrama*.
Computer Music Currents 1. CD Recording. Wergo, Mainz, W.Germany.
WER 2021-50.

Technical Keywords:

Actual voices
Acoustic instruments
Sample manipulation
Spectral manipulation
Synthesised bells
Synthetic timbres
Text excerpts
Effects (digital)
Morphing dynamic envelopes
Morphing timbres

Details:

similar to staging a play
giving the most extravagant daydreams an appearance of reality
concentrates on the coexistence of meanings (significations): verbal meanings and the meaning of acoustic images
political commentary on the effects of normalising tv as mass entertainment.

My Thoughts:

A really interesting conceptual idea, but the actual realisation was too long, and the actual events too arbitrary. The music simply sounded chaotic, with no apparent rationale for why particular events occurred when they did.
This music was completely unfocussed and incoherent, without any points of engagement for the listener

Scaletti, C. (1987). *sunSurgeAutomata: realised using the Platypus Digital Processor*.
CDCM Computer Music Series Vol 3: Compositions by Salvatore Martirano.
CD Recording. Centaur Records, USA. CRC 2045.

Technical Keywords:

Algorithmic composition
Synthetic timbres

Details:

uses cellular automata to organise patterns of clicks into pitch and rhythm

My Thoughts:

ultimately she used more than just clicks, and there were several different sorts as well, there were also some vocal sounds
there was some sense of mystery and wonder at where the unfolding was going.
the patterns of the clicks and how they moved around in the pitch space was good
the work was short, and ended with a clear 'boing' which seemed to come from nowhere but worked as a good concluding event

Overall this piece was well structured, sustaining interest throughout the work

Schindler, A. (1984). *Tremor of Night and Day: for Cello and tape*. CDCM Computer Music Series Vol 8: Compositions by Jonathon Berger, Chris Chafe, David Jaffe, Dexter Morrill, Allan Schindler. CD Recording. Centaur Records, USA. CRC 2091.

Technical Keywords:

Acoustic Instrument
Sample manipulation
Synthetic timbres
Sampled natural sounds

Details:

inspired by text about seascape which is always changing but always remaining the same
opening cello gesture recurs throughout with variations

My Thoughts:

synthetic timbres were a bit too edgy at times
bass sounds were too boomy
the cello gesture was quite clear and passionate
at times the organisation of synthetic sounds seemed musically undirected and unfocussed but the sound events themselves were often evocative of the sea or water in timbre and dynamic envelope
the strong gestures in instrumental part tied the work together and gave impetus and direction to the work.

Schottstaedt, W. *Leviathan*. Computer Music Currents 3. CD Recording. Wergo, Mainz W.Germany. WER 2023-50.

Technical Keywords:

Sampled natural sounds
Sample manipulation
Tape loops
Tuning samples to a specific scale

Details:

used computer simply to help with the virtual tape splicing
a concern with form and the idea of music being good to hear.
scathing personal opinion about computer synthetic timbres sounding ugly, lack life, cause fatigue. Ugly timbres impedes the actual music. should be concerned with what the sounds are intended to do, that makes the piece hold together.

What is it about real sound that gives it its richness? It is not steady state spectrum. FM synthesis can come close but computer intensive: requires too many oscillators to reproduce part of one sound

Uses one sound: the mast creaking, and easier to use the sampled sound because the programming required is much huger than using the sampled sound.

disagrees with contemporary notion that a serial (logical score) will guarantee good music.

so writes in extended tonality, extended tunings (microtonal)

which he sees as a political choice which helps to bind together the social group.

the artist should speak the vernacular

dissonance should be resolved, but as the music sees fit.

writing music has nothing to do with self expression, it is not a matter of inventing structures, it is not self therapy, it is not a job, it is only indirectly a social forum, and it is not a science

My Thoughts:

while the original recorded sound was really dramatic and delicious, the actual music was very ominous, and a lot of it was really slow moving and similar, with little evolution in the sound.

overall it was musically uninteresting.

Smalley, D. (1985). *Clarinet Threads: for amplified clarinet and tape*. Computer Music Currents 6. CD Recording. Wergo, Mainz, W.Germany. WER 2026-2.

Technical Keywords

Interactive performance

Acoustic Instrument

Extended instrumental techniques

Sample manipulation

Synthesised natural sounds

Spacialisation

Synthetic timbres

Sampled instrument

Extension of instrumental possibilities through computer part

Details:

written using Cmusic, bass sax is also amplified.

My Thoughts:

quite discrete sounding events,

many of the timbres are now commonplace in computer games, so they have little intrinsic interest to a 21st century listener, which is rather unfortunate as about half way through the piece these sounds dominated

there was no melody, rhythm or anything that actually gives any movement to the piece might as well be getting the sound out of my virtual pinball game as thinking this composer has actively created anything.

This music was tedious, disconnected, undirected and unfocussed.

Smalley, D. (1986). *Wind Chimes*. Computer Music Currents 5. CD Recording. Wergo, Mainz W.Germany. WER 2025-2.

Technical Keywords:

Morphing timbres
Sample manipulation
Sampled natural sounds
Synthesised Instrumental timbres
Synthetic timbres

Details:

uses the initial sounds available from a set of wind chimes, including scraping, and manipulates these sounds in a variety of ways.

My Thoughts:

An idea that didn't really work all that well in terms of music, its synthetic sounds present nothing new in terms of timbre or articulation, the way the music unfolds seems quite undirected and unfocussed, with little apparent connection between sound events. perhaps this is what wind chimes are like.

Stockhausen, K. (1955/56). *Gesang der Junglinge*. LP Recording. Deutsche Grammophon, W.Germany. 138 811 SLPM.

Technical Keywords:

Text excerpts
Morphing timbres
Sampled voices
Sample manipulation
Specialisation
Synthetic timbres
Tuning timbres to a specific scale

My Thoughts:

Swarms of similar sounds (eg vowels or the synthetic minotae) swirling around ie granulation with pitch gliding. Sometimes the grains collide and sound like breaking glass.

some very nice synthetic bass sounds like electric bass guitar. introduced some time after beginning and get more present as the work progresses, but then cut out well before the end.

The piece is evolutionary, however the introduction of each sound event seeming to occur out of nowhere quite unpredictably. The sounds often overlap and move around each other.

The fact that particular sound types last for some time and have movement within each sound helps to blend the piece together, as the ear has a bit of time to experience each item before the next occurs. Also each sound recurs so each one begins to sound a bit familiar, however the variety and the structure of the work make comprehension somewhat difficult, so repeated listenings are necessary.

Stockhausen, K. (1960). *Kontakte*. LP Recording. Deutsche Grammophon, W.Germany. 138 811 SLPM.

Technical Keywords:

Acoustic instruments
Effects (echo)
Morphing timbres
Spacialisation
Synthetic timbres

Details:

Two movements.

My Thoughts:

In some places the acoustic instruments and the synthetic sounds are indistinguishable as they overlap in articulated shape and timbre quite well. This contrasts with a number of clearly synthetic sounds with quite complex timbres and of long duration, however many of the timbres are now commonplace in computer games, so they have little intrinsic interest to a 21st century listener.

I: This movement introduces a variety of timbres which are instrument like (except piano does not make much of an apparent entrance except for one harmonic chord), and some of the complex sythetic sounds.

II: This movement uses mostly synthetic timbres with some instrumental interludes, and some new longer synthetic sounds which fold through as another layer at times.

However the overriding effect as the movement unfolds is the sound of of someone playing a computer game, as the complex synthesised sounds predominate in volume and quantity, with sort of unpredictability of events, even though many are repeated at various times.

Musically and compositionally, it is hard (as a 21st century listener) to take this work seriously, as this type of soundscape is often created by accident through the playing of computer games.

Stroppa, M. (1982/4). *Traiettorie: for piano and computer-synthesised tape*. Computer Music Currents 10. CD Recording. Wergo, Mainz, W.Germany. WER 2030-2.

Technical Keywords:

Acoustic Instrument
Extension of instrumental possibilities through computer part
Partials of sound used to generate chords
Sampled instrument
Spacialisation
Synthetic timbres
Tuning timbres to a specific scale

Details:

means 'trajectory' and is in three movements of contrasting directions
used Music V and several thousand short sound files which were mixed to provide synthetic orchestration

My Thoughts:

The first movement was sounded chaotic and undirected,
the second movement slowly unfolded with the piano gestures being varied, which give this movement some coherence

this extended to third movement and the regularity of events by about half way through made for more interesting listening.

The music seems to rely on the volume of sound files, huge length of program to impress, rather than anything musical

It was not dissonant and the piano sounds gave some comfortable familiarity to the listener, yet overall, musically this work is incoherent, disconnected, undirected and unfocused.

Teitelbaum, R. (1983). *Run Some By You: for one human-played and two computer-played acoustic pianos*. Computer Music Currents 8. CD Recording. Wergo, Mainz, W.Germany. WER 2028-2.

Technical Keywords:

Acoustic Instruments

Real time processing of instrumental sound

Interactive performance

Tape loops

Effects (delay)

Details:

uses the Digital Piano System (which he invented)

a single pianist plays, their events are picked up, transformed and fed back to two other player pianos.

no synthetic or sampled sounds

My Thoughts:

very dense texture

cross rhythms with a lot of energy

not dissonant, and sounded like a virtuosic performance

the piano sounds are quite rich and interesting,

and because a lot of it was in the higher registers, most of the sounds events were clearly audible.

However, it is structurally disconnected, undirected and unfocussed instrumental music, which quickly became too monotonous, and relentless, without enough evolution and variety in the texture.

Teitelbaum, R. (1987). *Golem 1: for computer music performance system*. CDCM Computer Music Series Vol 2: Compositions by Richard Teitelbaum, Martin Bresnick, Neil B Rolnick, Rick Baitz, Scott Lindroth. CD Recording. Centaur Records, USA. CRC 2039.

Technical Keywords:

Narrative structure
Sample manipulation
Sampled natural sounds
Sampled voices
Synthesised voices
Synthesised Instrumental timbres

Details:

for two MIDI systems
evolution of artificial intelligence from primordial swamp
commentary on conservative political era in which we currently live

My Thoughts:

the beginning of this piece was aurally difficult because it was too slow to start and then too boomy without enough definition of the sound events.
the vaguely narrative structure and the intent of the music gave a slight point of reference to the music
the discrete higher pitched sounds were pleasant on the ear,
and the interlocking event patterns were quite fast, which kept up momentum
but musically it took too long to evolve, so that by 12 minutes the music had lost interest and had become tedious.

Teruggi, D. (1985). *E Così Via: for piano and tape*. Computer Music Currents 8. CD Recording. Wergo, Mainz, W.Germany. WER 2028-2.

Technical Keywords:

Acoustic Instrument
Effects (delay)
Effects (digital)
Real time processing of instrumental sound
Sample manipulation
Sampled instrument
Tape loops

Details:

in 3 movements
uses SYTER real time sound processor

My Thoughts:

strongly rhythmic sections with a lot of energy in the opening
the synthetic timbres were really clear and different than the instrumental timbres,
instrumental sounds dominate
not very dissonant
the individual sounds were allowed to stand alone and be heard through the clear texture
some synthetic timbres were very deep and muddy
and the synthetic sounds really appeared disconnected and aimless, which made the
work seem unfocused
the vitality of the piano part gave the work impetus
each movement was between 2 and 4 minutes long
Overall the work was quite interesting and engaging.

Tipei, S. (1986). *Cuniculi, for five tubas*. CDCM Computer Music Series Vol 3: Compositions by Salvatore Martirano. CD Recording. Centaur Records, USA. CRC 2045.

Technical Keywords:

Algorithmic composition (of some elements)
Acoustic Instruments

Details:

used sieves (logic operators to select elements out of a pool of possibilities) to produce rhythmic patterns and as orchestration constraints.

My Thoughts:

strangely ugly beginning where the sound was too low pitched and soft
sounded muddy and chaotic
presumably the work was structured around the concept of growing from nothing to something
the slow evolution and sound made the music slightly meditative, and structurally it was quite interesting, leaving the listener impatient for the occurrence of each new event.

Vaggione, H. (1985). *Thema*. Computer Music Currents 6. CD Recording. Wergo, Mainz W.Germany. WER 2026-2.

Technical Keywords:

Acoustic Instrument
Extended instrumental techniques
Sample manipulation
Sampled instrument
Extension of instrumental possibilities through computer part

Details:

written using Cmusic, bass sax is also amplified.

My Thoughts:

quite a lot of activity with quite discrete sounding events,
which arouses the curiosity and engages the listener,
quite rhythmic in swarms of sounds
opening concentrates on chiff, key clicks and hollow tube effects.
but this section ultimately was too long without much significant change
another section introduced the idea of breathing and the section where the sound slowly
grew out of silence was really engaging.
Overall, it was just a bit too long in some places, but really embodied some interesting
ideas and contrasting sounds making it musically interesting.

Varese, E. *Ameriques (full orchestra with added percussion)*. CD Recording. Sony
Classical, USA. SMK 45 844.

Technical Keywords:

Acoustic Instruments

Details:

not purely geographical reference in title, but symbolic of discoveries: new worlds
motivic structure is personal
opening flute figure develops by a characteristic (to Varese) process of successive
reiterations, interrupted by violent orchestral interjections.
cross cutting and setting blocks of musical material against one another.
percussion is a distinct voice in the music

My Thoughts:

Metronomic introduction,
The melodic motifs repeated give a sense of continuity
mostly pleasant sounds with occasional tutti chord dissonant crashes
then sirens start again-although soft still present/clearly audible and a bit freaky
then pandemonium breaks out, which eventually calms down and the texture thins out,
then more harmonious full orchestra
which goes to long violin tremolo over percussion rhythms
one thing is always leading onto the next
the interruptions/eruptions are the beginning of a new section that evolves out of the
sound of the eruption: by number of instruments thinning in texture, but some notes
repeat which provides continuity and flow in that section
sirens come in and out- sounds a bit eerie
the piece starts pleasant but becomes ugly and it gets relentless with the huge dissonant
chords occurring so often and a bit too predictably so got tedious in places, it often
seemed like it was ending and then kept going on and on
which had the effect of being squashed by an unstoppable relentless mass.
Despite the program notes the work had a descriptive quality, like an aural photograph
of New York, capturing particular events which generally gave the music a clear point
of reference, although it did not evolve sufficiently to sustain interest for its entire
duration

Varese, E. *Integrales (instrumental ensemble and percussion)*. CD Recording. Sony Classical, USA. SMK 45 844.

Technical Keywords:

Acoustic Instruments

Details:

varied repetition of opening motif, unequal metrical units,
same thematic material then repeated in bass of group
new figure in 3rd section
then percussion, then solo oboe
return to some melody from section three.
continous timbral and textural change from one segment to the next.
music moves from block to block in typical Varese style

My Thoughts:

nice opening typical melody with leaps and recurring pitches
fragments in all three voices (melody, countermelody, percussion) recurr so
the music moves along
brass sounds too strident and unpleasant after the opening
recurring alarm sounds and high pitched chords sounds enervating and alarming
these timbres create a work that is aurally unpleasant.

Varese, E. *Ionisation (for 13 percussionists)*. CD Recording. Sony Classical, USA.
SMK 45 844.

Technical Keywords:

Acoustic Instruments

Details:

37 Percussion, 3 keyboard instruments.
Change in sonority is demarcation of form.
Dynamics are an integral part of the composition
polyrhythmic and ongoingly rhythmic
sense of progress and development from first bar to last.

My Thoughts:

Siren in background sounds really forbidding and gloomy,
Percussion in background in rhythmic patterns-only a few loud crashes
mostly gentle but urging along-
gives music movement and direction.

Varese, E. *Octandre (instrumental ensemble)*. CD Recording. Sony Classical, USA.
SMK 45 844.

Technical Keywords:

Acoustic Instruments

Details:

wind ensemble with tmpt and double bass

traditional division into movements

material of third movement is derived from earlier in the work.

music moves from block to block in typical Varese style

My Thoughts:

oboe solo opens with dissonant, atonal harmonies

repeated motifs with variations

but the entries and events of other instruments sounded chaotic and erratic without any o
reason for specific events to have happened

Overall the work was uncomfortably dissonant, and its brevity was its saving grace,
since it was so structurally undirected.

Varese, E. (1922). *Offrandes (soprano and instrumental ensemble)*. CD Recording. Sony Classical, USA. SMK 45 844.

Technical Keywords:

Acoustic Instrument
Actual voice

Details:

soprano and chamber orchestra
two short songs

My Thoughts:

I: melodies slowly unfold
couldn't understand the text
sounded like it must have been a very sad song
II: voice blended in with instruments leaving them indistinguishable from each other.
Musically this work did not seem to have any coherence, perhaps the text may give it meaning.

Varese, E. (1927). *Arcana (full orchestra with added percussion)*. CD Recording. Sony Classical, USA. SMK 45 844.

Technical Keywords:

Acoustic Instruments

Details:

based on a fixed idea of 11 notes which returns in a hundred guises from jazzy syncopations to marching tunes to Stravinsky
immense expansion of the passacaglia form: the development of a basic idea through melodic, rhythmic and instrumental transmutation.

My Thoughts:

insistent opening with irregular rhythms and brass notes, which sounds ominous
repetition of ideas as little fragments repeat with variation in tempo, timbre, melody etc
full orchestration leads one on but eventually became relentless with the loud drum beats, full chords and blaring brass
and the repetition became tedious, except for one tutti chord near the end which was a harmonious very fast arpeggiation as the full orchestral colour unfolded with the piccs finally on top
too long without any real shape or sense of direction

Varese, E. (1936). *Density 21.5 for solo flute*. CD Recording. Sony Classical, USA. SMK 45 844.

Technical Keywords:

Acoustic Instrument

Details:

use of repetition, varied and modified and expanded motif, rhythmic and melodic design which includes use of extreme registers, repeated intervals in various sections each of which focusses on a diff. interval

My Thoughts:

repeated melodic motifs which gradually extend to new regions
legato
only used 2 or 3 pitches at any one time
repeatedly got to point of repose and kept on going past it
this idea was repeated to often and ultimately lost its interest.

Viñao, A. (1987). *Toccata del Maga*. Computer Music Currents 11. CD Recording. Wergo Mainz, W.Germany. WER 2031-2.

Technical Keywords:

Morphing rhythms
Tuning timbres to a specific scale
Sampled instruments
Acoustic Instruments
Sample manipulation

Details:

specifically concerned with pulse and rhythm and how these are generated by repetition of fragments and superposition of rhythms and variation
used two Yamaha synthesisers and two Sony tape recorders

My Thoughts:

great opening gestures wild and romantic, which gave great impetus.
lost the impulse as it got into
small discrete repeated events which seemed to be musically undirected and unfocussed
the full chords recurred which gave a nice full sound
the string bass was nice as distinct round sound, but
got too much with the repetition, and not enough evolution
elements of the work such as the actual string sounds, and the melodic fragments and other gestures provided some interest, but it was not enough, because there was not always enough sense of why particular things were happening in the music, so it seemed somewhat incoherent.

Waschka, R. (1989). *A Noite, Po'rem, Rangeu E Quebrou (At Night However It Creaks and Breaks)*. CDCM Computer Music Series Vol 9: ...musics, metaphors, machines... CD Recording. Centaur Records, USA. CRC 2078.

Technical Keywords:

Interactive performance

Algorithmic composition (of some elements)

Acoustic Instrument

Details:

for contrabass and tape

performers part is generated by computer in real time

tape part is algorithmic based on performers part

My Thoughts:

clarity of timbres made a number of separate voices

strong contrast between bass which sounded ugly and boomy, with an erratic and unpredictable character, and the rapid high pitched synthetic sounds swarming all over the place, through small pitch variation.

these sounds carried the music forward, but overall it seemed to lack a clear structure and goal.

Warren, A. (1987). *Contraption*. CDCM Computer Music Series Volume 5: Music from the Winham Laboratory at Princeton University. CD Recording. Centaur Records, USA. CRC 2076.

Technical Keywords:

Acoustic instruments

Effects (digital)

Sampled instruments

Sampled voice

Synthetic timbres

Details:

for computer tape and live drumset

My Thoughts:

Impetus provided by the pleasant sounding timbres and the interacting rhythms active quite high pitched and realistic sounds, even the synthetic sounds had rhythm.

This piece of music is in the semi rock tradition, pleasant but unremarkable.

Wessel, D. (1977). *Antony*. Computer Music Currents 10. CD Recording. Wergo, Mainz W.Germany. WER 2030-2.

Technical Keywords:

Synthetic timbres
Additive Synthesis
Tuning timbres to a specific scale

Details:

synthesised using a Digital oscillator bank of 256 independent oscillators.

My Thoughts:

striking opening by the piece starting from nothing, but in fact the opening silence for 40secs leaves one wondering whats happening for quite a while.
it is one long continous sound which changes over time by the addition and subtraction of frequencies and timbres
mostly sounds like one long orchestral sustained chord (so closely matched pitches)
but then occassionally a choral sound, or a brass sound, would emerge for a short while out of the overall mass
mostly quite harmonious but elements emerge which are more strident
sometimes verges on white noise
the focus of listening being on the small changes kept the interest going to some extent, but sometimes the slow evolution of the work made concentration and focus difficult.

White, F. (1985). *Ogni pensiero vola*. Computer Music Currents 7. CD Recording. Wergo Mainz, W.Germany. WER 2027-2.

Technical Keywords:

Linear predictive coding
Text excerpts
Synthetic timbres
Synthesised voice
Actual voice

Details:

title means "every thought flies"
synthesised with Music 11 program

My Thoughts:

Gentle, with simple textures
arhythmic
timbres pleasant to the ear
but is unfolding too slowly to sustain interest and simply became tedious

White, F. (1987). *Still Life with Pianos*. CDCM Computer Music Series Volume 5: Music from the Winham Laboratory at Princeton University. CD Recording. Centaur Records, USA. CRC 2076.

Technical Keywords:

Acoustic Instrument
Sample manipulation
Sampled instrument
Effects (phase vocoding)
Spectral manipulation

Details:

piano soloist who plays original material for samples and extensions of this material, while computer part distorts samples in time and spectrum. Uses Csound and Cmix software.

My Thoughts:

nice clear sounds but the altered sounds were too long and got quite tedious because no rhythm and musically speaking, did not have any clear reason why they were there, so aurally it sounded like piano sounds in clouds of synthetic timbres, some of which were very sombre.

once the initial idea of the synthesised timbres having some intellectual relationship with piano sounds had been established, then the piece could have finished, as the whole piece didn't have much focus or structural direction.

Aurally it seemed like a technique looking for music to be used in.

Winsor, P. (1988). *Dulcimer Dream*. CDCM Computer Music Series Vol 1: Compositions by Larry Austin, Thomas Clark, Jerry Hunt, Phil Winsor. CD Recording. Centaur Records, USA. CRC 2029.

Technical Keywords:

Acoustic Instrument
Algorithmic composition

Details:

for human performed piano from computer generated score

My Thoughts:

minimalist piano music that keeps on circling around itself
this repetition gives it interest

lovely rich chords, nicely placed in the piano registers

sounds were really quite clear most of the time

the rapidity of events overlaid by melodic and harmonic motion gave the music a lot of impetus and variety, with continuity provided by the regular rhythm.

This was a very engaging work.

Winsor, P. (1990). *Anamorphoses: for trumpet ensemble*. CDCM Computer Music Series Vol 9: ...musics, metaphors, machines... CD Recording. Centaur Records, USA. CRC 2078.

Technical Keywords:

Algorithmic composition (of some elements)

Acoustic Instruments

Details:

for amplified trumpets

four movements from 2 to 4 mins in length

each movement focusses on a single idea

computer was used to determine attack times and voicing

My Thoughts:

breavity of movements meant ideas were not overly prolonged

mostly sounded like fanfares, which were quite compelling.

This work sustained quite a lot of interest.

Wishart, T. (1986). *VOX-5*. Computer Music Currents 4. CD Recording. Wergo, Mainz W.Germany. WER 2024-50.

Technical Keywords:

Morphing timbres

Effects (phase vocoding)

Spacialisation

Spectral manipulation

Synthesised voice

Synthetic timbres

Details:

uses the intial vocal sound to morph into many other sound objects.

music based on idea of shiva creating and destroying the world

My Thoughts:

the spacialisation (in this case the panning) was great and really clear

recognisable real world sounds meant there was a point of reference to start with, but

musically it was a bit disconnected and aimless, except that as this is the conceptual idea behind the piece since it is about creation and destruction.

so actually realised the idea in a really clear way to give structure to the piece.

Wolff, C. (1989). *Mayday Materials*. CDCM Computer Music Series Vol 6: Compositions by Jon Appleton, David Evan Jones, Paul Moravec, and Christian Wolff. CD Recording. Centaur Records, USA. CRC 2052.

Technical Keywords:

Sample manipulation

Sampled instruments

Details:

In 9 movements

composed as dance music

alternate meanings of Mayday: lightheartedness and workers of the world day.

used Synclavier II and Roland Synthesiser

My Thoughts:

each movement quite short between 2 and 5 mins

clearly delineated timbres in different pitch spaces provided different voices

strange rhythms that never really seemed to repeat themselves

but sparse texture and odd sound combinations seemed musically undirected and unfocused, without any apparent structural goal.

knowing it was for dance gave it a different context, and the brevity of the work meant that the listener's attention could be maintained.

Wolman, A. (1986). *A Circle in the Fire: for bass clarinet and tape*. Computer Music Currents 6. CD Recording. Wergo, Mainz, W.Germany. WER 2026-2.

Technical Keywords:

Narrative structure

Acoustic Instrument

Extended instrumental timbres

Synthetic timbres

Spectral manipulation

Tuning timbres to a specific scale

Details:

uses a prewritten story for musical structure

and the conclusion is based on a Victoria mass transposed to different keys all the time

My Thoughts:

opening with synth sounds is too long and the atmosphere is full of doom, as the sounds are too full spectrum bass, there is not enough momentum to create interest.

the actual instrument provides a bit of interest when it comes in, which gradually growing as piece continues, as dynamics change in clarinet part, but it is very repetitive and set against the sythetic sounds its all quite static.

The music relies on itself for impetus and engagement, as the the story is unknown, however it certainly does not live up to its promise

even the conclusion doesn't seem to bear any relation to the mass as promised in the notes, although the actual sounds are nice and delicate in this part.

Overall the work is tedious, with very little evolution or structural clarity.

Wyatt, S. A. (1988). *Still Hidden Laughs: for Synclavier and Yamaha Systems*. CDCM Computer Music Series Vol 3: Compositions by Salvatore Martirano. CD Recording. Centaur Records, USA. CRC 2045.

Technical Keywords:

Synthetic timbres

Details:

uses sound masses rather than pitch
and gestures to give shape to the layers

My Thoughts:

each of the different sounds was articulated really clearly in different pitch, timbral and articulation spaces with a lot of space to let each one speak for itself without interference

and the slow unfolding plus the combination of gliding tones from noise and shoals of bells and other staccato sounds made for a sense of mystery and engagement with the music in wondering where the unfolding was going.

Overall it was a little bit slow, but the structure and clearly connected sound events gave a coherently unfolding work.

Yuasa, J. (1984). *Towards "The Midnight Sun" - Homage to Ze-Ami: for piano and quadraphonic computer generated tape*. Computer Music Currents 9. CD Recording. Wergo Mainz, W.Germany. WER 2029-2.

Technical Keywords:

Found objects
Noise generators and filters
Sample manipulation
Sampled natural sounds
Spacialisation
Acoustic Instrument

Details:

spacialisation is an important part of this piece

My Thoughts:

the opening low chords on piano were delicious and rich, while the few notes were allowed to resonate

however the introduction of the noise bands was too abrupt

clear separation between the piano and synthetic sounds

silence after 5 mins could have been a successful conclusion, but instead led into a new section based on high pitches.

Overall the music was too disconnected and aimless, with no apparent reason for particular sound events to occur. Structurally the music was too long and slow with no clear evolution of ideas.

Yuasa, J. (1987). *A Study in White*. Computer Music Currents 7. CD Recording. Wergo, Mainz W.Germany. WER 2027-2.

Technical Keywords:

Sampled voice

Text complete

Effects (phase vocoding)

Noise generators and filters

Additive Synthesis

Spacialisation

Morphing timbres

Sample manipulation

Sampled instrument

Details:

two movements each based on a different short text

My Thoughts:

the synthetic timbres are soft and gentle, pleasant to the ear

the synthetic sounds covered a huge pitch range

simple textures and a slow unfolding,

but the work just manages to maintain interest because the text is just intelligible and gives the work a continual point of reference.

APPENDIX B:

Performances of Works in my folio

When we grow up?

19 May 2005
Hot Chips Laptop Concert
University of Wollongong

Litany for Refugees

26 August 2006
Mark Street Hall, Fitzroy, Melbourne.
“Composition in 60 Seconds” concert
The Boite Winter Music Festival 2006

the goddess lives

The Melbourne International Festival Ringtone Project 2006.
Available for download from www.ringtonesociety.com.au

Sunflowers

2 September 2005
Mark Street Hall, Fitzroy, Melbourne.
“Composing Women” concert
The Boite Winter Music Festival 2005

5 November 2006
St Saviour’s Cathedral, Goulburn
Choral concert
5th Southern Tablelands Music and Arts Festival 2006

Publication details of Works in my folio

Sunflowers

Published in 2005 by Publications by Wirripang, Wollongong
ISMN: M720060 41 5

Sunflowers (for flute trio)

‘a bridge of dreams’ a CD of flute music by Australian composers
Published in 2006 by Publications by Wirripang, Wollongong.

APPENDIX C:

Conference Papers Presented

Composing for Listening

University of Wollongong, Higher Degree Research Conference
27 September 2006

Making Music from Scratch(es)

Fabulous Risk: Australian National Circus Conference, Wollongong
3 December 2006

Towards Making Music from Natural Sounds

Asian Pacific Music Festival and Conference, Wellington NZ
12 February 2007.

COMPOSING FOR LISTENING: **HDR Presentation 27/09/2006**

My music is composed for appreciative listening by another.

It serves to communicate a message or feeling to a potential audience. While this may seem to state the obvious, there are alternate reasons for working in sound. These reasons include self exploration of internal moods and feelings of the composer, or as compositional experiments exploring various ideas in sound, or the techniques to produce and reproduce sound, or the aural and sonic possibilities of new technologies and environments. These latter reasons do not explicitly include audience as part of the compositional equation.

While psycho-acoustics is also concerned with the ways a listener perceives sound, it is a more narrowly defined discipline, which may include music as part of its study. It is however, more concerned with physical issues of sound perception and hearing by the ear and conscious discrimination by the brain. Although there are some overlapping concerns, my ideas are motivated by finding a method for the composition of new music which includes audience appreciation as one of the primary outcomes, as well as the production of a work of art, which can be discussed and valued aesthetically.

The audience problem is compounded by mainstream music analysis being based on examination of the paper score, rather than the aural output. This presents two main issues. Firstly, music which is not written down is not analysed to the same degree or considered to be as significant to music theory as is score based music (Boyle, 1997). This has particularly applied to computer music. Please note that throughout this talk I use the term 'computer music' as a hold all which includes earlier electronic and electro-acoustic works, musique concrete as well as present day works created in the digital domain.

Secondly, a focus on the score as 'the music', in isolation from its realisation in performance, and the context of that presentation of the work, disengages analysis and theory from the aural product (Cook, 1987). Thus the listener, has been omitted from consideration, as an important participant in the musical process.

However, my research and compositional output are concerned with the ways in which the audience can be helped to appreciate new music. Indeed, part of my current project is the composition of acousmatic music, that is recordings, based on the manipulation of naturally occurring sounds, such as frogs or machinery, to be presented in non-traditional venues such as art galleries, on radio, or home sound systems.

There are multiple implications arising from using naturally occurring sounds as the building blocks of musical works. 21st century digital technology offers the means whereby computer music composition techniques can be expanded in new directions to create music which may be used to accompany other instruments and singers, or may simply stand alone. My work aims to explore a number of these possibilities.

Many times I have observed visitors to a gallery or sound sculpture take in a quick impression of a work and move on before they have absorbed any detail from the work. CD and radio listeners often simply use the music as background to their daily life, without much attention to the music itself. In a concert hall, with traditional music, should the listener wish to detach from the music, the usual option is sleep, since mostly the audience is held captive in their seats at least until interval.

Given the difference in focus from concert hall presentation to newer methods of presentation of the work which require active listening participation, how can the audience be facilitated to engage with this music, when the components of the work are also unusual?

I propose that the likelihood of a listener consciously engaging more with the music depends on one or more of a number of factors, such as whether or not they are physically comfortable, and if they understand the intent, and can relate to the content of the work. The model is based on the idea that if too many factors in a musical work are new to the listener, and do not reinforce each other then the listener (unless they are in search of constant new stimulation and experiment) will find it difficult to engage with the music. The experience will not be sufficiently fulfilling for the listener, so they will not attend to the details of the music.

I am developing a model of composer/listener communication using reframed concepts from Information Theory. My model posits that listeners obtain knowledge about a work from a wide variety of sources, including the unusual music they are hearing for the first time. This model can enable discussion and critique of any type of sound work, should it be presented to an audience outside of the composer's studio. This model goes beyond the work of Leonard B. Meyer (Meyer, 1956) and others, such as Lehrdahl and Jackendoff (Bent and Pople, in Groves article on Analysis) which are based on quite similar assumptions to Meyer's work.

By developing a theory of music which can address a broad range of issues, it is possible provide a conceptual bridge between composer and audience. This new theory should then be systematically useful for both composition and analysis. My new theory takes concepts from a relatively new discipline, which has been progressively developed in the latter part of the 20th Century.

This is the 'Mathematical Theory of Communication' developed by Shannon (Shannon, 1948; unknown, 2006) which is concerned with the transmission and detection of information. Thus it has become known as **Information Theory**.

Information Theory is attractive because it is concerned with communication from the relatively objective point of view of the accurate transmission of information, rather than specifically engaging with the subjective experience of composer and listener. It also sidesteps the use of words like 'meaning' and 'language' which, despite their common use, are very hazy in definition when applied to music. However, the original theory was initially developed to discover the maximum amount of data that could be sent over 'noisy' telephone wires that could be correctly interpreted by the receiving device.

Adapting it to a broad contextual theory for music composition and reception of course requires some investigation and adjustment. Firstly it is necessary to examine the context for which it was created. These conditions imply some underlying ideas in the theory which need to be articulated and possibly need to be altered when applied to music. This work has already begun with a summary of theory in musical terms by

Richard Overill in his article on Information Theory in *Groves Dictionary of Music*. He says it is:

“ A theory which seeks to describe, by means of mathematical equations, the behaviour of systems for storing, processing and transmitting information. Here, the term ‘information’ is interpreted broadly as covering ...the signals (aural, visual, and other sensory stimuli) by means of which an individual can perceive their environment or communicate with others” (Overill, 2006)

Meyer’s ideas about listener expectations were also rooted in Information Theory. These earlier theorists have explicitly assumed that the audience is educated in the style of the music to which they are listening. This familiarity permits them to know and react to the breaking of convention within that style for the expressive purposes of the composer. That is, Meyer has essentially assumed that composer and audience begin on the same wavelength about the music.

This position is touched on by James Tenney who says that familiarity with the music is not the main issue, but rather ascribes the changes in perception of contemporary Western art music to its increasing aural complexity (Tenney, 1992:4). For example he suggests that the music has become more difficult to listen to because it is more dissonant. Schoenberg has succinctly summed up the issue “What distinguishes dissonance from consonance...is a greater or lesser degree of comprehensibility” (cited in Tenney, 1992:8).

Although this may explain why many listeners find ‘new’ music challenging, because it falls outside their expectations of ‘music’, it does not help to find new ways of constructing music which can be understood by a general audience. In addition, there are physical issues of presentation which impact on the ability of the listener to take in the work especially when presented outside the concert hall: are seats available? Is the work audible? Is there too much background distraction (other music, people talking)? Is it too loud and overwhelming? Is the ambient climate comfortable for all concerned?

My theory focusses on three main areas in its conceptual design. Firstly, I primarily differ from Meyer. I assume that the audience is uneducated in music, and has no

background knowledge of the style of music being presented. Yet it is clear that the degree of background knowledge the audience can bring to the listening of a new work can make a significant difference to their engagement with it.

Secondly, the theory was elaborated as a mathematical model. However, my intention is to take the concepts as themselves, applying them to musical practices in general, rather than applying the formulae in some algorithmic fashion to specific musical elements, such as pitch, or structure. Consequently, some of the terminology will be adjusted in order to reframe the concepts in a manner more consistent with the way music is discussed and analysed. Together these differences allow a broader application of the concepts of Information Theory than was possible with Meyer's single assumption of an educated audience.

Specific concept terms which have been reframed are

- **Information** in a telegraph system is new data which differs from previous data, becomes in music '**knowledge**' gained as the music unfolds.
- **Data** in a telegraph system are the elements of the signal, become '**details**' of the music like individual notes and phrases, the type of performance venue.
- **Redundancy** in a telegraph system is new data which replicates previous data, becomes '**corroboration**' (to make more certain) in music.
- **Noise** in a telegraph system is interference with the transmission of data, becomes in music '**listener discomfort**' ie the physical preparedness of the listener for the music.

- **Surprisal** in a telegraph system is the arrival of an unexpected data point, which in music is '**unexpectedly new**' or the occurrence of something unexpectedly different.

I find that these different words take the singularly defining aspects of the original concepts, actually enable the concepts to be applied more accurately to an unknown music.

However, my model has a third aspect to it, which also goes beyond Meyer's work. This is the inclusion of the idea that 'knowledge' about the music comes from a variety of sources apart from pre-existing stylistic knowledge. If these sources of knowledge tend to 'corroborate' each other, overcome 'listener discomfort' and the number of 'unexpectedly new' features the listener has to contend with are controlled, then the audience is more likely to engage in the listening experience.

The possible sources of 'knowledge' for a listener of a new work are:

- The presentation style which includes aspects like the performance medium eg concert hall or CD, the physical location of the sound sources eg around audience, or on stage, performance practices eg familiar gestures or with dance or other movement
- Background knowledge the listener brings to the music may include items such as their knowledge of music in general, this specific style, this specific composer, an informative title and instrumentation of the work as well as the composer's intention in writing this work. In some circumstances, this information could be delivered immediately preceeding listening by program notes or a composer's talk. However, when the audience is largely left to their own devices these strategies may not work.
- The actual content of the music: sound sources such as the instrumentation, or the technical equipment being used, elements which clearly refer to extra musical items, such as frog sounds represent themselves as well as all of Nature, as well as the fairy tale princes.

- The actual content of the music: unfolding or structure which include small scale motifs, large scale structure articulated through themes, familiar elements such as typically articulated endings, and textures which assist in the delineation of structure.

These possible sources of ‘knowledge’ will help to overcome possible ‘listener discomfort’ which may interfere with the listener’s ability to engage with the music. ‘Listener discomfort’, may arise for a number of reasons such as the listener’s cultural background, their state of mind, their physical state, their level of comfort in the environment, as well as their individual perception of what sounds are ugly or unpleasant. Consequently, I suggest that it is possible to encourage uneducated listeners to engage with music with which they are unfamiliar by considering these issues as part of the compositional problem. In particular, if one or more of the key elements are unusual, ie ‘unexpectedly new’, then it may be necessary to maintain more traditional aspects of music in the remaining areas of the work. While some may argue that some of these components are beyond the composer’s job description I suggest that contemporary compositional thought agrees with this idea. For instance, Warren Burt, a well known and respected composer has commented:

I have often said that the function of a composer is to not just make the music, but also make the instrument, create the context in which the music (or other creative activity) can take place, train the performers, produce the performance, and document the music in all forms and media afterwards.

All of those are part of "composition" for me. (Burt, 2006)

In conclusion, I have proposed a model of music making which explicitly includes the audience as part of the compositional problem. This model uses concepts from Information Theory as its building blocks. These concepts have been reframed more broadly, and the model uses radically different assumptions about audience capability than have the earlier theorists. As a result, this model is applicable to all new music being presented to a general audience.

REFERENCES

- Bent, Ian D. and Anthony Pople. "Analysis". *Groves Music Online*. ed. L. Macy. (accessed 19/04/2005, 21/04/2005), <<http://www.grovemusic.com>>
- Boyle, David R. (1997). *Musical Analysis of Works for Performers and Electronics-an Alternative Approach*. MA (Hons), University of Wollongong.
- Burt, Warren (2006). Personal Communication to Wendy Suiter. 26/06/2006
- Cook, Nicholas (1987). *A Guide to Music Analysis*. Oxford University Press, Oxford.
- Meyer, Leonard B. (1956). *Emotion and Meaning in Music*. University of Chicago Press, Chicago.
- Overill, Richard E (2006). "Information Theory". *Groves Music Online*. ed. L. Macy. (accessed 06/08/2006), <<http://www.grovemusic.com>>
- Shannon, C.E. (1948). "A Mathematical Theory of Communication." The Bell System Technical Journal July, October, 1948 **27**: 379-423, 623-656.
- Tenney, James (1992). *META/HODOS and META Meta Hodos: A Phenomenology of 20th Century Musical Material and an Approach to the Study of Form*. (2nd Edition), Frog Peak Music, Lebanon, NH.
- unknown (2006). "Information Theory". Bell Laboratories. (accessed 18/05/2006), <<http://www.lucent.com/minds/infotheory>>

Making Music from Scratch(es).

Fabulous Risk Conference Wendy Suiter 2006

I was the inaugural Musical Director of The Performing Older Women's Circus in Melbourne. This paper describes my experiences and approach to making music from its inception, for four performance seasons from March 1995 to 1999.

POW Circus was started by some older women who had been performing with the Women's Circus founded by Donna Jackson. In particular, Jean Taylor was excited about the new experiences she was having and the acrobatic skills she was learning in the Women Circus. She wanted to share the excitement of being a circus performer with other older women. With the encouragement of some others who wanted a taste of the circus life, Jean, in the role of Director, organized a six week project of skills development with a short performance at the end of the time.

I came to POW Circus at this point of conception, originally as a potential musical performer, since I, as had a number of other women, also assumed, that as every circus has music, we would be needed. At the initial meeting, it quickly became evident that they needed a Musical Director. Consequently, as the most experienced musician I took on this role.

The main aim of POW Circus was to show that being an older woman (defined as being over 40) was no barrier to participation in circus skills and performance. This meant challenging ageist assumptions about what is appropriate behaviour for older women, as well as providing a safe and supportive space where the particular needs of older women, for physical safety, and self expression were being specifically met.

Consequently, the circus was open to any woman over 40, regardless of previous experience or physical ability, offering a supportive environment for older women to learn new skills. It became a tradition, that, at the end of each performance, all the participants would run on stage and announce their age. Here are the musicians from the first year's performance.

My philosophy was that the participants should make the music. My role was to facilitate it by teaching them performance skills, manage performance anxiety, challenge their conceptions of the possible, build trust in the group and myself as leader, and to build on any preexisting interest or skills the participants brought with them. And last, but not least, was my own personal task of writing, arranging, rehearsing and producing the music for both the main performance seasons and for small performances the Circus was often called on to do, at conferences concerning aging.

This was the most challenging compositional work I have done ... trying to find interesting sound results from limited materials. It was a challenge to develop new ideas and new ways of implementing them with the movable feast but limited abilities of the participants. However, the initial six week project was a huge success for the participants, and the audiences for our two performances were delighted and enthusiastic supporters.

Those who came to the Showband were from two groups. Firstly, those who had always wanted to play music but had never before had an opportunity to try it out, and this seemed like a safe space. Many of these participants did not play an instrument, feel comfortable singing, or have any experience playing music in a group, let alone follow a conductor. Secondly, there were those who had wanted to be acrobats, but found it was too hard given their disabilities, so they joined the musicians. Consequently, there was a diverse range of skills, and instruments: generally around the beginner level.

Following the success of the initial project, it was decided that the Circus would continue on a more permanent basis, and I remained as the Musical Director for another three annual performances. This paper will elaborate on these themes and explain some of my approaches.

Firstly, I suspect that the participants were a bit shocked to be greeted by a classically trained contemporary art music composer, with little practical knowledge of any other style of music. In general they thought I was a bit odd, but they were obliging, and we explored a

number of ways that contemporary art music has been created in the 20th century, including improvisation, electronics, and chance procedures.

Not only that, but I was very happy to try out some more experimental ideas of what 'music' could be, and how it could be created, and asked them to follow me. For instance, one year the performance theme was Tarot Cards, so we made music using amplified playing cards.

Secondly, I was challenged by the Director's improvisatory approach to the performances, to which rehearsals and the so called 'scripts' provided only a rough guide. Since, like most classically trained musicians, I had been taught to be obsessively perfectionist, I developed a 'Zen-like' approach to the performances, and hoped that, after all our work, that whatever happened was meant to be. It also meant that I tended to choose music that was quite cyclic and extensible, without much discernable contour, so that the music could vary in duration, and stop fairly rapidly without much loss of integrity, depending on what was happening on stage. So we played a lot of music like this.

The third challenge, was the participant's personalities and limited physical abilities. It seemed that the older women drawn to the adventure of the circus were determined individuals long used to acting autonomously and individually. Working together in a group and taking direction from me, the Musical Director, were major challenges, especially when they were partially deaf into the bargain. So there were times when we had a mini circus of our own!

Finding general music teaching materials to use with older adult beginners was also a challenge. Since most beginner student groups are considered to be primary school children, the materials are produced for that mental age. I approached the task in several different ways. I used some of the group composition exercises developed by R Murray Schafer for use in secondary schools. These exercises are designed to open people's ears to the nuances of sound and musical texture.

At the same time we listened to a wide variety of experimental music for timbre and texture. I taught them the rudiments of reading rhythmic notation, and then created minimalist group percussion pieces based on these rhythms. I used the skills of those who could already read music at a minimal level to play melodies I wrote or arranged for them. I am proud to say that over time the practical abilities of the participants improved on a number of dimensions, as you will hear.

So now, to the music itself. The core group primarily consisted of a keyboard player, a beginning clarinet player, a recorder player, all with very basic music reading skills, and others who were completely untrained and came with a motley collection of percussion things. Others came and went including some guitar players, and some flute players. Consequently, the only ubiquitous materials were the voice and percussion.

My initial goals were two fold. Firstly, to provide a group experience where the musical product did not depend on one individual getting it right, and secondly, to provide more variety in timbre and texture than possible if everyone stuck to the few notes they could produce on the instruments they brought with them.

As music reading skills were low, and I am not experienced at teaching music by ear, I concentrated on three approaches. The first approach was improvisation. This is an excerpt from our very first performance using found objects and any instrument any one could use to produce a sound.

I also used theatrical improvisation exercises which I adapted from movement to the sound world. Often I presented a minimal set of elements, directions on the order in which they were to be played, and left the rest to each individual's discretion on where to start, and how long to do it for. As I mentioned previously, predominantly they were not keen on singing. It was even a challenge to get them to speak, but they rose to the occasion, even for the very first performance.

This idea, uses amplified semi-spoken vocalise derived from words appropriate to the circus theme for the year, according to rules I set up to gain the maximum variation in sound. These elements of improvisation gave an opportunity for variety and to allow for individual abilities and tastes in the group. As this was a particular favourite of mine, we did it again four years later.

Since I believe that reading music is a desirable skill in its own right, as my second approach, I taught some basic rhythm notation, which over time, meant that we could start to play some more complex group pieces. The first clip shows some unison percussion

This second group rhythm piece, from a later performance, primarily using sticks tapped on the ground, is more complex.

And thirdly, there was music with simple melodic lines. We began with everyone playing the same melodic line in unison (ideally) on their respective instruments.

However, this second clip several years later shows the instrumentalists playing their independent lines very confidently.

Throughout the six years I was there, the skills of the group improved through the constant challenges I put before them. They told me that they often wondered what I was up to during the training sessions, but always could finally make sense of it during the performances. As well, they sometimes wondered whether we were really making music, but they played on regardless.

I left the circus, with much regret, because they needed some fresh input, and I needed to go onto other projects. POW Circus continues to this day, with a music group, who now sings.

However, I was pleasantly surprised earlier this year, when I was talking to someone who has joined the group recently. She told me that the few original members who are still there, talk about how challenging it was working with me, but also just how much they learnt and were stimulated by the new musical materials. Together we made some wonderful music, and I would like to thank them for their trust and enthusiasm.

ASIAN PACIFIC MUSIC FESTIVAL PRESENTATION

“Music is a code in which the deepest secrets of humanity are written...[and] the study of music should be the key to understanding man’s [sic] nature.” (Cook, 1987:1).

My compositional research is concerned with the use and transformation of samples of naturally occurring sounds in the creation of digital music. The project will examine the multiple implications which come from using naturally occurring sounds as the building blocks of musical works. An important part of the project is to exploit these implications compositionally. 21st century digital technology offers the means whereby electronic music composition techniques can be expanded in new directions to create music which may be used to accompany other instruments and singers, or may simply stand alone. I will refer to one of my works called ‘*Litany for Refugees*’ to provide examples of the ideas which I am exploring.

There are two main approaches to sound in computer music which are, in some sense, a continuation of nineteenth century debates around the values of programme music and abstract music. I quote from the Grove’s Dictionary of Music: “The first, more programmatic, approach is the use of recognisable real world sounds, including other music to create ‘radiophonic’ works which can border on documentary, while the second is more abstract, simply creating a discourse of sound types and timbres.” (Emmerson and Smalley, accessed 08/03/2005).

There was, however, no doubt that advocates from both sides of the nineteenth century debate recognised that it was all music, the debate was rather concerning the relative values and merits of each type of music. This contrasts significantly with contemporary Western culture, in which there is no unanimous definition of music, and the boundaries of what is considered music, are drawn individually by each composer and listener.

From the beginning of the 20th Century a number of instrumental composers (eg Debussy, Stravinsky, and Ives) championed the idea that any instrumental sound could go together with any other and this would constitute music (Chadabe, 1997:22). John Cage extends the concept of music even further to include all sounds as musical events even those which occur despite not having been specified by the composer. Thus, Cage makes no distinction between music and sound (Vella, 2000:39). Indeed, Cage suggested that over time the use of 'noise' to make music will continue and expand, and that discussions about music will change emphasis from dissonance and consonance to what is 'noise' and what is 'musical' (Chadabe, 1997:26). Vella makes the point that noise has always been an essential part of music through the use of percussion, (Vella, 2000:20-21).

Yet Vella makes it clear that despite music taking on new sounds and extending sonic gestures and techniques, it is simply exploring new means of emotional expression (Vella, 2000:84). This is reinforced by Toop's suggestion that sound is used to express 21st century Western social values where "...the solid melts into aether in everyday life, where everything is transient and individual, in a frenetic and discordant world where there is no certainty." (Toop, 1995:11).

In a wide ranging survey of the definitions of Western art music in music dictionaries, Nettl summarised the concepts considered significant in defining Western art music, which reinforce the notion of Music as Art. These values are: the inclusion of all types of sound, organised by the composer in a manner to represent the world, nature and emotion, becoming both meaningful and meaning creating, through the ordering of the sounds, affecting the listener through intellectual response and by creating mental images and emotions (Nettl, accessed 16.03.2005).

Digital sound recording and reproduction provides a means to use naturally occurring sounds in music. Each naturally occurring sound has its own inherent musical possibilities. The idea here, is to use one naturally occurring sound as a compositional source, while remaining itself as a recognisable, distinctive sound, thus using the extra musical associations that are attached to particular sounds as part of the compositional idea.

The perception and reception of this sound depends on the social and cultural background and contemporary context of composer and listener. This can be used to challenge the listener to engage with their aural surroundings differently. The goal of my compositional research is to encourage people to listen to and appreciate the richness and implications of sound in the world around us, by using sound elements in an organised way to create music, which will fully explore the intrinsic qualities of the sound, while enjoying and acknowledging the original sound source.

Typically, descriptions of Art music focus on the means whereby the music is produced. Thus there are descriptors of either the compositional methods, or the means whereby it is realised. For instance, some of the genres are known as ‘minimalism’, ‘process music’, ‘micropolyphony’, ‘counterpoint’, ‘aleatoric’, ‘improvisation’, and ‘serial’ music describe compositional process, while other descriptors such as ‘Electro-Acoustic’, ‘symphony’, ‘string quartet’, or ‘oratorio’, while usually implying some sort of form, actually, and more specifically, describe the means of realisation into sound.

This distinction between compositional process, and the means of realisation is a useful place to start considering the implications of using natural sounds as building blocks for making music. Two core issues can be identified. The first is to provide the elements of the composition through using the rich characteristics of an individual natural sound purely as a unique but complex timbre. This could be achieved by creating one or more virtual instruments with a recognisable timbre, which can produce individual sound elements (equivalent to notes on an acoustic instrument) which are precisely defined along a range of one or more parameters of pitch, articulation, dynamics, and duration of events.

In this work, the sampled spoken voice is the instrument, and each of these parameters are applied to the recorded voice in various ways. The basic manipulations to the recorded sounds in this work are altered amplitudes to create dynamic variation and accented occurrences, and manipulation of pitch through phase vocoding. However, not only could the transformed sound remain recognisable as itself, but also the original sounds can be used very abstractly as the source material for digital transformation into unrecognisable synthetic materials. This has also been a part of the sound world for *‘Litany for Refugees’* and will be explored later in more detail.

Secondly, it is necessary to provide the compositional system in which these sound elements can be used in an organised way to create music. This could be achieved through using pre-existing instrumental compositional techniques and procedures. One possibility is to derive, from a specific sound sample, motivic particles which can be manipulated thematically in the course of composing music from that sound. This will expand the structuring and form building possibilities for creating large scale (anything longer than 3 minutes) musical works. It enables the application of long-established compositional techniques of instrumental music to the domain of digital music. In particular the application of techniques of contrapuntal writing which were continued by the twelve tone composers. Techniques such as inversion, transposition, retroversion, augmentation, and diminution. For example, in the first section of *Litany for Refugees*, a significant process is the canonic device of stretto, using the rhythms established by the repeated phrases to bring the voices closer together by the end of this section.

The development of related themes and ideas can also enable multiple sections (or movements) to be written which have clear theoretical and meaningful relationships to each other. For instance, in this work, the second section takes the idea of speeding up but applies it to the whole of the text, not just the spacing between the voice entries. The second section also extends the idea of accented words into a set of polyrhythms which build up during the course of this section. Another algorithm based on serial procedures for transposition and timing of phrases, was used for the conclusion to the work.

Another aspect of computer music is the compositional use of sound reproduction techniques to expand the compositional tool box to include immersion and spatialisation. In this work, various algorithms were used to choose the phase/timing of occurrences of various events, and the projection of sound events into stereo space. This seemed the simplest way to derive a set of varied sound events, that have some kind of internal coherence, even if this logic is not audible to the listener.

I am drawn to the use of naturally occurring sounds, particularly those that occur in ‘sound masses’ like a chorus of frogs, or the circular saws on the housing project near my home, or the sound of breaking glass, not only because of the richness and variety of timbres, and the way the sounds both individually and en masse, naturally evolve over time, but also because they come built in with cultural and thus meaning associations. Consistent meaning is still difficult because the associations will to some extent vary between listeners.

In ‘*Litany for Refugees*’ the use of text probably ensures that the meaning is more consistent. However, as part of the effect of the work is a play on the meaning of the words, some of which are Australian colloquialisms. Although this requires the listener to have some facility with Australian English, in order to fully understand the work, it also has the value of maintaining words which are unique to Australian English. These are the original recordings of these words, each of which I used as lead words for one of the succeeding phrases.

Now to provide more detail about the work. *Litany for Refugees* is a work in two sections with gradually changing textures, plus a short finale. Each of these sections is defined by some variation in the text used, as well as by the use of different musical devices.

The first section has four voices, built from out of phase elements, which gradually come into phase, via some algorithms I developed specifically for this purpose. As well, the pace of this section gradually increases throughout the work as the space between words gets smaller and smaller until practically non existent by the end of the section, although the length of the words remains unchanged.

The projection of sound events in this section are worked out in a different way, using procedures similar to typical serial manipulations, which in this case are determined by the phrase length. The reason for doing this is to introduce some variation into the temporal relationships that are occurring between voices. These manipulations affect the number of layers being heard at any one time, as well as their projection into the stereo space.

The second section is polymetric with 9 different voices in two different meters, a meter of 15 and a meter of 11. These were chosen because the number of words 165 in the whole section divided into these lengths neatly, and each of them could be subdivided further into a number of interesting rhythms. Each voice has a different accent pattern to define rhythm within the meter. Each voice comes in sequentially through the course of the section to build up a dense texture. Each voice is also pitch shifted in a range of + or – two semitones from the original.

The finale consists of a new phrase in the text, reworked through a serial process to provide a new mix for each of the voices, giving both timing for entries, and the pitch for each one of the four voices.

Finally, the whole work was accompanied by several other layers of sound derived from specific words and qualities of those word. These other ‘instrumental accompaniments’ were added to give more impetus to the whole work, while ensuring that the other voices remained clear and the other layers added interest without dominating..

Although the sounds were derived from the original words, they no longer bear any audible relation to the original sounds. Each of these extra ‘instruments’ was created by taking specific words and then stretching, pitch shifting, and filtering to an extent determined by my intuitive taste and how the result was needed to fit into the overall texture of the work.

These layers are:

1. a bass rhythm derived from ‘oh to be unaustralian’. This phrase was looped at a very fast tempo, resulting in a shorter duration, and then pitch shifted into the low bass register. Its dynamic level is fairly constant from entry until exit.
2. a very high pitched rhythm derived from ‘dinky di ocker’. This phrase was looped at a very fast tempo, resulting in a shorter duration, and then pitch shifted into the very high frequency range. The dynamic envelope

for this instrument was derived from the frequency envelope of the phrase 'oh to be unaustralian'.

3. a low melodic phrase made from a stretched version of 'antipodean' which has the effect of lowering the pitch as well as lengthening the duration of the phrase. This was then put through a lo pass filter and replayed three times during the work
4. a hi melodic shape made from 'oh to be unaustralian'. This phrase was stretched in duration for nearly the whole length of the work. It was initially shifted into a very high frequency range by means of a commercial algorithm which inverts the frequencies. Then a high pass custom made comb type filter was applied, with the filter envelope derived from the frequency envelope of the phrase 'oh to be unaustralian'.
5. a midrange melody made from the phrase 'dinkum aussie'. This phrase was also temporally lengthened which also lowered the frequency spectrum. However, this was then pitch shifted into the mid range frequency zone.

In conclusion, I have been exploring the possibility of creating expressive music from sampled naturally occurring sounds. As can be seen by the previous examples, at the risk of stating the obvious, my concepts of using naturally occurring sounds to create new instruments which can be played in new ways, does not exclude the human voice. In any case the essential concept is based on the acknowledgement that compositional materials and compositional methods are separate aspects of creating any music. I would now like to play the whole work for you. Thank you.

LITANY FOR REFUGEES