Array

Communications of the ICMA

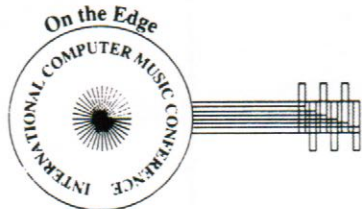# Table of Contents

I C M C

HONG KONG

On the Edge

Painting by Sun Yong

The Hong Kong University of Science and Technology
The Hong Kong Urban Council
The International Computer Music Association

19 -24 August, 1996

On the Edge

香港

CALL FOR PARTICIPANTS

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ICMA News

Allen Strange
President, ICMA

Volume 16, Number 1 introduces our new *ARRAY* editor, Katharine Norman. Katharine, also a newly elected ICMA Board member, holds a Ph.D. from Princeton University where she studied with Paul Lansky. Her works include music for instruments, voices, computer music and collaborative works for film. Awards include a Fulbright Award, a Wingate Fellowship and various grants and commissions from the Art Council of Great Britain and the Arts Council of England. She is currently on the composition Faculty at the University of Sheffield, U.K. Dr. Norman is the first European *ARRAY* editor bringing an even more global perspective to our newsletter. Katharine, welcome to the party!

One of the first newsletter variations is an on-line edition of *ARRAY*. The ICMA Board and Officers have voted to publish *ARRAY On-line* beginning with this issue. *ARRAY On-line* will appear on the ICMA Web site [http://coos.dartmouth.edu/~rsn/icma/icma.html] approximately one month after the hard-copy has been received by the ICMA membership. This procedure will still give our members the advantage of advanced codex publications but provide the ICMA the option of sharing information with the public-at-large. The on-line edition will contain no advertising or membership/order forms. All ICMA forms are currently available at the web site. Any comments or feedback about this new format is certainly welcomed.

The CDCM Computer Music Series' and the ICMA's demand for perfection has delayed the release of *Volume 21: The ICMA Commission Awards: 1992-93*, due to a printing error. The problem has been rectified and the volume is now available from ICMA or directly from CDCM. This striking issue presents the music of Cort Lippe, Ira Mowitz, Takayuki Rai and Horacio Vaggione and has computer generated cover art by Sachiho Murata of the Kunitachi College of Music. The ICMA Board has also approved the production of the next volume of ICMA Commissions which will contain the award compositions from the 1995 and 1996 ICMCs.

ICMA COMMISSIONS 1996

The ICMA commissions are now well and truly established, and have resulted in a remarkable variety of inspiring music (buy the CDs !). Works as different in aesthetic as Stephen Montague's delicate *In Memorium...* for quartet and electronics and Carla Scaletti's fun, and thought-provoking *Public Organ* installation last year, just go to show that there just isn't one kind of 'good' computer music - it can be as varied, and as vital, as the personalities who make it.

The two composers commissioned to create works for ICMC 96 are Ricardo Dal Farra and Frances White. By way of an introduction to their work, here is a brief profile of each composer, and a little about their music making.

ICMC 1996 COMMISSIONEES:

Ricardo Dal Farra

Over the last decade Ricardo Dal Farra has become one of the leading composers of and spokesmen for computer music in Argentina. Born in Buenos Aires in 1957, he has taught electroacoustic music at the National Conservatory of Music of Argentina, the Electronic Music Lab of Argentina's Society for Musical Education, the Municipal Conservatory of Music of Buenos Aires, and the ORT Technical Schools, and presented electroacoustic works to an ever growing radio audience in Argentina.

Dal Farra has worked with most electroacoustic platforms during the last decade, beginning with the DX7, the Samson Box, the NeXT, and various commercial vehicles for sound transformation and editing.

Some of Dal Farra's compositions are: *El fin* (1978), for piano, percussion and electronic instruments; *Estudio sobre ritmo y espacio* (1982), for concrete sounds digitally processed in real time; *Estudio eliptico* (1983), for live electronics; *Civilizaciones* (1983), for six percussion players and live electronics; *Audiciones* (1983), for live electronics; *Musica para Hall* (1984), for guitra and live electronics, composed with Carlos Costa; *Primer instante* (1985), electronic sounds on tape; *Karma* (1986), computer generated sounds, produced at CCRMA, Stanford University; *Integrados* (1986), for guitar and live electronics, composed with Arturo Gervasoni; *Ancestros* (1986), for ancient aerophones from the Andes mountains and live electronics; *Para todos ellos* (1987), for MIDI guitar and live electronics; *...Due Giorni Dopo* (1988), computer resynthesized speech, produced at CSC of Padova's University; *Come'n go* (1989), for komungo and live electronics; *EGT* (1989), for guitar and live electronics; *SP4* (1989), for an interactive computer music system; *Xastock* (1989), for tenor sax and live electronics; *Interacciones*, for sounds and images generated by computer in real time; *Tramas* (1990), for small orchestra and live electronics; *Ashram* (1991), for Mukha Veena and tape; *Furioso*, for oboe and live electronics, composed with Leon Biriotti; *Homotecia* (1992), for bandoneon or flute or oboe or piano or guitar and tape; *Teragon* (1992), for an interactive computer music system; *Memorias* (1992), computer generated sounds, produced at

CCRMA, Stanford University; *Mel18* (1994), seven short pieces for virtual piano, for an interactive computer music system.

Recordings of his pieces *Karma, Integrados, Ancestros, Double, Clones, Estudio sobre ritmo y espacio* and *G* appear on *Musica Electroacustica en Tiempo Real* (on cassette tape - 1987 - Frog Peak Music); *Karma* is also included on the cassette collection published by Argentina's Music Council (1988); *Para todos ellos* (excerpt) is included on the cassette companion of the *Contemporary Music Review* dedicated to live electronics (1991); *Xastock* appears on The Aerial CD #6 (1994 - Nonsequitur); *Memorias* is included on the companion CD of Leonardo Music Journal #4 (1994 - MIT Press); *Mel18* appears on the CD collection *Panorama de la Musica Argentina* (1995 - Fondo Nacional de las Artes, Argentina).

Information provided by Jon Appleton and Ricardo Dal Farra

Frances White

"I hate computers." This is the concise summary that you are likely to get when you ask Frances White about her attitude towards technology. "If there was a way to make computer music without them, I'd do it," she elaborates. But since there's not, she's been doing it the old-fashioned way, writing works for computer-synthesized tape, with and without live performers. Her music has been a regular feature on ICMC programs since 1986, and she is one of the two composers commissioned by the ICMA to compose a piece for the 1996 conference in Hong Kong.

Although she doesn't like characterizing herself as a "woman composer," she does believe that her attitude towards computers and music is different than a man's. "I tend to think of computers entirely as a means to an end — I'm not interested in computers themselves. I think this attitude is perhaps more common among women than men." She frequently repudiates the notion of "computer music" altogether. "You might say that I make music with computers, but I don't make 'computer music'." Rejecting the high-tech approach, Frances is interested instead in "a handmade music." She loves the way that a computer allows her to work like a painter: perfecting each brushstroke, subtly modulating each area of color. Working and reworking, she can

spend hours, days, or even weeks getting a sound just right. Her work stands out in the way that a piece of hand-thrown pottery, bearing the thumbprints of its maker, would stand out in a collection of flawless mass-produced china. Or to use one of her favorite analogies, she works like a gardener, cultivating her music so that it can grow of its own accord. An avid orchid fancier, she often insists that "gardening and composing are the same thing."

Frances' fundamental approach to composition is based on the process of listening. "Sound and listening to the sound are always the starting points for me. I never think of music as a language conveying a message. In my work, I try to make something pretty simple, but still engaging, that you can explore for yourself by listening to it." To create this, Frances seeks out sounds that "remain mysterious" to her every time she hears them. As a result, her tape parts are almost always extremely quiet, and frequently feature noisy, less- than-high-tech sounds. "Sometimes the most inspiring sounds are those that are plain, fragile, maybe even a little ugly. I feel that part of my job as an artist is to try to make space for these sounds."

In her recent work, she has applied this idea of discovery through listening to the medium of tape-with-instruments. The problem with this combination has always been how to relate the live and taped parts to one another. In Frances' case the answer has been to make tape parts that act as sonic spaces — or "ambiences," as she calls them — for the performers to listen to. While aspects of this approach can be seen in her widely-performed *Still Life With Piano*, her distinctive handling of the tape-with-instruments medium wasn't really established until 1991 with *Trees* for two violins, viola, and tape. Inspired in part by her experience with bonsai (the Japanese art of miniature tree cultivation), the tape music portion of this piece moves at a very slow pace, suggesting a more spatial conception of music. In *Trees* and the subsequent piece *Winter Aconites* (a 1993 commission by The ASCAP Foundation in memory of John Cage), the performers must listen intently to the tape in order to find their places. The coordination of tape and live parts is very flexible, but it is based on the performers having such an in-depth musical understanding of the tape part that they can respond intuitively to it, placing their long tones in just the right places. "Even though

they have just a few notes in them, I think of these pieces as being quite virtuosic," says Frances. "They just require a different, quieter kind of virtuosity than most other difficult music does."

Frances has been very busy in the last year. She has just written a work for string quartet, piano, and tape in a style similar to *Winter Aconites* called *Lesser Celandines*. This past spring she participated in the Other Minds Festival in San Francisco, sharing her music with composers such as Terry Riley, Lou Harrison, Alvin Singleton, Mari Kimura, and Muhal Richard Abrams. Members of the Cassatt Quartet have just recorded *Trees* for an upcoming CDCM release. And now she is working on her ICMA commission. "It's for shakuhachi [Japanese bamboo flute] and tape and will be called *Birdwing*. I'm taking shakuhachi lessons to learn about the instrument and its tradition. It's a very inspiring instrument to me: it is very mysterious. Traditional meditative shakuhachi music moves through time based on the player's breath, so it is very intimate and personal. As I have been studying, I am struck by how many aspects of this musical tradition seem to resonate with my own feelings about music. I think that in some ways the piece might be very different from my recent pieces."

Information provided by James Pritchett

CORRECTION TO ARRAY Vol. 15, no. 3 Winter 1995

Dear Array,

In Brad Garton's review of the Banff ICMC he wrote: "I was looking forward to the mega-performance of David Jaffe and Andrew Schloss's Wildlife, which had to be cancelled because of a lack of technical resources."

Actually, the piece that was cancelled was not "Wildlife" (which was performed at the Montreal conference and is available on a CDCM CD) but "The Seven Wonders of the Ancient World", a brand new 70-minute concerto for Radio Drum-driven Disklavier and eight instruments. Also, the cancellation of the piece was not because of a lack of technical resources, but because of a lack of funding for paying the players. The Banff ICMC was running a large budget deficit and was forced to cancel some of the larger pieces at the last minute. Our's was one of them. In fact, the piece makes very little demands on technical resources. It requires only a Yamaha Disklavier grand piano and 8 players (harp, harpsichord, mandolin, guitar, bass, 2 percussionists and harmonium). Incidentally, the piece will be available on CD later this year on the Well-Tempered Productions label.

David A. Jaffe
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A Word From the Editor

As I embark on my first issue of Array I'd like to extend my thanks to my predecessors, Brad Garton and Robert Rowe, who've contributed (and I trust will continue to contribute!) so much to Array, and ICMA in general. Thanks chaps, for your hard work, your interesting thoughts and your support. A hard act to follow. Also, thanks to Gary Singh, a rather unsung hero, for continuing to design *ARRAY*, make sure everything runs smoothly and placate confused novice editors.

My introductory words echo Brad and Robert's parting plea - please do GET INVOLVED !

What do you want from ICMA, from ICMC? What would you like to see in *ARRAY* - What would you like more of, less of? What would you like to say?

ARRAY is your forum. And your views matter. So drop me a line.

Katharine Norman

Is This Your Last ARRAY ?¿

Please check the mailing label on the back of this issue of *ARRAY*

to find out your current ICMA Membership Expiration Date.

Reports and Announcements

The ICMA in Latin America
By: Eduardo Reck Miranda
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Latin America has recently emerged significantly in the field of computer music. Various institutions and societies have been created to foster research and computer-aided music-making in several Latin American countries.

To cite the example I know best, NUCOM is an association which is part of the Brazilian Computer Society. It has full endowment with scientific credibility necessary to obtain national support for research projects. NUCOM was created in 1993 by Geber Ramalho, Mauricio Loureiro and myself through discussions via the Internet, and has already promoted two important computer music symposia: Caxambu 94 and Canela 95. The number of participants in Canela was very encouraging: there were 180 delegates attending 8 sessions of papers, 6 key lectures, 2 tutorials and 6 concerts, featuring worldwide composers and researchers. A third symposium is being planned. These symposia have consolidated Brazil as one of the leading Latin American countries in computer music research. There is currently a controversial debate as to whether members of the various Latin-American associations, such as NUCOM, should also become associated to the ICMA. The most frequently asked questions are: What are the advantages of belonging to an international computer music association? And, is not the term "international" itself highly contradictory, for an association whose board of directors includes 90% of USA nationals? In my view, it seems that the ICMA is moving in the right direction by establishing regional offices in various continents, namely: Europe, Asia, Oceania and the Americas. Whilst this might be advantageous for some, it is still a question whether the Americas office will change the picture of the ICMA for Latin America. It is worth noting that the recent boom in the field of computer music in Latin America does not automatically mean that people from this Southern continent bother about the ICMA or ICMC. On the contrary, there are currently only an insignificant number of Latin American

members. Although Array often features "news from South America" in its announcements, it is evident that those items are always reported by the same few people, who act as self-proclaimed special envoys.

My point is that it seems that Latin America has made progress in the field, independent of international patronage. This is a positive factor but I do not advocate isolation. Rather, I wish to bring the matter to the attention of ICMA, so that the right decisions can be made in order to include Latin America in the Association's policy with all the credits this continent deserves. Negotiations are now under way in order to set the first Latin American ICMC in Brazil, probably in 2001. Uruguayan-born composer Conrado Silva (now at the University of Brasilia) is at the forefront of this project, with full support from many Latin American groups, such as LIPM (Argentina) and NUCOM (Brazil). This is perhaps a plausible step forward, but the question still remains as to whether a Latin American ICMA office will ever be established.

Sowing Seeds of Future - A Residency and Exchange Program in Computer Music between the Americas
by Carlos Cerana
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Laboratorio de Investigacion y
Produccion Musical (LIPM)
Buenos Aires, Argentina

It is always difficult to write a chronicle, and specially when one has been part of the reported events. Nevertheless, I want to share with the computer music community some reflections on the results of a project carried out among three centers of the Americas. I feel that the quality of these results not only enhances the present of our field: they also will be of great significance for its future.

The Program:

An exchange program in computer music took place from 1990 to 1995 among two centers of the United States and one of Argentina. The institutions involved were the Center for Computer Research in Music and Acoustics (CCRMA) at Stanford Uni-

versity, the Center for Research in Computing and the Arts (CRCA) at the University of California, San Diego, and the Laboratorio de Investigacion y Produccion Musical (LIPM) at the Recoleta Cultural Center of the Municipality of Buenos Aires. The program was granted by the Rockefeller Foundation, and this funding allowed reciprocal visits, concerts and residences of composers and researchers of the three centers.

The Centers:

CCRMA and CRCA do not need to be introduced to the readers. They are well known as leading computer music centers, and have developed technical media and software that are broadly used by researchers and composers. In this article I want to focus on what the program represented for our center: a Latin American point of view.

LIPM (Laboratory for Musical Research and Production) is the most important electroacoustic and computer music center in Latin America. It is the inheritor and continuator of former institutions that began electronic music in Argentina: the Musical Phonology Studio at the University of Buenos Aires (founded in 1958, which was the first electronic music laboratory in Latin America), and the Laboratory of the Di Tella Institute (founded in 1963). Composer Francisco Kropfl and engineer Fernando von Reichenbach were the pioneers that developed those studios. They kept working together through time, and presently are the main staff of LIPM.

Activities:

The exchange program allowed musicians to relate to new environments and to communicate their experiences and works to audiences of a different tradition. We have received at LIPM the visits of outstanding musicians and researchers of the States, like Chris Chafe, John Chowning, David Jaffe, Max Mathews, F. Richard Moore, Dexter Morrill, Janos Negyesy, Daniel Oppenheim, Roger Reynolds, Robert Willey, among others. They presented concerts and taught courses to Argentine students and trained musicians.

On the other hand, composers Francisco Kropfl and Julio Viera —present director

of LIPM— could present their internationally recognized work at the Californian centers. Fernando von Reichenbach showed his original hardware designs to young composers and technicians at CCRMA: the unique devices for electronic music that he developed in Buenos Aires during the '60s.

Many young Argentine composers traveled to the States, learning techniques and producing new pieces during residences lasting three to six months. They were Miguel Calzon, Pablo Cetta, Pablo Di Liscia, David Horta, Javier Leichman, Fernando Lopez Lezcano, Juan Carlos Pampin, Guillermo Pozzati, Jorge Sad and the author of this article.

As the three centers used compatible hardware and software, pieces started at one center could be finished in either one, a remarkable new possibility in computer music. The works produced during the first three years of the program are documented in a double compact disc: "Intercambio/Exchange".

Extension to Other Countries:

After the first period of the program, the initial centers agreed in extending the trilateral exchange to other countries of America. Composers from the Center for Music and Acoustic Research and Documentation (CEDIAM), at the Central University of Venezuela, from the Laboratory of Musical Informatics (LIM) of Guanajato, Mexico, and from the Brazilian Universities of Minas Gerais and Brasilia went to work in the States. The project also supported the trips of personnel from the North American centers to Brazil, Venezuela and Puerto Rico. Composers of LIPM traveled to Venezuela, Brazil and Chile for concerts and lectures; we have also participated in a concert tour —with composers from CCRMA and the University of Colgate— visiting centers of the East Coast of the States and Canada, to present live computer-interactive pieces.

Conclusions:

It is far beyond the scope of this article an exhaustive report of the activities carried out during the exchange program. Robert Willey has compiled a more complete documentation, that helped in the making of this article. It can be consulted at:

http://crca-www.ucsd.edu/bobw/intercambio.html

I meant to point out how a program of cultural exchange can be so important for the development of an interdisciplinary field like computer music. For the younger generation, contact with composers and researchers of the States was an invaluable learning opportunity. Presenting our work to audiences of different countries proved to be a significant encouragement for growing in artistic maturity.

As a result of the program we presently have in Argentina a consistent community of composers with a thorough knowledge in programing. They are working as associates at LIPM and at other institutions, producing new pieces, developing software and teaching.

We have developed productive relations with other centers of computer music in Latin America. Particularly, we have worked closely to the strong computer music movement in Brazil: composers from LIPM have been invited to form part of the selection Jury of the two Brazilian Symposia of Computer and Music held in Caxambu in 1994 and in Canela in 1995, organized by the NUCOM in conjunction with the Brazilian Computer Society.

The links among composers and universities throughout the region will expectedly increase in the near future. New projects are been envisaged, such as an educational network through Internet.

I feel that the intensive activity carried out during the last five years is just the beginning. We have sowed the seeds for something that will expand and grow. We are just relishing its first fruits.

Information on Annual Activities in Argentina
provided by Pablo Di Liscia
Professor in Computer Music Professor
Quilmes University (Buenos Aires)
Associate Researcher at LIPM Centro Cultural Recoleta
(Buenos Aires)
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It should be pointed that the XI National Week of Electroacustic Music was organized by the Argentine Federation of Electroacustic Music (FARME), whose President is Francisco Kropfl, Vice President Luis Maria Serra and Secretary Julio Viera. The event received the support of LIPM of Centro Cultural Recoleta (Municipality of Buenos Aires) and M&T

Fundation presided by Mrs. Nelly Di Tella.

The School of Musical Arts and Sciences at the Catholic University of Argentina organized a concert of electroacoustic music, on October 7th, 1995. There were presented works by the students of the Centro de Estudios Electroacusticos (CEE), coordinated by Pablo Cetta.

An international landscape of electroacoustic music was presented at the Centro de Estudios Avanzados en Musica Contemporanea (CEAMC) in Buenos Aires, during October, November and December 1995:

Three concerts, organized by Carlos Cerana and Juan Carlos Figueiras, featured works by Jorge Rapp, Celso Aguiar, Eric Lyon, Kui-Dong, Edgard Varese, Jorge Naparstek, Rodolfo Caesar, Stephen Pope, Fernando Lopez Lezcano, Gyorgy Ligeti, Javier Leichman, Eduardo Miranda, Robert Thompson, Vladimir Usachevsky and Claudio Alsuyet. Contact: Carlos Cerana (rqcerana@arcriba.edu.ar)

A significant activity in Computer Music was developed at the Laboratorio de Invesigacion y Produccion Musical (LIPM) during 1995:

Concert by Francois Bayle and Daniel Teruggi, from Groupe de Recherches Musicales (GRM), Paris; Lecture by Daniel Teruggi (GRM); Didactic concert "An Approach to Electroacoustic Music" by Francisco Kropfl; Didactic concert "Concrete Sound in Electroacoustic Music" by Prof. Enrique Belloc; Didactic concert "Composers and Computers" by the composer Javier Leichman; Concert and lecture by Richard Moore, University of California, San Diego; Course on D.S.P by Richard Moore; Lecture by the composer Alcides Lanza, from Electronic Music Studio, McGill University, Montréal, Canada; Lecture by Chris Chaffe and Fernando Lopez Lezcano from CCRMA, Stanford University, USA; Concert by Chris Chaffe, from CCRMA; Concert by the Researcher and composer Fernando Lopez Lezcano and Gary Scavone (sax), from CCRMA, Stanford University; Concerts by the composer Fausto Sebastiani; Concert - lecture by Ricardo Nilni (France); Seminary "An Introduction to Electroacoustic Music and Musical Analysis Epistemology" by Francois Delalande; Workshop on csound by Prof. Riccardo Bianchini from Conservatorio Santa Cecilia of Rome; Na-

tional contest, "Sonoclip" by electroacoustics means with the support of the M&TReports and Announcements Foundation.

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XII National Meeting of Electroacoustic Music and Technical Media
Buenos Aires, Argentina

The XII Reunion Nacional de los Medios y la Musica Electroacustica (XII Meeting of Electroacoustic Music and Technical Media) will take place in Buenos Aires, during late October 1996. The event is organized by the Argentine Federation of Electroacoustic Music (FARME), with the collaboration of the Laboratory for Musical Research and Production (LIPM) of the Recoleta Cultural Center, Municipality of Buenos Aires. From October 21 to 25 a series of concerts, lectures and technical presentations will be held, covering the electroacoustic and computer music activity of Argentina.

Submissions by Argentine composers living abroad are welcome. The pieces should be sent in DAT format, along with program and biographical notes, not later than August 31. As in the XI Meeting of 1995, all works are subject to selection by a Jury.

The board of FARME regrets the misinformation published in Array Vol. 15, no. 2, for which FARME was not responsible.

All materials should be sent to:

XII Reunion Nacional de los Medios y la Musica Electroacustica
LIPM
Junin 1930
1113 Buenos Aires
Argentina

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In Memoriam Salvatore Martirano 1927-1995
by Larry Austin

American composer Salvatore Martirano died on November 17, 1995. Only six months before, my wife Edna and I visited Sal and his wife Dorothy for four wonderful days of talk, music, food, and wine in their Urbana, Illinois, home. Sal and I were going over the final draft of the booklet notes for his compact disc and computer music retrospective, Volume 22 of the CDCM Computer Music Series. We had been working on the project since the summer of 1994. I had proposed the retrospective to Sal then, not knowing then that he had just been diagnosed with ALS, the incurable and terminal disease that would take end his life fifteen months later.

Sal got to see, hold, read, and hear his cd before he died. He told me, "It's beautiful, Larry." Reprinted below is my introduction to Sal's booklet notes, now in his memory.

"The recordings on this compact disc constitute a significant retrospective, benchmarks of American composer Salvatore Martirano's powerful creations in electroacoustic and computer music genres through the past three decades. The pieces range from his very first tape piece in the 'sixties to his algorithmic/interactive music inventions of the 'nineties. Through this same thirty-year span, I have known and marveled at the musically inventive spirit of Salvatore Martirano, my long-time friend and co-composer. It is labor of love to write these words, reflecting on his ongoing contribution to and—always—the creation of the newest new music."

"Salvatore Martirano is Sal, alias Sal-Mar Construction, alias yahaSALmaMAC, alias S(ound)A(nd)L(ogic), alias.... Sal's musics and machines are madness and logic in symbiosis: Mephistophelean mixes of science and improvisation, algorithms and lyricism, formalism and jazz, rigor and informality, theater and politics. Like Charles Ives, Sal is the composer's composer, an American composer whose music—with every new piece he composes or instrument he invents—challenges and measures our own. Sal is a techno-musico,

creative genius, hell-bent to heretically turn new or old, hi- or lo-culture music on its head...to experiment and discover what it sounds and feels and looks like in antithetical combination: straight-ahead, backwards, upside-down, inside-out, round-about, a cheval de randon, politically incorrect..up-your's! We love it!"

"In spite or because of its impolitic, heretical, often mocking assault, Sal's sounds and logic are startlingly beautiful, amazingly intelligent, and musically virtuosic. It is compelling because of his consummately inventive compositional technique and because of his intense feelings about and creative commentary on the world around him: the musical world, the big world up in the sky and the world he creates with his music inside himself, his collaborators, and his audiences. Sal's music always lives today's and predicts tomorrow's life."

Stanford University CCRMA Summer Workshops

Digital Signal Processing for Audio; Computer-Assisted Research in Musicology; Introduction to Psychoacoustics and Psychophysics; Audio & Haptic Components of Virtual Reality Design; Introduction to Algorithmic Composition; Advanced Projects in Algorithmic Composition; May'96 Three-day Intensive DSP Workshop

Course Descriptions

Digital Signal Processing for Audio: Spectral and Physical Models
July 22 - August 2, 1996
Individual, Corporate Affiliate Fee: $1200, Corporate Non-Affiliate Fee: $1500
Two weeks instruction. Limited to 15 participants.
Instructors: Perry R. Cook, Xavier Serra. This course will cover analysis and synthesis of musical signals based on spectral and physical models. The course will be organized into morning lectures covering theoretical aspects of the models, and afternoon labs. The morning lectures will present topics such as Fourier theory, spectrum analysis, the phase vocoder, digital waveguides, digital filter theory, pitch detection, linear predictive coding (LPC), and various other aspects of signal processing of interest in musical applications.

The afternoon labs will be hands-on sessions using SMS and the Synthesis Toolkit in C++, SynthBuilder, and other software systems and utilities. Familiarity with engineering, mathematics, physics, and programming is a plus, but the lectures and labs will be geared to a musical audience with basic experience in math and science. Most of the programs used in the workshop will be available to take.

Computer-Assisted Research in Musicology
August 19 - August 30, 1996
General Fee: $800, Student Fee: $600
Two weeks instruction. Limited to 15 participants.
Instructor: David Huron.
The workshop is offered in cooperation with the Center for Computer Assisted Research in the Humanities, Stanford University.

This course provides a comprehensive introduction to computer-assisted research in musicology and ethnomusicology using the Humdrum Toolkit. Participants will learn to manipulate computer-based scores, tablatures, and other documents in order to solve a wide variety of musicological problems. By way of example, participants will learn to characterize common patterns of orchestration in Beethoven symphonies, examine harmonic progressions in Bach chorale harmonizations, and investigate text/melody relationships in Gregorian chant.

Thousands of full scores will be available for processing on-line — including repertoires from various cultures, periods, and genres. The course will be of particular value to scholars contemplating graduate-level or advanced music research projects.

All software and documentation from the workshop (including a sizeable score database) are free to take. The software is available for UNIX, DOS, OS/2 and Windows-95 (some restrictions apply). Familiarity with the 'emacs' or 'vi' text editors is recommended, limited knowledge of UNIX is helpful.

Introduction to Psychoacoustics and Psychophysics: Audio and Haptic Components of Virtual Reality Design
June 24 - July 6, 1996
Individual fee: $800, Affiliate fee: $1000, Corporate Non-Affiliate fee: $1200

Two weeks instruction and laboratory. Limited to 15 participants.
Instructors: Brent Gillespie, Sile O'Modhrain, Craig Sapp.
Guest Lecturers: Perry R. Cook, Louis Rosenberg (Immersion Corp.), Malcolm Slaney (Interval Research), Bill Verplank (Interval Research)
This course will introduce concepts and apply tools from cognitive psychology to the composition of virtual audio and haptic environments. In particular, the salience of various auditory and haptic phenomena to the perception and performance of music will be examined.

Just as visual artists spend time learning perspective to provoke 3D effects, composers and virtual object designers must study the perceptual sciences to create virtual environments which are convincing upon hearing and touch. We will study relevant topics from acoustics, psychology, physics and physiology. We will apply these to the design and rendering of virtual objects not for the eyes, but for the haptic and audio senses. Principles of speech, timbre, melody, pitch, texture, force, and motion perception will be addressed. Various audio and haptic effects and illusions will be demonstrated.

Morning lectures will cover these topics and also feature talks by eminent researchers and entrepreneurs working in the fields of psychoacoustics and haptics. Afternoon labs will provide practical experience in psychophysics experiment design and execution. In addition to sound synthesis tools, various haptic interfaces will be made available for experiment designs.

Introduction to Algorithmic Composition
July 8 - July 19, 1996; Fee: $800
Two weeks hands-on instruction. Limited to 20 participants.
Instructors: Heinrich Taube, Fernando Lopez Lezcano, Tobias Kunze, Nicky Hind, Jonathan Norton.
This course introduces basic principles and techniques of algorithmic composition and covers such topics as object oriented music representation, chance composition, algorithmic description of musical processes, and musical pattern languages. Sound synthesis performed as course material will include MIDI, the (realtime) Music Kit and (non-realtime) Common Lisp Music. The course will be taught using the Common Music environment* on Mac and NeXT

workstations. The labs will be hands-on spectral and physical modeling using software such as SMS, MusicKit, SynthBuilder, and simple C-Code examples. The Yamaha synthesizers to be used in the course will include the VL-1 and SY-77. All source code and documents from the workshop including the graphic interface are free to take. Prior programming experience is useful but not required.

http://ccrma-www.stanford.edu/CCRMA/Software/cm/cm.html

Advanced Projects in Algorithmic Composition
July 22 - August 2, 1996; Fee: $800
Topics are continued from the first course but emphasis is placed on developing programming skills while working on individual projects. [Students may take the full 4 week Algorithmic Composition course at a reduced tuition rate of $1400]

Intensive Audio Digital Signal Processing
May 17 - May 19, 1996; Fee: $1500
3 days instruction. Limited to 15 participants.
Instructors: William Putnam, Julius Smith, Scott Levine.
This workshop covers applications of the Fast Fourier Transform (FFT) arising in digital audio research. The main topics addressed are practical spectrum analysis using the FFT, sound synthesis by means of spectrum models, and signal processing using the FFT.

Specific topics include FFT windows, spectrum analysis, FFT based convolution, and phase vocoders. Both the overlap-add and filterbank-summation interpretations of short-time Fourier processors will be addressed. Additionally, applications such as audio compression, and time/compression and expansion will be presented.

ANNUAL SUMMER CONCERT
The annual concert of new music by CCRMA composers will take place during the Summer Workshops. It will be held at Frost Outdoor Amphitheater at Stanford on July 18, 1996.

ADDITIONAL INFORMATION
Housing costs are not included in the course fee. Campus housing is available for the summer workshops through the Stanford University Conference Office. Informa-

Reports and Announcements, cont.

tion on lodgings in Stanford/Palo Alto vicinity will be sent to the spring workshop participants. No academic credit is offered for participation in the workshops.

FOR APPLICATIONS CONTACT:
CCRMA Summer Workshops
Department of Music, Stanford University
Stanford, CA 94305-8180, USA.
Phone: (415) 723-4971
Fax: (415) 723-8468
E-mail: aledin@ccrma.Stanford.EDU
http://ccrma-www.stanford.edu/

First International Music Software Competition

The Groupe de Musique Experimentale de Bourges (GMEB), in collaboration with *Computer Music Journal*, announce the first "Concours International de Logiciels Musicaux de Bourges" (International Music Software Competition).

All public-domain or share-ware software packages are eligible for the competition. Entries are sought in each of four categories:

real-time sound synthesis/processing
non-real-time sound synthesis/processing
computer-assisted composition
interactive control and performance.

The jury, to be chaired by Max Mathews, will award a first prize of FF 5000 and three other prizes of FF 2500 in each category. The winners will be announced during the Bourges "Synthese" Festival, which takes place from 31 May through 9 June in Bourges, France. The winning software packages will also be described in a feature article in Computer Music Journal 21:1. The deadline for receipt of submissions is 6 May, 1996.

Submission materials should be sent to, Concours International de Logiciels Musicaux de Bourges, GMEB, Place Andre Malraux, BP 39, F-18001 Bourges, Cedex France; telephone (+33-4820) 41.87; fax (+33-4820) 45.51; electronic mail agmeb10@calvacom.fr. For more information, see the GMEB or CMJ Web pages at http://www.gmeb.fr or http://www-mitpress.mit.edu/Computer-Music-Journal.

1997 ISCM World Music Days Seoul, Korea.

The special theme of the festival will be: "Human Voice in Music." Composers including those from countries not affiliated with the ISCM may submit one work. Entry fee: Dfl. 25, which must be sent via international money order, Eurocheque, or in cash (bank checks will not be accepted). Compositions may be submitted in the following categories:

a.) orchestra (with or without soloists, choir, or electronic instruments);

b.) chamber orchestra (with or without soloists, choir, or electronic instruments);

c.) music for ensemble;

d.) vocal music (choir and smaller vocal ensemble);

e.) solo instrument(s) and/or voice(s), with or without electronic instruments or tape;

f.) electroacoustic works, multimedia, interactive computer works with live vocal performance, or tape works (which may be with film or video);

g.) sound installations;

h.) other categories.

In relation to the festival's theme, the Artistic Committee encourages submissions of vocal works or works in which vocalists are included, as well as chamber operas and works for children's choir. Priority will be given to the works which have been composed within the last 5 years.

All submissions must be accompanied by the following: a short biography of the composer and the composer's address; wherever possible, a recording (or video) of the work; program notes for and duration of the submitted work; and the entry fee. Receipt deadline: May 30, 1996. Submitted materials will be returned only if specifically requested and the cost of return postage is provided. For further information, and to submit materials, contact:

ISCM, c/o Gaudeamus Foundation, Swammerdamstraat 38, 1901 RV Amsterdam, THE NETHERLANDS.
Phone: (31) 20 694 7349; fax: (31) 20 694 7258

ICAD '96:
The Third INTERNATIONAL CONFERENCE ON AUDITORY DISPLAY
Palo Alto, California November 4-6, 1996
Co-sponsored by
Santa Fe Institute
and
Xerox PARC

Continuing the work of the successful ICAD '92 and '94 meetings, ICAD '96 will be held November 4-6, 1996 in Palo Alto, California, USA. ICAD is a forum for presenting research on the use of sound to display data, monitor systems, and provide enhanced user interfaces for computers and virtual reality systems. It is unique in its singular focus on auditory displays, and the array of perception, technology, and application areas that these encompass. Like its predecessors, ICAD '96 will be a single-track conference. Attendance is open to all, with no membership or affiliation requirements.

SUBMITTING PAPERS

This year's ICAD will be organized along three principal themes:

1. Auditory data representation (exploration of data via sonification)
2. Sound in immersive environments (virtual reality)
3. Auditory displays on the World Wide Web

Within these themes, there are three potential submissions:

1. Formal Papers
2. Project Reports
3. Informal, short "open mike" presentations

Note: There will be a strong preference for presentations with sound.

Submissions should include a 4 page summary for the papers, 2 page summary for the Project Reports, and an abstract only for the informal presentations. These must be received by May 20, 1996. Notification of acceptance will be made by July 15, 1996.

Submit 6 copies to:

ICAD
Santa Fe Institute
1660 Old Pecos Trail, Suite A
Santa Fe, NM 87051

Manuscript submission: May 20, 1996
Notification of review decisions: July 15, 1996
Conference: November 4-6, 1996

CONFERENCE CHAIRS:
Steve Frysinger, James Madison University; Gregory Kramer, CLARITY, Santa Fe Institute;

STEERING COMMITTEE
Rich Gold, Xerox PARC; Steve Frysinger, James Madison University; Gregory Kramer, CLARITY, Santa Fe Institute; Beth Wenzel, NASA Ames Research Center

The Santa Fe Institute

The focus of the Santa Fe Institute is research on complex systems. This work encompasses an extraordinary range of topics normally studied in seemingly disparate fields. Natural systems displaying complex adaptive behavior range upwards from DNA through cells and evolutionary systems to human societies. The dynamics of complex systems are difficult to comprehend and even more difficult to communicate. Data visualization—and more recently data sonification—are emerging as crucial tools for the comprehension and communication of complex systems data.

Xerox Palo Alto Research Center

The Xerox Palo Alto Research Center (PARC) performs pioneering research that covers a broad spectrum of research fields ranging from electronic materials and device research through computer-based systems and software, to research into work practices and technologies in use. The center's mission is to pursue those technologies that relate to Xerox's current and emerging businesses.

Located in the Stanford University Industrial Park in the heart of Silicon Valley, PARC was charged upon its founding in 1970 to be the "architect of the information age." Since then it has delivered into use such significant pieces of the current information infrastructure as laser printers, graphical user interfaces, object-oriented programming languages, and Ethernet local area networks. PARC has contributed to user interfaces, electronic components, embedded software and architectures for each new line of Xerox copiers, printers and systems reprographics products.

Address general inquiries to:
Dr. Steven P. Frysinger
James Madison University
College of Integrated Science & Technology Harrisonburg, Virginia 22807
Tel: (540) 568-2710
Fax: (540) 568-2761
frysinsp@jmu.edu

Gregory Kramer
Clarity/Santa Fe Institute
310 NW Brynwood Lane
Portland, OR 97229
Tel: (503) 292-8550
Fax: (503) 292-4982
kramer@listen.com

Announcing Soundsite Sound and Culture
http://sysx.apana.org.au/soundsite/

Soundsite is the online journal of Sound Theory, Philosophy of Sound and Sound Art. It is a WWW-only publication for sound artists, practitioners and theorists, Its current and proposed territory deals with the cultural, theoretical and practical aspects of sound as manifest in a range of areas:

language and discourse; voice; poetics; acoustics; psycho-acoustics; ontologies and epistimologies of sound; hearing vs. listening; aurality and corporeality; space and architecture; sound geographies; philosophies of sound; post-musics; film, video and tv soundtrack; sound art and sound by artists; sound and noise; virtual systems; human-computer interface; communication and technological systems; low fidelity sound; radio and radiophonic art; performance; recording; composition; aesthetics; art.

We are interested in your contributions! We are also accepting reviews of films, exhibitions and performances involving questions of sound, artist's descriptions, as well as well written polemics, essays, and interviews. Essays are preferred with footnotes and bibliography as and where appropriate.

Please send your essay proposals, reviews, feedback, etc, to:
soundsite@sysx.apana.org.au.

A discussion list for related areas and announcements will be created shortly.

http://sysx.apana.org.au/soundsite/

For the Italian Speakers Amongst you:

Slap Press:
http://students.rpilo.it/slap/slap.htm
An innovative italian page about electroacoustic and radiophonic music. Packed with information.

Start 'em young......

Anna's Music Box - Children's computer music software by Larry Polansky. A standalone application for kids (five years old and up)...kind of fun. http://music.dartmouth.edu/~larry/polansky.html and then go to MIDI SOFTWARE and the piece is called Anna's Music Box. Larry.Polansky@Dartmouth.edu

MEDIAMIX 96
3/4/5th May 1996

A weekend conference of electroacoustic music, live electronics and music, film and multimedia installations at the University of York, celebrating the launch of *Organised Sound*.

*Music by, amongst others, Jean-Claude Risset, Rajmil Fischmann, Ambrose Field, Nick Fells, David Worrall, Tony Hood and Tony Myatt
*Films and videos
*Sound diffusion via York Ambisonic 3D sound system
*Keynote paper to be given by Jean-Claude Risset, followed three formal paper sessions and a discussion forum
*Demonstrations by selected manufacturers, CDP and various software designers

Further Information and Box Office:

Department of Music,
University of York, Heslington, York. YO1 5DD.
Tel: 01904 432448 Fax: 01904 432450
http://www.york.ac.uk/depts/music/mm96.htm

Organised Sound

AIMS AND SCOPE

Cambridge University Press is pleased to announce the publication in 1996 of a new journal, Organised Sound.

Organised Sound is published three times a year and focuses on the rapidly-developing methods and issues arising from the use of technology in music today. The journal concentrates upon the impact which the

application of technology is having upon music in a variety of genres, including multimedia, performance art, sound sculpture and electroacoustic composition. Organised Sound provides a unique forum for engineers, composers, performers, computer specialists, mathematicians and music scholars to share the results of their research as they affect musical issues. Each issue includes articles relating to a specific theme, as well as other articles and occasional tutorial articles on topics relevant to this exciting field. There is also a useful Announcements section, which will keep readers abreast of current events and points of note.

The theme of issue 1 is Sounds and Sources and the other themes for Volume 1 are The Time Domain and Algorithmic Composition. An accompanying CD will be sent free to subscribers annually.

Organised Sound:

*Provides an international forum for musical and technological discussion; Ffurthers the dialogue between engineers and musicians; encourages young specialists in the field to publish and share the results of their work

*Offers broad coverage of such topics as multimedia, performance art, sound sculpture, and electroacoustic composition

* Acts as a link between the academic community and professionals working in the music and computer industries

Forthcoming articles:

A History of Sampling
Harry Davies

Sounds and Sources in Powers of Two: Towards a Contemporary Myth
Barry Truax

Is there a Québec Sound?
Francis Dhomont

Form and Referential Citation in a Work by Francis Dhomont
Stephane Roy

TAO: A Physical Modelling System and Related Issues
Mark Pearson

MIDI and Communality
Bruce Cole

Object-oriented Music Representation
Stephen Pope

SUBSCRIPTION INFORMATION

Organised Sound is published three times a year in April, August and December. Volume 1 in 1996 is £63 ($98) for institutions, £35 ($49) for individuals and £25 ($36) for students. Delivery by airmail is £14 per year extra. An annual CD is issued free with the subscription.

CALL FOR PAPERS

Authors are encouraged to submit manuscripts which reflect the editorial policy of the journal. For Instructions to Authors and further details of how to submit manuscripts, please contact the Editorial Office at the University of York, as follows:

The Editors
Organised Sound
c/o Department of Music
University of York
Heslington
York YO1 5DD
United Kingdom
Email: OS@cage.york.ac.uk

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WWW information:
http://www.cup.cam.ac.uk/

4th International Conference on Music Perception and Cognition

McGill University
Montréal, Québec
11-15 August 1996
Directors: Professor Bruce Pennycook, Professor Eugenia Costa-Giomi, Faculty of Music, McGill University.

McGill University is sponsoring the 4th ICMPC. This interdisciplinary conference will focus on a variety of aspects of music perception and congnition: psychoacoustics, music performance, musical development, music modeling, music analysis, neuropsychology, psychomusicology, music sociology and other related fields of enquiry.

ICMPC Address
4th ICMPC
Faculty of Music
McGill University
555 Sherbrooke St. West
Montréal, Québec, H3A 1E3
Canada
tel: 1.514.398-4535 ext. 0504
fax: 1.514.398-8061
email: icmpc@music.mcgill.ca
http://www.music.mcgill.ca ~/icmpc/icmpc.html

ICMA-TALK

A Suplementary Mailing List
From: jpff@maths.bath.ac.uk
John ffitch

There has been some interest in the creation of an suplementary mailing list for members of ICMA which is less formal and more "chatty" that the current one. To that end the mailing list icma-talk has been created. While icma@umich.edu will continue to carry the current material

1. Job postings
2. Software Library announcements
3. Conference Announcements
4. Concert performance opportunities
5. Official ICMA notices
6. Other topics of probable interest to the membership in a moderated context, icma-talk@bath.ac.uk will provide an unmoderated forum for communication between members on any topic related to computer music and to ICMA or ICMCs.

The new list will be available in both a direct and a digest format. If members wish to joint this new list, they should send mail to majordomo@bath.ac.uk with the line: subscribe icma-talk or: subscribe icma-talk digest where upon they will be added to the list. The administrator of the new list is me, but reached at icma-talk-request@bath.ac.uk or in case of difficulties jpff@maths.bath.ac.uk

Call for communications - JIM'96

JIM'96 Computer Music Conference (Journees d'Informatique Musicale 1996) 17-18 may 1996, Caen, France
http://www.ircam.fr/jim96
jim96@ircam.fr

General Information

The JIM computer music conference took place for the first time in 1994 in Bordeaux, France, then in 1995 in Paris, France. This two-day conference gathers researchers in computer music and musicians that use computers as a means of expression or as a tool for composition. JIM'96 will take place in 1996 in Caen, France. It is organized by University of Caen (GREYC, Groupe de Recherche en Informatique, Image et Instrumentation de Caen). The proceedings will be made available at the beginning of the conference. An electronic edition of the proceedings will be made available on the World Wide Web. An information page for JIM'96 is already set up at : http://www.ircam.fr/jim96.

Program

Planned events are : communications on recent computer music researches and applications, lectures by invited senior researchers, and concerts. Talks will be given in French or in English. There will be no simultaneous translation.

New Music & Art from Bowling Green International Call for Works and Papers.

Composers are invited to submit original compositions for year round performance consideration under the sponsorship of the MidAmerican Center for Contemporary Music at Bowling Green State University. Selected works will be performed throughout the 1996/97 season by distinguished faculty, guest performers and student ensembles. Compositions will also be reviewed for inclusion on the nationally acclaimed BGSU New Music & Art Festival to be held in October, 1996. Composers may submit scores for any medium. A performance tape should be included, if available, plus a short resume and a complete listing of works. Compositions for tape, video, or live electronics, or those requiring computer assistance will be considered.

The MidAmerican Center also issues a call for papers to be presented on the Festival. Papers may be submitted on any aspect of music since 1945. For paper applicants, submit a signed cover letter and four unsigned copies of a 200 word abstract or a complete paper; and send materials to the attention of William E. Lake (phone: 419-372-0522; e-mail:wlake@bgnet.bgsu.edu). Postmark deadline: March 25, 1996. Presentations will be limited to 20-25 minutes.

The following formats will be accepted: 2 or 4 channel reel to reel, PCM F1 (Beta or VHS), DAT, and compact disc. Compositions may be submitted and received at any time and will be given performance consideration for the 1996/97 concert season, however, to be considered for the 17th Annual New Music & Art Festival, to be held in October, 1996, there is a postmark deadline of: March 1, 1996.

For return of materials, include an SASE. Alternatively, composers may donate their scores to the Archives of the MidAmerican Center for Contemporary Music at BGSU - all music in the unique collection is catalogued and circulated (entries without return postage will automatically become the property of the Archives).

Composers selected to participate in the Festival must provide two scores and a set of parts at their expense; and attendance to the Festival is required a small travel honorarium will be offered to each guest composer and paper presenter.

For further information, and to send scores, contact: Marilyn Shrude, Director, MidAmerican Center for Contemporary Music, College of Musical Arts, Bowling Green State University, Bowling Green, OH 43403-0290.

Phone: (419) 372-2685; fax: (419) 372-2938. E-mail: mshrude@opie.bgsu.edu

Dartmouth College Master's Program

The Dartmouth College Master's Program in Electro-Acoustic Music is an interdisciplinary degree program dedicated to work that explores the interrelationships among music, technology, cognitive and computer science, acoustics, and related disciplines. While in the program, students are encouraged to pursue and develop their individual goals, and their work may = be directed towards creative, research, theoretical, or technical topics. We are interested in students who are highly motivated and who want to help redefine the future of music and technology.

The graduate program is small, friendly and intense. There are usua lly six graduate students who work with each other and graduate program faculty on a daily basis. Because students bring a wide variety of background and experience to the program, it is common, for example, for a student with a strong computer science background to assist a composer on a highly technica l and innovative project. Conversely, experienced composers often guide and assist students without previous compositional experience. Faculty and students collaborate in a wide variety of ways, working together on projects both formally and informally, and a sense of community is encouraged. Graduate students organize and present three or four concerts of electro-acoustic music each year. They supervise equipment in the studios, make recommendations for new equipment and are considered as younger colleag ues by the faculty.

The small Hanover community and the modest size of Dartmouth as a research university, puts students into daily contact with undergraduates, as well as graduate students and faculty in other disciplines.

Requirements:

Candidates for admission to the Master of Arts program should be able to demonstrate significant experience and/or interest in some combination of these disciplines:

hfc@cmp-nut1.music.uiuc.edu,
hfc@ccrma.stanford.edu

Depending on student's areas of specialization within the program, the requirements for completion of the Master of Arts Degree in Electro-Acoustic Music include:

1. A minimum of six terms in residence after the bachelor's degree.
2. The ability to play a musical instrument and an understanding of music theory and history.
3. Course requirements for the degree include five proseminars in music and technology and courses in psychology, acoustics, computer science and engineering.
The five proseminars are:
The influence of technology on the roles of musicians and musical institutions in the 20th century.
Survey and analysis of the repertoire of electro-acoustic and computer music.
Analysis of musical systems
Analysis, synthesis, and perception of timbre
Composition of electro-acoustic and computer music
4. Directed research (thesis courses) Two courses taken under the joint supervision of a member of the music faculty and a member of another cooperating department.
5. A thesis approved by the student's graduate committee and the faculty of the Department of Music demonstrating a mastery of the materials in the student's area of concentration within the program.

Recent Thesis Topics

Transformation of Audio Signals by Use of the McAulay-Quatieri Sinusoidal Model of Sound by Theodore Apel
Rethinking the Design of Wind Controllers by Gerald Beauregard
QuickMQ: A Software Tool for the Modification of Time-Varying Spectrum Analysis Files by Stephen Berkley
Direct Manipulation of MPEG Compressed Digital Audio by M. Alexander Broadhead
HS: A Symbolic Programming Language for Computer Assisted Composition by Michael Casey
Vocali, an electro-acoustic composition by Raymond Guillette
Using Physical Modeling Synthesis to Produce Realistic Timbres by Courtney

[Kennedy]
Applications of Wavelets in Music: The Wavelet Function Library by Clifton Kussmaul
A Theoretical Model of Timbre Perception Based on Morphological Representations of Time-Varying Spectra by Christopher Langmead
Mutation Synthesis by Martin McKinney
Forging Elements: Electro-Acoustic Sound Art by Kenneth E. Overton
Conversations, an electro-acoustic composition by Ileana Perez
Experimental Filter Design Using Neural Networks for Sound Generation by John Puterbaugh
Matters Integrating the Shakuhachi with Electronic Sound by Kojiro Umezaki

Faculty

Music: Jon Appleton (Program Director), Charles Dodge, Larry Polansky
Psychology: Jamshed Bharucha
Physics: Michael Sturge
Faculty of the Department of Mathematics and Computer Science and the Thayer School of Engineering

Admission

Three students will be admitted each year. The students will receive full tuition fellowships and stipendiary support. The application deadline is February 1 each year.

For more information and applications, please write to:

Graduate Program
Department of Music
Dartmouth College
6187 Hopkins Center
Hanover, New Hampshire 03755-3599
(603) 646-3974

Common Music Home Page

Check it out:
http://ccrma-www.stanford.edu/CCRMA/Software/cm/cm.html
System documentation is in html format and available from the home page.

Rick Taube
Theory/Composition
School of Music
University of Illinois

NEW Computer Music Journal Editorial Address

Stephen Travis Pope, Editor
Computer Music Journal
P. O. Box 14043
Santa Barbara, CA 93107
(805) 967-2621
email:cmj@ccmrc.ucsb.edu
WWW: http://www-mitpress.mit.edu/Computer-Music-Journal/

International Electro-Video Clip Competition

Composers may submit 2 to 3 minute electroacoustic stereo tape works on DAT or two track. Prizes: cash and a CD recording of the winning work. Deadline: May, biennial (even years). Write or call for complete information before applying:

Mr. Claude Schryer
4001 Berri #202,
Montréal, Québec H2L 4H2
Canada
Tel(514) 849 9534
Fax(514) 987 1862

Australian Computer Music Association Conference '96

The 1996 Australian Computer Music Association conference will be held from 12-14 July 1996 at the Queensland University of Technology (QUT) Academy of the Arts in Brisbane, Australia. The topic of the event will be "Engaging with Art and Artistry", and the activities will include formal papers, concerts, workshops, and panel discussions. To receive electronic-mail information about the formal call for papers or procedures for submitting a proposal for a workshop or panel discussion issue, send email to : ACMC96@qut.edu.au, or Andrew Brown (Conference Coordinator): a.brown@qut.edu.au

ARCANA Composer in Cyber Residence.

Each month, ARCANA will present international composers as the ARCANA Composer in Cyber Residence. The presentation will feature text, sound, and graphics. Composers worldwide whose work is based in the domain of new and experimental

music are invited to apply for Cyber Residency. Applicants must not be German legal residents or citizens the goal is to increase awareness about other trends and expressions of new music being made in other countries in order to gain maximum cultural exchange and to initiate international collaborations.

There will be no juried decisions applicants will be handled on a first come first served basis. All material must be submitted in digital format i.e., via e-mail or on floppy disk. For further information and submission details, contact: ARCANA, noharmdone publications, Boddinstrasse 5, Stf. 2 L, D-12053 Berlin, GERMANY.

ARCANA WorldWide Web site: http://www.icf.de/Arcana/

9th Annual Marimolin Composition Contest.

Works will be accepted for the following instrumental combinations: duo for violin and marimba; duo for violin, marimba, and tape; or trio for violin, marimba, and clarinet (B-flat or A). Duration: 7 15 minutes. Awards: a total of $600 in prizes will be awarded; and winning works will be performed and considered for publication. Deadline: July 1, 1996. For complete details, contact: Nancy Zeltsman, 475 Lake Drive, Princeton, NJ 08540.

Call for scores - The Schreck Ensemble

The Schreck Ensemble announces a call for scores which involve soprano, violin, bass clarinet, and live electronics and/or tape in any combination thereof. For further information, contact: Schreck Ensemble, Koperwieklaan 48, 2252 NW Voorschoten, THE NETHERLANDS. Phone: (31) 71-5612287; fax: (31) 70-3859268.

WNUR - call for tapes

WNUR, an FM radio station at Northwestern University, invites composers to submit recordings of electronic and/or computer music for broadcast consideration. Recorded formats should be DAT or high quality cassette. Biographical information and program notes should accompany submitted recordings. For further information, and to submit materials, contact: Peter Edwards, WNUR-FM, c/o The Classical Show, 1905 Sheridan Road, Evanston, IL 60208.

LATIN AMERICAN MUSIC CENTER (LAMC)

The Latin American Music Center is part of the School of Music of Indiana University in Bloomington (USA) and its main goals are to foster the research, diffusion and perfomance of Latin American art music ranging from colonial to contemporary music. LAMC was founded in 1961 by the distinguished Chilean composer and musicologist Juan Orrego-Salas, and following his retirement in 1987, directors of the center have been composer Ricardo Lorenz and presently, conductor Carmen Tellez. Since its creation, the LAMC has established an important library (it is the most complete collection of Latin American art music in the world), has promoted exchanges between musicians and scholars from the United States and Latin America, and commisioned, performed and recorded exemplary music. Contacts among musicians, students, academics, and the public provide a stimulus for research and appreciation for Latin American music. Olimpia Barbera, music teacher and patron of the arts, graciously supports a scholarship fund for outstanding music students from Latin American countries who wish to study at Indiana University. To contact the LAMC: Dr. Carmen Tellez (Director) or Gerardo Dirie (Coordinator). Gerardo Dirie is recommended for those specially interested in topics concerning Latin American electroacoustic and computer music.

Gerardo Dirie can be reached at the following address:

Latin American Music Center
School of Music
Indiana University
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Gerardo Dirie:

Argentinian composer of instrumental and electroacoustic music, he graduated from the Universidad Nacional the Cordoba, Argentina. In 1987 he received a Fulbright Fellowship to study composition at Indiana University. A retrospective concert of his music for soloists and live electronics was performed by the Hueco Ensemble in Manhattan, New York. More recently, he received awards from the National and Inter-

national Tribune of Electroacoustic Music in Argentina and France respectively, and the International Tribune of Composers (UNESCO) in Finland. Nowadays he is completing a doctorate in composition in Indiana University while working as coordinator for the Latin American Music Center.

Further information on the LAMC staff can be obtained in the following URL:

http://www.music.indiana.edu/som/lamc/whoswho.html

LAMC is "on-line"

The Latin Maerican Music Center recently started a project to offer some of the LAMC's materials and services through Internet resources. LAMC On-line consists of two main sections: LAMC Home Page and Discussion List on Latin American music (LAMC-L). The LAMC Home Page is available through any of the browsers used on the WWW, and has an initial link located in the Indiana University School of Music Home Page. The Uniform Resource Locator (URL) for the LAMC Home Page is the following:

http://www.music.indiana.edu/som/lamc

Currently the home page contains several sections that include information about the LAMC and its staff, the complete collection of LAMusiCa (LAMC's Newsletter), and links to other on-line resources in Latin America. LAMusica, the LAMC's Newsletter (which is also distributed by snailmail), can be found in the URL: http://www.music.indiana.edu/som/lamc/indexlamusica.html

The second section of the LAMC On-line project is LAMC-L: Academic Discussion List for Latin American Music. The list was launched to bring an avenue for exchanging news about works-in-progress; questions of general interest about Latin American music; announcements of conferences, festivals, concerts, recordings, etc.; but mainly for serious discussion on issues concerning music in Latin America and Latin American music. Among the subscribers there are groups with different interests, such as historians, composers, musicologists, folklorists and performers, who have joined the list with the purpose of carrying their discussions on it. The list accepts messages in English, Spanish and Portuguese. Anyone can subscribe to LAMC-L. The procedure is quite simple: once you are in your email

account follow these steps:

Send a message to:

LISTSERV@IUBVM.INDIANA.EDU Skip the "Subject:" line In the body of the message write: SUBSCRIBE LAMC-L your-first-name your-last-name If you end your email message with a default "signature" (quotation, picture, address, etc.), please disable it before sending the message. You will receive a messsage confirming your subscription and a "welcome message" with general information about the use of the list and a guide on how to obtain additional information. LAMC staff invites all those interested in Latin American music to browse through the home page, subscribe to the list, and send them their comments and suggestions.

"Online Resources in Latin America" is prepared by Erick Carballo <carballo@ucs.indiana.edu> and can be found in the WWW in the URL: http://www.music.indiana.edu/som/lamc/LatinAm_Resources.html

Future Projects

As forthcoming projects for the home page the creation of a directory of Latin American composers, a directory of Latin American music schools and instituttions, institutions related to Latin American music in other parts of the world; and a compilation of theses, dissertations, projects and reserach on Latin American music are planned. Some of the Latinamerican composers who contributed to the LAMC-L are: Gerardo Dirie, Ricardo Dal Farra and Martin Alejandro Fumarola (Argentina), Rodrigo Segnini-Sequera and Adina Izarra (Venezuela) and Diego Luzuriaga (Ecuador). Significant events and recordings of electroacoustic and computer music from Latin America were reported and/or reviewed through LAMC-L, such as the concert of Live-electronics held in Caracas in October 1995, the Argentinian "XI Semana de los Medios y la Musica Electroacustica", the CD "Musica Electroacustica de Compositores Latinoamericanos" (curated by Ricardo Dal Farra) included in Leonardo Music Journal #4 and the Chilean CD "Electromusica de Arte".

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Creating Worlds for my Music to Exist: Women Composers of Electroacoustic Music in Canada

by Andra McCartney
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From January to November of 1993, I interviewed fourteen women composers from three Canadian urban centres—Montréal: Claire Piché, Lucie Jasmin, Pascale Trudel, Monique Jean, Helen Hall and Kathy Kennedy; Toronto: Gayle Young, Sarah Peebles, Wende Bartley, Elma Miller, Ann Southam, and Carol Ann Weaver; and Vancouver: Hildegard Westerkamp and Susan Frykberg. These interviews then formed part of a larger study (McCartney 1994). This research explores gender issues in electroacoustic music, through its imagery and institutions, as well as through individual responses by my consultants. Several factors came together to convince me to investigate how women composers work with electroacoustic technologies. I had been interested in the social impact of computer technology[1] for some time (McCartney 1990), and had started to look specifically at the interaction of women with technology[2] (McCartney 1991). I had also designed and run a residential science and technology careers workshop for young women (Grades 9 and 10) students from across Ontario, to introduce them, with a feminist perspective, to different areas of science and technology.[3]

At the same time, influenced by hearing the soundscape work of Canadian composer Hildegard Westerkamp, I began to create both electroacoustic tape pieces and electronic studies using a MIDI sequencer. I started to attend meetings of a MIDI Users' Group in Peterborough, Ontario, where I lived at the time, and was surprised to find that I was the only woman member the group of thirty members had ever had. Although I was well aware of the masculine environment of computing from my experience as a programmer, I had never yet been the *only* woman member of a computer group. As I attended the meetings, I felt more and more out of place. Oten, when I approached members chatting idly before or after the meeting, conversation would falter and drop away. At one point, a speaker handed out outlines of his talk to everyone except me, walking past me as if I was not there, perhaps assuming that I was accompanying one of the other members. Although I persisted for a year in attending meetings, I never felt completely accepted. Even the language seemed strange—although I was already quite familiar with computer language, the terminology of this group seemed even more concerned with size, speed, power, and control than business computer language.

Around this same time, I came across two books which became important sources of inspiration. The first was Donna Haraway's *Simians, Cyborgs, and Women: The Reinvention of Nature* (1991), particularly an article called "The Cyborg Manifesto." I found Haraway's work enticing because she did not demonize computer technology, nor did she accept it as a "necessary evil," nor did she worship it—the three attitudes I had previously seen in writing on this subject. Haraway's approach seems to have more potential than any of these. She talks of working with technology as both pleasurable and "scary," using the adjective scary to conjure up feelings similar to being on a roller coaster, or watching a horror movie: even the sense of danger associated with computer technology has pleasurable feelings attached to it.

Haraway acknowledges the genesis of computer technology in military research, and spends a large part of her article mapping that association, and its effects. However, at the same time, she also talks of female pleasure in technological skill, and this was something that I immediately recognized, and that struck a chord. Through the careers workshop that I had organized, I had met several women engineers and scientists, who all stayed at sessions long after they were over, because they enjoyed meeting other women with similar interests. Many of them said to me privately that they did not like feeling apart from other women, that often their technological skill set them apart, and seemed to compromise others' (and sometimes their own) ideas of femininity. I remembered how odd I felt when other women would say that they wanted nothing to do with computers, that the machine world was completely alienating.

Through Haraway's work, I started to see how the stereotypical construction of woman, as naturally close to Mother Earth, and at the same time distanced from machines, places a barrier between women and computers. Haraway describes an alternative viewpoint, where women can be technologically skillful without compromising their identities as women, integrating nature and culture.

Haraway also uses the image of the "cyborg," the hybrid organism both human and machine, as a powerful metaphor. She describes the traditional relationship between man and machine as a boundary war: the machine as enemy, to be controlled, just as woman is to be controlled. For example, in the silent film *Metropolis,* the machine woman is evil, lustful, and powerful. She has to be destroyed in order for the 'real' woman (virginal, motherly, and virtuous, therefore safe) to be set free. Haraway argues for "*pleasure* in the confusion of boundaries and for *responsibility* in their construction" (1991: 150). The cyborg is a hybrid. It is not natural: "The cyborg skips the step of original unity, of identification with nature in the Western sense. This is its illegitimate promise that might lead to subversion of its teleology as star wars" (1991: 151). So, although the cyborg is a product of military research, its fragmented identity that can never hope for original wholeness could alter what seems an inevitably dangerous trajectory. It has no investment in being true to its origins.

In a 1991 interview of Haraway, Andrew Ross suggests that the feminist cyborg could be considered a "bad girl," the whore in the triumvirate of images often stereotypically associated with women (virgin, mother, whore), because of its association with excitement and danger (Penley and Ross 1991: 19). But in this case, unlike the *Metropolis* example cited above, the erotic power of the "bad girl" is celebrated rather than destroyed. Haraway's is a theory that acknowledges the two primary feelings I associate with technological work: pleasure and peril.

Haraway's book was also the first work that I had read that saw genuine possibilities for critical and creative feminist work within a

technological world. When Haraway also uses the metaphor of noise to speak of the proliferation of codes suggested by cyborg politics, there is a link to the ideas of experimental musicians:

> Cyborg politics is the struggle for language and the struggle against perfect communication, against the one code that translates all meaning perfectly, the central dogma of phallogocentrism. That is why cyborg politics insist on noise... (1991: 176)

The reference to noise in this quote made me think of the Futurists' experiments, and the words of John Cage: "I believe that the use of noise to make music will continue and increase until we reach a music produced through the aid of electrical instruments" (Cage 1961: 3).

The ideas of Cage and the Futurists associate noise with freedom from the confines of classical conventions, and the ability to use all sounds, rather than just instrumental sounds, to make music. Although this is not the only philosophy associated with electroacoustic music, this type of thinking suggests the potential for cyborg politics.

I started to think more about the possibilities of feminist work with electroacoustic technologies, influenced by Susan McClary's *Feminine Endings* (1991). As Haraway discusses the gendering[4] of technology, McClary describes the gendering of music and musical discourse. She notes that music, because of its association with subjectivity and the body, has at times been associated with effeminacy (1991: 17), and that as a result, a discourse has arisen that stresses the rationality and transcendence of music. McClary discusses tonal music (such as sonata form,[5] or opera[6]) in terms of its semiotic codes, noting how themes and musical gestures are constructed as rational or irrational, how these codes are mapped on to masculinity and femininity, and how many canonic exemplars of western art music construct desire as stereotypically masculine/rational and concerned with control of the feminine/irrational.

My concern here, however, is not with sonata form or opera, but with contemporary electroacoustic music, which is not necessarily tonal. To what extent do cultural constructions of masculinity, femininity, and desire enter into the discourse of

electroacoustic music, which is often organized in ways other than through tonality? McClary also describes the discursive strategies of several contemporary women musicians, including Laurie Anderson. She discusses both Anderson's approach to music and to technology, commenting on her fascination with technological gadgetry, and quoting Anderson from Adam Block's 1985 interview:

> All of my work that deals with machines, and how they talk and think, is inherently critical. That's certainly the bias. But I think many people have missed an important fact: those songs themselves are made up of digital bits. My work is expressed through technology— a lot of it depends on 15 million watts of power. (McClary 1991: 137)

Anderson's performance with technology combines criticism with fascination, skill and fun with political commentary. Her approach to technology seems similar to Haraway's cyborg politics: "A cyborg body...takes irony for granted.... Intense pleasure in skill, machine skill, ceases to be a sin, but [becomes] an aspect of embodiment" (1991: 180).

McClary discusses Laurie Anderson's "Langue d'Amour," which has a spare tonal structure, layered with a thick timbral texture. This piece questions gendered codes by re-writing the Genesis story. McClary describes how Anderson uses electronic technologies in this work to tell her story:

> Layered on top of the mix are the sounds of what are identified as electronic conches—teasing glissandos that slide upward, smearing the certainty of diatonic articulation. Even Anderson's voice is split off into several registers at once by means of the Vocoder—unitary identity is exchanged for blurred, diffused eroticism. Eventually the decisiveness of verbal speech is abandoned for a prolonged moment of musical jouissance, in which the murmured text—"Voici, voilà la langage d'amour" and "La, la, la, la" puns continually on "tongue": the tongue of love, the tongue that

> flickers in and out of the snake's mouth, the tongue inciting feminine ecstasy.

This is most emphatically *not* a story my people tell. (McClary 1991: 145) Here is "cyborg" music that turns its back on the Garden of Eden, and that suggests possibilities for feminist technological/musical eroticism. I looked for more writing on gender, music and technology. But nowhere else did I find a published analysis that brought feminist thinking about music and technology together.[7]

My study aims to bridge this gap, focusing on women composers in Canada. First, I review texts on electroacoustic music, noting the limited attention given to Canadian works in the international literature, and works by women in much of the Canadian literature. I then situate the work of women composers in the Canadian scene, discussing particularly the contributions of Norma Beecroft, Marcelle Deschênes, Diana McIntosh, and Micheline Coulombe Saint-Marcoux to the development of electroacoustic music in Canada.

In a recent article based on the following section of the thesis (McCartney 1995a), I describe the metaphors, images and myths invoked in mainstream discourses associated with electroacoustic music, in popular magazines, and computer software. I investigate how my consultants' language reflects and/or contests this imagery, or how it might be framed by entirely different assumptions and experiences. My thesis also includes a discussion of language and imagery in university course texts.

The next step is a consideration of the institutional structures of electroacoustic music (McCartney 1995b). As well as referring to excerpts from the interviews, I use statistical information, from the Ontario universities that offer electroacoustic studio courses, regarding the number of male and female students in each course in recent years. I then discuss how gendering exhibits itself in the division of labour in electroacoustic studio courses at universities, as well as in concert halls, conferences, and professional organizations. My consultants discuss their experiences in these institutions as students, teachers, and professional composers.

In a section that focuses on individual responses to symbolic and institutional gendering, I point out the variety of strate-

gies that each composer uses to construct her identity within the world of electroacoustics (McCartney 1995c). A discussion of three works follows: one by Susan Frykberg, *Woman and House;* one by Wende Bartley, *A Silence Full of Sound;* and one by Hildegard Westerkamp, *Breathing Room.* In the discussion about each piece, I focus on how each of the composers chooses to work with technology, and how her culturally-constructed position as a woman affects her work. I ask myself: in what ways are these pieces examples of cyborg politics, in the sense that Haraway uses this term? In other words, how do they imagine other possible stories to tell, other possible lived social relations? How do they conceptualize technology as other than a monster to be tamed? How do they rewrite our ideas of Woman and Machine?

A common theme throughout my study is the notion of performing: that to be an outsider either "as a woman" or "as a composer" may lead a woman composer to "play" being the exceptional woman, or the stereotypical woman, and/or the composer. This role-playing can allow much greater flexibility and freedom in the definition of the roles, if it is a consciously-chosen strategy. At the same time, not all roles are freely chosen. Sometimes a woman may play these roles unconsciously, as a defence, alienating herself from parts of her life experience.

The language my consultants use to talk about musical technologies often seems to pull in at least two directions: towards criticism of a mainstream reality and towards the imaginative creation of feminist worlds, stepping outside and listening within, simultaneously. To describe this tension, I use the word (im)possible, a construction that has several meanings. Although, as the presence of these women shows, it is not literally impossible for a woman to compose electroacoustic music, my consultants often feel bracketed by an environment that defines the elctroacoustic composer as male. Women are not denied entry to electroacoustic composition courses and studios, yet the environment in those places can sometimes devalue their ways of working, making it impossible to work as they wish. At the same time, perhaps more is possible: the disjuncture between how the electroacoustic composer is stereotypically constructed and her daily experience of being a composer may encourage any of these women, of necessity, to imagine other pos-

sibilities. This balancing act leads them, perhaps by its very precariousness, to start to think of different ways of interacting in the electroacoustic environment.

Many of my consultants express hesitation about what would constitute these new ways of interacting. However, I would argue that their discourse, both in language and in music, suggests some different conceptualizations and desires from those of the mainstream. In my conclusions, I discuss the relationships among the linguistic and musical metaphors used by these composers, and their significance in the production of alternatives.

Each composer's situation, experiences, and compositional strategies and styles differ. The conclusions of my study, among other variations, point to the power of personal voice, and of place: the incredible diversity within electroacoustic music. My research aims to draw together the common threads of my consultants' experiences, while honouring their differences.

References:

Cage, John *Silence.* Cambridge, Mass: M.I.T. Press, 1961.

de Lauretis, Teresa.*Technologies of Gender: Essays on Theory, Film, and Fiction.* Bloomington, IL: Indiana UP, 1987.

Dery, Mark, ed. *Flame Wars: The Discourse of Cyberculture.* Durham, NC: Duke U.P., 1993.

Franklin, Ursula. *The Real World of Technology.* Toronto: CBC Enterprises, 1990.

Grant, George. *Technology and Justice.* Toronto: Anansi, 1986.

Hacker, Sally. *"Doing it the Hard Way":* *Investigations of Gender and Technology.* Edited by Dorothy E. Smith and Susan M. Turner. Boston: Unwin Hayman, 1990.

Haraway, Donna. "The Promises of Monsters: A Regenerative Politics for Inappropriate/d Others." In*Cultural Studies,* ed. L. Grossberg, C. Nelson & P. Treichler, 295-337. New York: Routledge, 1992.

————. *Simians, Cyborgs, and Women:* *The Reinvention of Nature.* New York: Routledge, 1991.

McCartney, Andra. "Inventing Images: Constructing and Contesting Gender in Thinking About Electroacoustic Music." *Leonardo Music Journal* 5, 1995a: 57-66.

————. "Whose Playground, Which Games and What Rules? Women Composers in the Digital Playground."*Proceedings of the International Computer Music Conference: Digital Playgrounds.* Banff, Alberta, 1995b: 563-570.

————. "Le Relation Ambigu/The Ambiguous Relation." Part I: *Contact!* 9.1, Fall 1995c: 43-58.

————. "Creating Worlds For My Music to Exist: How Women Composers of Electroacoustic Music Make Place For Their Voices." M. A. thesis, York University, Toronto, Ontario, 1994.

————. "The Science and Technology Careers Workshop: Integrating Feminist Approaches in Residential Science Education." *Resources for Feminist Research* 20(1-2), 1991: 50-51.

————. "Perspective Transformation: The Development of a Critical Method to Introduce Learners to Computers." Master's thesis, St. Francis Xavier University, 1990.

McClary, Susan. "Narrative Agendas in 'Absolute' music: Identity and Difference in Brahms's Third Symphony." In *Musicology and Difference: Gender and Sexuality in Music Scholarship,* ed. Ruth Solie, 326-344. Berkeley, CA: U. of California P., 1993.

————. *Carmen.* Cambridge: U. of Cambridge Press, 1992.

————. *Feminine Endings: Music, Gender and Sexuality.* Minnesota: U. of Minnesota Press, 1991.

————. "Afterword: The Politics of Silence and Sound." In Attali, Jacques, *Noise: the Political Economy of Music,* 149-60. Minneapolis: U. of Minnesota Press, 1985.

Oliveros, Pauline. *Software for People.* Baltimore, MD: Smith, 1984.

Penley, Constance, and Andrew Ross. "Cyborgs at Large: Interview with Donna Haraway." In *Technoculture,* ed. C. Penley and A. Ross, 1-20. Minneapolis, MN: U. of Minnesota Press, 1991.

Rosen, Judith. "Composers Speaking for Themselves: An Electronic Music Panel Discussion." In *The Musical Woman: An International Perspective.* Vol. II, ed. Judith Lang Zaimont and Catherine Overhauser, 280-312. Westport, Conn: Greenwood.

Trinh, Minh-Ha. *When The Moon Waxes Red: Representation, Gender and Cultural Politics.* New York: Routledge, 1991.

Turkle, Sherry. *The Second Self.* New York: Simon and Schuster, 1984.

Wajcman, Judy. *Feminism Confronts Technology.* University Park: Pennsylvania State U. Press, 1991.

Selected Discography of Works by Canadian Women Composers[8]

Anthologies:

"Anthology of Canadian Music." Montréal: Radio Canada International.
  —volume 37, Electroacoustic Music, 1990. CD ACM 37. Includes *Fluke Sound,* Ann Southam; *Cricket Voice,* Hildegard Westerkamp.

"Discontact! II 1995. Montréal: Canadian Electroacoustic Community, 1908 Panet, Suite 302, Montréal, Québec, H2L 3A2. CD. Includes *Embrace,* Monique Jean; *Music Box II,* Kathy Kennedy; *Nocturnal Premonitions,* Sarah Peebles; *Le Poisson Qui Cache l'Oiseau,* Pascale Trudel.

"Discontact!" 1 1992. Montréal: Canadian Electroacoustic Community. CD. Includes *Radio Perspectives,* Wende Bartley; *Qui Suis-Je,* Claire Piché; *Alchimie,* Pascale Trudel; *Radio Convergence,* Hildegard Westerkamp; *Flat Water,* Gayle Young.

"Électroclips." 1990. Montréal: empreintes DIGITALes, 4487 rue Adam, Montréal, Québec, H1V 1T9. CD. Includes *Breathing Room,* Hildegard Westerkamp.

Musicworks 48: "The Politics of Music/

The Music of Politics." 1990. Available from *Musicworks,* 179 Richmond St. W., Toronto, Ontario, M5V 1V3. Includes "The Continuous" from Susan Frykberg's *Woman and House.*

Musicworks 38: "Bridging Language." 1986. Excerpt from *Photoskia,* Helen Hall.

Musicworks 31: "Women Voicing." 1985. Excerpts from *Rising Tides of Generations Lost,* Wende Bartley; *Saxarbra, Machine Woman,* Susan Frykberg; *The Emerging Ground,* Ann Southam; *In Motion,* Gayle Young; *Collage of Desert Plant Sounds, Cricket Nightsong, His Master's Voice,* Hildegard Westerkamp. Toronto: Musicworks. Cassette MW 31.

Musicworks 28: "Electroacoustic Music in Canada." 1984. Excerpt from Susan Frykberg's *Machine Woman.* Toronto: Musicworks. Cassette MW 28.

Musicworks 26: "A Walk Through the City." 1984. Excerpts from *Cool Drool, A Walk Through the City, When There Is No Sound,* all by Hildegard Westerkamp. Toronto: Musicworks. Cassette MW 26.

"The Aerial #5. A Journal in Sound." 1992. Contains excerpts from *Kai,* Sarah Peebles. AER 5.

Individuals:

Bartley, Wende. "Claire-voie." 1994. Montréal: empreintes DIGITALes, 4487 rue Adam, Montréal, Québec, H1V 1T9. IMED 9414-CD.

Frykberg, Susan. "Transonances." 1985. Toronto: Underwhich Audiographic. Cassette.

Westerkamp, Hildegard, & Norbert Ruebsaat. "Inside the Soundscape." 1986. 685 W. 19th. Ave., Vancouver, B.C., V5Z 1W9.
  1. *Fantasie For Horns I and II;* 2. *A Walk Through the City, Whisper Study, Street Music;* 3. *Cordillera, Zone of Silence Story;* 4. *Voices for the Wilderness;* 5. *Harbour Symphony.* Vancouver: Inside the Soundscape. Cassettes 1-5.

A new solo CD of Westerkamp's work, "Transformations", will soon be released by empreintes DIGITALes.

Author's Bio:
Andra McCartney is a PhD. student in the Music programme at York University. She is engaged in research on questions of music, technology, and gender. Her dissertation will be an ethnography of the electroacoustic studios at Simon Fraser University, Vancouver, BC, Canada. She also composes electroacoustic music, currently working on a cycle of tone poems that incorporate vocal and environmental sounds.

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[1] There is a huge, and growing, literature in this area. Recent publications that I have found most useful include: Dery, 1993; Franklin, 1990; Haraway, 1992, 1991; Penley & Ross, 1991; Wajcman, 1991. I still refer often to Turkle, 1984.

[2] See, for instance, Judy Wajcman's *Feminism Confronts Technology,* (1991); the compilation *Technoculture,* (Penley & Ross, eds. 1991) which, though not specifically a feminist collection, includes several important feminist contributors; the compilation *Inventing Women: Science, Technology and Gender,* (Kirkup and Keller, eds. 1992); Haraway, 1992, 1991, 1989; Hacker, 1990; Faulkner and Arnold, 1985. Teresa de Lauretis' 1987 publication *Technologies of Gender,* while sub-titled "Essays on Theory, Film, and Fiction," has insights that are important in any consideration of feminism and technology. The same could be said of Trinh Mihn-Ha's 1991 *When the Moon Waxes Red.*

[3] I focused particularly on creative projects. The participants in the workshop were more interested in continuing with science at school when they realized that when they did so, they did not have to give up their artistic interests as a result.

[4] "Feminist theory and practice around gender seek to explain and change historical systems of sexual difference, whereby 'men' and 'women' are socially constituted and positioned in relations of hierarchy and antagonism' (Haraway 1991: 131).

[5] See, for instance, McClary, 1993; 1991.

[6] McClary, 1992; 1991.

[7] Rosen (1987) gives a transcription of a panel, and two interviews, with American women composers of electronic music. However, there is no discussion of the issues raised. Oliveros' (1984) work, while useful, focuses more on general questions related to feminism and music.

[8] Only includes works by consultants for Andra McCartney's Master's thesis (York University, 1994). *ICMA ARRAY V16, N1*

Lexikon-Sonate
An Interactive Realtime Composition for Computer-Controlled Piano

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Anton-Bruckner Konservatorium

Lexikon-Sonate is a work in progress which was started in 1992. Instead of being a composition in which the structure is fixed by notation, it manifests itself as a computer program that composes the piece – or, more precisely: an excerpt of a virtually endless piano piece – in real time. *Lexikon-Sonate* lacks two characteristics of a traditional piano piece: 1) there is no pre-composed text to be interpreted, and 2) there is no need for an interpreter. Instead, the instructions for playing the piano – the indication "which key should be pressed how quickly and held down for how long" – are directly generated by a computer program and transmitted immediately to a player piano which executes them. In this paper I will describe from where I started and how I arrived at the concept of an infinite interactive realtime composition.

Origins

In the late sixties the Austrian/Slovakian poet Andreas Okopenko started to write the novel „*Lexikon-Roman*" (Okopenko, 1970) – the first literary HyperText, several years before this term was introduced by Ted Nelson (Nelson, 1970). This novel – „*a sentimental journey to a meeting of exporters in Druden*" (subtitle) – consists of several hundred small chapters which were brought into alphabetical order. By reference arrows as in a lexicon the reader could make her own investigations through the multiple nested web structure of the text. Instead of presenting a sequential text with a predefined direction of reading, Okopenko provides a structure of possibilities, which challenges the reader to become a creator of her own version of this novel.

Twenty-five years later an interdisciplinary group of artists and computer freaks called „*Libraries of the Mind*" started to create an electronic version of this book using HyperCard as a programming environment. Now the navigation through the text was easily achieved by clicking onto the reference arrows, the „links". The elec-tronic implementation (which is about to manifest itself as a CD-ROM) also provides new features that were impossible with a printed book: an electronic logfile which keeps track of the ways and deviations of the reader, search for keywords, the possibility of making annotations etc.

Andreas Okopenko, who himself belongs to the „Libraries", suggested adding other media like pictures, photos, spoken language, music and sound. And so other artists joined the group: a graphic artist, a photographer, and at last myself, a composer.

After reading the book three demands for the music became obvious:

1) Music for the „Lexikon-Roman" cannot consist of „jingles" which are played whenever a certain text particle has been selected. With music the problem of time emerges: music – unlike a static pictorial object or even a text – is always related to time: it takes place „in time", whereas beholding a picture or reading a text happens „out of time". One can meditate over a poem for a long time, or just read over it. But music is always linked to a certain time span, reflecting time. So it became clear that the music cannot consist of pre-recorded pieces that are simply recalled. It should reflect the reading behaviour of the reader: if she spends a long time on a chapter, the music should stay in the same „mood" or character, and if she starts zapping nervously between the textural links, this should also be reflected by the music, resulting in quick changes of character.

2) The complex structure of the novel challenged me to achieve something related in musical composition: a complex network of musical meanings, an infinite maze of sounds.

3) The lexical principle of references – starting at a certain point and arriving somewhere else by reference arrows – gave me an idea of the formal aspect of the composition. If the music changes, this change should not be abrupt, but taking some aspects of its former state and perpetuate it, while something new is added. Consider you are making a transition from A to B to C – for instance, when you are reading an encyclopaedia starting with the keyword „A" which leads you to „B" by a link, and from there to „C". There is a semantical relationship between A and B, but to a lesser extent between A and C. When you are in the B state, you will still remember A which provided the reference; and when you approach C, A will still be present, but only to a lesser extent. If you dare move towards D, you will probably forget about A. Indeed, this lexical concept of links is the underlying formal principle of *Lexikon-Sonate*.

Piano Music

I confess that I have serious problems with the piano. As a composer and a double bass player I am mostly interested in sound processes, whereas the piano does not offer much flexibity in sound production: once the key is pressed, nothing can be done to shape the sound afterwards, as opposed to a bowed instrument, for example.

On the other hand, the piano has a big advantage: as a polyphonic instrument it allows different voices to be played at the same time. Due to its equal timbral characteristic it is predestined to represent the structure of traditional music. In this respect it was utilized during the last 250 years. Before the development of radio and records, piano transcriptions were used to obtain an acoustical impression of a symphony or opera.

The decision to write a piano piece can also be seen in another light: taking revenge for the piano lessons I had to take since my early childhood. Using a piano also implies awareness of its incorporated history: its role in the bourgeois salon, as an inspirational tool for a composer, and as a handy instrument to unload emotional energies. At last: writing for the piano means to reflect on the whole history of this instrument, its repertory, its highly developed virtuoso techniques and its typical compositional subjects. Writing a solo piece for this beloved and hated instrument must result in a „hyper"-piano piece which increases its historical, social and compositional implications; a music beyond the scope, virtually never-ending, which exceeds the facilities of a human player. A composition, that can only be executed by a computer-controlled piano.
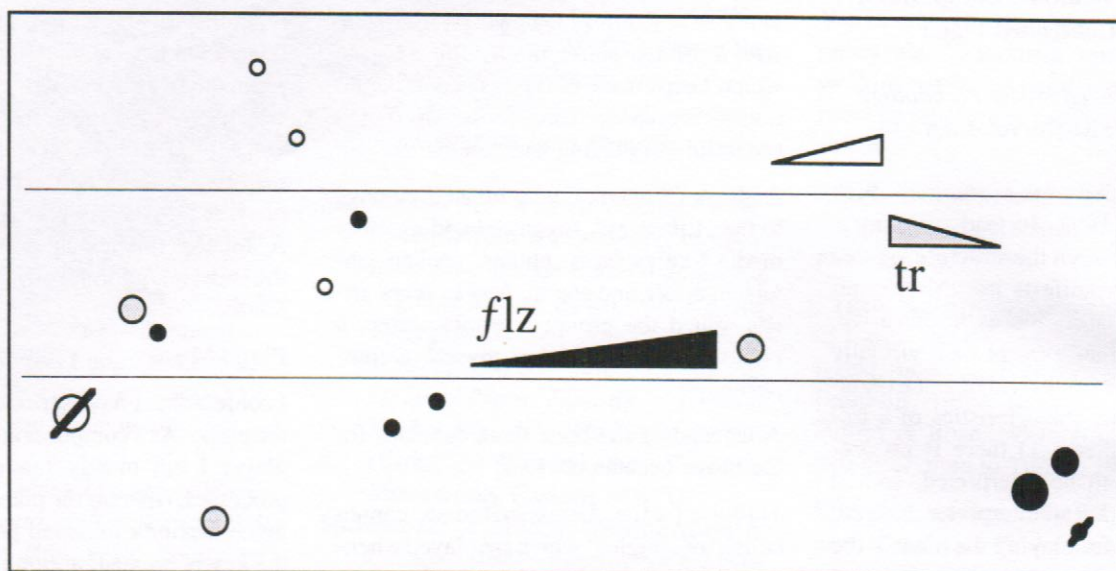
Partikel-Bewegungen (1991-93) for flute, bass clarinet & saxophone
page from one of the instrumental parts (duration: 20 ")

Real Time Composition

For a long time I have had a vision of an infinite music which is „composing itself" without lacking a personal style and interesting flavor. I had some theoretical ideas about how to achieve this goal, and I even developed a set of playing rules for the performance project „*Partikel-Bewegungen*" (1991-94) for flute, bass clarinet and saxophone. In this piece each musician plays an independent, graphically notated part which was generated and printed by a computer program written in my own xLOGO-based „Computer Aided Composition Environment" which I have been developing since 1988. Each class of graphical signs can be interpreted according to a certain set of rules, which only gives a rough outline. The „fine tuning", however, is achieved by the musicians themselves during the performance – in real time – by listening to each other and coordinating or even juxtaposing their playing with the sounds of the others.

When I started to work on a commission at IRCAM in 1992 (*Entsagung* for flute, bass clarinet, prepared piano, percussion and the IRCAM Musical Workstation), I came across MAX, a „graphical development environment for multimedia and music" (IRCAM/ Opcode). Immediately I realised that this was the very programing language I was looking for since a long time – a

powerful tool which allows to experiment with compositional strategies and to listen to the result immediately.

Real Time Composition Library

First I started to re-implement some objects which already existed within my own xLOGO-based „Computer Aided Composition Environment", like specialized random functions and rhythm generators. The realtime facilities of MAX offered me the fantastic possibility of rapid prototyping and refining after listening, whereas in my xLOGO-environment a transcription into musical notation had to be done.

The result was so compelling and encouraging that I began to implement some models for algorithmic composition, which later became the starting point for *Lexikon-Sonate*. As a side-effect a whole library of compositional tools – the „Real Time Composition Library" (RTC-lib) for MAX – evolved, whose version 2.2 is available from several ftp-sites (see appendix).

This library offers the possibility to experiment with a number of compositional techniques, such as serial procedures, permutations and controlled randomness. Most of these objects are geared towards straightforward processing of data. By using these specialized objects together in a patch, programming becomes much clearer and easier. Many functions that are often useful in

algorithmic composition are provided with this library – allowing the composer to concentrate on the composition rather than the programming aspects.

Regardless of the fact that this library was conceived for a particular project it became more and more obvious that its functionalities are open and generic enough to be used by other composers in different compositional contexts.

Although the theoretical point of view of the library is based on paradigms which have been extracted from serialism and its further developments until today, it does not force a single aesthetic, but provides a programming environment for testing and developing musical strategies. „Serialism" here refers to a certain method of musical thinking rather than orthodox dodecaphonic techniques which has been abandoned by serial theory itself (cf. Stockhausen, 1957 and Koenig, 1965).

The library is composed of two main categories of objects: basic programming tools (like toolbox functions, chance and list operations) and specific musical functions (harmony, rhythm, envelopes) – see Fig. 1.

As an example I will discuss the group-rhythm object which generates a rhythmic structure according to Stockhausen's „Gruppen"-theory (Stockhausen, 1957) and takes into account the concept of „periodic-
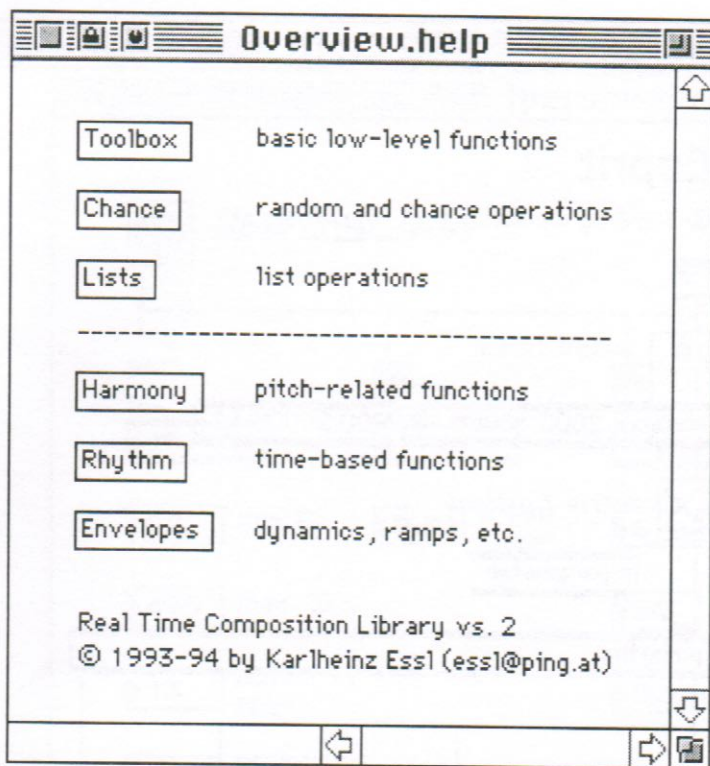
Fig. 1: Content of RTC-lib 2.x

Fig. 2: the „group-rhythm" object

ity" as it was formulated by Gottfried Michael Koenig (Koenig, 1965). These concepts indicated the end of the orthodox „punctual" serialism and finally led to the abolition of row permutation techniques. Instead of a permutation program which was derived from a given basic row, Koenig introduced the method of random selection as it manifestates itself first in his *Streichquartett 1959* and later in his composition program *Project 1* (Koenig, 1970 and Essl, 1989).

As its basic material this rhythm generator uses a supply of entry delays (ED) which form a geometrical row between a minimum and a maximum ED in a certain number of values. In our example the min.ED is 100 ms, the max.ED is 1000 ms – between these boundaries a geometrical row is constructed:

row index: 0   1   2   3   4   5   6

entry delay: 100 464 215 316 464 681 1000

When group-rhythm is switched on, it chooses an ED-value by chance. Now the „periodicity factor" determines how often this value will be repeated, before another one is chosen. When the factor is 1, the resulting rhythm will be completely periodic – an even pulsation. If the periodicity factor becomes 0, a completely aperiodic rhythm with no repetitions of a chosen ED is generated. In between these boundaries of pure „periodic" or „aperiodic" rhythms a broad field of interesting intermediate steps is situated. By gradually changing the periodictiy parameter over the time, transitions between different grades of (a)periodicity can be achieved easily.

These specialised generators of the RTC-lib are functional implementations of a certain algorithmic model whose „behaviour" can be changed by the model's parameters. In this way an infinite variety of variants can be produced, which are always linked to the central idea of the model, even when the results are very different. Combining different RTC-generators in one patch, is a convenient way to implement specific algorithmic compositional models, as will be shown in the following chapter.

Modules

Up to now the *Lexikon-Sonate* consists of 24 music-generating modules which are related in a very complex way. Each module generates a specific and perceptual characteristic musical output (a „language") due to a certain compositional strategy ap-
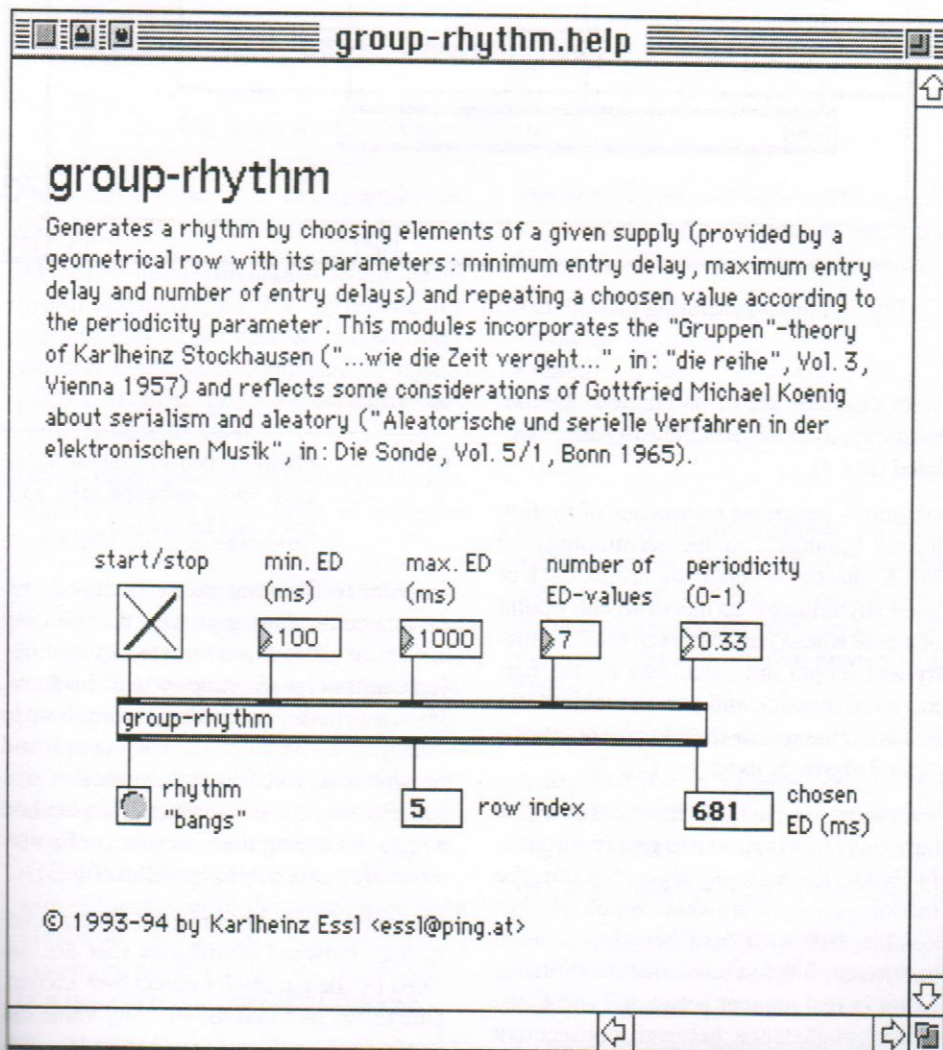
plied. A module represents an abstract model of a certain musical behaviour. It does not contain any pre-organised musical material, but a formal description of it and the methods how it is being processed. The idea of autopoiësis – material organizing itself due to specific constraints – plays an important rule.

By using different random generators which are controlling each other (which – serially thought – form a scale between a completely deterministic and a completely chaotic behaviour) new variants of the same model are generated. Variants may differ dramatically from each other, although they are always perceptable as „instances" of the given structural model.

One of the simplest (but nevertheless most compelling) modules of *Lexikon-Sonate* can be found in ESPRIT (fig. 3).

This module generates melodies with a pronounced „espressivo" character. Before investigating what „espressivo" means and how it is achieved let us first look at the flow diagram of this patch; a basic structure, that appears in nearly all modules of *Lexikon-Sonate*.

From top to bottom we notice the following object boxes which are connected with lines:

• phraser – alternatively generates phrases (AD = „Aktionsdauer") and pauses (PD = „Pausendauer") of a certain length. The concept of „Aktionsdauern" (time filled with sound) and „Pausendauer" (empty time, without sound) was developed by Karlheinz Stockhausen (Henck, 1980) in order to control structural „density". In *Lexikon-Sonate* the statistical time proportions between AD and PD are controlled by a so-called „weight factor", an integer between 1 and 3.

weight factor	AD	PD	perception level
1	short	long	background
2	medium	medium	middleground
3	long	short	foreground

In other words: the weight factor determines the perceptual level of a module – whether it is dominantly playing in the foreground, being modest in the middleground, or hiding itself in the background.

• parameter – before generating a new phrase, all parameters of the module are randomly changed within pre-defined boundaries.
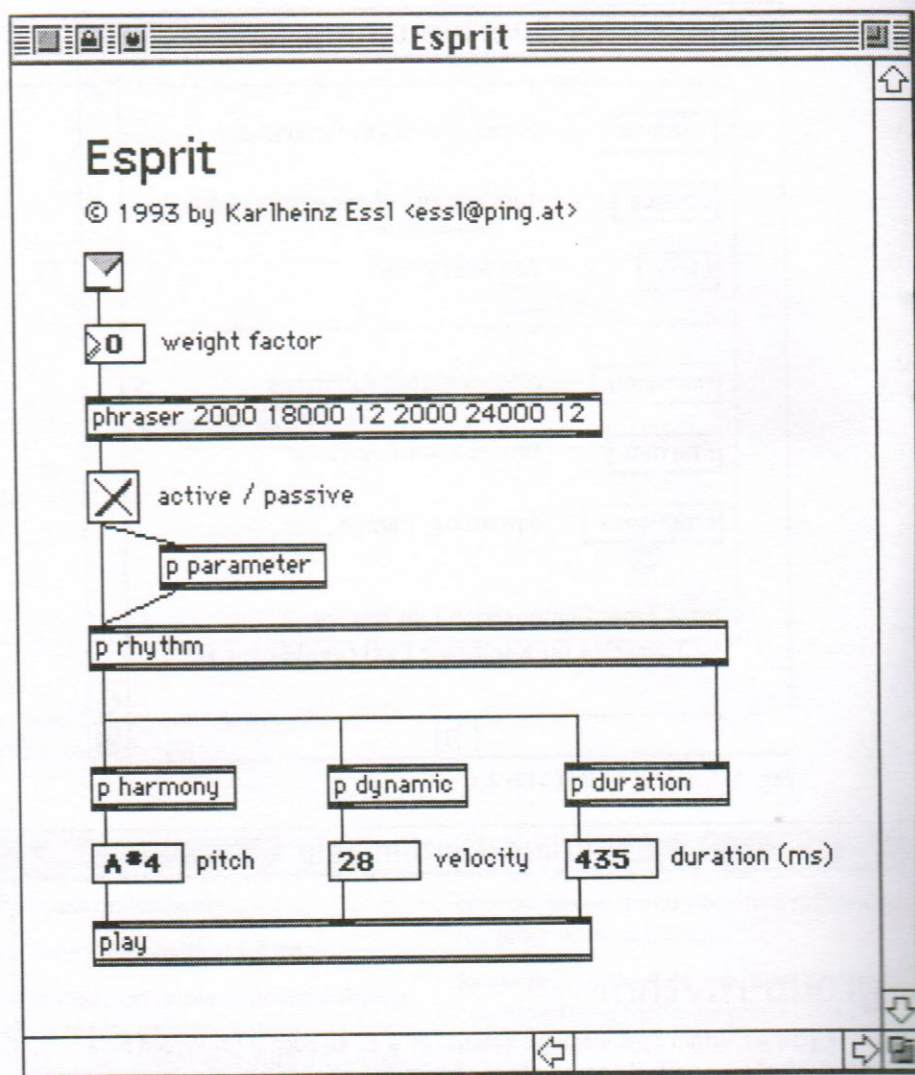

Fig. 3: music-generating module ESPRIT

With this new set of parameters rhythm, harmony, dynamic and duration are calculated (fig. 4).

• rhythm – generates a sequence of rhythm pulses („bangs", in the terminology of MAX) during the length of an AD. Each of these rhythmic bangs marks an entry point of a note whose parameters of pitch, velocity and length are calculated by the harmony-, dynamic-, and duration-objects. In ESPRIT, the group-rhythm object, as discussed above, is used (see Fig. 3).

• harmony – a rhythm „bang" sent to the harmony object causes it to generate a pitch. In ESPRIT, the harmony algorithm uses the random generator brownian which selects a number within defined boundaries (min, max) according to a brown factor. With this factor (a real number between 0 and 1) the statistical distance between consecutive values is determined – the „Freiheitsgrad".

brown factor	effect
0	always repeats the same value
1	each value between min. and max. can be chosen

In order to filter out tone repetitions, octaves, and oscillating pitches, the resulting stream of pitches is evaluated by two objects, anti-octave&prime and anti-bis&osc. If such an undesireable event were about to take place the pitch is surpressed and brownian is asked to supply another one that fits into the constraints. This method avoids disturbing musical effects of a not-so-smart harmonical algorithm (fig. 5).

• dynamic – uses brownian to generate velocities between boundaries that are defined by the parameter object (see above). Due to the fact that the velocity value depends on the value chosen before (according to the „brownian factor") envel-
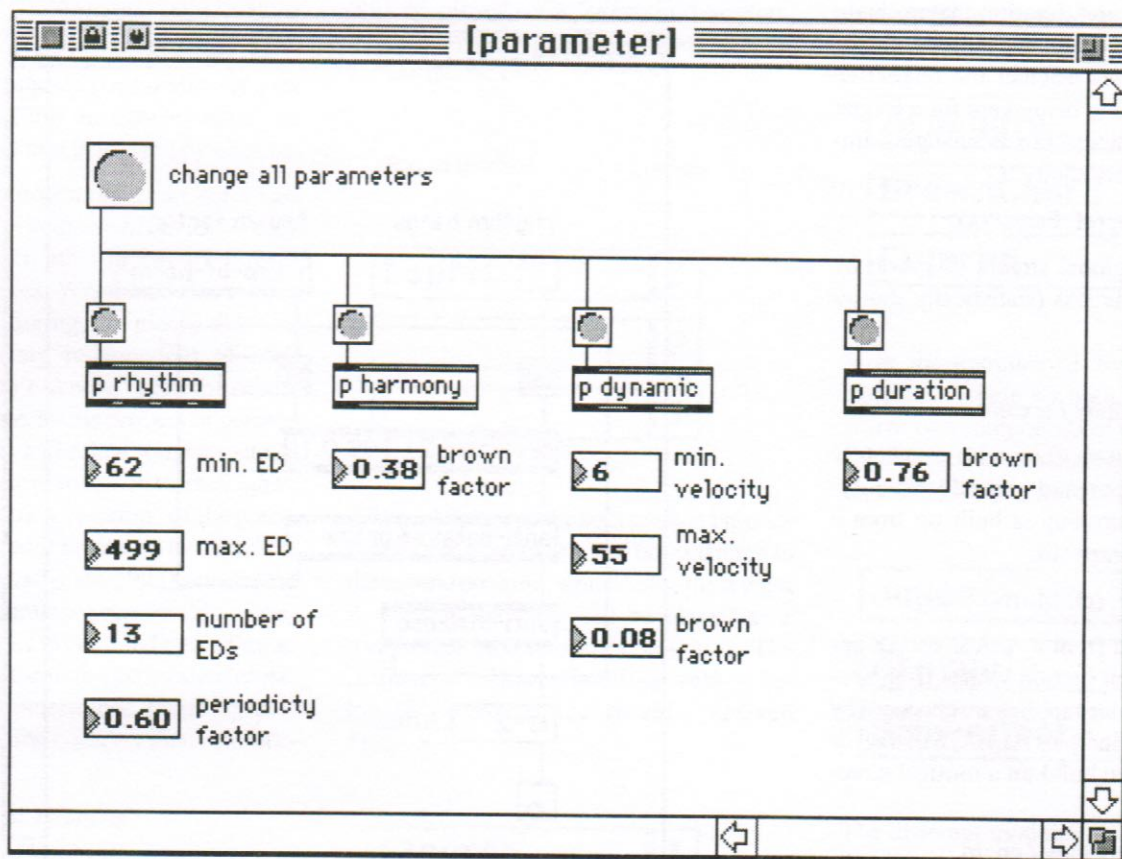
Fig. 4: parameter setting of ESPRIT

shapes like crescendo, decrescendo can occur.

•duration – uses brownian to determine the length of the note. By this the articulation („phrasing") of the melody is controlled: whether a phrase is comprised of legato, portato, staccato, pedal effects etc. or any combinations of them.

•play – combines pitch, velocity and length into a MIDI note message which is sent to the MIDI-controlled piano.

Although the music generation is achieved by random operations, it will never sound like this. In rhythm the repetitions of values create „islands of periodicity" within a complex (chaotic) situation; whereas in harmony, dynamic and duration the randomness is controlled by the „brown factor" leading to the emergences of melodic cells, envelope shapes, articulated phrases etc. By this the desired „espressivo" character – with its association to Viennese music since Mozart until Schoenberg, Webern and Berg – emerges; not at will, but as a consequence of a particular compositional strategy.

The 24 Modules

The 24 different music-generating mod-

ules of the *Lexikon-Sonate* can be assigned to 5 different types of musical structures. Superimpositions may occur. These structural types are:

• melody
• chord
• texture
• repetition
• pauses

In the following all modules are listed, together with a short description; furthermore their relationship to the 5 types of musical structures and references („cf.") to other modules with similiar properties are given.

ARPEGGIO: chord / texture (cf. GLISSANDO)

Arpeggios of 4 to 14 notes, ascending or descending, which are built up of 2 – 4 different intervals.

BROWNCHORDS: chords (cf. PULSCHORDS)

1–6part chords on a brownian rhythm. The harmonic structure is built of intervalic rows.

CLOUDS: texture / melody; (cf. TRILLER)

„Clouds" of fast moving notes („*rubato*

rhythm") within a certain pitch range. Some notes are highlighted by dynamic accents.

ESPRIT: melody

Espressivo-melody of some complexity, refering to the so-called „Viennese Espressivo".

FERMATA: pause

Inserts global pauses into the whole musical stream and sustains the notes at these „cutting points" as resonances with the sustain pedal.

FIGUREN: melody / texture

Grace-note figures with *crescendo* towards or *decrescendo* from the main note.

GLISSANDI: texture; (cf. ARPEGGIO)

Glissandi, composed of minor and major seconds which are sustained with the pedal.

GENERALPAUSE: pause

Entirely stops the stream of music. By this the whole infinite process of music generation will be organized in sections.

GRUPPEN: melody, repetition

Parameters organized in „Gruppen" according to serial theory (see above). Each of the
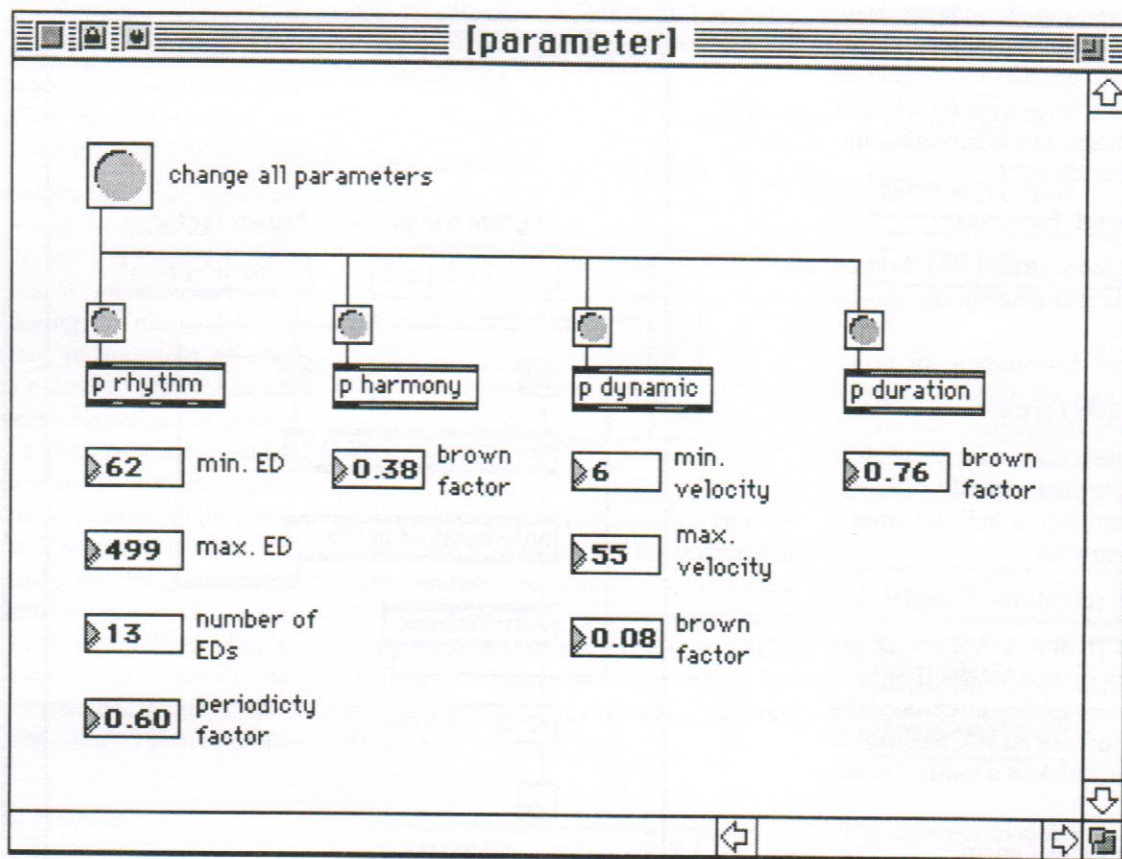
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GRUPPEN: melody, repetition

Parameters organized in „Gruppen" according to serial theory (see above). Each of the

structural parameters rhythm, harmony, dynamic range and duration factor obtain their own, individual periodicity factor which determines whether the respective parameter value is being kept for a longer period („periodicity") or is changing immediately („aperiodicity").

HACKER: pause; (cf. FERMATA)

Interrupts the global stream of music by inserting short breaks (statistically shorter than FERMATA).

HOQUETUS: melody / texture

Periodic rubato-rhythm with constantly changing registers and generally loud dynamics. The harmony is built up from a supply of two intervals.

JOYCE: melody; (cf. MOTIV)

Music obtained from a radical choice approach: for each section values from predefined parameter supplies are choosen (by the selection principles ALEA, SERIES or SEQUENCE) to build up a musical structure.

MELOCHORD: melody / chord

Structural transition between melody and chord. Depending on the duration of the entry delay (ED) the repetition rate of the chosen ED and the chord size are determined, according to the following relation:

• shorter ED: high repetition rate, small chord size

• longer ED: low repetition rate, large chord size

MOTIV: melody; (cf. JOYCE)

For each phrase different sequences of parameter values (for rhythm, harmony, dynamic and duration) are calculated which are „looped" for the duration of this very phrase. By this method the concept of „motives" (as it traditionally appears in rhythmical-harmonical contexts) is extended to other structural parameters.

ORGELPUNKT: repetition; (cf. REPLAY)

A repeated note which is dynamically increasing and decreasing.

PAUSE: pause

Simply does nothing at all. Like GENERALPAUSE, HACKER and FERMATE it allows that only two different modules are combined, instead of three.
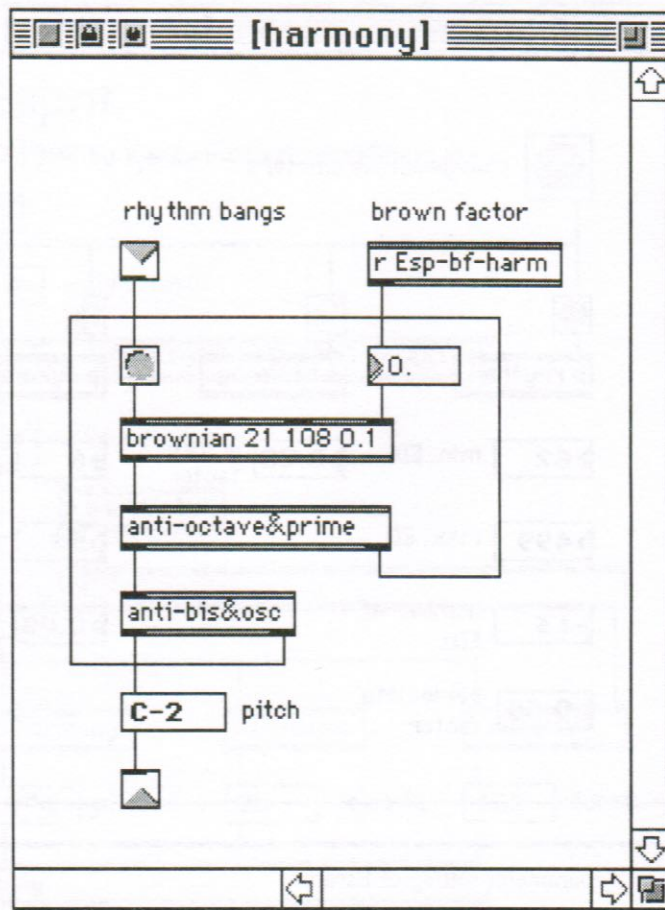
POINTILIST: melody

Fig. 5: harmony generator of ESPRIT

Parameters changing each note („Punktuelle Musik"). Parameter ranges and row sizes may change.

PULSCHORDS: chord (cf. BROWNCHORD)

Up to 6-part chords on a constant rhythmical pulsation of different speed. The harmony is built of intervalic rows of different sizes.

REPLAY: repetition / texture; (cf. ORGELPUNKT)

Layers of repeated notes of different speeds which are dynamically increasing and decreasing. The harmonic structure is composed of two or three different intervals.

RÊVERIE: melody

Melodic line of complex *rubati* with moving harmonic constellations.

RICOCHET: repetition; (cf. ORGELPUNKT)

Repetitions of a single note with increasing or decreasing speed with crescendo or decrescendo.

SLEEP: melody / pause

Most of the time it does nothing (like PAUSE),

but sometimes it plays a short melodic phrase.

SUSPCHORDS: chord / repetition

1 – 4part legato-chords on a constant pulse which is structured by rests. The harmonic structure consists of intervallic rows where several note may occur in the next chord (harmonic „suspension").

TRILLER: texture; (cf. CLOUDS)

Trills of 2 – 6 notes, dynamically increasing and decreasing, mostly together with *accelerando* or *ritardando*. NB: A six-note trill consists of rapid permutations of six notes within a single octave register.

As stated before these 24 modules are forming a sort of musical HyperText. At the „boundaries" of its algorithmic model a module can obtain characteristics of another one, giving a reference („link") to it. Some examples:

•A variant of ESPRIT which is only composed of fast rhythmical values would give us the same impression as a structure generated by CLOUDS.

• A phrase of BROWNCHORD which only contains chords of chord size=1 could be similar to a melodic phrase generated by RÊVERIE.

• A thrill of six notes (a permutation of a set of six notes within an octave) could be similar to a structure generated by CLOUDS.

This shows that those modules are not closed entities with an exclusive behaviour – they are linked to each other in a very complex way by references. When modules are being combined during the piece, they are acting completely independent of each other. They don't „know" what the others are doing. Hence, by the process of perception the listener will relate some structural aspects of different modules to each other, composing her own „version" of the piece. This approach, as it is viewed by *„Radical Constructivismus"* (Essl, 1992), entitles the listener to become a „composer" – constructing the piece in her mind by finding an individual way through a polyvalent maze. A way, that is determined rather by personal criteria of the observer than by objective structures.

Combinations of Modules

During the piece up to three different modules are combined whereas each of them occupies a different „weight". This weight factor will determine the statistical proportions between „Aktionsdauern" (time filled with music) and „Pausendauern" (empty time) of a module, as it was shown before in the discussion of the „phraser"-object of the module ESPRIT. In other words: the weight factor determines the perceptual importance of a module.

When combining modules in *Lexikon-Sonate*, there will always be one in the „foreground" (weight = 3), one in the „middleground" (weight = 2), and one in the „background" (weight = 1). The weight for each module will change whenever a new one is brought into the game: e.g. a „foreground" structure could turn into a „background" or the „middleground" into the „foreground" etc.

The combination of modules takes place in a chain of three boxes, which is filled by the chosen modules, from top to bottom. On the right side of each box the number refers to the weight of the position. In the example shown below, the first box always occupies weight 3 (= foreground), the middle 2 (= middleground), and the last 1 (background).

For example, imagine ESPRIT has been chosen. It is being put into the first box to which

the weight=3 is associated. Hence, ESPRIT will be played as a foreground struture: long melodic phrases, interrupted by short pauses (see above).

chosen module   „weight"

Esprit	3
	2
	1

After a certain time the next module FIGUREN is selected. Now ESPRIT will be transfered to the second position, which holds the weight 2, whereas FIGUREN will be played as a foreground structure with weight 3. The „influence" of ESPRIT becomes weaker, being displaced by the recently entered FIGUREN.

Figuren	3
Esprit	2
	1

Finally, BROWNCHORDS enters the scene, taking over the foreground. ESPRIT is turned into the background, and the weight of FIGUREN is decreased.

BrownChord	3
Figuren	2
Esprit	1

When ARPEGGIO is put into the chain, ESPRIT is abandoned. We have seen that this module – which started as foreground – gradually lost its power, becoming weaker and weaker until it was dropped completely. We also notice a formal transition: in the beginning ESPRIT alone, then in counterpoint with FIGUREN, and at last a polyphony of three different modules. Since the occurence of ARPEGGIO, however, a situation is established, where two modules are

kept (BROWNCHORDS and FIGUREN) as a „memory" of the previous situation.

Arpeggio	3
BrownChord	2
Figuren	1

With the entrance of JOYCE, FIGUREN is cancelled. Again we notice a formal shift, where two compounds of the recent musical situation are maintained, while a new aspect is brought into the game.

Joyce	3
Arpeggio	2
BrownChord	1

The different modules are chosen by random – an already picked module is being blocked until all others are selected. Whenever GENERALPAUSE occurs, all active modules will be switched off, resulting in silence. By this the infinite process of *Lexikon-Sonate* will be articulated in „movements". Afterwards the sequence of weights will be mixed again (now – instead of 3–2–1 perhaps 2–3–1 in) which will serve as a formal principle for the next movement.

User Interface

Now, after knowing enough about the elements of *Lexikon-Sonate*, let us finally have a view to its user interface (see Fig. 6):

On the top one can find a box named control with some buttons attached to it:

• auto: a toggle which switches on the automatic playing mode;

• add module: whenever this button is clicked, a new module will be chosen

by random and put into the chain;

• change weight: chooses another sequence of weight factors;

• stop: turns off the whole machine.

The „control" box serves as a sort of conductor which gives cues to the music modules, that are placed below. Clicking on the auto-toggle starts the simplest performance

Lexikon–Sonate

© 1992-93 by Karlheinz Essl <essl@ping.at>

Interactive Real Time Composition Environment for Computer Controlled Piano

auto   add module   change weight   stop

control

Esprit	○	MeloChord	Ricochet	Clouds
Gruppen		BrownChord	Orgelpunkt	Figuren	○
Reverie		PulsChord	○	RepLay	Arpeggio
Hoquetus		SuspChord	Triller	Sleep
Joyce		Motiv	Pointilist	Glissando
Hacker		Fermata	Pause	Generalpause

Esprit	3
PulsChord	2
Figuren	1

Esprit — select a module

3 2 1 — select a sequence of weights

---

mode: the built-in conductor will entirely take control, selecting the modules in time and switching them on and off. If one wants to influence the behaviour of the machine, one can click on the „add module" button. Whenever this is done, a new module will be chosen by random and combined with the two others that are still active. Clicking on the „change weight" button will change the weight factors as they are applied to the module, determining whether a chosen module serves as a foreground, middleground or background structure. This can be seen at the bottom of the display – the three boxes forming the „chain" that was discussed in the previous chapter.

However, there are also more advanced levels of interaction. Instead of merely re-questing a change to take place (by clicking on the „add module" button), one can decide at will, which modules shall be combined. This is achieved by choosing a module from the „select a module" pop-up menu, which will be sent into the combination chain. Furthermore, the sequence of weight factors can be determined, by selecting it from the other pop-up menu „select a sequence of weights".

But one can also by-pass the combination chain which allows only three modules at a time to be played, and with different „weights". By opening a module itself (by double-clicking on its box), one can directly access its parameters, choosing various settings and all the possibilities of combinations.

Performance Aspects

The fact that *Lexikon-Sonate* never repeats itself creates a challenge to invent a particular performance situation that utilizes its interactive facilities. The premiere took place on February 2, 1994 in the concert hall of the Austrian Radio as a live broadcast during the radio program „Kunstradio – Radiokunst". On stage there was the only the fantastic „Bösendorfer SE Grand Piano", but no player at all. The radio listeners (who were not sitting in the concert space) nevertheless had the possibility to interact with the computer program by dialing a certain telephone number. Whenever a call came through, *Lexikon-Sonate* would change its compositional behaviour by adding a new and randomly selected module

into its combination chain. In this way the totality of radio listeners would „govern" the form of the music, even though nobody could know the exact effect of their contribution.

At a lecture I once asked two persons from the audience to come on stage and sit there, back to back, so that they could not see each other. By giving signs with their hands, they indicated when they desired a change in music. Although these persons could not see each other, they could hear when the other had required a change – this led to a situation where the both started to „play" with each other, resulting in a wonderful and energetic performance.

Acknowledgments

I want to thank Robert Willey (University of California, San Diego), Dennis Patrick (University of Toronto, Faculty of Music), and Gerhard Eckel (IRCAM, Paris) for their comments which were of help in formulating this article.

References

Essl, K. (1989). „Zufall und Notwendigkeit. Anmerkungen zu Gottfried Michael Koenigs Streichquartett 1959 vor dem Hintergrund seiner kompositionstheoretischen Überlegungen". *Musik-Konzepte,* 66 „Gottfried Michael Koenig". Munich: edition text + kritik.

Essl, K. (1992). „Kompositorische Konsequenzen des Radikalen Konstruktivismus". *Positionen. Beiträge zur neuen Musik,* 11.

Henck, H. (1980). Karlheinz Stockhausens Klavierstück X. Ein Beitrag zum Verständnis der seriellen Kompositionstechnik. Cologne: Neuland Musikverlag, 19–23.

Koenig, G.M. (1965). „Serielle und aleatorische Verfahren in der elektronischen Musik". *Die Sonde,* 5 (1).

Nelson, T. (1970). Literary Machines. Swarthmore/PA: self-published

Okopenko, A. (1970). Lexikon-Roman einer sentimentalen Reise zum Exporteurtreffen in Druden. Salzburg: Residenz Verlag

Koenig, G.M. (19670). „Project 1". Electronic Music Reports, 2. Utrecht: Instituut voor Sonology.

Stockhausen, K. (1957). „...wie die Zeit vergeht...". *die Reihe. Informationen über serielle Musik,* 3. Vienna: Universal Edition

Appendix

The software described in the paper runs only on a Macintosh and requires Max 2.5 (© by IRCAM /Opcode) or later. It is in the public domain and available via ftp or WWW.

Real Time Composition Library for Max 2.5

Currently a version 2.2 of the „*Real Time Composition Library*" for MAX is available from the following ftp-sites:

 ftp://ftp.ircam.fr

/pub/IRCAM/programs/max/patches/composition/RTC-lib_2.2.sea.bin

 ftp://kahless.isca.uiowa.edu

 /ftp/pub/max/RTC-lib_2.2.sea.hqx

Lexikon-Sonate

Lexikon-Sonate is available as:

1) MAX program:

A limited public domain version can be obtained from the „Disklavier Discovery Archive" which is maintained by Robert Willey (http://crca-www.ucsd.edu/bobw/disklavier.html). It can be retrieved via anonymous ftp from:

ftp://wendy.ucsd.edu

/pub/midi/disklavier/essl/Lexikon-Sonate.sea.hqx

Another limited version specially designed for samplers and synthesizers is included into the new version of the RTC-lib for MAX which can be obtained from:

```
ftp://ftp.ircam.fr
/pub/IRCAM/programs/max/
patches/composition/RTC-
lib_2.2.sea.bin
```
2) MIDI file:

5 different MIDI-files generated by *Lexikon-Sonate* can be obtained via anonymous ftp from:
```
ftp://kahless.isca.uiowa.edu
/pub/max/lexicon/
```
3) Disklavier disk:

A recording of *Lexikon-Sonate* as a Disklavier disk can be found at:
```
http://crca-www.ucsd.edu/
bobw/disk3.html
```
4) Audio on CD:

An excerpt of the premiere of *Lexikon-Sonate* (featuring the „Bösendorfer SE Grand Piano") was released on the CD „Karlheinz Essl: Rudiments" (1995). It can be ordered from my publisher:

TONOS Musikverlags GmbH
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NB: This article was originally written for the proceedings of the „*II Brazilian Symposium on Computer Music*" (Canela 1995) – this version includes some corrections, updates and enhancements.

This article can also be obtained from the World-Wide Web under the following URL:
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http://www.ping.at/users/
essl/bibliogr/lexson-
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Electronic Music in Postmodern Times

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The human body is an amazing living system intricately designed to survive in its environment. One day a new virus penetrates the body and threatens the stability of the entire system; alarms go off and differentiated lymphocytes (one of the white blood cells) approach the viruses in order to figure out their makeup. Browsing at the speed of light through the enormous data base of previously produced anti-bodies, these lymphocytes find out that they have never before encountered this particular viral strain. Then, quickly the undifferentiated lymphocytes rush to read the genetic code of the unknown virus. Using that information lymphocytes mature and become differentiated, changing their identities so that their genetic code matches the code of the unknown virus. Now, ready for the fierce battle, these new lymphocytes start to multiply as fast as they can. Each new lymphocyte produces a deadly antibody protein which kills the virus, saving the social order of the organism. Concluding the transaction, the lymphocytes memorize this viral genetic code and store it into their data base, in case of eventual need in the future. The ecological day and long term organismic gratification have been won!

On another day, one of the body's delicate parts, a single living cell, no one knows exactly why, turns out to be a self-expressive innovator and changes its social function—decides not to die at all. Therefore, instead of vanishing at the end of its lifetime, it starts to multiply producing more and more innovative siblings. This geometrically progressing, separatistic growth has no concern for the sociable coexistence of its constructive elements. It functions egocentrically and with self indulgence, destroying everything in its path. Cutting and ravaging the other surrounding cells and tissues this anti-social cancer grows until it reaches a point where it can expand no more. At this instance, the delicate social organization of the original system—the human body—is so disturbed that it cannot function as a whole any longer; it has to collapse and die, killing itself and the cancer. The ecological day has been lost!

These two simplified stories from biology deal with two important social concepts—creation and innovation. Creation, as it will be used in this paper, is holistically concerned and synergetically controlled, while innovation is holistically unrestrained and synergetically adversarial. These processes—an innovative and a creative one—both concerned with novelty, take place at all times in nature; they are the part of the ongoing struggle for existence. At the present moment of scientific development, creation and innovation in nature appear to be aconscious and amoral. However, if we look at creation and innovation as processes that take place in our culture there is potential that they may be applied both consciously and with moral purpose. Humankind can make intentional decisions about creating or innovating within the ecology of its environment.

You may wonder how all this relates to electro-acoustic music in the United States. Let me explain. For the most part of this century contemporary music was driven by the dynamic and progressive ideas of modernism. Electronic music, tightly linked to technology and its development, became one of the biggest proponents of the modernism and musical avant-garde. The question is: Was this avant-garde innovative or creative? There are several ways of looking at this problem. But let me use my biological analogy once more. In both cases mentioned earlier, the changes made within the cells rendered specific responses from the organism. It was not the change or the single action taken by the changed cells that made it into a good or bad choice; it was the complexity of responses generated by the transacting components of the holistic system. Quality does not exist in the cell nor in any singular component of a living system, it is rooted in the transactions between them. Similarly, the artifacts produced by the musical avant-garde and modernism, cannot be analyzed apart from responses made by the environment in which they are presented. If there is to be an evaluation, it has to come from the quality of the transaction which includes not only the musical configuration but also its cultural response as well.

Let me assume that the most common function of music is its attempt to communicate—to present a body of aural information which may be eventually understood by society. How does that work? Have you ever wondered why a funeral march from China does not sound to western ears like anything even remotely mournful. That happens because the music is sound organized into socially understood patterns. Musical sounds per se are certainly meaningless, because music cannot express anything extramusical, unless the association to which it refers already exists in the minds of the listeners. There is no way to convey any meaning if there is no common redundant ground of socially shared experiences and responses.

The reason why most of the musical avant-garde activities have failed to connect and communicate lies in the fact that they fell normatively into a category of musical innovation and not creation. Most of the self-conscious modernist composers do not realize that their problem of producing music is not really musical; it is a problem of a lack of concern about contemporary society and culture as a thinking and responding entity. Again, the artistic value is not by any means inherent in the art product; it is in the process of transaction between the perceiver and the art object that is important. The trends in contemporary music during the last fifty years clearly show that major concerns of those who composed, were focused predominantly on product not response. The prevalent belief that there is some kind of immanent meaning that can be embedded into art objects and magically understood by anyone is false. Thus, in search for this immanent perfection, modernist composers have concentrated on developing innovative compositional techniques and systems, rather than exploring the transactive results of communication with the audiences. They completely neglected this function within the holistic social system and pursued egocentric, technological values and ends.

Music composed for acoustical instruments very quickly exhausted all its spectrum of novel instrumental techniques and special effects, reaching an end where almost nobody paid any special attention to the fact that there were gongs being dipped into the water and violins being played everywhere but not on the strings. Western avant-garde music produced everything from the extreme emptiness of silence in John Cage's *4'33"*, to the extreme sonic saturation in the finale of Iannis Xenakis' *Bohor I*. These musical extremes were reached more than twenty years ago, and once everything and anything got to be acceptable, then the modern idea of any artistic progress and, an

agreed on avant-garde, became impossible. Nothing in the arts could shock an informed public any more, because nothing good or bad being produced ever had a life, long enough to produce public interest. Music had to become just one more disposable commodity. On the other hand, there is an illusion that electronic music has not reached this dead end because it is closely connected to an avalanche of new technological development, and there is no indication that this trend will not continue into the future. For that reason, electronic music composers will have plenty of "toys" to play with for quite some time, and it will be easy for them to not take time or have patience to address the problem of music as a medium with a responsibility to communicate with humankind. This is a regrettable condition and it can be changed.

What makes the electronic music world significantly different from the rest of the contemporary music is its relationship with technology— the key element that puts modernism into overdrive. There is a common misconception that technology is either good or bad; it is the neither one—technology per se is simply neutral. It is neutral in the same fashion the artifacts are neutral. Technology requires human interaction and response in order to be evaluated and fit into categories like "good" or "bad". Lets take a TV set, or television as a medium, and see how it plays when released into reality of cultural interactions. When people watch television for seven hours a day, as Americans do on average, the impact is both complex and interesting. Though, the scope of this paper is not directly related to television, to make a point I would like to address one issue—television and human physiology. There is a high probability that excessive television watching may turn the viewers into "couch potatoes" who minimize their physical activities due to the numerous hours they spend in front of the TV screen. It could be hypothesized that the physical fitness of these people is less than optimal; unless, of course, they watch and actively participate in TV fitness programs. The good aspect of this watching may lie in information obtained; the bad aspect may be that it physiologically undermines the human body. Educated people are fully aware of this problem and therefore may consciously engage in physical exercises on their own to counter the hours passively spent in front of the TV. Again, the problem is not in

television—it is how humans choose to, or are lead to respond.

How does all this relate to our electronically driven music adventures, and how does electronic music technology affect the humans that deal with it? We all pretty much know the good sides of the issue, but how about the bad ones. Taking a brief look to institutionally organized electronic music activities, it is obvious where emphasis is heavily placed. The prime interest of everybody appears to be the technical capabilities of esoteric software. The focus is not on cultural response but on the exchange of technological information among electronic music composers. The value of music is commonly measured by the complexity of structural systems and sophistication of equipment used to produce it. The interest is concentrated on how are the electronic music pieces made rather than what kind of response they generate when released to the public. The question is: Does this focus have the ability to convey and share common life experiences with the public in order to better humans' dwelling within their own bodies? Let me explain.

Hyper-modern culture, exponentially driven by desire for progress via technology, is producing historically unprecedented complexity and contradiction among its structural elements. Building denser and denser data highways hyper-modern people are confronted with a glut of information which forces them to make one of the two choices. A) They can metabiologically cause excessive stress to themselves by attempting a suicidal digest of all incoming data—the amount of information in a single issue of the New York Times contains more data then a person who lived 400 years ago had to process in her entire life, or B) In order to escape this general information overload people resort to a tunnel vision that concentrates on an unbelievably narrow window of highly specialized interests. These individuals are learning more and more about less and less; leaving out of the equation any semblance of an holistic understanding of how their specialty fits into the rest of existence. They soon discover that they are not living their life, their specialty is living them, and the result is an iconoclastic insanity. Neither of these two choices offers an attractive life strategy, but out of sheer informational desperation, more and more people are opting for the second alternative. Of course, these hypermodern spe-

cialists have lost touch with the common base of humanity in pursuit of their own unconnected obsessions. T.S. Eliot, in commenting on Dante's Inferno, describes Hell as some place where nothing connects with nothing. Sound familiar?

Does this mirror what we are doing in our electronic music world? It really does if we choose to have a hyper-modern lifestyle that aborts all possibility of dwelling sanely within the limitations of the body. Look at the Internet where we are exchanging mostly technical information. How about the electronic music education which focuses mainly on teaching the computer software. Are we loosing touch with our common base—music as a service oriented art? It is perfectly right to exchange among ourselves the technical information about the makeup of our music, but in the end—a sound is a sound is a sound. No audience would particularly care to find out all the peculiarities of our highly specialized software, nor would that information bear any significance in their interpretation of our music. Perhaps we should stop making music exclusively for ourselves and look at the world outside our own narrow niche, in order to understand where we came from, and where and how, we want to go. What is the prospect of achieving this important task?

The promise of postmodernism lies in the possibility of culture arriving at the hyperconscious state, where creative wisdom begins to replace innovative cleverness. Holistic, environmentally-concerned creation must take precedence over separatistic, self-expression; and both/and continuums have to become a priority over either/or polarities. Does this task emerge to be utopian and impossible to achieve? Recently, I have seen a TV commercial advertising computers made by DIGITAL; their slogan stated: "Man has an increasing appetite for more and more." I guess they are right assuming that humans only follow their instinct for instant gratification. Postmodern hyperconsciousness, which demands a disciplined slow down, is as difficult to attain as it is to convince the public of the importance of appetite control and staying on a healthy diet. So, what do we— composers of electro acoustic music—have to do? Slow down and make sure that the amount of time we spend on figuring out new software, is accompanied by an equal amount of time spent studying philosophy and aesthetics, not only in the field

of music but equally in the other arts and sciences. This slow down does not necessarily mean a quantitative change but rather a qualitative one. On the contrary, the amount of work we may be required to perform can actually increase; what would change is the focus of our investigation. We should not be attempting to bite off a single piece of innovative information that cannot be chewed up and carefully digested. More time ought to be spent studying and understanding the transaction between our music and its social environment. We have to broadly educate ourselves about the various aspects of our own and other cultures, if we want to convey and share common experiences. Without this mutual understanding no communication is possible. Only connect... the rest is silence.

What characterizes postmodernism is its resistance to singular explanations, and its respect for differences; it has an intense concern for pluralism and otherness. Postmodernists are engaged in a constant dialogue with the other, this does not mean agreement but rather an open-minded interest in understanding opposing viewpoints. Inquisitive post-modern criticism derived from this interest in pluralism, is to be used creatively in solving local problems rather than making attempts at global solutions. It is essential to understand that postmodernism is not an artistic style such as expressionism, for example. Postmodernism is the world view which in order to be understood requires a more elaborate explanation. The transition from the modern to post-modernism is far more difficult than the transition from a pre-modern stance to a modern one. Both pre-modernist and modernist positions are based on a singular idea—the redemption of humankind. Pre-modern religious belief provides humankind redemption from its vulnerability via sacred dogma. Like religion, modernism also provides humankind an escape from its unenviable condition, only this time the redemption is to be achieved by secular means, particularly by science and technology. In modernist belief the primary role of science and its allies, is to

find the universal laws that govern existential processes. Unfortunately, contemporary science and technology are still trying to give us the impression that we live in a world in which existential randomness may be transformed to absolute truths in the future via research and development. This scientific doctrine is similar to the illusions created by the sacred redemptionism of pre-modern religious dogma. Pre-modernist and modernist beliefs both cling to their redemptionistic aims with great tenacity— it is the very ground of their being. What appears to be so difficult and frustrating about post-modernism, to pre-modernists and modernists, is the idea of finally giving up on human redemption. People are used to thinking in terms of absolute truths and ever continuing progress toward a state of either, in-life or after life perfection. On the other hand, in post-modernism, all absolutes and redemptive mega- narratives are replaced by a multiplicity of relative truthfulnesses, to be mutually respected and acknowledged. The primal concept of bricolage is one of the strategies for action used by post-modern culture. Bricolage is, as explained by Claude Levi-Strauss in his book The Savage Mind, an assortment of finite number of thoroughly understood, but limited means, for solving a large number of diverse problems. Like the handyman who comes to your house to repair something, and innovativelly and comprehensively uses the same bricolage of tools regardless the difficulty. No matter how technologically sophisticated society may be, its subjects still operate within the bricolages assembled by personal knowledge and intelligence. Most important of all for post-modernists, is to realize the scope of one's bricolage in proportion to the scope of the musical problem before them.

Finally, let me propose some of the postmodern strategies to use in achieving music's lost communication with the audience. One of the most important general characteristics of postmodern musical configurations is the new use of old music. The musical information already known and

previously digested by public, is presented again in new constellations. Postmodernists regard the unassimilated past as, as much a partner in musical creation, as the yet to be explored future. Therefore, postmodernism has no absolute canon related to proportion and beauty; it regards all historical styles and strategies as equally viable options in solving contextual aesthetic problems. By eclectically selecting, not only from the past, but also from the diverse non-western worlds of music; by collapsing the differences among high, middle, and low cultures—postmodernism produces fresh and interesting musical constellations. This collage of divergent cultural levels may often carry more than one possible interpretative meaning; these meanings are double coded and are configurations fraught with potential for parody, pastishe, and irony. When combined, all these characteristics invariably produce products that are disjunct and discontinuous—but not similar to a disjunctness and discontinuity often associated with musical avant-garde. If there is a single negative point about the avant-garde in music—then it is the use of discontinuity and disjunctness without any historical or compositional reflexivity. The musical avant-garde has been obsessed with one unconnected novelty after another, never going back and reevaluating what has gone before in relation to what is going on now. Being aware of this perceptual problem postmodernists repeatedly use reflexivity as one of the most important features in their work and their compositions. This reflective concern also requires the postmodern electronic music composer to extensively study the ideational redundancies embedded in her culture. More importantly, she has to find ways of clearly explaining to her audience the intentions of her musical compositions and the necessity of engaging the designated public in musical disjunctness with an active reflective perception. No reflexivity in the contemporary composer's cultural matrix, or no reflexive intentions and intellect in her contemporary listener—no connection, and no music!

The Platform Blues or Looking for Mr. Real Time

Roger Dannenberg, Belinda Thom, Lorin Grubb, and Eli Brandt, Carnegie Mellon University

We have spend a lot of time lately trying to decide on a platform for our future work in real-time interactive computer music systems. Until now, our most advanced systems were written on Amiga computers, which offer a real-time operating system, low cost, and interesting graphics. Unfortunately, Commodore went out of business, and in any case the Amiga line was not keeping up with the performance of other systems.

This is the story of our search for a replacement machine. Before discussing our options, we will describe the capabilities we are looking for. First, we want a machine that supports interactive, real-time computation. For example, the machine should be able to devote several milliseconds of computation to audio processing at frequent intervals, say 5ms. If the operating system, a device driver, or another process ever takes the processor for a long period of time, audio buffers will underflow, and MIDI timing will be corrupted. Second, we would like not to write device drivers for the system. Our experience is that device drivers are very expensive to write: learning what to do and how to do it is difficult, devices are quirky and poorly documented, and some devices like new graphics accelerators are very complicated. Third, we would like to have high-performance graphics with video input and output for multimedia performances. Fourth, we would like a portable system for concerts. Finally, we would like high performance at a reasonable cost. Is this asking too much?

The first requirement, real-time support, has been the most limiting one. Several years ago, we hoped to use some variant of the Mach OS, which was created at CMU and has a large following. Mach is the basis for NextStep, OSF/1 and IBM's Workplace OS, so it seemed like this might make an interesting platform. With support from IBM, we implemented some device drivers and evaluated the real-time capabilities of both Mach 3.0 and RT Mach.

Evaluation of a real-time system is not entirely simple. With most performance evaluation, you just average execution time over some number of runs and you get an answer. With real-time systems, you want to know the worst case performance, which means you need some way to catch the system at its worst. How can you know that you ran a test at exactly the right/wrong moment?

Our solution is to run an essentially continuous test. We schedule MIDI output every 10ms and use another machine to timestamp the incoming data. The data is processed to determine the maximum time interval between successive MIDI messages. Suppose the maximum separation observed is 15ms. This means that something in the system had control over the processor for at least 5ms; otherwise, the normal 10ms separation would have been observed. This also tells us that the system never took away the processor for more than 15ms, since MIDI messages were never separated by more than that amount.

In practice, we evaluate operating systems by running our MIDI test while exercising the system in various ways. For example, moving the mouse, causing display updates, reading from the disk, playing audio, launching applications, and using the network are all operations that may interfere with real-time processing. If the operating system delays our processing by more than 10ms, we are sure to detect the problem.

Mach 3.0 (with some scheduling modifications) and RT Mach had similar worst-case delays of around 300ms, not even close to meeting our requirements.

This led to the consideration of a number of different machines and operating systems. Our current assessments follow. We are not experts on all of these systems, so we would be happy to hear of any relevant experience from others.

NeXT. The NeXT OS, which is based on Mach 2.5, was not designed to be a real-time system, so we did not consider NeXT machines or software for our work.

IBM AIX and Real-Time Kernels for PCs. IBM's AIX version of Unix appears to be quite good from a real-time standpoint. Other real-time systems are available, but none of these is directed at the multimedia market. We have not verified this, but it seems unlikely that the small companies making real-time kernels or the large one making AIX will support the new 3D graphics accelerator chips and high-end audio interfaces.

Macintosh. This is an obvious candidate due to its popularity in the computer music field. We measured a worst-case delay of 5ms (on a 6100AV machine) using OpCode's Vision to generate a MIDI stream and playing an audio file in the background (which also generated disk accesses). This is good, but we note that the Macintosh OS was not designed to support multiple processes at different priority levels, e.g. Audio, MIDI, Animation, and user interface processes. This might be a problem if, say, a long-running MIDI event handler could not be preempted to refill the audio output buffer. Apple has plans to introduce a new operating system, and there have been recent rumors of a takeover. Both of these suggest that the Mac OS as we know it may not last long enough for us to derive any benefit from it. On the positive side, the PowerPC processor line is exceptionally well-suited to audio signal processing, and Apple laptops are reasonably priced.

SGI. Machines from Silicon Graphics are growing in popularity within the computer music community. We have not run any timing tests on SGI machines, but have seen impressive reports. SGI does not seem to make any definite claims about real-time performance, so one would want to do some testing before assuming the real-time problems are solved here. Assuming that SGI real-time support is "real," SGI machines offer excellent implementations of MIDI and digital audio. Two drawbacks of SGI systems are that they are expensive (especially when configured for video I/O and high-speed graphics), and SGI workstations are not very portable. A sales rep suggested that we could carry a PC as a terminal to avoid carrying a big SGI color monitor. But, if we are carrying a PC, maybe we do not need the SGI at all. Read on.

PC DOS. Laptop PCs running DOS are inexpensive and very reliable from a real-time point of view. However, DOS is very limited in terms of address space, support for multiple processes, and device drivers.

Windows 3.1. With respect to our criteria, Windows 3.1 is much like Mac OS. Support for multiple priority levels is weak, and the operating system has a limited lifetime. Like the Macintosh, time-critical code must run within callback functions called by the operating system, but with Windows, memory allocation is tricky and memory in general is harder to deal with. As with the

Macintosh, we measured a 5ms worst-case delay (on a 66 MHz Pentium machine) using a sequencer to play MIDI while another program played audio from the disk.

Windows 95. Windows 95 fixes some of the memory problems of Windows 3.1, but the real-time performance is terrible. Frequent delays in the range of tenths of seconds were observed even with the network disconnected. Reports are that you must implement time-critical code within device drivers. This is essentially true of Mac OS and Windows 3.1, but the protected address spaces of Windows 95 make development more difficult.

Windows NT. Windows NT does a fair job, even with the network and other programs running. Usually, the delays are in the 5 to 9ms range, but a lot of activity seems to cause 30 to 50ms delays and a delay of 4053ms was observed! With the network disconnected and all servers shut down (easy to do by pointing and clicking) the worst-case delay was well below 1ms for some time, but in an extended test (24 hours), we observed 20ms to 30ms delays on the average of every 2 hours. Our fear is that this is due to the virtual memory implementation and may be unavoidable without putting application code in device drivers. NT supports the Open GL standard and we expect to see support for low-cost graphics accelerators and video input boards on Pentium-based laptops, which are both portable and reasonably priced. There are also NT versions for non-Intel processors.

What is the answer to the platform blues? We do not know. It is extremely frustrating, with all the attention given to multimedia, that current systems offer such poor support, and it is not clear that any system meets our needs. Our group is proceeding cautiously with Windows NT. We are trying to hedge our bet by developing within the W framework (see the 1995 ICMC proceedings) which should be relatively easy to move to another platform if NT does not work out.

Comments (to dannenberg@cs.cmu.edu) are invited. We plan to offer a follow-up article based on comments and additional experience.

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International Computer Music Association

Membership Form

ICMA, Inc., 2040 Polk St., Suite 330, San Francisco, CA 94109 USA
Phone (408) 395-2538; Fax (408) 395-2648
Email: ICMA@sjsuvm1.sjsu.edu

ICMA Membership _____ New _____ Renew _____ Former _____ Change of Address

Rates effective Janurary 1995. Please check membership type and enter amount.
Students must provide evidence of enrollment.

____ Individual Membership $50.00 ____ Sustaining Membership $100.00 ____ Student Membership $15.00

____ Nonprofit Institutional Membership $150.00 ____ Corporate Membership $200.00

Amount: $_____

Please type or print clearly. This information will appear in the next ICMA Membership Directory

Name

_____
first   middle   last

Complete mailing address. Include postal code and country. Include company/institution name if appropriate. This is my: ____ home address; ____ business/professional address

_____

_____

_____

Affiliation (e.g., studio, university, corporation, organization):

_____

Position (e.g., director, associate, professor, officer, student):

_____

Sex (Optional) Female _____ Male _____

Telephone _____ - _____ or _____ - _____
country/area code local number   country/area code   local number

Fax Number _____ - _____
country/area code local number

Email: _____

URL: _____

Payment Method
_____ My check is enclosed.
_____ Purchase Order is enclosed.
_____ Please charge to the credit card listed below.

Complete this section for credit card orders.

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____ MC
#_____

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#_____

Card Expiration
Date:_____

Signature:

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(Signature required to process charge orders)

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