PULSE FIELD

SoundScape IV

DIGITAL

DOMAINS

Program by: Robert S. Thompson, Ph.D.
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PULSE FIELD
SoundScape IV
Disc I

Pete Stollery (Scotland)

Pete Stollery (born Halifax, UK 1960) studied composition with Jonty Harrison. He now composes almost exclusively in the electroacoustic medium, particularly music where there exists an interplay between the original "meaning" of sounds and sounds existing purely as sound, divorced from their physical origins. In his music, this is achieved by the juxtaposition of real (familiar) and unreal (unfamiliar) sounds to create surreal landscapes. His music is performed and broadcast throughout the world and recent performances include Musica Nova, Prague (1994), International Computer Music Conference (1995, 1996, 1997, 1998), Spitalfields Festival, London (1995), Journees d'Informatique Musicale, Paris (1995), ARTWORKS, Texas (1995), Brazilian Computer Music Symposium (1995, 1996, 1997, 1998), Florida Festival of Electroacoustic Music (1995, 1996), Musica Verticale, Rome (1995), RUMOURS, Birmingham (1993, 1994, 1995, 1997), DISCOVERIES, Aberdeen (1993, 1994, 1995, 1996 ,1997), São Paulo Bienal Internacional de Música Eletroacústica (1996), KEAMS (1997) and the International Symposium on Electronic Art (1996, 1997). A number of works are available on CD. SHORTSTUFF (tape alone) was awarded Special Prize in the Musica Nova 1994 competition; ONSET/OFFSET (tape alone) was given an Honourable Mention at the Stockholm Electronic Arts Award, 1996 and also the 1st Pierre Schaeffer Competition for Computer Music; ALTERED IMAGES (tape alone) won 2nd prize at CIMESP '97 (Concurso Internacional de Música Eletroacústica de São Paulo).

He has collaborated with a number of artists from all aspects of the arts, most notably Aberdeen-based choreographer Andy Howitt, with whom, along with sculptor Anne Bevan, he recently collaborated to produce the theatre piece SUNNIFA to great acclaim at the St Magnus Festival in Orkney.

He has also worked with sound designer Peter Key on a number of projects including *Our Dynamic Earth* in Edinburgh, UK and *Magna* in Rotherham, UK.

He is currently Lecturer in Music and Director of the Electroacoustic Music Studio at the University of Aberdeen where he is able to guide school children, students and teachers in the creative use of technology in music education. He is also Artistic Director of *discoveries* an occasional series of concerts in Aberdeen which aims to bring together electroacoustic works by school children and students to be performed alongside works by established composers from around the world.

He is chair of Sonic Arts Network, the national organization supporting electroacoustic music and sonic art in the UK, of which he has been a director for the past nine years; he edits the Journal of Electroacoustic Music published annually by SAN. In 1996, along with Alistair MacDonald, Robert Dow and Simon Atkinson, he established the group *invisiblEARts* whose aim is to perform acousmatic music throughout Scotland and to promote Scottish acousmatic music to a wider audience, both in Scotland and abroad.

1) Onset / Offset **7:23** **1996**

My previous tape piece *Altered Images* was concerned with the dual interpretation of the word "image" on both aesthetic and sonic levels, *Onset/Offset* is concerned, even more than before,

with exploiting the interplay between the original “meaning” of sound objects and their spectro-morphological characteristics. Thus, there are many recognizable sounds in this piece which can, and should, be perceived on both levels - the sound of a key in a lock on one level refers to the action of unlocking a door, but on another, is also interesting as a pure sound in itself.

Onset/Offset was realized in the Electroacoustic Music Studios at Northern College, Aberdeen and at the University of Birmingham in April 1996. It has received Honourable Mentions at the Stockholm Electronic Arts Award, 1996 and the 1st Pierre Schaeffer Competition for Electroacoustic Music, 1998 and was released on the Acousmatica CD label (CD 1298) in 1998 and also on Electroshock in 1999 (ELCD 010).

1) ABZ/A **12:15 1998**

ABZ/A consists of a number of scenes using sounds from in and around Aberdeen which kind of call up what Aberdeen means to me as someone who lives there, but which will also will mean something to everyone who listens to it; here are some fairly untreated sounds which are instantly recognizable to everyone (airport, cars on cobbled streets, shopping center). There is text but not that needs to be understood.

There is no story line - it's more a collection of scenes glued together by opening/closing gestures derived from the sounds themselves. These scenes get longer and longer with the last one lasting for over half the piece. It is best listened to over headphones to really get into the piece and to listen to the minute and subtle transformations of sounds. These sounds are sometimes real/familiar (beach, cars) and sometimes unreal/unfamiliar (opening sound, big drone at climax). Most of the time I am playing around with the images created by the juxtapositions of these sound types. Is the accordionist playing in a shopping center, on a street, by the sea, or in an unfamiliar space? All of these - and sometimes at the same time! This is what I find interesting about composing in this medium - I like to take the listener on a journey where everything around them is constantly changing from familiar to unfamiliar.

ABZ/A is part of a larger collaboration called *...silhouettes/resonances...* by four sound artists based in Scotland. Each piece is concerned with a composer's response to a sense of place. The four places (the other three: Glasgow - Alistair MacDonald, Inverurie - Gregg Wagstaff, the Island of Harris - Robert Dow) were chosen from across the varied landscape of Scotland and they reflect both the differences in landscape and the differences between the composers. The work was commissioned by the BBC for Radio Scotland's Week of Sound in March 1998 and was released on CD in 2000 (MPS CD 013).

pete stollery

acousmatic music

When I first became involved in electroacoustic music, I was fascinated with the way that technology could allow the composer to work directly with sound, in a similar way to a sculptor or potter working with his/her materials. The ability to manipulate material at this basic level is, of course, a central aspect of my music for tape alone, which falls aesthetically very much within the traditions of the musique concrète and acousmatic music of France and Québec. This can be seen most obviously from later pieces which are concerned with the interplay between the "meanings" associated with sounds and these sounds as pure sonic material, divorced from any mimetic connotation. My music involving live performers also uses these ideas, particularly during the creation and subsequent development of materials and structures within the compositional process - a vocal or instrumental gesture might be generated through improvisatory techniques, much in the same way as I might improvise with sound transformations in a studio environment[1].

One of my main concerns as a composer is to communicate as clearly and succinctly as possible to the audience. This is not to imply that I am attempting to present only "accessible" music to audiences, rather that I wish to provide opportunities for the listener to become aware of the inner workings of sound objects. Thus, there is little in my music which can be likened to "broad brush-work" - attention to detail and the positioning of sound objects within a prescribed time frame is paramount, allowing the listener to become aware of the intrinsic qualities of the sounds themselves.

Shortstuff was conceived for performance over a multi-channel loudspeaker diffusion system. Spatial location, which can be so successfully exploited in the medium of tape music, was paramount during the composition of the piece. Some parts of *Shortstuff* may appear odd when listened to over a stereo pair of loudspeakers or headphones. The opening minute, for example, contains many short sounds which are placed carefully within the stereo panorama. Much of the left/right positioning can appear extreme, the additional dimension of depth provided by a loudspeaker diffusion system being necessary for the successful execution of the work.

Such a passage occurs between 1'33 and 2'20. This section begins with a gradual fade in of a rapidly spatially oscillating water sound which appears first as background material; at 1'58 the rate of oscillation begins to decrease, bringing it to the fore when, at 2'06 the sound comes to rest on the right hand side of the stereo field. At 2'12 the rate of movement picks up again and by 2'20, the sound returns to its original background role. During performance, it is intended that this whole passage moves from one area of the performance space to another. Once the sound has come to rest in the right hand side of the stereo field, the sound can be carefully moved down the right hand side of the audience to reach the rear before the oscillating recommences and then, as the rate of

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[1] Improvisation in this case refers to methods of creating materials - trying, testing, assessing; investigating and exploring sound.

movement increases, the sound can be brought back over the heads of the audience to its original position.

As with much of my music, there is a tendency in *Shortstuff* towards the positioning of sound objects within carefully prepared time frames, often using drones to articulate the space within which sounds occur, rather like a painter covering a canvas in a wash background before commencing painting. This is a trait which permeates much of my music, the purpose of the background material being to highlight the sonic activity taking place on top of it. *Shortstuff* concludes with such a passage. After the climax at 6'20, a low drone appears shortly followed by very short high-pitched "chirps". These two sound types define the dimensions of the sound space within which the ensuing sounds are placed. At 8'09 the low drone falls away to widen the available space even further, leaving the closing sounds of the piece to fade away into infinity.

Much of the material in *Shioum* (1994 - tape alone), was created from feedback loops, in this case derived from a Lexicon Vortex signal processor. Sound groupings were generated by a more improvisatory approach than before, often involving altering parameters within programs in real time in order to generate more complex textures. Almost three hours of material was produced in this manner, sieved and then sorted into types.

One of my interests at this time was the possibility of gradual morphological transformations of sounds. With the Vortex processor, I was able to move seamlessly between two different signal processing programs set up within the device. Depending on the length of time set for the change to take place, transformations of sounds, particularly those previously created from feedback loops within the Vortex itself, would often produce periods of instability within the sound as different parameter settings crossed and eventually settled at their target values. The passage in *Shioum* from 7'10 through to 8'38 clearly exploits this technique, particularly just before the resolution at 8'32, where the preceding inharmonicity resolving to a fixed pitch is deliberately cadential in nature.

In previous tape pieces, I had been concerned to make sure that there was no recognition of the source of sounds I was using; much time was spent remodelling concrete sounds to create new ones which only hinted at possible relationships to real sounds. In *Shioum* I was beginning to move away from this and towards a more extensive pool of sound materials. From 2'55 to 4'36, the piece seems to inhabit an abstract sound world where, from time to time, sounds hint at mimesis - periodic motion from wave-like water and breath sounds, wet glass squeaking, doors closing. This "teasing" of the audience with the "meanings" of sounds is an important aspect of my music which has continued to develop later in tape pieces such as *Altered Images* and *Onset/Offset*.

As with earlier pieces, clarity and detail are paramount and the listener witnesses the slightest change in the state of sounds through the presentation of

transformations with little or no accompanying material; the passage from 8'38 through to the end uses the same technique as described in *Shortstuff* (c.f., 1'33 to 2'20) of gradually decreasing the rate of a rapidly oscillating sound so that its internal structure is revealed.

Structurally, *Shioum* is clearly sectional, and falls into two sections of approximately equal length - 0'00 to 4'47 and 4'47 to 9'40. At the mid-point there is an almost complete reduction of activity which nevertheless maintains the grasp on the attention of the listener. Sounds reappear in a disparate manner before stability is reintroduced with the gradually smeared chord at 5'11.

Having initiated in *Shioum* a move towards using more recognisable sounds in my tape music, I wanted to take this further and to exploit the dual concept of image within acousmatic music, on both an aesthetic and a perceptual/sensual level. *Altered Images* (1995 - tape alone) and *Onset/Offset* (1996 - tape alone) both exploit the interplay between the real and the unreal, the recognisable and the unrecognisable.

The concept of "image" in *Altered Images* can be understood on two levels; firstly, the overall shapes of gestures and objects and from where they emanate within a performance space; and secondly, the images formed in the mind of the listener as a result of listening to gestures, objects and textures. This is best exemplified with reference to the section beginning at 6'13. It begins with an unprocessed recording of a bicycle, recorded whilst in motion but with the microphones very close to the gear mechanism inside the hub of the rear wheel. Thus, we hear a lot of the finer detail that would not normally be heard by either a rider or someone standing at the side of the road as the bicycle travels past. The listener hovers between recognition of global aspects of the sound (the periodic motion of pedals, the "out of doors" nature of the passage) and non-recognition of the inner detail of the sound (the clicking of the gear mechanism). The surreal nature of the scene is further enhanced by the gradual introduction of sounds, recognisable and unrecognisable, which effects the significant shift in listening emphasis from a natural sound world to a completely artificial one.

At the same time, the shape of this image is transformed in a number of ways. The recording is initially in mono and as it fades in, it widens to cover the stereo image. As sounds are "abstracted" from the surface, they vary in dimension; sometimes wide, full and encircling, sometimes narrow and taut; the dimensions of the images are constantly mutating.

There are similar concerns in *Onset/Offset*. At 3'08, an unprocessed recording of activity in an urban street arises from an abstract texture. As with the "bicycle scene" in *Altered Images*, I spent a great deal of time listening to the internal movement of this texture and, as well as abstracting sounds from and imposing sounds onto the scene, I sensed the presence of a pitch. I made use of this pitch

by gradually introducing it (4’02) and reinforcing it before eventually letting it take over, reaching a climax at 5’18.

There are many references to real sounds in *Onset/Offset*; the key in the lock opening the door at the beginning of the piece is, on one level, metaphorical, but at the same time, there lies an interest in the spectro-morphological behaviour of this gesture. The ambiguity of recognition surrounding the chosen sonic material is central to this piece; a door slides open to reveal a new sound space, but at the same time, is heard as pure sound itself; a street scene is recognised initially, but with the subtle inclusion of other sounds, gradually mutates into the unrecognisable. The boundaries between what is known and what is not known become blurred.

Brigid Burke (Australia)

Brigid is a composer, clarinet soloist, visual artist, and educator. She has performed extensively in solo and chamber recitals, both nationally and internationally. Highlights in 2001-2 of performances were at the Cybrosonica Festival at the ICA, London, Medi@terra Festival micromuseum 2001, Bulgaria, Slovenia and Frankfurt and Seoul International Computer Music Festivals.

As a freelance performer/composer Brigid is broadcast on ABC FM including local & overseas radio and is currently working on a commission from the Australian Broadcasting Commission *Listening Room* to be broadcast late in 2002. Her most recent CD recordings have been reviewed and broadcast internationally. The Performing Arts Board of the Australia Council, Japanese Printing Corporation, ANAT, South Australian Govt., Community Arts Centers and Universities have also supported Brigid in her performances and compositions. She has a Master of Music in Composition from Melbourne University and is currently lecturing at Victoria University and RMIT University Melbourne.

2) The Retreating Flower **7:17** **1999**

This composition is a treatment of vibrato in the bass violin, which has been electronically transformed in live performance with voice samples. It sets out to take you on a voyage through a tunnel of questioning…silence…movement…stillness…all that prevails through controlled and uncontrolled environments. The sounds project as pure abstractions but move forward even if only through low vibrations. The selected gestures have been totally transformed but maintaining a refreshing real-time quality. Once objective was to make the samples grow in and out of each other, to create a three dimensional impression through extreme panning and manipulation. I felt at times that I was wallowing in low vibration of bass frequencies, making them turn in circles changing to upper partials and exploring different pulses according to the shifting of frequencies. The work was made possible as part of a project DE/RE CONSTRUCTION Suite #1 a radio work devised by David Tolley broadcast on New Music Australia ABC September 15, 1999. This is a re-composition work commencing with an improvisation by David Tolley.

Aimee Norwich and John Peters (United States)

3) Music as Science **3:32** **1992**

Music as Science is part of a collaborative project called Space Fabric, recorded and concieved 1993-5 by Aimee Norwich and John Peters. Music as Science was recorded at the electronic music lab at Georgia State university where John and Aimee met while studying music composition with Robert Scott Thompson. John Peters is presently concluding a Master's degree at GSU. He lives in Atlanta where he teaches and performs the piano, and composes traditional, experimental, acoustic, electro-acoustic, and electronic music. Aimee Norwich got her Bachelors degree in Jazz Studies at GSU in 1995 studying the bass guitar. She currently resides in San Francisco, where she composes and performs contemporary music. She plans to pursue a Masters degree in composition at Mills College.

Music As Science attempts to investigate music as language and art.. Language is ambiguous so truth is subject to interpretation because our symbols are associated with memories. Music can communicate through symbols and gestures as any other language, but is also artistic and abstract, and can exist without conveying meaning, or ideas, as simply an observation of the sounds.

Music As Science uses some traditional music (pitch, rhythm) as it's material, but features sound collage. Audio samples were manipulated and sequenced, sometimes emphasizing a word, and it's meaning or a sound and it's structure, sometimes passively exploring of the words and sounds

themselves divorced from traditional meaning or structure so as to improvise a new one. A musical interpretation of this is the guitar solo played by Te Cool under our direction. Such experimental approaches to music as science can inspire speculations that result in creative new music.

Sample Credits: Interviews with Steven Pinker, John Mack, and Jane Caputi from the Thinking Allowed talk show with Geoffrey Mishlove, A Nova (PBS) episode "Signs of the Apes, Songs of the Whales" that featured John Lilly, a Webern String Quartet, Takemitsu's November Steps, Ginastera's Popul Vuh, gibberish from random guests who happened by.

Inanimate constructions in a natural place
Mechanical productions of original states
I can see the future in a different space
Immaculate destruction with these sounds to deface

Simplistic history is not what we choose
and in this strange complacency a mind with no clues
I can see the future through a different muse
Immaculate digestery with sounds to diffuse

Michele Biasutti (Italy)

Michele Biasutti specializes in ecological music, music which seeks to return to the essential elements of human nature, re-evaluating the primary sphere of human auditory perception. He is interested in the relationship between scientific thought and the logic of music, applying the results to his composition and research.

Composer and Psychologist, Michele Biasutti was awarded diplomas at the Padova Conservatory of music. A prize-winning composer (International Composer Competition *L. Russolo*, International Competition of *Bourges*, Concour International de Composition de la *Societé de Musique Contemporaine du Québec,* International Competition *Pierre Schaeffer*, ...), his works were radio broadcast (RAI, ORF, RNE 2, Radio Bratislava, RTSI, HRT, Radio Canada) and selected for International Festivals (*ISEA 95* in Montreal, *ISEA 96* in Rotterdam, *Soundbox* in Helsinki, *VI BSCM* in Rio de Janeiro, *JIM99* in Paris, *VII BSCM* in Curitiba). His music was performed in Festivals in Europe (*Music Now* in Dublin, *Purcell Room* in London, *Fondazione Levi* in Venice, *31st International Music Festival* in Opatija, *Musica Verticale* in Rome, *Aspekte* in Salzburg, *Triduum* in Klagenfurt, *Society for new music* in Prague, *Concerts à la Villa Gillet* in Lyon, *Musiques d'aujourd'hui* in Marseille, *Neue Musik* in Freiburg; *Encuentros mùsica europea* in Madrid,...) in North and South America (*M.I.T.* in Boston, *SMCQ* in Montreal, *University of Maryland* in Baltimore, *San Francisco State University*, *New York University*, *III Bienal Internacional de Música Elettroacustica* in San Paulo, ...) and in Australia (*Interfaces, ACMC 2000* in Brisbane).
He collaborated with International Centers for electronic music. He is active as music organizer, currently scientific director of the Computer Art Festival in Padova. He is in the jury of international competitions of composition.

As a researcher in psychology of music, he received a Ph.D. at Padova University, discussing an experimental research about the perception of environmental sounds. For reason of research and advanced study Biasutti spent time at Indiana University in Bloomington and at the University of California at Berkeley. His writings have been published in several international psychological reviews. Among them: *International Journal of Psychosomatics*, *Rivista di Musicoterapia*, *Hearing Research* (Elseiver). He is the author of the books: *Scholar Autonomy and Educational Research* (CLEUP), *Environmental Sound Education* (La Nuova Italia). He has taught at the Conservatories of Novara and Venice and is researcher at Padova University.

His music is recorded on Compact disc *Artis-Cramps* (ARCD 062, Polygram distribution), *Fondazione Russolo-Pratella* (Ef. Er. P94), *Rivo Alto* (CRR 2111, CRR 2025, CRR 9511, CRR 9610, Electa and Ducale distribution), Intersound IS 01-7, *Accademia Musicale Pescarese* (MV001).

4) Deep Sea **9:40** **2000**

The work is a sound trip in the sea's depths. The aim is transforming the sea sounds, proposing other ways of listening. Starting with the sea sounds, the piece would stimulate human abilities to discover imaginary sea soundscapes, with the tracks that people can find in the collective memory. The water sounds have a great symbolic value, since all humankind experienced living in the amniotic liquid. The water elements were used to enter in the collective memory's dimension, transforming the timbres from sound to noise.

All the sound material used in the piece was derived from sea sounds. The sea sounds were signal processed by computer with elaboration such as pitch shift, stretching, filtering and distortion. In this way the sea sound became hardly recognizable. The formal development of *Deep Sea* follows psychological principles, considering the perceptive thresholds for stretching. Elaborations in the low register and polyrhythmic crescendos were used. The composition proposes a new semantic dimension of the water sounds, utilizing a perceptive game between the new framework and the memory's abilities evoking the original sounds.

The premiere performance of *Deep Sea* was given at ACMC 2000, *Interfaces*, at Queensland University of Technology in Brisbane (Australia) on the 5th of July 2000. The work lasts 9' 40".

The piece obtained a Mention at the 28th International Competition of Electroacoustic Music and Sound Art / Bourges 2001 (Section II- 3 category work for electroacoustic and sonic art).

5) Transparenze **10:01** **1989**

for contralto flute, tape and signal processing

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Psychology research and musical composition.

Musical development in contemporary society

The way of thinking the music and composing changed through history especially in the 20th century. The application of electronic research on sound, in addition stylistic and aesthetic changes gave new inputs to the contemporary composer. The artist had more freedom in creativity and he experimented many possibilities for finding new musical meanings.

The 20th century has witnessed the appearance of many different musical trends and techniques. There has been a widespread tendency to conceive music more and more as an abstract and intellectual arrangement of sonorities. Several authors have theorised method of combination of sounds in which rhythm becomes very complex and organised. The utmost grade is represented by total serialism, in which musical parameters follow numerical rules.

The scientific trends in our society gave many inputs in this direction. This happened in many disciplines and also the music was influenced. Composers tried to compose following "scientific" and controllable principles, applying exact knowledge, skills or use a new system of coherence. The scientific research gave many inputs to composers, but it is important how these stimuli could be used. A more control in composition is necessary, and a mere application of mathematical lows could be too speculative and reductive for the musical experience. The problem is that the new codes are developed without considering the sound effect, but only the coherence with mathematical laws. It is important to find a real musical meaning and not only algorithm and mathematical rules while composing. Applying in composition a scientific approach is important for music development, but the composer must be aware of the principles used. The composer has to control the sound material and not the mathematical rules to control the compositional process.

These manners of composition reflect the Taylorist concept according to which man can organise his life being guided exclusively by scientific knowledge, ignoring emotions or experience. Perhaps this attitude is responsible for the lack of respect for nature and environment that often occurs in scientific and technological research. In this context the primary perceptive sphere of man is neglected in favour of intellectual complexity.

The application of mathematical models to composition determinates a more abstract music. Many scores realized following such compositive principles are often too difficult for the listener. The forms chosen affect the comprehensibility and accessibility of works which seem created to be studied and analyzed rather than listened to. *Formal complexity does not necessarily mean musical worth or quality*.

This approach shows little consideration and interest in the role and social functions of music in the course of history, since in many cases there was scarce or no effort to communicate with the audience.

Compositive grammar versus listening grammar

Most of the contemporary music production is difficult for listeners and we have a gap between compositional and listener levels: the listener is not able to recognise all the details thought by the composer.

Lerdahl (1988) distinguished the compositive and the listening grammars. The compositive grammar consists of all the abilities involved in writing a piece, and the generation of the system of rules of the piece. The listening grammar consists of all the processes involved in decoding a piece of music when one is listening to it, for having a mental representation of it (Lerdahl, Jackendoff, 1983). Writing is a cognitive ability that involves complex procedural plans, which are not necessarily in correlation between those used in other tasks. To write music, it is necessary to have a basic knowledge of laws such as of tonality and of harmony. These laws are not essential to the performer or to the listener. When a performer plays a piece of music, he needs mainly a good articulation and a good hearing. He does not need any knowledge about how it is possible to construct the music. A similar perspective could be applied to the listener: writing is also different from listening.

Lerdahl (1988) thinks that compositional codes are either natural or artificial. Natural grammars are based on implicit rules of a musical culture; instead artificial rules are generated by the composer's inventions. The discrepancy between compositional and listener levels happened when an artificial grammar is used, and there is a difference between production and use. In music a semantic meaning is not involved and it is necessary to define a communicative level. Therefore the generative grammars became more abstracts. The development of artificial grammars since the Nineteen thirties of 20th century generated a gap with the audience.

Lerdahl (1988) pointed out that in contemporary music many differences exist between compositive and listening grammars. For explaining this concept, the author proposed the example of the piece *Le Marteau sans Maître* composed by Pierre Boulez on 1954. This piece is considered a masterpiece of serialism, also if nobody for many years was able to define the serial structure which the piece is based. Lerdahl pointed out that the structure of *Le Marteau sans Maître* is very complex and articulated and it is impossible to understand it only listening, also carefully for an expert listener. This is an example of the gap between compositive and the listening grammar.

One may wonder if compositive grammars and listening grammars are opposite or is it possible to think of them in a comparative way? At a compositional level it is important to generate compositive grammars joined with listening grammars. To work in this direction there are some disciplines, such as psychology, that could give many inputs to the composer.

The importance of psychology

Psychology is important because in this field there are many researches have been done to define the characteristics of aural capabilities and could be useful for defining the features of the listening grammar. Psychology studied music from different perspectives: gestalt, perceptive, cognitive, and ecological. All these field of studies can give us ideas concerning how the human mind elaborates the acoustic stimuli and the limits of the processes.

There are a lot of questions and topics in the field of psychology that could be interesting for the composer: Knowing how humans recognise, interpret and categorise auditory stimuli it is very important for the composer to be aware of the ways. There are important questions to be asked: How is articulated auditory perception? How humans select the stimuli? How they organise their knowledge? What are the most important features of memory processes? Also other questions could be of some interest: Are there any classes or categories in which similar stimuli are stored? What are their characteristics and what is the important feature in this process? What are the most important acoustical elements for perception (e.g. transitory of attack, envelop, or other

temporal elements)? How important is the nature and the physic characteristics of the objects that produce sound?

At a general level one may wonder how people interpret the music and what kind of knowledge they generate? Are there any relationships between music and the stimuli of other sensory modalities (e.g. visual)?

In psychology, perception is one of the most important fields of research, and addresses the way in which humans represent reality. Perception is a process of internal reconstruction of the information. There is a difference between reality and representation: reality represents the physical aspects of the environments, and representation is a process that gives an internal form for the sounds. This discrepancy is evident in the illusions, some effects studied in the field of perception, in which there is a discrepancy between phenomenological and physical levels. A lot of researcher studied the illusions (Pierce, 1983) and this field is a practical demonstration of the perception process.

Perception is a selective process, which takes only the most important characteristics from the environment. This selection is very important because it is not possible to remember all the details: humans select only the most important elements. The terms of how the selection happens are also very interesting for the composer.

Another field of study is the ecological approach to perception that was developed in the last decades. Originated by Gibson's (1966) criticisms to the parcelled methodology adopted in traditional perceptive research, the ecological approach proposed new concepts, such as *event perception*, and *everyday listening*. The events perception is the tendency to think phenomena as events. Gaver (1988, 1993a, 1993b) used the term *everyday listening*, defined by the author as the act of taking information from the world, and of listening to the sound events that they produce. In this field much research has been done (Biasutti, 1996; 1999b). The ecological approach to hearing is important because it addressed the sound events that we can listen in to the world, such as the whistle of the train, sound of people walking, the sound of two hands clapping and so on. This kind of approach is very important for electroacoustic music, because in this field the composer uses sound events and concrete material, deriving from recordings of natural sounds. The ecological approach to auditory perception could give the composer many ideas of how everyday sounds are recognised and decoded by listeners.

The research in the field of psychology of music considered primarily mental processes and functions involved in listening, while less interest was dedicated to music composition. The study of cognitive processes involved in composition allows schematising the single processes of writing. Knowing the cognitive processes involved in musical composition is useful to composers, because it allows them to develop skills for improving the level of consciousness in the task carried out. It is important to stimulate the metacognition processes, because they allow to understand all the abilities that we have and that are involved in composition (Biasutti, 1999a).

Psychological constructs are useful for musical composition: the composer has to respect the perceptive limits, in order to communicate with the listener. The results of many studies surveys in the field of psychology of music could be used in music composition. Today we have many experimental data that allow us to apply psychoacoustical data in composing.

Houtsma (1984, p. 297) noted that musicians 'now must control (and therefore understand) all the important relationships between physical sound parameters and subjective sound attributes'.

Parncutt (1989) proposed a psychoacoustical approach to harmony. We can think of a scientific approach of making music, linked to the real ability to perceive music. Composers may use the empirical data of many researches as a reference in the limits in using the musical material. The application of psychological research in composition is now developing quickly and many

composers used the data of psychoacoustic research. In this context, psychology is not only a way for analysing the products, but also a way for giving inspiration to composers.

Suggestions for ecological premises

It is difficult to recognise real needs in a society like ours, in which a great mass conditioning and a strenuous quest for status symbols are constant characteristics. To counteract this tendency, it becomes necessary to come back to our origins and experience perceptions. Nowadays man can leave to machines many of his tasks and devote more time and energy to recapture his expressive intimacy. It is important to revive a correct and balanced relationship between body and mind, recognising the importance of the primary perceptive sphere. This could occur on the basis of naturalistic and psychological premises.

In our times the interaction with the environment as a source of inspiration for musical creativity has undergone great transformations, including both stylistic and aesthetic changes in the artistic expression. The wide range of technical possibilities to elaborate and synthesize sound, offered by the improvement of electronic devices, had a great importance.

The distinction between consonance and dissonance is among the laws of composition that were abandoned. New laws and principles were applied, such as the dichotomy between sound and noise first theorised by Luigi Russolo and later brought to life by authors such as John Cage and Edgard Varese become a strong intellectual reference for composers. Later Pierre Schaeffer and his group researched and produced what they called *musique concrete*, a montage of recorded natural sounds modified and arranged.

The realisation of works in which the gestalt principles figure-background was no longer applied led another innovation. Technological evolution made these innovations effective to fully effectuate them. By means of electronic music it was possible to compose works in which all the formal elements flow in a continuum and the main melody cannot be distinguished from the accompaniment. Other authors like Ligeti in *Atmosphères* for orchestra or Penderecki in *Threnody for the victims of Hiroshima for 52 strings* follow these principles with orchestral instruments.

Many composers were inspired by nature and environment in their composition. Also in electroacoustic music there are many examples of uses of sound recorded in the environments.

As far as the contemporary music's scene is concerned, Battistelli wrote the opera *Experimentum Mundi* in which he uses as musical material the sound events produced by man at work, such as bakers, builders, blacksmiths.

Fort, director of *Groupe de Musique Vivantes in Lyon* proposed happenings in the park of *Villa Gillèt* in Lyon with concerts of birds' songs' recordings by loudspeakers placed on the trees.

The American composer Reich, in the piece *Different Trains*, used the sound recorded in train stations with musical aims.

In rock music many bands used mechanical sounds or sounds recorded in the environment. The *Pink Floyd* in the song *Money* used sound events and the rhythm of a cash register to make music.

In recent years other kinds of music such as *Ambient Music* and *Noise Music*, used environmental sounds and noise. A new trend that obtained a great audience is the *New Age*, in which composers adopted environmental sounds to create tenderly atmospheres.
In the contemporary music field, Truax (1996a; 1996b) theorised a new kind of composition called *soundscape composition*, in which the sound sources are connected with the original context.

Elements of my artistic activity

In this sphere of expression, I have developed sound experience collecting the scientific data of psychology research to make music. This soundmaking technique can help finding ways for respecting human perception. My goal is to create ecological music, that is to say a music that attempts at retrieving basic elements of human nature, both from an environmental and psychological perspective.

In my activity as a composer, I try to develop a musical concept that uses fundamental aspects of human nature. I aim at conveying an ecological music intended as a rediscovery of primary rhythm and sounds, which do not require any cultural background to be enjoyed. I want to stimulate and enhance the innate sound sensibility of man, seen as archetypal.
This modality rises from the necessity to stimulate the basic sound sensibility of man, the primary perceptive sphere that can be considered archetypal. For primary sphere I mean the sound competence that all people have. For example many authors (see Salk 1962; Fornari 1984) showed the importance of rhythm in human nature. They have considered the sense of rhythm as a natural and biological imprinting determined by the mother's heartbeat that the foetus constantly hears in the prenatal condition.

In an experimental research Biasutti (1990) pointed out that the hypnotic experience of his experiments might bring out the sense of rhythm.

In order to awake these natural sensations, it is important to dismiss cultural patterns and regain the fundamental issues of existence that are too often forgotten and set aside by the hectic rhythms of a life influenced by false necessities. To re-establish proper relationships between mind and body, it is necessary to give the right relevance to essential aspects of aural perception like rhythm, timbre and dynamics. These features should not be used arbitrarily, but keeping in mind the characteristics of humans' perceptive systems and their limits. As for formal schemes, the revaluation of some basic parameters of music does not mean a return to old compositive forms such as tonality. On the contrary, this revaluation can be done developing and utilising factors of our biological sphere.

In a research work I carried out, I introduced cyclic events of human life in musical composition. *Biological Rhythm* for flute and tape is a piece composed in 1987 in which I intended to express rhythm in a corporeal dimension, transferring into music biological characteristics as the cyclic recurrence of respiratory acts.

Music can be called ecological when it tries to establish a deeper balance between body and mind, and enhance our potential to learn through perception. Today artists have the possibility to choose between their personal code and formal principles in relation to the sounds used. Composers should abandon stereotyped compositive forms. The development of forms should origin from the natural characteristics of the material and means used.

Today authors can choose their personal codes from a wide range, as they are not bound to follow a dominant trend. There are plenty of ways to express the self freely, according to one's particular skills and attitude. The opportunities in this field are manifold and can be fruitfully exploited.

The main idea is to treat sound in its less traditional aspects and thus enter the recess of human personality. Sounds and silence acquire a special dimension and meaning in a context of instinctive communication. Perceptive levels became finer and make listeners more and more aware of minimal variations, expanding temporal and spatial boundaries.

In using the psychological principles, I do not follow a specific method. Each piece was generated by different strategies and it is very difficult to discern a general law. Many times I was inspired by stimuli and ideas that Psychology gave me.

For example the piece *Iridescent figure* for violin, flute, bass clarinet, cello and piano, is based on some perceptive phenomena studied in the field of psychology of music, such as masking, space-time perception and some perceptive illusions on rhythm. The aim is to apply in music composition the results of these researches, experimenting new formal developments. The data of the psychological researches are utilized for transforming the musical material. In this way we can obtain new semantic meanings. The sound figures presented are changing constantly: they deform, lengthen, transforming themselves in unexpected ways. The experimentation concerns the space-time organization using polyrhythms, rhythms that are every time the same physically, but phenomenologically different, and the masking of simple rhythm's figures that constitutes a more complex context. Are considered the abilities in discriminating chords in the high and low registers and the limits of tonal perception. The perceptive paradoxes are utilized for generating and dissolving structural tensions. Formally the piece is based on an ascending semi tone interval, using the tone G as tonal a center. The second interval expands itself gradually in a major third, creating perceptive games between minor and major third. The material develops gradually by rhythmic crescendos that at the end of the piece become sound clouds, composed of a lot of notes in a third interval. The piece is articulated in sections, each of which on a specific perceptive phenomenon: minor and major third, timbre masking, rhythmic deformation, and limits in the discrimination of minor and major third.

In many works, I use traditional instruments with electronic devices for signal processing to elaborate instrumental sounds. I think that technology influences our way of living and it is important to use technological instruments in composition for the feature of music. This use has to follow artistic means and not only research projects.

In *Tavola VII*, nicknamed "of the sequences of harmonics", for string trio and signal processing, I experimented on timbre. I utilized all the sound possibilities that the string instruments allow. The timbre has a very important part. The original idea was to point out a sound universe that is usually very difficult to hear, and made up attack transitory, rustles and infra sounds. These kinds of sounds are not normally utilized in music. The aim is to work into the sound, directly modeling the acoustic material. The formal organization of the piece is developed starting from single notes that were articulated following timbre principles. The sound discovery and the hypnotic movement were realized with the purpose of extending the perception of space-time.

In the piece *Deep Sea* for tape, I also experimented on timbre. The work is a sound trip in the sea's depths. The aim is transforming the sea sounds, proposing other ways of listening. Starting with the sea sounds, the piece would stimulate human abilities to discover imaginary sea soundscapes, with the tracks that people can find in the collective memory. The water sounds have a great symbolic value, since all humankind experienced living in the amniotic liquid. The water elements were used to enter in the collective memory's dimension, transforming the timbres from sound to noise.

All the sound material used in the piece was derived from sea sounds. The sea sounds were signal processed by computer with elaboration such as pitch shift, stretching, filtering and distortion. In this way the sea sound became hardly recognisable. The formal development of *Deep Sea* follows psychological principles, considering the perceptive thresholds for stretching. Elaborations in the low register and polyrhythmic crescendos were used. The composition proposes a new semantic dimension of the water sounds, utilising a perceptive game between the new framework and the memory's abilities evoking the original sounds.

The premiere performance of *Deep Sea* was given at ACMC 2000, *Interfaces*, at the Queensland University of Technology in Brisbane (Australia) on the 5th of July 2000.

The piece obtained a Mention at the 28th International Competition of Electroacoustic Music and Sound Art / Bourges 2001 (Section II- 3 category work for electroacoustic and sonic art).

References

Arnheim R. (1986). *New Essay on the Psychology of Art.* Los Angeles: University of California Press.

Biasutti M. (1990). Music ability and Alterated State of Consciousness: An experimental research. *International Journal of Psychosomatics*, 37 (1-4), 82-85.

Biasutti M. (1996). *Identification of sonic backgrounds in adolescents*, Preceedings of Joint International Conference (IV International Symposium on Systematic and Comparative Musicology and II International Conference on Cognitive Musichology), 7-14, Ghent: University of Ghent.

Biasutti M. (1997). Sharp low- and high- frequency limits on musical chord recognition, *Hearing Research*, 105, 77-84.

Biasutti M. (1999a). Cognitive processes in composition. *Proceedings of the Sixièmes Journées d'Informatique Musicale* (15-24). Issy Les Moulineaux (Parigi): CNET.

Biasutti M. (1999b). Educazione ambientale al suono. Firenze: La Nuova Italia.

Bregman, A.S. (1993). *Auditory scene analysis: hearing in complex environments*. In S. McAdams and E. Bigand (Eds.). *Thinking in sound. The cognitive psychology of human audition*, (10-36). Oxford: Oxford University Press.

Fornari F. (1984). *Psicoanalisi della musica*. Milano: Longanesi.

Gaver, W.W. 1988. *Everyday listening and auditory icons*. «Dissertation Abstracts International», DAI-B 50/04.

Gaver, W.W. 1993a. *What in the world do we hear?: an ecological approach to auditory event perception*. «Ecological Psychology», 5: 1-29.

Gaver, W.W. 1993b. *How do we hear in the world?: exploration in ecological acoustics*. «Ecological Psychology», 5: 285-313.

Gibson, J.J. 1966. *The senses considered as perceptual system*. Boston: Houghton-Mifflin.

Houtsma, A. J. M. (1984). Pitch salience of various complex sounds. *Music Perception*, 1 (3), 296-307.

Lerdahl, F. (1988). Cognitive constraints on compositional systems. In Sloboda J. A. (Ed.), *Generative processes in music: The psychology of performance, improvisation, and composition* (231-259). Oxford: Oxford University Press.

Lerdahl, F., Jackendoff, R. (1983). *A generative theory of tonal music*. Cambridge: MIT Press.

McAdams, S. 1993. *Recognition of sound sources and events*. In S. McAdams e E. Bigand (a cura di). *Thinking in sound. The cognitive psychology of human audition*, (146-198). Oxford: Oxford University Press.

Parncutt R. (1989). *Harmony: a psychoacoustical approach*. Berlin: Springer.

Pierce J. R. (1983). *The science of musical sound*. New York: Scientific American Books, Inc.

Salk L. (1962). Mother's Heartbeat as an imprinting Stimulus. *Transaction of the New York Academy of Science*, 24, 753-763.

Schaeffer P. (1966). *Traité des objets musicaux*. Parigi: Edition du Seuil.

Schafer, R.M. (1976). *The tuning of the world*. Toronto: McClelland and Stewart Limited.

Schafer, R.M. (a cura di). 1977. *Five village soundscapes*, n.4, The music of the environment Series. Vancouver: The World Soundscape Project/ARC Publication.

Sloboda, J. A. (1985). *The musical mind. The cognitive psychology of music*. Oxford: Ox. University Press.

Truax, B. 1996a. *Sounds and sources in powers of two: towards a contemporary myth*. «Organised Sound», 1: 13-21.

Truax, B. 1996b. *Soundscape, acoustic communication and environmental sound composition*. «Contemporary Music Review», 15: 49-65.

Xenakis, I. (1961). La Musique stochastique: éléments sur le procédés probabilistes de composition musicale, *Revue d'Estèthique*, 14 (3-4).

Xenakis, I. (1971). Les musiques formelles. Nouveaux principes formels de composition musicale. *Revue musicale*, 253-254.

Xenakis, I. (1976). *Musique, Architecture*. Paris: Tournai, Casterman.

Bruce Christian Bennett (United States)

Bruce Christian Bennett (b. 1968) is a native of Seattle who has lived in San Francisco since 1991. Mr. Bennett has conducted research and composition at the Center for New Music and Audio Technologies (CNMAT) and is currently employed by Digidesign. He received his Ph.D. in music composition from the University of California, Berkeley in 1999 where he studied composition with Richard Felciano and computer music with David Wessel. He received his M.M. in composition from the San Francisco Conservatory of Music in 1993, where he studied composition with Andrew Imbrie, David Conte, and Elinor Armer; and he received his B.A. in music from Reed College in 1990 where he was a student of David Schiff. He is a founding member of both the Berkeley New Music Project and the CNMAT Users Group (a coalition of composers and engineers whose interests are in the interaction of music and technology), and is president of the board of directors for Earplay, a San Francisco-based new music ensemble. He is also the editor of the Society of Composers, Inc. Newsletter. His works have been performed throughout the United States and abroad, and has been played by such groups as the Arditti String Quartet, the Ensemble InterContemporain, Sirius, and members of the San Francisco Contemporary Music Players.

6) Stretch **18:24** **2000**

Stretch is a sonic exploration of time stretching. It uses several very short samples of gongs, cymbals, tampura, shakuhachi, beluga whales, etc., and stretches them as much as 164 times their original duration. This creates an extraordinarily rich -and dense texture of sound, revealing the vast sonic world contained within sounds that normally pass too quickly to be heard in such detail. The composition unfolds in several waves, creating a large-scale arch form.

Tae Hong Park (Korea)

Tae Hong Park received his B.E degree in Electronics at Korea University in 1994 and has worked in the area of digital communication systems and digital musical keyboards at the GoldStar Central Research Laboratory in Seoul, Korea from 1994 to 1998. He has received his M.A. at Dartmouth's Electroacoustic Music Program in June 2000 and is currently a graduate student at Princeton's Composition program. His current interests are primarily in musical and technical issues in computer and electroacoustic music, which include composition and research in multi-dimensional aspects of timbre.

7) Omoni **6:03** **1999**

Omoni (mother in Korean) is a piece that touches on many facets of motherhood. The piece was mainly composed using speech samples obtained from numerous, "interviews" when asked to comment on the subject of motherhood. One of the primary objectives was to get speakers from a diverse age group (3-92 yrs.) and background to render a wide spectrum of responses. The two channel version of the piece was finished during the summer of 1999 at the Dartmouth Electro-Acoustic Music Studio. The current 8 channel version was completed at Princeton in Spring 2001.

PULSE FIELD
SoundScape IV
Disc II

Sara Hornbacher and Neil Fried (United States)

1) Transfigured Time **20:00 1998**

(program notes unavailable)

Orlando Jacinto Garcia (Cuba)

Cuban/American composer, conductor, music educator, and new music advocate Orlando Jacinto Garcia is Professor of Composition and director of Composition Programs for the School of Music at Florida International University (FIU) in Miami where he is also the Director of Graduate Music Programs. Garcia is the founder of the FIU Electronic Music Studio and the FIU New Music Ensemble and recently founded the NODUS ensemble, a professional chamber group based at FIU dedicated to the presentation of new music. Born in Havana, Cuba in 1954, Garcia emigrated to the US in 1961 and has resided in Miami since 1977.

Garcia's composition teachers included Morton Feldman, David Del Tredici, Dennis Kam, John Corigliano, Donald Erb, Bernard Rands, and Earle Brown among others. He received his DMA in composition from the University of Miami in Florida in 1984.

My works reflect an interest in exploring the counterpoint between density, timbre, registration, instrumentation, and pacing in music. At the same time I am interested in attempting to direct the listener to focus on minute aspects of sound (what some people might consider the "details of music") and in so doing hoping to compel the listener to transcend the temporal experience normally associated with the perception of Western Art Music. These ends are accomplished through the use of repetition, silence, and the slow evolution of the materials in a work. In contrast to some of the other composers interested in exploring the aspect of non-directionality in music (e.g. minimalists), I continue to attempt to retain a certain amount of mystery in my work with regard to where the musical materials have evolved from and where they are going in a given piece while maintaining a certain amount of focus. I am also interested in non referentiality in music. This is to say I am not interested in referencing music outside of my own except when the music referenced is relatively non-referential itself or when I can place a music with more obvious references in a setting that reduces and/or strips these references. This evidenced in recent works that explore more consonant material. Ultimately my aim is to create a sensual and at the same time abstract and mysterious sound world that will hopefully engage the listener and producing a unique and profound experience. (OJC)

2) Como un coro de clarinetes celestiales **12:49 1998**

Como un coro de clarinetes celestiales (like a choir of celestial clarinets) was created in the Music Technology Center at Florida International University in Miami during the Summer and Fall of 1999. The source materials for the piece are digital audio samples that I made of myself playing a clarinet through a digital processor. The musical gestures consist of sustained notes, trills, scalar lines, etc., all performed employing circular breathing. The samples were then processed and assembled using a variety of software including Supercollider, Peak, and Pro Tools. As with most

of my work, the slow evolution of events as well as the counterpoint between register, density, timbre, and pacing are important concerns.

Peter Grenader (United States)

Peter Grenader studied music composition at the California Institute of the Ar. Jnder Barry Schrader and Morton Subotnick, (whose influences are both evident in Electrolux) and composers Gordon Mumma, Pril Smiley, Milton Babbit, Eliott Carter, Fritz Wieland, Lou Harrison, LeMonte Young and Vladimir Ussachevsky. Along with the Periodic Festival, he has twice won the Virginia Commonwealth Music Festivals and has had performances throughout the U.S. and Europe including the Institute of Sonology in Utrecht and Bourges, France. Film work includes Witches Brew, starring Richard Benjaman, Terry Garr and Lana Turner.

3) Fluxus 1 – A Cathedral in Chartres 8:10 2002

The idea to do a drone piece came to me when visiting the high-gothic Cathedral of Notre-Dame in Chartres, France just as the pipe organ was getting a bit of afternoon exercise. Mimi and I were scaling the massive medieval spiral staircase to the vespers while it sounded and I was struck by the incredible natural phasing from the standing wave in the hall vs. the sound bellowing up the spires themselves.

Fluxus 1 is a rondo as there are four variations of basic patch which present themselves in a dovetailed canonic format. The overall- contour of each voice reflects a 1 minute fade-in, a 2 minute duration, and 1 minute decay to silence. The four voices were timed so that each new part begins its fade-in as the previous voice reaches its 2 minute duration period. This is how I elected to change the coloring gradually.

4) Electrolux 9:59 2002

Electrolux came to me after a 22 year hiatus from writing music. This is not an attempt to excuse, but more just a simple fact and I urge you to accept, reject or remain unaffected by this body of work as you would not knowing. But in the very least it may explain its time-capsulated style and sonic pallet. The piece is in A-B-A-C form, with a developed C section. So it may be that Electrolux is two pieces lumped together - like the main course plopped on top of the salad. As unorthodox as it may be, the resulting melange works. But I am its mother and because of that overly proud and forgiving. Please judge for yourself.

Electrolux received its premier on March 19, 2002 at the Periodic Experimental Music Festival hosted by the Center for Cultural Contemporary Art in Barcelona, Spain - an event in which it won.

Joji Yuasa (Japan)

Joji Yuasa, born on August 12, 1929, in Koriyama, Japan, is a self-taught composer. He first became interested in music while a pre-medical student at Keio University, and in 1952 turned to music full time when he began to study composition at the "Experimental Workshop" in Tokyo.

Since then, Yuasa has been actively engaged in a wide range of musical composition, including orchestral, choral and chamber music, music for theater, and intermedia, electronic and computer music.

His works, including film and television scores have won several prizes: among them the Jury's Special Prize of the 1961 Berlin Film Festival; the Prix Italia (1966,1967); the San Marco Golden Lion Prize (1967); Osaka Prize (1972,1988); and five Grand Prizes at the Japan Arts Festival.

Yuasa has received a number of scholarships at home and abroad: the Japan Society Fellowship (1968-69), Composer in Residence at the Center for Music Experiment UCSD (1976), Berlin Artist Program by DAAD (1976-77), the New South Wales Conservatorlum of Music In Sydney (1980), the University of Toronto (1981), IRCAM (1987), etc.

He has won numerous commissions for his orchestral, chamber, choral and electronic compositions Including commissions for orchestral works by the Koussevitzky Music Foundation, Saarifind Radio Symphony Orchestra, Helsinki Philharmonic Orchestra, Japan Philharmonic Orchestra, NHK Symphony Orchestra, Canada Council, Suntory Music Foundation, IRCAM, National Endowment for the Arts of the U.S.A., etc.

As a guest composer and lecturer, Yuasa has contributed to the Festival of the Arts of This Century In Hawaii (1970), New Music Concerts In Toronto (1980), Asian Composers League In Hong Kong (1981), concert tour for Contemporary Music Network by British Arts Council (1981), Asia Pacific Festival In New Zealand (1984), Composer's Workshop In Amsterdam (1984), Darmstadt Summer Course for Contemporary Music (1988), Lerchenborg Music Tage (1986, 1988), Pacific Music Festival In Sapporo (1990), etc.

His music has been widely performed throughout the world at such festivals as the ISCM World Music Days (1971, '74, '78, '79, '81, '83, '84, '85, '91, '93) Warsaw Autumn (1969, '76, '78, '81, '84, '86), and Horizon (1984, etc.) Yuasa had been actively engaged in music research and education at the University of California, San Diego. until 1994. Presently he Is Professor Emeritus at UCSD and is working and teaching in Tokyo.

5) Projection Esemplastic for White Noise 7:55 1964

This is my first piece of "pure" electronic music. It was realized at the NHK (Japan Broadcasting Corporation) Electronic Music Studio and was commissioned for the radio program, although I started to engage in "Tape Music" in 1954. composing "Musique Concrete. "

The entire source of this composition is white noise utilized as a total spectrum of sound. I could curve various desired sound figures through the combination of characteristic filters and a variable-speed tape recorder.

The configuration of sound. the so to speak "Giacometti process" seemed to me a rather more oriental approach to the subject than the occidental one in which a formative process is based on the proliferation of the cell to the full body.

Moreover. I was, at that time. rather critical of the general tendency of Electronic Music. most of which sounded as if it were an extension of the pointillist style of instrumental music seen in the age of Post-Webernism.

The above thoughts led me towards the working and processing of white noise as the sound source which seemed most malleable to various possibilities of the configuration of sound.

I confined the figuration of sound here only to the form of plasticity: bending, warping and changing the band width continuously; which is closer to the music of my own cultural tradition, of Shakuhachi, of Koto. and so on.

Silence and the distance in sonic space are also very important elements in this music related to the above idea. There is a long silence of fifteen seconds before the ending section after the massive, intense layered cluster of twenty-five narrow white noise bands.

This piece led me to compose a larger scale white noise composition with the spatial movement of sound through five speakers with twenty-five channels derived from five-track tape recorders: "ICON on the source of White Noise" (1967).

PULSE FIELD
SoundScape IV
Disc III

Michael McNabb (United States)

Michael McNabb performs his live electroacoustic works internationally, and is a frequent collaborator with dance, film, and video artists. He has received awards from the Prix Ars Electronica, the National Endowment for the Arts, the Bourges Electroacoustic Music Festival, and the league of Composers/ISCM, and his composition *Dreamsong* was named as one of the best works of the last 40 years by the San Jose Mercury News. He now works primarily in his personal studio in San Francisco, California. Other major works include *Invisible* Cities, available on Wergo (WER 2015-50).

1) Dreamsong **9:21** **1978**

Dreamsong is a careful blend of synthesized sounds and recorded natural sounds that have been digitally processed or re-synthesized. The result, termed a *classic* of *the genre* by New Yorker music critic Andrew Porter, is an expressive sonic continuum ranging from unaltered natural sounds to entirely new sounds - *or,* more poetically, from the real world to the realm of the imagination. This widely influential work was one of the earliest to achieve, through the precision of digital processing, a smoother integration of these two elements than was previously possible in either studio-produced electronic music or live performance.

In *Dreamsong,* the listener is repeatedly drown in by references to familiar musical, vocal, and environmental material, only to be transported into a vivid alien landscape by on unexpected and surprising sonic manipulation. Constant transformations of timbre and texture, fluid shifting between familiar sounds and imaginary musical images, and illusory spatial movement 011 combine to powerful musical effect. An extended melodic line odds a strong thread of continuity. *Dreamsong* premiered at the first concert of the then-newly-created Center for Computer Research in Music and Acoustics, in November 1978. The vocal timbres ore based on the voice of soprano Marilyn Barber .

Jean-Claude Risset (France)

Born 1938 (Le Puy, France}. Musical studies (piano with Robert T rimaille and Huguette Goullon, composition with Suzanne Demarquez and Andre Jolivet) and scientific studies (Ecole Normale Superieure, Doctorat es-Sciences with Pr. P. Grivet, 1967).

Works three years with Max Mathews at Bell Laboratories to develop the musical resources of computer sound synthesis: imitation of real timbres (brass synthesis, 1965; pitch paradoxes, synthesis of new timbres and sonic development processes, 1967- 1969}. Publishes a catalog of computer synthesized sounds 0969). Sets up computer sound systems at Orsay 0970 - 1971), at the University of Marseille-Luminy 0974), and at IRCAM, where Pierre Boulez asks him to head the Computer Department 0 975 -1979). Professor at the Faculte de Luminy, University of Aix-Marseille 0979- 1985). Presently "Directeur de recherche", CNRS, works on computer music in Marseille.

1st UFAM piano prize, 1963. Prix du Groupement des Acousticiens de Langue fran~aise, 1967. Winner of Dartmouth International Electronic Music Competition 0970} with *Mutations* I, entirely synthesized by computer. CNRS Medal 0972}. 1st Prize for Digital Music at Bourges International Electronic Music Competition 0980). Grand Prix SACEM de la promotion de la musique symphonique 0981). Honorary prize ARS ELECTRONICA, 1987.

2) Sud **23:56 1985**

Sud was commissioned by the French Ministry of Culture, and realized in 1984 - 1985 at the Groupe de Recherches Musicales (GRM), INA, Paris. GRM, headed by Franscois Bayle, is the birthplace of "musique concrete", pioneered by Pierre Schaeffer around 1948; in addition to analog equipment, it now resorts to the computer to process sounds rather than to synthesize them. The piece is built up from a few sounds, mostly natural sounds recorded near Marseille, and also some computer sounds synthesized in Marseille. These sounds have been processed by computer, using a set of programs developed at GRM by Benedict Mailliard and Yann Geslin.

At the beginning of the piece, the recorded sounds are presented almost as soundscape photographs -but they are most of the time altered by computer transformations. Thus the dynamic flux of the wave profile opening the first movement permeates all three movements. The piece actually resorts to only a few germinal sounds: recordings of the sea, of insects, birds, wood and metal chimes, as well as brief "gestures" played on the piano or synthesized on the computer. These were then transformed and multiplied using several operations: filtering, modulating, reverberating, spatializing, mixing, and hybridizing. Cezanne wanted to "unite feminine curves and hilly shoulders": similarly, cross-synthesis permits to hybridize, for instance, metal and bird sounds. I have used cross-synthesis to impart to one sound the dynamic character of another one -for instance, to give the flux of sea waves to different sounds. Also a major-minor pitch scale (G- B- E- F sharp- G sharp) will gradually color various sounds of natural origin; it will develop into a defective scale and act in the last section as a kind of harmonic grid, somewhat like a eolian harp.

The natural and synthetic sounds are first presented separately. Along the piece, they merge more and more closely, through mixing and processing. Thus real bird songs have been spatialized as well as synthetic bird-like or insect-like sounds. In the third movement, the filtering of birds' caw first appears as a colored echo, later as a genuine bird's *"raga"* using the defective scale. The origin of the many sounds deduced from the germinal material can be ascribed to a “family tree” displaying the sonic proliferation and resembling a rhizome. The arrangement in time of the many sounds implies several levels of rhythm and a logic of fluxes. However, one can imagine a scenario, to be taken only metaphorically:

I. The sea in the morning. Animation of whistling and squawking birds. Synthetic harmonic clouds. Accumulation of hybrid sounds. Heat: real and simulated birds and insects.

II. Call- a bell animated by the sea. Winds, waves, energy flows: a metaphoric tempest.

III. Sea sounds gradually get tuned into a G sharp. The harmonic grid unfolds, animated by various pulses -from programmed gestures, from birds, from sea waves which finally subside.

A more detailed presentation of *Sud* can be found in the *Bulletin du CPRIM,* vol. 11,1987, pp. 6 - 9: Sud, une musique numerique hybride et "naturaliste". Cf. also J.C. Risset:About James Tenney, composer, performer, and theorist, *Perspectives* of *new music* 25, 1987.

COMPUTER MUSIC: WHY?

Jean-Claude Risset

Why resort to the computer, which at first glance seems so unmusical a machine?

I have always been eagerly interested in the musical use of timbre. Timbre is often regarded in music as on auxiliary ingredient, with only cosmetic value, and extrinsic to the genuine musical structure. There is an analogy in the fine arts. A few centuries ago, paintings were often copied as engravings, lacking color, which was only considered a dispensable embellishment: but color can also be used as on essential aspect of the picture. Timbre is also called tone color, and I wonted to give it a more functional role. Not being content to compose with sounds, I longed to extend my compositional activity to the level of the sound structure, to compose my own sounds.

In the early sixties, electroacoustic music already permitted to widely extend the range of sounds available for music. However it did not appeal to me at that time. "Musique concrete", resorting to recorded sounds, certainly provided a huge variety of sounds: but one can only transform those sounds in ways that are rudimentary in comparison to their richness. With electronic music, on the other hand, one has more control over the sounds -but the sounds are very simple and rather dull, unless one submits them to operations which destroy this control. My first compositions were for instruments, and I wanted to give up neither richness of sound nor refinement of control over them.

I have been attracted by computer sound synthesis, first implemented in the late fifties by Max Mathews at Bell Laboratories. In this process, the composer instructs the computer to directly calculate the sound wave, as though it directly engraved the groove of a record. In principle, one can thus produce any sound, without any a priori constraint or restriction. One only needs to provide the computer with a thorough description of the physical structure of the tone one wants: the computer will then convert this description into sound. This gives potentially complete control over the structure of the sound, which can be composed by the user just as he can compose a chord or an instrumental episode. While acoustic instruments are rather stable mechanical structures, yielding sounds with certain specific characteristics, 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, hence capable of suggesting novel musical architectures.

However, these promising resources have to be conquered. In order to manufacture any sound, the computer does need a complete specification of its

physical characteristics. At the onset of computer music, such specifications were not available, even for familiar sounds. Thus a lot of experimentation and research was required to help evoke and control musically the desired sounds. I had the privilege to perform such work with Max Mathews at Bell Laboratories between 1964 and 1969. Early syntheses tended to sound dull and mechanical: it was a challenge to get the computer to sound musical. We first had to try to imitate instrumental sounds, since the descriptions given by Acoustics treatises were grossly insufficient as synthesis recipes. We found that we had to take in account some highly specific modalities of auditory perception. At the same time, we could take advantage of these specific features to create auditory paradoxes and illusions, thus opening new ways to control the sound and its auditory effect.

This exploration of the resources of computer sound synthesis was also carried by other musicians, especially John Chowning at Stanford University; it continues today in many centers, including Stanford, IRCAM and GRM in Paris, and our laboratoire d'Informatique et d'Acoustique Musicale in Marseille. It is to a large extent a scientific research venture, which has brought novel insight into auditory perception processes. Also musical sound was an interesting ground to develop the computer as a refined and differentiated tool, helping each one to carve its own sounds, while it is too often viewed as an instrument of normalization and depersonalization, a useful alibi for certain practices. And the newfound sonic territories are there to stay. The precision and reproducibility of the computer helps making results durable and exploitable by others, at different times and places. I still occasionally take advantage of experiments performed by myself or someone else twenty years ago. Thanks to the progress of microelectronics, computers and digital tools are becoming more and more accessible. Today, most present commercial synthesizers are digital, that is, they are specialized computers, and their resources draw upon the knowledge and know how about sound developed earlier in the course of exploring the possibilities of computer music synthesis.

Resorting to processing of existing sounds may seem easier than synthesis, since one does not have to take trouble injecting some liveliness and a characteristic identity into sounds already endowed with these qualities. However modification of rich sounds can often be gross and exterior. Synthesis allows considerable flexibility and ductility because one can exert control at the source of the sonic construction. Certain computer modifications of recorded sounds can give interesting and novel results due to the very precision of the computer. But in most cases, to perform intimate and flexible transformations, one must resort to elaborate analysis-synthesis transformations, which can be complicated and demanding. Thus, while sound processing is of considerable interest, the musical utility of pure synthesis remains.

But of course the validity of a work of art is by no means guaranteed by the scientific or technical apparatus it resorts to. Pieces of music realized with the computer should be evaluated as such, not as experiments: composing apiece of

music remains an individual venture, for which responsibility and artistic commitment rest upon the author. The music should speak for itself. All I can say is that the computer has helped me come to grips with deeply rooted compositional fantasies: sculpt and compose the sounds themselves; act at the birth of sonic processes and control at the same time the sound material and the musical structure, both in the vertical and the horizontal dimension; suggest an illusory sound world, immaterial yet present, and manage its encounter with the world of real sounds.

~ Jean Claude Risset

John Chowning (United States)

John Chowning was born in Salem, New Jersey, in 1934. He studied composition in Paris for three years with Nadia Boulanger.In 1966 he received the doctorate in composition from Stanford University, where he studied with Leland Smith. With the help of Max Mathews of Bell Telephone Laboratories and David Poole of Stanford in 1964 he set up a computer music program using the computer system of Stanford's Artificial Intelligence Laboratory. This was the first implementation of an on-line computer music system ever.

In 1967, Chowning discovered the frequency modulation (FM) algorithm in which both carrier-frequency and modulating-frequency are within the audio band. This breakthrough in the synthesis of timbres allowed a very simple yet elegant way of creating and controlling time-varying spectra.

Over the next six years he worked toward turning this discovery into a system of musical importance. In 1973, he and Stanford University began a relationship with Yamaha (Nippon Gakki) in Japan, which led to the most successful synthesizer series in the history of electronic musical instruments.

John Chowning has received fellowship grants from the National Endowment for the Arts and was artist-in-residence with the Kunstlerprogramm des Deut- schen Akademischen Austauschdiensts for the City of Berlin in 1974, and guest artist in IRCAM in 1978- 79, in 1981, and in 1985.
John Chowning currently teaches computer-sound synthesis and composition at Stanford's Department of Music and is director of the Center for Computer Research in Music and Acoustics (CCRMA), one of the leading centers for computer music and related research in the world.

3) Stria **17:03 1977**

The composition takes advantage of certain features of the FM algorithm which made it possible to integrate a non-tonal division of the frequency space and the ratio of non-harmonic spectral components. Several levels of the piece are governed by the ratio of the Golden Mean: the microscopic elements of timbre (the ratio of the partials), the ratio of the pseudo-octaves (which are not real octaves but here the pitches and their partials an "octave" apart behave the same way pitches and spectral components of harmonic sounds in the spacing of real octaves do) and the overall form and development. Thus the sounds were not composed simply as spectra determining "timbre", but rather for functional purposes as well. Thus, the inharmonic relationship of simultaneously sounding pitches yield a certain transparency and order in what are normally considered to be "clangorous" sounds. -*STRIA* was commissioned by the Institut de Recherche et de Coordination Acoustique/ Musique (IRCAM), Paris, which Pierre Boulez started in 1975 with the initial help from CCRMA, for presentation in Luciano Berio's exhibition of electronic music at IRCAM in the October of 1977.

MUSIC AND COMPUTERS

John Chowning

I started working on frequency modulation (FM) in 1967.1 played my first experiments for Max (Mathews) and Jean-Claude (Risset) at Bell Labs. about the same time and then I didn't do a whole lot with it for a couple of years. I hadn't really connected my ear to the theory. There were some realizations I hadn't made until 1970 when I thought about Jean-Claude's additive synthesis trumpet examples and remembered how he had described them to me. It occurred to me that I could achieve a similar effect by using the same envelope on amplitude and on index. One could get the increased spread in brightness of a brass-sound as a function of intensity. Before that I had asked George Gucker, a graduate student in Engineering who had a Master's degree in Music, to help me understand how what I was doing could be explained. We went together and looked at a text by Terman, a Stanford professor who had written a book on radio engineering. Gucker helped me understand negative frequency and why we should hear the harmonic components. At that time (1967) it seemed like there were a few cases where it might be useful, for bells and other such sounds.

So the idea just sat. Then in late 1970 I remembered having made drum-like sounds (which are used extensively in *SABELITHE)* and I remembered Jean-Claude's work on synthesizing trumpet sounds. I had the acoustic insight that in both cases there is a correlation between the evolution of the amplitude and the bandwidth of the spectrum and the technical insight that the bandwidth of the spectrum was simply controlled through the modulation index. Someone heard me explain this and thought it ought to be interesting to the music industry. So I talked to Stanford's Office of Technology and Licensing. This office began looking for an organ company which might be interested. One actually sent some engineers to visit, but they didn't understand what was going on. In a last attempt a person from OTL discovered that Yamaha also built organs, and contacted them. Yamaha sent an engineer who happened to be in Los Angeles, who understood immediately what was going on. They took a license on the technology in 1975. While the development of FM was certainly important in the composition of *SABELITHE* the first thing that was interesting to me was the spatial part, the aspect of projecting sound images in space. That was very powerful for me. The research on moving sounds in space began in 1965. I did those first spatial examples with clicks and pops, ordinary tones that had sharp envelopes that seemed to work, but there was no internal life in any of these sounds. I did some little examples until I really felt comfortable with the beginnings of FM. I had this feeling of incredible intensity in the sense that in all these years -from 64 to 71, which is when *SABELITHE* was finished -all that I had learned was packed into those five minutes of music, timbral interpolation which I had been thinking about and spatial localisation.

And so to the technology, getting the DACs together and once they were there the space program to work, they all converged in this piece. *SABELITHE* was actually my first piece since the beginning of my work with computers (I had started computer music at Stanford in 1964). Leland Smith had put together SCORE (a note-list generating program) which was quite an accomplishment; I could not have realized *SABELITHE* without SCORE; One would create an input to SCORE, which was much more powerful than Music IV at the time, which in turn would create the note-list. The next step was to run it through the FM program which I had written for MUS which became MUSIC 10 (a software synthesis program) for the PDP-10 written by D. Poole and Tovar and through the function generators I had written. Then I waited and waited and waited for the computation of the sound samples. The system for software synthesis was basically the same as now-a-days. Of course the control was much more primitive and it took much longer, a lot longer. That's why so little music was done. I never had a total run of the piece because there wasn't enough memory to contain all the samples. I did five or six sections, these sections were then written on the disk. When they were finished we had to convert them and record them onto a (four track) Scully tape recorder. I worked on the first version of *SABELITHE before* the *Artificial Intelligence Lab* moved from the old IBM 7094, which was connected via disc to the PDP-1, to the PDP-6 which was the first of the DEC-10 36-bit machines. So of course all of the pro- grams no longer worked, so that the piece for two instruments and tape never got realized. The IBM 7094 -PDP-1 system was interesting, in that it was, I believe, the first on-line computer music system in the country (and the rest of the world). At Bell Labs. (where Max Mathews had done the first digital sound synthesis) they wrote a tape on their big machine, took it to a specially built device which read from this standard computer tape and which did the sound conversion. The punched cards were used to program the initial computer as was the case at Stanford, except that at Stanford the IBM wrote on to a disc which was shared by a PDP-1. This PDP-1 had this DEC-Scope. The IBM wrote to disc, the disc was shared by the PDP-1 which was used as a buffer, just a way to manage the samples continuously, actually not bad: 10 kilohertz per channel. And these bits were converted by the PDP-1 DEC-Scope's 10-bit x and y coordinates. I connected alligator clips and they became audio channel A and channel B.

In the summer following *SABELITHE* n971) I wrote the dynamic space program including the Doppler shift so that the sound-path could be controlled by a function. An engineer had built a little arm that had a pot at two positions so that you could move this arm and it would move a pointer on the screen, like a modern day "mouse". He helped me to write a program to plot the points, and from that I figured out how to generate Doppler shift on the basis of distance between points. I thought the nicest thing would be to do it manually, but finally I decided that the Lissajous figures were much more beautiful. I was trying to draw something, with this arm, when an engineer next to me said "Oh, it looks like if you did that maybe as a Lissajous figure… " and then I interrupted to ask

what a Lissajous figure was, because I didn't know what such a figure was at the time. He explained that any phase relationship between a sine and cosine projection generalizes to a Lissajous figure. So that's typical of the way that I learned, nothing very formal, just by asking questions. I experimented with these Lissajous functions, they were so beautiful. And I made double Lissajous, I simply tried, not knowing what would happen and they were even more beautiful. So that's what I used in *TURENAS* (as functions for spatial paths of the moving sounds). And they were much more graceful than that I could have imagined or done by just drawing with a mouse. And once they existed, they became very much part of what I could imagine. And I think that's some of the wonderful part of art making contact with technology, connecting your art with another domain. If you talk to a composer who has written for fiddle all his life you know pretty much what he can imagine, or she can imagine. But if you talk to someone who has perhaps never written for fiddles, but has thought a lot about graphics and you are thinking about sounds in space, then there can be some connection that can't be imagined otherwise, I think.

I think I and Martin Bresnick had suggested to the department (of music) that they invite Ligeti when Leland (Smith) was going on sabbatical (leave). That was in '72. So the department asked him, and Ligeti came. I am sure he knew nothing of our work, so it was not for computer music that he came. He explained that he had received this invitation from a university in California. He hod never been there, he thought it would be warm and sunny, and he needed time to work on his commissions and he was over-commissioned and so he accepted. He was there for some two or three months before he ever visited the old (AI) lab. And it was only then because Charles Stein - an American pianist who specialized in Schoenberg and the Viennese school, wanted to see the computer music lab. Now, I had spent time with Ligeti and he knew that I was interested in computers but he had never been to the lab. Ligeti came and I played *SABELITHE in* our little office with bad speakers. Then a few months later I finished *TURENAS* and Ligeti attended the first performance at Stanford. Later, Ligeti who had already been scheduled to give a lecture at the Berlin festival and at Darmstadt (Internationale Ferienkurse fuer Neue Musik), asked Bachauer in Berlin and Thomas in Darmstadt if he could bring this Californian guy. As I was going on sabbatical leave, I went to Berlin and Darmstadt with Ligeti where I explained FM synthesis and played my pieces. Before I left I did a few experiments on inharmonic spectra, just tones that I would generate, trying different numbers, squareroot of two, that was interesting, pi, that wasn't because it is so close to 3 :1. I had read in context of my music theory teaching about Bartok and the golden mean and the Fibonacci series. This was in my mind, so I tried ratios between carrier and modulating frequency of the golden mean. It seemed to be different and not familiar, not bell-like particularly. Then I went away and was left with these sounds while I wrote the FM paper in some little Italian port where I was looking for a sail-boat that my family and I could live upon. Then I was notified by Stanford while I was away on sabbatical that I was not promoted to a permanent position, so therefore, I had to find another job.

That's when I was recommended (it must have been Ligeti) for the DAAD grant (from the Deutsche Akademischer Austausch- dienst -Kuenstlerprogramm for a stay in Berlin). Ligeti was an amazing person. At some point, when I was in real need he pulled out of his pocket 500 Marks; he is extraordinarily generous. I think that people who have been poor and then become pretty well off as Ligeti is now, also become either avaricious or extraordinarily generous. Ligeti is one of the latter. So in 74/75 I was in Berlin and I had a whole lot of time and no computer music system. At the Technical University there was a PDP-1O that I could use but that had no converter. So I gained some theoretical insight into the spectral possibilities of the golden mean and the tuning system while using that computer. I formulated the basic idea for *STRIA.* When I came back to Stanford in the late part of 75, that's when Pierre (Boulez) and the formative group of IRCAM came, John Grey, Andy Moorer, Loren Rush and I gave this summer workshop for them. I then began working on *STRIA.* I think *STRIA* was the most fun piece I have ever composed. It was all with programming and that was incredibly enlightening to me. Andy (Moorer) showed me how to write a SAIL-program (Stanford Artificial Intelligence Language). I said "Show me how to write a play-statement or a note-list statement so I can see how you write it and how you get it in and start from the beginning ..: and from that I wrote the program for *STRIA.* With a lot of help. It was essentially a personal experience - you know, how it is: you get help and you ask questions and get answers, that extend far beyond the question, it was such an engagement. Everything that happened (in the course of the composition) was in some neat little cell and I could change that and things would be different. And there was no random number generator that I had to worry about. It was absolutely deterministic. There is not a random number generator in that piece, which is not true of *PHONE* or *SABELITHE* or*TURENAS.* So it felt engaging in the sense that all this was within a programming language and maybe a sort of naive use of it but with very compelling musical feelings about how to use it. And then this idea of spectral relationship and frequency division and controlled beating; if something is ever so slightly apart, one component from another, then it'll beat, just a little of frequency skew and it will beat. And if they are always changing a little bit then the beating will always be in flux. "

PHONE was mostly motivated by Mike's (Michael McNabb's) DREAMSONG. He had done these simple vocal tones with just waveform-synthesis, let the waveform synthesis be tracked according to the fundamental pitch trajectory, and it all sounded real. When I went to IRCAM in 79 I thought as a way to get going on the IRCAM system which was a PDP-10, I would try to do sung vocal tones with FM. At that time Xavier Rodet and Gerald Bennet were working on what was later to become known as CHANT, now CHANT-FORMES (a special synthesis program). And incredibly quickly I was able to synthesize fairly good soprano tones. I was seduced by it, I got more and more interested in them, and I got into this spectral fusion stuff and what made things sound natural. In four weeks I had the basic sung vocal tones and in another six months I had fairly convincing realistic tones. And then I did these transformations (like from inharmonic bell-

like sounds to vocal-like tones), kind of as an experiment. I was at IRCAM from December 79- August 80. And from the time I got back (to Stanford), from the end of August until February of '81, I did nothing but work on *PHONE,* except for a couple of days at Christmas. I learned most about composition and programming while working on *STRIA,* though I didn't accomplish what I believe I have understood, but about acoustics and perception I may have understood more in *PHONE.*

I don't think that a whole lot has changed over the last ten years. What one can do certainly is greater in the sense that things are a lot faster and the means we have are more powerful. Every piece that's done I think advances music. If we listen to it, it must, if it doesn't, we haven't listened, or we listen, but we don't hear. If we listen to what's done, that must advance music. But that's inevitable. As far as the capabilities are concerned, I mean what I guess I wished I could have done ten years ago was not different than what I wish I could do now.

I think FM is just a technique and it is useful of the extent that it is appropriate. FM is good for what we're able to make it do. I certainly understand its value in the world of industry and I certainly understand it in the world of composition. It is a very efficient way to get complex tones. It's nothing more or less than what it is: additive synthesis adds, FM-synthesis FMs, subtractive synthesis subtracts each having its own unique attributes. If it is efficient to do massive additive synthesis because computational devices are much more efficient themselves, then one does it. FM was finally attractive because it allowed us to realize something the ear desired and with efficiency, not everything the ear desired, but something the ear desired. And if memory is enormously cheap and computational powers are enormously cheap and fast then one can do software synthesis with very great efficiency, then we'll do more of it. There is no doubt about that. The musical idea will change in regard to what's available, and what's available will change to some extent in regard to what one wants. Technology is also leading our ear. Let's assume that some composer would say "there is nothing that I'll ever hear that I couldn't have imagined" - I would disagree. There is a lot that we will hear that we ourselves could not have imagined but for the fact that we were in contact with technology and one another. Our intellect leads our perceptions and our perceptions lead our intellect, and given any point in time it's one or the other. The idea of *STRIA* was initially an aural phenomenon, but then it became an intellectual one which led my ear further than I possibly could have heard.

The interview was recorded on May 8, 1987,
transcribed and edited by Johannes Goebel

Eric Lyon (United States)

Eric Lyon composes in digital, acoustic and hybrid media. He is a founding member of the annual Bonk Festival of New Music. His compositional aesthetic is dedicated to non-linearity and extra-terrestrial reference. Lyon has taught computer music at Keio University, the Academy for Media Arts and Sciences (Gifu, Japan), and currently teaches in the Dartmouth Music Department. His song cycle *White House 1980* was recently performed at UMass Dartmouth in an arrangement by James Bohn, and his latest contribution to music theory is a paper on the electronic counterpoint of Aphex Twin, delivered to the Experience Pop Music Conference in Seattle.

Lyon's music and sound manipulation programs may be found at http://arcana.dartmouth.edu/~eric.

4) FrM **7:25** **2002**

FrM is dedicated to F. Richard Moore, a great teacher with the ability to clarify and illuminate the mathematics of digital audio signal processing, and to indicate its musical significance. The source materials consist of a small set of synthesized tones, each 23 seconds in duration, created with algorithmically designed Frequency Modulation networks. The tones were subjected to chains of oracular processing, resulting in unpredictable emergent musical behaviors. Finally the materials were assembled according to both algorithmic and intuitively derived formal schemes.

During the later stages of composition, I was guided by the images and text of "Raku Art and Technique" by Hal Riegger, in his descriptions of the techniques of shaping, firing and glazing in experimental American emulations of the ancient Japanese art. Riegger observes of raku the "emphasis on meditation and quiet contemplation as a means of developing awareness of the inherent beauty of the non-perfect asymmetrical form. It celebrates the excitement of surfaces which derive their character from nature-inspired phenomenon".

FrM was composed on the the Djerassi property in Woodside California, a place of great natural beauty. It seemed strangely appropriate to create a work in this environment with exclusively synthetic, digital materials, sounds that had no origin in the physical world, except perhaps in the imagination of the composer.

Mushroom – An Oracular Sound Processor

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Introduction

Composers of digital music today have a bewildering variety of sound-processing tools and techniques at their disposal. At their best, these tools allow composers to hone a sound to perfection. However, they can also lead us into a routine which bypasses avenues of experimentation, simply because the known tools work so well and their sonic output is so attractive. An alternative strategy is oracular sound processing. An oracular sound processor creates a derived version of its input whose characteristics could not have been fully predicted, while affording the user little or no parametric control over the process. Thonk [2] is a good example of an oracular processor. Mushroom is another such processor.

Mushroom

Mushroom controls and archives hierarchical, sequential processing of sound. Central to the operation of Mushroom is the reduction of processing to its most basic components - input and output sounds. Mushroom requires that all processes be implemented in terms of input and output, with any parametric choices made internally by the process. For example, if a process ring-modulates a sound, it must also algorithmically select the ring-modulation frequency. This requirement makes all sound processes interchangeable. The crux of Mushroom's work is to assemble a random sequence of these processes and apply that sequence to an input sound, creating an output sound.

Random sequential processing of sound is the basic operation of Mushroom. In its simplest model, an input sound is presented to Mushroom, which selects a random series of processes, applies them to the input sound, and produces an output sound. This itself is quite useful as a one-shot oracular process. However Mushroom provides further operational structure. Rather than specifying an input sound and receiving a single output sound, the user specifies an input sound, a desired number of output sounds, and the processing level. Each of the derived sounds will be created from a different random sequence of processors. The processing level is based on the idea of a familial relation among derived sounds. The original input sound is defined as level 0. All sounds derived directly from this sound are at level 1. The first run of Mushroom on an input sound must be at level 0. After that run, there exists at least one derived sound at level 1. Requesting a new Mushroom run at level 1 results in Mushroom randomly selecting a sound from all level 1 sounds, and creating a new sound at level 2. That process is repeated for the requested number of output sounds at level 2. At higher levels, the sounds are more

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[2] http://www.audioease.com/Pages/Free/FreeMain.html

highly processed. They are less recognizably related to the original input sound, but they collectively embody complex sonic interrelations among all the sounds at the different levels. These relationships are then available to the composer to contemplate and perhaps exploit.

In addition to the basic operations described above, Mushroom implements a few conveniences. Since Mushroom archives all processor sequences, the user can discover how any sound was created at any level. By calling a utility called Mushmimic, the user can specify a derived sound, and request that Mushroom apply the sequence of processors that generated the derived sound to a new input sound. Mushroom also facilitates deleting unwanted derived sounds, which then become unavailable for further processing.

Implementation

Mushroom is written in Perl, and runs on Linux or any other Unix system. The Mushroom Perl scripts are designed to operate on a given input sound in a directory. The program first looks in the current directory for preference and processor files, and creates them if they are not found. The preference file specifies how many processors to run in a single random sequence. The default is three. The processor file contains a list of available processes. Once this information is loaded, Mushroom begins to create derived sounds. First an input sound is selected. If the run is at level 0, this will always be the original sound. At any higher level, an input sound is randomly selected from available sounds at the next lower level. Then a series of processes is selected from the processor list. Finally, the processors are applied by calling Perl functions named after the processes.

As an example, suppose the first process selected is rev1. This is the function that calls rev1:

```
sub rev1_mproc {
   local ($insnd,$outsnd) = @_;
   `rev1.pl $insnd $outsnd`;
}
```

Mushroom knows nothing about the Perl script “rev1.pl” except that its two parameters are “name of input sound” and “name of output sound”. The script “rev1.pl” must exist in some directory where Perl can find it. Here is “rev1.pl”:

```
#!/usr/local/bin/perl
$HOME = $ENV{"HOME"};
require "$HOME/PERL/libperl.pl";
($insnd,$outsnd,$dry,$tail,$gain) = @ARGV;
defined $outsnd || die "insnd outsnd [dry tail gain\n";
#SET DEFAULTS IF UNDEFINED
$dry = $dry || .3;
$tail = $tail || 1.5;
```

```
$gain = $gain || 1.0;
# PATH OF THE Csound ORC
$proc = "$CSDIR/REVERB/rev1";
$nchans = &getchans( $insnd );
if($nchans == 2 ){
   $instr = "i1";
} else {
   $instr = "i2";
}
$snddur = &getdur( $insnd );
$dur = $snddur + $tail ;
$score = $proc . ".sco";
# CREATE Csound SCO
open( SCORE, ">$score");
printf SCORE "$instr 0 %.5f 1 0 %.5f %.5f %.5f .01\n",$dur, $gain, $dry,
$snddur;
close( SCORE );
#RUN Csound TO GENERATE PROCESSED SOUND
`csio.pl $proc $insnd $outsnd`;
```

Note that this script is not autonomous, but relies on other scripts and processes. This reverberation process is implemented in Csound. But other processes are implemented in C, and could also be implemented in any acoustic compiler that does not require interactivity or communication through a GUI. The various programs used in even a single process may be scattered all over the system, but Perl brings them together and Mushroom harvests the results.

It is easy to add new processes to Mushroom. First one creates a script which performs processing, and whose only parameters are input and output soundfile names. Second, the name of that process is added to the processor list. Third, a calling function is added to Mushroom. Suppose we create a processor script that stretches a sound, and call it “stretch.pl”. We add the word “stretch” to the processor list and create a calling function named “stretch_mproc” which looks like this:

```
sub stretch_mproc {
   local ($insnd,$outsnd) = @_;
   `stretch.pl $insnd $outsnd`;
}
```

We’re done, and now stretch is available to Mushroom as a process that may be randomly inserted into a sequence.

Musical Applications

I have used Mushroom primarily to generate sounds that are then deployed in tape music through traditional mixing methods. There is also a stripped down version of Mushroom

written for Max/MSP that is limited by the real-time computational capacity of the computer. Finally, I designed a web site where visitors could create apply Mushroom to synthetic sounds. There are many other possibilities for sound installations and not-quite-real-time streaming projects. The design for Mushroom could also be modified to incorporate various forms of expert knowledge, and could work in conjunction with a database that automatically extracts salient features from derived sounds.

Conclusion

Mushroom is a highly effective and enjoyable oracular sound-processing tool, creating complex sounds that have found their place in my own compositional work. There is a characteristic Mushroom "sound" which is highly processed. However the specific nature of the sound is entirely dependent on the available processes which Mushroom deploys. Through adding and deleting available processes the behavior of Mushroom may be personalized while still preserving its oracular function.

PULSE FIELD
SoundScape IV
Disc IV

Kyoko Kobayashi (United States)

Kyoko Kobayashi (b. 1979) graduated Berklee College of Music as a Music Synthesis Major. She is currently pursuing graduate studies in the Electro-Acoustic Music program at Dartmouth College.

1) Evocation of Times Gone By **3:09** **2002**

Evocation of Times Gone By is composed of processed sounds of daily life and my cat playing on the piano. This piece was first programmed in The New Music Festival 2001 at Dartmouth College.

2) Egg **2:45** **2002**

Egg is composed of sounds of egg cracking. At the time of composition, I was thinking of how fascinating it is that so many different dishes can be made from eggs. I took the opportunity of making a quiche (uses many eggs) to record the sounds.

3) Recombination Study **3:17** **2002**

Recombination Study is composed of two themes that are transposed and recombined. In this piece, I wanted to explore the subtle difference that occurs when sounds are combined at slightly different pitches.

4) Westland Ave. **5:00** **2002**

Westland Ave. is the name of a street that I have lived on for a year in Boston. The process of creating this piece was like flipping through pages in a diary, and all at once, remembering so many things that happened.

David R. Mooney (United States)

Born 1949 in Newport News, Virginia, USA. Self-taught composer of computer music. In the mid-sixties through college, Mooney experimented with various kinds of tape manipulation. After digressing for two decades through writing and visual arts he returned to music in the early 1990s. Performances include the New Electroacoustic Music concert of the 1997 -1998 and 2001-2002 Music on the Edge series at the University of Pittsburgh; a pre-opening concert at the Electronic Music Foundation's Engine 27 performance space in New York in 1999; the International Computer Music Conference in Beijing (ICMC99); the year 2000 Shy Anne Sound and Video Festival in Tacoma, WA.; Electronic Music at Lewis 2001 Festival, Romeoville, Illinois; Logos Foundation Summer Concerts, Gent, Belgium, 2001; ICMC2001 in Havana (listening room); and Electronic Music Midwest, Kansas City, 2002. Broadcasts include Works from the Fringes of Sonic Expression on WMBC, Baltimore; Kalvos and Damian's New Music Bazaar, 2000 and 2001; a 2001 broadcast on BiP _Hop Generation, Radio Grenouille, Marseille, Inner Space on Radio Student in Zagreb, 2002, Sonic Stratosphere on KSER in Seattle, 2002, and

Where's the Beat? on CKUT in Montreal, 2002. Mooney's 24 part work *Rhythmiconic Sections* is available on the Arizona University Recordings (AUR) label. Mooney composes in his personal studio in Pittsburgh, PA, USA.

5) The Ancient Chinese Enclosing Game 30:00 2002

The Ancient Chinese Enclosing Game is a compositional matrix of prepared sound from which compositions of any length can be extracted. It represents a continuation of my efforts to devise a way of composing that manifests the patterns and cycles of life, the constants that underlie the quotidian drama upon which we tend to focus. A great majority of "serious" Western music is structured as narrative. There is a beginning, middle, and end. Tension builds and is released and resolved. This approach has carried over into the various genres of "electroacoustic" music. Music from many other parts of the world, however, uses rhythm and pattern as primary structural elements. Key among these for my purposes is the idea of polyrhythms as practiced by drummers. Beats of various duration are layered to form a complex whole, much as the cycles of life are layered: heartbeats, the revolving planet, waves on the beach, the ebb and flow of traffic during the course of a day, etc.

The Ancient Chinese Enclosing Game compositional matrix makes use of the concept of polyrhythms by providing a structure of layers, each of which is divided into segments .of different lengths. There can be any number of layers. Any kind of sound or silence may be inserted into the layers. The only conditions are that the layers are of the same overall length, their divisions must line up at the beginning and ending of the matrix, and global cycles within a layer (morphologies of sound such as timbre shifts, volume level, pitch changes, etc.) must also end where they began. The layers may be shifted incrementally (by the length of their time divisions) in either direction by any amount desired. The structure, therefore, remains constant while the details of the musical content change, and the entire matrix can be seamlessly looped regardless of the positions of the layers. Short compositions can be extracted from the matrix by selecting a start point for each layer, such as the twelve segment of layer four, the 20th segment of layer six, etc., realigning the matrix accordingly, and recording the results for the desired length of time.

The Ancient Chinese Enclosing Game single play version. This is the entire 30 minute matrix with a one minute fade in and fade out, designed for performance as a "piece."

The sounds for this first use of the matrix is derived from readings from an unpublished novel, also called *The Ancient Chinese Enclosing Game,* which depicts

Joseph Waters (United States)

An active composer of acoustic, electro-acoustic and inter-disciplinary works, Joseph Waters belongs to the first generation of classical composers that grew up playing in rock bands. His works span the genres of both live performance and electronics. The performance elements include traditional acoustic instruments from around the world (such as compositions for the Chinese Zheng and Japanese Koto as well as traditional European instruments), electronics, "live" experimental film scores and chamber music. He is composing an on-going series of duets for solo virtuoso acoustic instrumentalist with live electronic accompaniment as well as works for ensembles of all sizes — chamber to symphonic. He received his B.A. in composition at the University of Minnesota, his M.M. in composition at Yale University, and his Ph.D. in composition at the University of Oregon. He is Assistant Professor of Music at San Diego State University.

I am for celebration, as much as possible, whenever possible. (J.W.)

6) Heart of Mephisto 10:34 2002

The intention was to create pulse music based on sounds and rhythms produced by living organisms. The heart changes mood constantly, its beats are rounded at the shoulders – lub – the heart in systole —dub—the heart in diastole. Such a precisely and oh so sensitively imprecise pump. A pump! Unglamorous word! Sewage pump – sump pump — blood pump. The closure of the mitral and tricuspid valves makes the first heart sound. Closure of the aortic and pulmonic valves finishes the cycle — four valve pump — what flows through it? Rivers, thoughts — rivers of thoughts — plans — conceits — desires!!! — hate!!— revenge— plans— plans— —PLANS—love—tenderness—quiet morning by a lake—a hummingbird flutters through the slender passages, hovering momentarily in the thin chambers then shooting through— sleepless nights—raging torrents—thick red sewage—magma—molten subterranean fire— SystoleDiastole—SystoleDiastole—SystoleDiastole
finally
the heart at peace
stops

Lucio Edilberto Cuellar (United States)

Lucio Edilberto Cuellar C., born in Santa Fe de Bogota, Colombia, began musical studies at the conservatory of the National University of Colombia in his native city. In Colombia, his major professor was Eduardo de Heredia. In 1979, he moved to the United States, where he completed a Bachelor degree in piano performance at Kennesaw State University in Marietta, GA and a M.M. in music composition at Georgia State University in Atlanta, GA. Dr. Cuellar holds a DMA in composition from the University of North Texas where he was a Teaching Fellow from 1993 to 1996 as well as a recipient of the of the Merril Ellis composition scholarship up to 1997 and adjunct teacher between 2001-2002. Dr. Cuellar studied composition with Steve Everett, Charles Knox, Susan Tepping, Tayloe Harding, Phil Winsor, Larry Austin and Jon C. Nelson. Dr. Cuellar works with algorithmic composition, sound synthesis, multimedia video pieces and music for acoustic instruments.

7) Android **5:58** **1999**

(*Program notes unavailable.)*

PULSE FIELD
SoundScape IV
Disc V

Mike McFerron (United States)

Mike McFerron is an assistant professor of music and composer-in-residence at Lewis University in the Chicago area. He received a doctor of musical arts in composition from the Conservatory of Music at the University of Missouri-Kansas City in 2000. He has been on the faculty of UMKC and the Kansas City Kansas Community College, and has served as resident composer at the Chamber Music Conference of the EasU Composers' Forum in Bennington, Vt.

McFerron is founder and co-director of Electronic Music Midwest, a festival of electroacoustic music (formerly "Electronic Music at Lewis"), and he hosted the Kansas City Festival of Electronic Music (2000). McFerron has been a composers fellow at the MacDowel1 Colony (2001), June in Buffalo (1997), and the Chamber Music Conference of the EasUComposers' Forum in Bennington, Vt (1999). McFerron has won the Lousiville Orchestra Composition Competition (2002) and was a recipient of the Chicago Symphony Orchestra's "First Hearing" Program (2001). Recently, he was chosen the winner of the *Cantus* commissioning/residency program. McFerron has also received an honorable distinction in the Rudolf Nissim Prize (2001), and he has won the UMKC Concerto-Aria Composition Competition. Additionally, McFerron has been a finalist in the 2002 Swan Composition Competition, the 1999 Salvatore Martirano Composition Contest, and the 1997 South Bay Master Chorale Choral Composition Contest. His music has been featured on the 2001 SCI National Conference, SEAMUS National Conferences, the 9th Annual Florida Electroacoustic Music Festival, Spring in Havanna-2000 in Cuba, the MAVerick Festival, several SCI regional conferences, and concerts and radio broadcasts across the U.S. He has received commissions from The Chamber Music Conference of the EasUComposers' Forum, Nelson-Atkins Museum of Art in Kansas City, Jesus Florido, Thomas Clement, Andrew Lang, Sumner Academy of Arts and Science, and twice by the Metropolitan Youth Symphony Orchestra.

I hope that my music takes listeners on an emotional journey which leaves them exhausted.

1) Tape Music to Accompany “Plaid is 2% Truth 5:58 1999

This composition for tape alone is entirely rooted in the importance of the creative process. My process was based on the same process Kaleb Bowman used while creating a particular painting titled "Plaid is 2% Truth - #2." In this work, I conceived a global shape and worked towards control over local level issues. In essence, the sum for me is greater than its parts. Just as Kaleb's painting started with limited palette of colors, my composition utilized only three recorded samples which were manipulated in Csound. The composition was mixed in Digidesign's Pro-Tools at my home studio in Kansas City, Missouri.

Christopher Arrell (United States)

Chris Arrell began his composition studies at the age of 21 after seeing a symphonic concert for the first time. Arrell's principle teachers are Tristan Murail, Roberto Sierra, Steven Stucky, and Dan Welcher. After receiving his doctorate from Cornell University in 2002, Arrell joined the faculty at Clayton College and State University as Director of Composition and Theory.

Performances include those given by newEar, Judith Kellock, Ensemble Green, the Aura Ensemble and members of the California E.A.R. Unit at venues such as the Bowling Green New Music & Art Festival, Aspen, the Pacific Contemporary Music Center, Music99 and CalArts. His *Reel,* for tape, has aired throughout the Americas and abroad, once causing an audience member suffering from vertigo to become violently ill, and is available from Electroshock Music (ELCD 006). The same label will also include *I'A* II *is for Andiamo* on Volume vm of *Electroshock Presents: Electroacoustic Music.* In 2001, Arrell received a commission from the Fromm Music Foundation at Harvard University. Ensemble Sospeso will premiere the work during their 2003-2004 concert season.

2) Reel **4:41** **2001**

Reel explores the relationship of aural cognition to the perception of musical form. All material is generated from a single sound source and is arranged to progress from the highly abstract to the familiar.

3) "A" is for Andiamo **2:01** **2001**

"A" is for Andiamo is a short, comical work based on foreign expressions common to American English. Most of the expressions reference love, and, indeed, the creative impulse for this piece comes from my relationship with my friend and spouse, Lisa Leong. My special thanks to Marion and Jennifer Forest for their kind permission in using "Culturally Speaking" as source material. Text used by permission of Marion Forrest. "Culturally Speaking" @ 1986 Marion Forrest.

Brian Hansen (United States)

4) Excerpts from BRAIN **14:49** **1999**

Robin Julian Heifetz (United States)

Heifetz earned a doctorate in composition in 1978 from the University of Illinois If where he studied with Sal Martirano, Herbert Brun and Scott Wyatt. He served as a composer-in-residence at Stiftelsen EMS Stockholm, Colgate University, Sonic Research Studios of Simon Fraser University, Samuel Rubin Academy of Music of Tel-Aviv University, Institute for Psychoacoustics and Electronic Music (IPEM) of Ghent State University, Sweelinck Conservatorium, and Audio-Digital Laboratories. In the 1980s he served as an assistant professor as well as the director of the Center for Experimental Music at the Hebrew University of Jerusalem. From 1987 -1998 he was a contributing editor for *Journal SEAMUS* and his book *On the Wires of Our Nerves: The Art of Electroacoustic Music* was published in 1989 by the Bucknell University Press. His articles have appeared in *Interface-Journal of New Music Research, The Journal of Musicology, Music Review* and *Journal SEAMUS.* His recent digital works appeared on the CDs *Electroshock Presents: Electroacoustic Music - Volumes II, Vand VII,* Electroshock Records (Russia). He presently serves on the faculty of Antelope Valley College in Lancaster, California.

5) Falling off the Edge **8:54** **2002**

Falling off the Edge is a digital work created between 2001 and 2002 in Robin Julian Heifetz' home studio as well as Palette Music Studios in Burbank, California, U.S.A. The hardware was the Macintosh 9600 and G3 Accelerator 400/200. The software involved Digital Performer, Digidesign and Pro Tools 5.1.3. The principal sound generators were two Akai S1000PB Samplers, the E- mu Morpheus Z-Plane Synthesizer and the Korg Wavestation *ND,* among others. Digital processing was accomplished through the use of Waves Doppler Auto, Waves

Enigma, Waves Renaissance Reverb, Waves True Verb, Digidesign Audiosuite Reverse and the Roland VP-9000 Variphrase Processor. Its spirit is based on a poem of the same name created by the composer:

I'm a number greater than or equal to,
And less than or equal to all the numbers in a given set.
I accumulate points whose movements trace lines
Like rain water collected in the drainpipe.
Its coordinates serve as continuous functions of
A deceptive trick gone awry .
Its points of alternate teeth cause me to descend under the force of gravity
And in opposite directions I deviate from the heading,
Toppling beyond limits prescribed.
I am bound for disaster,
Falling off the edge.

Computer Music Warmware:
The Human Perspective

Robin Julian Heifetz

I am a composer. With one exception, I have composed only electroacoustic music since 1977. In order to explain why this is 1he compositional milieu in which I choose to function, I must address a very profound psychological need. I can sit at home in my study, with score-paper, pencil and other necessary implements, attempting to compose a work for orchestra (I must add here that this is a task I have successfully undertaken in the past on more than one occasion). Unfortunately, in this context I am not really dealing with music itself but with dots, lines and other symbols that serve to represent my musical ideas- to suggest otherwise would be clearly nonsensical. I wish to present an appropriate analogy from the plastic arts. Imagine a sculptor with clay: he sees it, touches it, and fondles it. When I compose music, I also need to touch and fondle my material. This sensual, interactive quality, so lacking in the com- positional act of instrumental and vocal music, is a principal feature of both analog and digital electroacoustic media and the principal reason for my dedicated involvement in this field of endeavor.

In this special environment, my senses are aroused as never before. My musical appetites are indulged, and I do not walk away hungry and emaciated as I might if I were sitting at home writing dots and lines. I do not wish to convey that one cannot derive sufficient nourishment while engaged in the act of composing instrumental and vocal music, that I am given to the unrestrained indulging of my appetites, or that I remain unmoved after listening to more conventional media but rather that I am experiencing a frenzy of poetic inspiration and rapturous delight for the first time in my career, and I need not apologize to those opposed to contemporary modes of musical expression who feel compelled to describe sensuality and the exaltation that results as something not in accordance with the propriety of "accepted" musical behavior.

These wretched souls react in this manner because composers involved today in electroacoustic music-and especially in computer music (which is my area of specialization) - suffer from a serious malady whose pathology can be observed in the tendency to focus attention almost exclusively upon technological rather than musical matters. As this prevailing tendency invariably saps music of its potency and beauty, then why do these individuals adhere so perversely to an approach that cannot possibly satisfy aesthetic requirements or exhibit taste, discriminating judgment, and musical sensitivity?

When we speak about computer music, the word "computer" functions grammatically as a qualifier - that is, we are not talking about musical computers,

because computers are not musical - in fact, computers are defined as artificial intelligence systems, which means that they are stupid as well. This suggests that only composers are disposed to creativity, and computers are unquestionably as dumb and as wanting in artistic imagination as any concert-grand piano.

The major cause of this malady is the fact that many colleagues simply think otherwise. The adamant refusal to acknowledge this state of affairs can be observed when they refer to their works as "computer-generated." It is not possible to sidestep the undeniable truth: compositions are *not* computer-generated-they are composer-generated! When a composer writes an orchestral work, he does not refer to it as "orchestra-generated." The term "generated" requires as a necessary condition a vital and natural creativity, free from affectation and constraint; and, according to the foregoing remarks, it follows that the computer functions in a completely different capacity, albeit an important one. This capacity enables the composer to concentrate upon more creative concerns by obviating the purely technical preliminaries so characteristic of the analog electroacoustic studio set-up, eliminating details that normally encumber the compositional task, and allowing him to work more efficiently in an environment conducive to exploration and adventure.

Listeners crave arousal and radiance of beauty. They need to be inspired with courage and hope. Unfortunately, many composers active today in the world's most technologically sophisticated centers for digital electroacoustic music produce material evincing few of these essential attributes. This is indicative of the fact that the most advanced digital hardware and software cannot camouflage a composer's lack of talent and imagination. In other words, "You've either got it, or you don't!"

In addition to this obsessive behavior of composers, a central problem yet to be tackled is one in which computers are perceived as machines by non-composers. It would be appropriate here to present two typical dialogues:

> "What instrument do you play?"
> "The computer."
> "No, seriously, what do you play?"
> "I play the computer."

With that final affirmation, the conversation comes to a grinding halt. Occasionally, musicians who know I am involved in elecrotroacoustic music will inquire:

> "What instrument do you play?"
> "The computer."
> "No, seriously, what do you play?"
> "I play the computer."

Experiencing a sense of frustration at what appears to be a futile situation, they persevere with:

> "OK, Robin, you want to be manipulative?
> Then tell us what *regular* musical instrument do you play?"
> I in turn ask with Talmudic flair:
> "Why is the computer *not* a regular musical instrument?"

At this juncture they surrender and the dialogue ends. To clarify my point, please indulge this allusion to technology. I should like to describe a mechanical apparatus with which I am quite familiar and whose configuration is most labyrinthine. It consists of sundry interrelated parts with separate functions, and these are used in the performance of a special kind of work: (a) it has almost ninety switches, which, when pressed, trigger a corresponding number of devices not unlike hammers (both in appearance and function); (b) once these hammer-like contrivances have been activated, they come into contact with rigid bodies that are forced from a state of equilibrium and begin to fluctuate repeatedly above and below some mean value (as the pressure of a soundwave).

If you have not yet guessed, I am talking about a machine that possesses more moving parts than the computer-a device of such intimidating dimensions that today I only wish I had learned to play the trumpet as a child. Yes, I am talking about the piano.

In the 280 years that have elapsed since the Paduan Bartolomeo Cristofori (1655-1730) invented this instrument, people have grown accustomed to its face. The greatest opposition it suffered as a new instrument was due to the fact that people did not know how to play it and did not understand its virtues. l Similarly, the advent of computer music was met with awe and wonder, if not outright disquiet. Certainly, one would think that sufficient time has passed since the pioneering efforts of the late 1950s to allay this state of apprehension and psychic tension. But sadly, the past and present are striking for the computer music composer's indulgent disregard of this profound emotional effect his music has upon the listener .

The conduct of the composer in the digital media is excessively intellectual and oriented with a view to rendering the composition intelligible in as unintelligible away as possible. The originator and developer of Gestalt Therapy, Frederick S. Perls, spoke of the intellect as "the whore of intelligence."2 The implication here is that, with all the musical energy misdirected because of excessive intellectualization, the composer does not see or hear any more. Unfortunately, there is so much of this "pandering" in computer music today that many of our artistic sensibilities-the very capacity for acoustic discovery and for making discriminating aesthetic judgments-have been dulled in the process. As a

consequence, one notes the cool indifference of the dissatisfied "customer" in the face of a music that does not take him into account.

What I am therefore recommending is a more humanistic, gestalt-motivated approach to the digital electroacoustic media. This would entail the creation of anew mode of thought characterized by compassion and tenderness for one's fellow-traveler on the musical journey - a new social dynamic in which all those who are involved are imbued with loving kindness and affection, are free from small-mindedness, free from having a prejudiced and morally self-righteous mind and petty resentfulness.

I am talking about a dynamic characterized by an exalted moral excellence and a thoughtful and sympathetic concern. Understandably, more than a mere scheme to be examined, the new computer music composition should be an act of generosity-an act of offering for acceptance. Without the composer's readiness to give, without his being painfully sensitive to the listener's pressing organismic needs, he must not expect the listener to ennoble his interests, values, and dignity. Similarly, the listener must also consider the composer's welfare and must do so with vigilance if he is to prove at all receptive to the composer's work.

What I am suggesting is not mawkish sentimentality but rather a new interactive context in which both composer and listener function as equal and active participants in a pivotal transaction. It is only with such mindfulness that communion and a refined, heightened musical sensitivity can be reached in these media, which is the very essence of postwar compositional development and which points the way to the twenty-first century.

Notes

1. Arthur Loesser, *Men, Women, and Pianos: A Social History,* (New York: Simon & Schuster, 1954), pp. 33-34.
2. Frederick S. Perls, *Gestalt Therapy Verbatim,* (New York: Bantam Books, 1981), p. 24

Elzbieta Sikora (Poland / France)

When I started to compose, in 1968 in Paris, studying electro-acoustic music with Pierre Schaeffer and François Bayle, I thought that one has to throw away the key of musical tradition into the deepest well. This was a great period of avant-garde and breathtaking freedom in art. We all did a lot of experiments trying new sounds, new musical structures, new forms. Today, after thirty five years of experience, I call myself *lyrical expressionist* and I have signed a very personal pact with the past. In my instrumental, vocal as well as in electro-acoustic works I am always interested by the sound itself, by its inner construction and the possibilities it offers, by the new way of producing sounds, by using non conventional instruments or advanced technologies of transformation and sound production/synthesis. But the "new" is now replaced by "how" and "why". Through the sounds I create, I try to guide the listener towards an original musical landscape which has to be of his own imagination, only brought to the surface by my music. Allusions to some known musical and real situations appear also in my work. I am using them as I am using all other sounds. Those various means have to serve the general musical form without any discrimination. One can see how electro-acoustic "manufacturing"- mixing, editing, transforming, combining different attacks with surprising resonance- influences my instrumental work and how the use of traditional instruments or voice colours the electro-acoustic work. Near my piano I have now a G4 computer. Independently of the material or techniques used, the most important for me is the musical expression. Lyrical or not.

6) Géométries Variables **21:46 2000**

(Program note unavailable.)