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INTRODUCTION

LEA SPECIAL ISSUE - GROOVE, PIT AND WAVE: RECORDING, TRANSMISSION AND MUSIC, PART II
IN CONJUNCTION WITH *LEONARDO MUSIC JOURNAL* VOLUME 13

This month, in Part II of our special LEA/LMJ issue (see the LEA January 2004 issue for Part I), we include two feature articles: "Recursive Audio Systems: Acoustic Feedback in Composition," by Christopher Burns and Matthew Burtner, in which the authors discuss the use of feedback systems in their compositional and performance techniques and "Turn/Stile: Remixing Udo Kasemets' *Calendaron*," by tobias c. van Veen, in which the author provides a lively narration of his attempts to update composer Udo Kasemets' work, thus interweaving DJ turntable techniques with compositions based on the Mayan calendar.

Leonardo Music Journal Volume 13 (LMJ13) and this accompanying special issue of LEA (part two of two) focuses on the role of recording and/or transmission in the creation, performance and distribution of music. In the print issue, these topics are discussed by Peter Manning, Yasunao Tone, Douglas Kahn with Christian Marclay, Nick Collins, David First, Matthew Burtner, Guy-Marc Hinant, Caleb Stuart, Álvaro Barosa, Holger Schulze, Sérgio Freire and Philip Sherburne.

LMJ13 includes *Splitting Bits, Closing Loops: Sound on Sound*, an audio CD curated by Philip Sherburne. The CD features pieces from an eclectic mix of composers/performers: AGF, M. Behrens, Alejandra & Aeron, DAT Politics, Stephan Mathieu, Francisco López, Institut fuer Feinmotorik, Janek Schaefer, Steve Roden, Scanner and Stephen Vitiello.

LEONARDO MUSIC JOURNAL

The LMJ series is devoted to the aesthetic and technical issues in contemporary music and sonic arts. Currently under the editorship of Nicolas Collins, each thematic issue features artists/writers from around the world, representing a wide range of stylistic viewpoints, and includes an audio CD or CD-ROM. LMJ is available by subscription from the MIT Press.

LMJ13, "Groove, Pit and Wave: Recording, Transmission and Music," can be purchased via the MIT Press at http://mitpress.mit.edu/LMJ or journals-orders@mit.edu.

More info about the issue is available at: http://lmj.mit.edu.

FEATURES

RECURSIVE AUDIO SYSTEMS: ACOUSTIC FEEDBACK IN COMPOSITION

by Christopher Burns and Matthew Burtner

Christopher Burns, CCRMA, Department of Music, Stanford University, Stanford, CA 94305-8180, U.S.A.
cburns@ccrma.Stanford.EDU
http://www-ccrma.stanford.edu/~cburns

Matthew Burtner, 1607 Mulberry Ave, Charlottesville, VA 22903, U.S.A.
mburtner@virginia.edu
http://www.burtner.net

ABSTRACT

Compositional and performance experience with a wide variety of audio feedback systems suggests a number of traits common to feedback processes. These systems share not only certain sonic qualities, but also offer highly linked relationships between pitch, timbre, amplitude and time characteristics. These unconventional parameterizations, along with the often unpredictable response of feedback systems to control and input, lead almost necessarily to an improvisational approach in composition and performance. In this article, the authors consider Matthew Burtner's *Study 1.0 (FM)* for radio transceiver and *Delta* for electric saxophone, Christopher Burns' *Letters to André* and *Calyx* for networked effects processors and a realization of John Cage's *Electronic Music for Piano* using a feedback software synthesis instrument.

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INTRODUCTION: FEEDBACK AND SYSTEMIC EXPRESSION

Our compositional work with feedback joins the tradition of creatively repurposing artists' tools. Matthew Burtner's *Studies for Radio Transceiver* considers the broadcast and reception of an FM radio system's self-noise, while his *Delta* re-imagines the amplified saxophone as a dynamic network of resonances producing feedback [1]. Christopher Burns' *Letters to André* and *Calyx* exploit commercial multi-effects processors for waveguide synthesis and his realization of John Cage's *Electronic Music for Piano* translates this idea into an unusual form of real-time software synthesis. In each case, acoustic feedback is used to reinvent the capabilities of a given technology.

These reinventions can be thought of as a form of system analysis, where the expressive qualities of the chosen tools (FM radio, the saxophone, effects processors) are revealed. Recursive loops expose the inherent properties of a system, diverting our attention from the content that ordinarily passes through the system to the behavior of the system itself. A central task in composition with feedback is the construction of compelling systems and loops.

These four projects were conceived and realized separately, employ different techniques, and express different musical intentions. However, in discussing them, we noticed that they share a number of common properties: the use of acoustic feedback had substantial ramifications, both for the compositional processes we employed and for the sonic qualities

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of the resulting music. Feedback seems to have a "nature," aspects of which appear across these divergent musical works. Each shares in the dynamic, articulate, potentially explosive sound of acoustic feedback and in its idiosyncratic response to control.

EFFECTS PROCESSORS AS WAVEGUIDES: *LETTERS TO ANDRÉ* AND *CALYX*

Letters to André and *Calyx* were composed with a hybrid digital/analog feedback system using off-the-shelf electronic music equipment. The feedback system was planned as a low-cost environment for music-making with a unique sonic fingerprint. This system was used actively from 1996 through 1998 to produce fixed-media compositions (recorded first to cassette and later to CD); it was also occasionally pressed into service as an instrument for improvisation.

The system was inspired by André Tavares' experiments with guitar-effects "stomp boxes" connected in feedback loops. An exciting feature of these experiments was the system's ability to generate sound without external input: the self-noise of the analog components of the network could be shaped via feedback into complex sonic textures. The concept of Tavares' guitar-effects network was replicated by recursively patching two digital multi-effects processors through an analog mixer. The new system added the feature of MIDI control over the effects processors, via a computer running sequencing software.

The works composed with this system were essentially all real-time activations of the system, scripted by MIDI control. A single system configuration was used for each piece, without any changes to the audio routing or effects processor patches that would require human intervention in performance or produce audio glitches. The output of the system was recorded without any further editing or manipulation: the feedback loop was treated as the "performer" rather than as a source of material for additional compositional refinement.

The use of feedback and the philosophy of system "performance" as finished work produced very tight constraints on the compositional process of these pieces. Composition began with configuration of the system hardware, patching together inputs and outputs. Each piece used its own routings between the mixer and the two processors, ranging from a circular stereo path to more complicated parallel configurations.

After connecting the hardware, the next task was programming the effects processors. Standard effects algorithms like reverb, chorus, flanging, pitch shifting, delay and equalization could be selected and combined in parallel or series configurations. The parameters (such as delay time or chorus rate) were then set for each algorithm, with eight parameters designated for real-time MIDI control. Configuration of the system was necessarily done on a speculative and interactive basis; different audio routings and effects settings were tested until a system resulted that produced a promising set of textures for composition.

In use, the behavior of the feedback network was extremely sensitive to its current conditions. The array of sonic possibilities for "the next moment" was totally dependent upon the current state of the system. However, the network was not genuinely chaotic. If musical events were generated from stable rest conditions, they could be reproduced again from those same

conditions, not only in broad outlines but also in their precise sonic details. In order to maximize the system's stability and reproducibility, "fussy" mixer settings were generally avoided by setting the faders and sends at unity or maximum. The dynamics of the system (including "start" and "stop") could be controlled using the built-in gain controls of the effects processors (automated via a MIDI sequencer and thus reproduced precisely time after time) - as a result, there was no need to change the mixer settings during the course of a given composition.

Because the sequencer facilitated stable, reproducible output, the system's "performances" could be and were shaped and revised over many months. While the system output was treated as a compositional endpoint, work-in-progress was listened to, critiqued, revised and re-thought as many times as desirable. However, the sensitivity of the system to its current state meant that the flow of composition could only proceed from the beginning of the work towards its end: a change to the parameter data at the beginning of a piece would alter the sonic results throughout. As a result, composition proceeded in chunks. After a short phrase or section was developed and polished, it was fixed, becoming an immutable part of the piece and influencing the development of future materials.

Compromise, the second and shortest of the four *Letters to André,* provides a relatively simple and direct example of the system in use. The piece is an inverted arch: a decrescendo followed by a crescendo, with the loudest moments defined by noisy textures and the quieter segments characterized by echoing, continuously sliding pitches. *Compromise* used a parallel system configuration in which the output of each effects processor was routed to its own input and also the input of the other processor. Both effects processors used pairs of processing algorithms in series: the first box offered a pitch detuner chained to a parametric equalizer; the second used a pitch shifter (with a wider possible range of pitch shifting than the detuner) chained to a delay.

[See Figure 1: system diagram for *Compromise* - Ed. note: the figures referenced in this article can be viewed in the online version of LEA at http://lea.mit.edu]

The inverted arch was created by reducing and then increasing the input levels to the detuner, pitch-shifter and delay; additional timbral modifications were produced with simple curves for the parametric equalizer and pitch-shifter settings. The most obvious use of the equalizer comes at the end of the piece, when low cuts and high boosts concentrate the sonic energy into high-frequency noise; the most dramatic change in the pitch-shifting comes at the bottom of the arch, when upward pitch shifts give way to downward transpositions.

The feedback system used for *Compromise* and related works implements what is essentially an idiosyncratic form of waveguide synthesis. Most of the varieties of signal processing available in multi-effects professors, whether pitch-shifting, chorusing or reverberation, can be understood as variations on the basic process of delay. When the feedback routing provided by the audio mixer is also considered, the system is essentially an implementation of the recursive delay structures which are the building block of waveguides. The analogy has more to do with principle than practice - one would be hard pressed to implement waveguide models of acoustic instruments using this

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equipment, and there are no real-world acoustic interpretations of the processor networks. However, the system shares an articulate and continuously varying sonic character with more conventional forms of waveguide synthesis.

The recursive nature of the audio path makes the system dependent upon its analog components for tolerance of overload. Both the mixer and the inputs to the effects processors occasionally overload or clip; with careful gain settings, the overloads can be concentrated in the analog sections of the network and digital clipping minimized. However, the system is not sonically pristine: audible grit and clicking are a necessary part of the music.

FEEDBACK IN THE DIGITAL DOMAIN: *ELECTRONIC MUSIC FOR PIANO*

Inspired by the waveguide analogy, more recent projects have involved fully digital implementations and variations of the hybrid feedback system described above, using software synthesis platforms like Pd and Common Lisp Music. One important difference between the hybrid analog/digital model and the software versions is that all-digital systems require external excitation. Software models have no self-noise and will not sound without some kind of input stimulus. The software networks must be excited by injection of an impulse, a noise burst, an arbitrary sound recording or a live microphone input.

A larger challenge for software implementations is gain control; digital feedback structures have an extremely small threshold between silence and explosive clipping (The problem can be avoided by using damped feedback - that is, feedback scaled by a coefficient less than unity - and continuous excitation, as in traditional waveguide applications for physical modeling. However, the models for these projects are self-generating and essentially undamped). Complex network topologies only become possible when automatic gain control techniques like peak-limiting compression or waveshaping are applied [2].

One software feedback system was implemented for a realization of John Cage's *Electronic Music for Piano*, first performed by Christopher Burns and pianist Christopher Jones in May 2002. *Electronic Music for Piano* is perhaps one of Cage's most permissive scores. While the range of possibilities - electronics and piano or pianos - is more circumscribed than in works for indeterminate groups of performers like the Variations series, *Electronic Music for Piano* lacks the systems of discipline associated with that series. The handwritten prose score (complete with Cage's strikeouts and emendations) consists only of lists of potential technical means - "feedback, and changing sounds (microphones, amplifiers, loudspeakers - separate system for each piano)," and suggestive metaphors to guide action ("observation of imperfections in the silence in which the music is played" [3].)

Electronic Music for Piano is dedicated to David Tudor; presumably the "permissive" characteristics described above have much to do with Cage's trust in his friend and colleague Tudor, as well as the shared culture they developed through extensive collaboration. The dedication can also be viewed as another kind of suggestion for performance. Our realization of *Electronic Music for Piano* is not only a digital translation of the work with hybrid feedback systems, but also an homage to David Tudor's homebrew analog feedback systems [4], now reinvented

with digital components and deterministic controls.

The feedback network is implemented in Pd, with a circular array of delay lines feeding each other and eight loudspeakers. Audio signals are passed around the circle in both clockwise and counterclockwise directions, with waveshaping functions to prevent clipping at every stage where signals are combined. Each delay time is continuously varying, with linear interpolations between randomly generated values over randomly selected lengths of time. This process was developed in response to another of Cage's suggestions:

as though there were
take a drawing of the controls
(volume, tone) available and -
on a transparency - transcription
for astronomical atlas suggesting
    were it   would
which (^ superimposed) ^ gives
suggestions for use of controls (not explore)[5]

The electronics operator - through a series of control parameters - and the pianist, via the microphone inputs, have influence over the feedback network. However, they do not have command of the process; the randomly generated parameters and the generally idiosyncratic behavior of feedback make the output of the system unpredictable. Sometimes the feedback imitates events played at the piano very precisely, sometimes it remains quiet during busy passages and sometimes it bursts into noise in the middle of a long silence.

[Figure 2: system diagram for *Electronic Music for Piano*]

This is the unusual aspect of this realization and instrument; the electronics are designed to guide the operator's musical choices, just as the operator guides the electronics. There is a symbiosis of piano, pianist, electronics and operator; in performance the situation is one of improvising with the electronics, rather than using the electronics to improvise. David Tudor said, "I want to find ways of discovering something you don't know at the time that you improvise.... The first way is to play an instrument over which you have no control, or less control than usual" [6]. In this realization, the instability of the feedback system makes it an equal partner in the improvisational process.

As with its analog/digital model, the software feedback system produces complex sonic textures, articulate melodic gestures and other interesting emergent behaviors. It creates a rich palette of unusual and continuously evolving sounds; the unpredictability of the feedback provides both a compelling musical element and an interesting challenge to the performers in the semi-improvisatory environment of *Electronic Music for Piano*.

THE ELECTRIC SAXOPHONE AS A FEEDBACK CONTROLLER: *DELTA*

The musical use of acoustic feedback is closely tied to the development of amplification. In musical instrument design, feedback is especially important for the development of the electric guitar. Perhaps most famously, Jimi Hendrix redefined guitar performance with his groundbreaking performance of "The Star Spangled Banner" at Woodstock in 1969. Hendrix abandoned traditional notions of guitar performance, using the instrument

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as a feedback controller. Hendrix's performance practice, and especially the Woodstock "Star Spangled Banner," inspired the composition of *Delta* (2001), a work for solo saxophone. The electric guitar, as played by Hendrix, provides a model for the reimagination of the saxophone as an electric feedback instrument.

In *Delta*, small microphones embedded inside the saxophone are used to capture resonances within the air column. Feedback between the internal microphones and external loudspeakers is generated and then controlled by opening and closing keys and by changing the air pressure in the column. The saxophone body becomes a filter, dynamically modifying the feedback signal via changing instrumental resonances.

The electric saxophone grew out of the Metasaxophone Project [7], an ongoing effort since 1997 to extend the properties of the saxophone through new performance techniques and technologies. The saxophone is enhanced as both a computer controller and as an acoustic signal generator. The idea to explore the saxophone as an electric feedback instrument arose from a desire to carefully capture the audio signal as a control signal for use in interactive electroacoustic music.
Using sensor technology and a microcontroller on the bell of the instrument, the Metasaxophone captures constantly changing performance data and converts it to continuous MIDI control change messages. This data is used to extend the gestural interface of the acoustic saxophone; the player can generate control data with techniques such as finger pressure and saxophone position, which do not affect any simultaneous acoustic activity with the instrument. The Metasaxophone as a MIDI controller debuted in 1999, in performances of *Noisegate 67*. This new controller continues to be used in a number of ways to extend the instrument [8].

Because the sensor-based modifications to the Metasaxophone do not alter the acoustic sound of the instrument, the native sound of the saxophone can be used in performance or interpreted as another type of control parameter. The continuing acoustic viability of the instrument makes amplification and acoustic feedback possible; hence the "electric saxophone," or Metasaxophone Audio System. The electric saxophone is based on a set of small electret condenser microphones inserted inside the instrument. The electret capsules used are Panasonic WM60-ATs, chosen because they feature good frequency response (20 to 20,000Hz), less than 2.2kOhm impedance and resilience under difficult environmental conditions, vibration and shock. Additionally, the omnidirectional polar pattern of the microphones aids the propagation of feedback in the air column.

The microphones, along with a long copper "arm" and a shielded cable, were threaded through heat-shrink tubing [Figure 3]. The resulting bendable arms are then rearranged to suit the specific miking situation desired. The three arms attach at the top of the bell of the saxophone [Figure 4]; from there, the three shielded audio cables are combined into a snake that runs to the audio equipment. The microphones each have a different audio output, so that their signals can be routed independently.

Once the microphones were operational, experimentation helped define the saxophone performance techniques that would enable the instrumentalist to control acoustic feedback. With the microphones in place, a series of acoustic measurements were taken of the interior of the saxophone. These tests suggested

the range of filter responses the saxophone will exhibit when placed in an audio feedback loop, and demonstrate the relative efficacy of various techniques applied in performance.

In *Delta* (2001), the Metasaxophone audio system becomes the basis for an electric feedback instrument. The continuous control properties exhibited in the acoustic tests became meaningful musical controls, extending the capabilities of the saxophone. [Figure 5 shows the technical setup for *Delta*.]

The saxophone sound is picked up by the microphones in the bell and output through the loudspeaker, where it is again picked up by the microphones inside the bell, now filtered through the body of the saxophone. The instrument feeds back and the performer can control the resonant frequency by changing the properties of the tube with fingerings. In keeping with Hendrix's inspiration, the microphone outputs are sent through a distortion box that emulates the type of overdrive distortion characteristic of electric guitars and tube amplifiers.

Because the saxophone body is not solid, the instrument cannot be overdriven, and attempts to create true overdrive distortion only overdrive the microphones. The distortion box creates the sound of distortion without the need to increase the gain of the audio system to unmanageable levels. In addition, the use of distortion introduces a wider frequency range that approaches the noise signals used in the acoustic tests. The broad spectrum allows for the activation of a variety of resonant frequencies in the air column.

The performer controls the feedback loop by forming an embouchure and applying different air pressures through the mouthpiece, and by changing keys on the instrument, either rapidly or in a slow, deliberate fashion: as with the Metasaxophone's pressure-sensitive sensors, the intention is to transform the discrete switches of the saxophone keys into continuously variable controls. Performance confirms that the frequency response of the instrument changes slightly as keys are slowly depressed or released. The changing internal state of the saxophone alters the air column, creating different, and often multiple, resonant frequencies.

The feedback loop has a pronounced effect on instrumental performance practice. In an ideal performance, no audible sound emits from the saxophone, and the audience hears simply the changing distortion and feedback as it is shaped by the saxophone body and activated by key clicks. In reality, however, the rapid changes in air pressure in the instrument inevitably cause acoustic byproducts - high squeaks, air hisses and honks - that are then amplified, distorted and fed back into the system.

Delta is highly unstable, and as such is permitted to be different for each performance. A score prepared for use in concerts in 2001 outlines in a tablature notation the fingering combinations to be used, embouchure pressure changes over time, and the formal conditions of the performance in the form of time-line energy changes. From the score, it appears that the performer has great freedom to shape the dramatic flow of the piece, but in actuality the freedom of the performer is closely curtailed by the instability of the system. Much like surfing on a breaking wave, the performer of *Delta* makes decisions about movement "on-the-fly," responding immediately to the system in order to keep the piece alive. The score outlines ideas that are always modified in performance due to the unpredictability of

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the system. [Figure 6 shows the score of Delta prepared for a performance at Stanford's CCRMA in 2001.]

The score contains up to five staves for the saxophone part. The "Sound" staff gives a graphic overview of the time/energy development of the piece and includes indications such as "cause/allow beatings," "very light tonguing to bring out squeaks," "changing key clicks" and "teeth on reed." The "Fingering" staff provides suggested key fingerings and gives descriptive "microkeying" indications such as "Ad lib low Bb attack to G#, insert periodically," "very slow changes of key - slight closing/opening," and "lift Bb key 1/4." In the beginning of the score, a "Sounding Pitch" staff appears at the top of the page, revealing the tritone structure that acts as the opening of the piece. This staff disappears on subsequent systems as pitch becomes something difficult or irrelevant to control. The "Air Pressure" staff uses a notation for pressure and gives indications such as "talk into horn while playing." The "Electronics" staff was used to give indications of changes in the distortion boxes or any other electronics.

In the performance this score was prepared for, a computer drum machine (the polyrhythmicon) was used to create frenzied accelerating beats behind the electric sax. A dense polyrhythm with a tempo relationship of 90 BPM (beats-per-minute): 60BPM: 120BPM gradually accelerates to 120BPM:180BPM:250BPM. This electronic part is not necessarily a permanent feature of the piece, and like all other aspects of the piece it can be changed or ignored. It was added to augment the tension of a hyper-frenetic performance system.

Despite the existence of a score, the composition of the piece was worked out in rehearsal and it is always recomposed in performance. The score is simply a guide for the performer, a repertoire of ideas and a memory aid for an instrument that can be quite disconcerting to play. Although the piece is different every time, it does have a clear identity and the score helps capture that, even as the system simultaneously subverts repetition.

The Greek letter ? (Delta), originally meaning "door," is a threshold or barrier at an opening, such as a sandbar at the mouth of a river. It is also the mathematical symbol for change. The saxophone body is viewed as a type of threshold or doorway into a world of rich change and dynamic transformation. Subsequent performances of the piece will use the same title, possibly with version numbers for significant changes.

CONCLUSIONS: SYSTEM DESIGN AND COMPOSITIONAL PROCESS

Although the works described here display different approaches to performance and aesthetic intentions, the common use of acoustic feedback leads to a number of other similarities between pieces. Most obviously, the sonic fingerprints of feedback are present in each. Whatever other sounds may be present, each composition trades in some way on the whistling, melodically articulate resonances characteristic of feedback. Grit, distortion, and other "lo-fi" artifacts are also common, even in the software implementation of *Electronic Music for Piano*.

In each case, system design was a major component of the compositional process. As with much electroacoustic music, the arrangement and configuration of the electronics determined the

range of sonic and compositional options for each piece. The most extreme example presented here is *Study 1.0 (FM)*, where the compositional work was, in essence, the conception and design of the electronic system.

The configurations of our feedback loops rarely allow for the direct and independent control of important musical parameters like pitch, rhythm and timbre. The performer of *Delta* fingers an E on the saxophone; at least some sonic change will be initiated and, at best, the system will resonate at some frequency in the harmonic series above the fingered E. Similarly, the composer working with a network of effects processors might change the length of a delay line in the hopes of creating a glissando or other variation in pitch. The composer and performer have the feeling of influencing the system, rather than controlling it.

This sense of engaging with a system, rather than commanding it, is strengthened by the dependence of feedback systems upon their current state. In each of the systems described here, the range of available sounds is highly dependent upon the current contents and conditions of the system. Typically, composers and performers have nearly their entire chosen sonic palette available at any moment. With feedback systems, this is not the case; future activity is limited and channeled not only by the composer's decisions, but also by the history of the audio system itself. A texture or sound, achieved with a certain system configuration or parameter setting at one point in a piece, may not be repeatable at another moment.

As a result, much of our compositional work with feedback systems is improvisational, even when the completed work is relatively fixed, as with *Study 1.0 (FM)* and *Compromise*. The potentials of the system at any moment and the range of influence of the controls can only be explored through improvisation. The complex, "messy" responses of feedback systems necessitate an intuitive approach in composition and performance; formal and sonic complexities result from the emergent properties of the system, interacting in the moment with the composer and performer. Feedback systems will speak for themselves.

REFERENCES AND NOTES

1. A detailed discussion by Burtner of this work is available in the current issue of *Leonardo Music Journal* (LMJ 13, "Regenerative Feedback in the Medium of Radio: Study 1.0 (FM) for Radio Transceiver," by Matthew Burtner). For a brief description of the article, see http://mitpress2.mit.edu/e-journals/Leonardo/isast/journal/toclmj13.html.

2. See Christopher Burns, Stefania Serafin and Matthew Burtner, "Musical Applications of Multichannel Generalized Digital Waveguides," in *Proceedings of the Stockholm Music Acoustics Conference 2003* and Christopher Burns, "Emergent Behavior from Idiosyncratic Waveguide Networks," in *Proceedings of the International Computer Music Conference 2003*.

3. John Cage, *Electronic Music for Piano* (New York, NY: C. F. Peters, 1968).

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4. See John D.S. Adams, "Giant Oscillations: the birth of *Toneburst*," in *Musicworks*, Vol. 69 (1997) pp. 14-17 and Joel Chadabe, *Electric Sound* (Saddle River, N.J.: Prentice Hall, 1997).

5. See Cage [3] .

6. Richard Kostelanetz, ed., *Conversing with Cage* (New York, NY: Limelight, 1987).

7. See Matthew Burtner, "The Metasaxophone: Concept, Implementation, and Mapping Strategies for a New Computer Music Instrument," in *Organised Sound*, Vol. 7, No. 2 (2002).

8. See Matthew Burtner and Stefania Serafin, "The Exbow Metasax: Compositional Applications of Bowed String Physical Models Using Instrument Controller Substitution," *Journal of New Music Research*, Vol. 31, No. 2 (2002).

ABOUT THE AUTHORS

Christopher Burns

Christopher Burns' recent compositional activity focuses on chamber music. His experience as a computer music researcher is a major influence on his acoustic composition; his newest works are written with pitch and rhythmic structures that are created and transformed using custom software. One of these pieces, a sextet entitled *The Location of Six Geometric Figures*, was recently awarded first prize by the Hitzacker Summer Music Festival. This work has been performed by ensemble recherche in Germany, ensemble Gageego! in Sweden and the San Francisco Contemporary Music Players in California.

Burns is the Technical Director of the Center for Computer Research in Music and Acoustics (CCRMA) at Stanford University, where he has completed a doctorate in composition, and is pursuing a second in computer music research. He has studied composition with Brian Ferneyhough, Jonathan Harvey, Jonathan Berger, Michael Tenzer and Jan Radzynski. His research interests include algorithmic composition techniques, the application and control of feedback in sound synthesis, and the study and preservation of sketch materials produced by electroacoustic composers.

Burns co-curates the *sfSoundSeries* concerts in San Francisco and the *Strictly Ballroom* concert series at Stanford; both venues feature contemporary music performed by local and international guest artists. These concert projects are also an outlet for his interest in the realization of classic electroacoustic music; recent projects include the creation and performance of new versions of works by Cage, Ligeti, Lucier, Nancarrow and Stockhausen.

Matthew Burtner

Matthew Burtner's music has been described by *The Wire* as "some of the most eerily effective electroacoustic music I've heard," and *21st Century Music* writes "There is a horror and beauty in this music that is most impressive." His work regularly combines instrumental ensembles, computer technology, interactive acoustics and multimedia.

Burtner is currently Assistant Professor of composition and computer music at the University of Virginia, where he is associate director of the VCCM Computer Music Center. A native of Alaska, he studied philosophy, composition, saxophone and computer music at St. Johns College, Tulane University (BFA, 1993), Iannis Xenakis' UPIC Studios (1993-94), the Peabody Institute of the Johns Hopkins University (MM 1997) and Stanford University's CCRMA (DMA, 2002). He has been composer-in-residence at the Banff Centre for the Arts, Simon Fraser University in Vancouver and the IUA/Phonos Institute in Barcelona. His original computer music research is presented regularly at international conferences and it has been published by journals such as *Organized Sound*, *The Journal of New Music Research* and the *Leonardo Music Journal*. His music has been recorded for Innova (USA), DACO Records (Germany), *Computer Music Journal* (MIT Press) and Norway's Eurydice label.

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TURN/STILE: REMIXING UDO KASEMETS' *CALENDARON*

by tobias c. van Veen, Dept. of Communications, McGill University, 853 Sherbrooke Street W., Montreal, PQ H3A 2T6, Canada.

tobias@quadrantcrossing.org
http://www.quadrantcrossing.org

ABSTRACT

Udo Kasemets' *CaleNdarON*, a sound-script that engages the Mayan calendar to give birth to random-chance composition, poses unique difficulties in the electronic age. As a "techno-turntablist" - and potential hermeneutist - of *CaleNdarON* at the Vancouver New Music Society's Link-Age Festival (2002) [1], I cut an approach to grasping this challenging script for 60 minutes of sound by six musicians. It proved deceptively exhaustive to play the turntable over the laptop, to scratch the binaries of nature/culture and mind/body through the manifold temporalities of Mayan numerology, and to face the demands of the *scriptual-logos* while catalyzing a questioning of the script, the technology and the techniques through a collision of historical records: the present-day turntablist clasping a living member of yesterday's avant-garde, Udo Kasemets.

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SPINNING THE CONTEXT

It is a sad epitaph of the history of modernity that phonographic experimentation and multiple directions of the avant-garde were forced into hiatus and perhaps never fully recovered after their dispersal during the two world wars. However, Douglas Kahn notes that "in the two decades following World War II, an abundance of artistic activities incorporated new approaches to sound" [2]. It was during these two decades that Estonian composer Udo Kasemets attended the Kranichstein Institute for New Music in Darmstadt (1950), studying Ernst

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Krenek, Edgard Varèse and Hermann Scherchen before immigrating to Canada in 1957. It was around 1960 that Kasemets "totally abandoned the above concepts and moved toward open forms, special notations, mixed media, audio-visual interactions, sound texts and electroacoustics" after being exposed to the work of John Cage [3]. Kasemets' movement toward what Kahn calls the *all sound* and *always sound* of Cage was dedicated [4]: "He withdrew most of his earlier compositions from circulation and concentrated solely on creating and presenting music and mixed-media art reflecting rapid and vigorous changes taking place in the culture and technologies of the latter half of the century" [5].

There are three junctures to be traced in this development. The first is the proliferation of the avant-garde of the early twentieth century, from the futurists to Dada and sound poetry; the second is the later generation, separated form the first by two wars and to which Kasemets belongs, which included the developments of Fluxus and happenings, Iannis Xenakis, electroacoustic music and minimalism. John Cage, it could be said, straddled the first and second junctures. The third juncture is the flourishing of "contemporary electronic music," from pop and rock permutations ("Kraut rock," new wave, industrial music) to African-American innovations (funk, disco, Chicago house, Detroit techno, electro, hip-hop and their Afro-futurist movements), including their "avant-garde" tendrils (IDM, minimal techno, lowercase and microsound, microhouse, clicks 'n' cuts).

As someone at the tail end of the third juncture, I find myself magnetized by the tragically short *first* exploration of technology and it is this desire that awakens a fourth juncture in the history of "electronic" music where, at the limits of today's "experimental" scene, a return to considering the technology and apparatus of performance and the very means of composition places the "producer" at the heart of a nascent history. This thirst for productive experimentation, which so drove Russolo (even in his dark passion for war) and Varèse, is sampled as a catalyst for combating the pessimism of the postmodern milieu.

Today's phonographists and computer musicians are turning to the surviving members of the second juncture to learn of the first forays into the technological unknown of aurality. Unfortunately, the average DJ knows little of these junctures (which are sketched here only as arbitrary histories to facilitate an understanding in this context). Conversely, among the academy, an appreciation of the African-American traditions of rhythm and percussion - what was considered "the music of the future" by Cage - is scant [6].

Thinking of another turn-of-the-previous-century author, Proust, it is perhaps worth recalling that to move forward is to remember. A turntable rotates endlessly to circulate the movements of sound. To *turn* back, to glance behind, is to scratch out a history in the revolutions of wax. At the juncture of *chance* - temporal performativity - the apparently antiquated phonograph eclipses the computer. Wax, the loop and the turn prepare the way for scripting Kasemet's junctured sound in tactile ways, which the circuitry of the laptop renders untouchable. Beyond tactility, the laptop encodes multiple time as variables, determining, in the process, the process of process itself, making *possible* an algorithm of generative numerosity. Until the laptop can be tampered, decodified,

broken - it remains a control device.

There is more to be said of the laptop and the turntable (we shall return to this), for the turntable, like the failure of the script, demands impossible time and impossible touch. To perform at that moment where the performance cannot be performed, where the script becomes impossible to follow, when the moment of impossibility or what would be judged as codified failure - a new *stile* in the dial of time, a new time of listening (and to consider this time as unique) - is to cut the grooves into skips and smooth them through burns. To turn a new stile of sound - *Turn/Stile*. To work with Udo Kasemets and to re-turn a century-aged tradition of phonographic experimentation so that it rotates face-to-face with postmodern DJ histories and techniques, scratched through the mediation of post-Cagean composition and cut and burnt with an avid ear for the panaural, is to solder these traditions and histories, to conjure and mix inspiration from wax and wires, and to sonically sound the way into unnoted sound/scapes.

Stile: \Stile\, n. [See Style.] 1. A pin set on the face of a dial, to cast a shadow; a style. 2. Mode of composition. May I not write in such a stile as this? - Bunyan.

PARAMETERS OF THE *CALENDARON*

Kasemets' conceptual score for an undetermined number of electroacoustic, electronic or otherwise amplified musicians presents a unique conundrum. This dilemma arises in the interpretation of the script, which calls for a prepared, yet improvised, reading of the graphic "event-sounds." These pictographemes are numerative illustrations sampled from Mayan calendar permutations, presented for the musicians as sonic events to produce in a certain timeframe. The temporal is delimited by the random drawing of shuffled playing cards, by each performer, to ascertain an event's duration.

This interpretative intensity - already a matter of lightning-speed poetic hermeneutics - is compounded when a musician cannot easily construct the two sample sets as required, as in the case of irregular uses of a turntable, where sources cannot be quantified beforehand. By engaging tactile technology that, at base, wires the temporalities of the Mayan script, the difficulties of inhabiting the historical disjunctive are embodied in the momentum of the performer. The *remix* that follows proceeds from Kasemets' allowance for "mental abstracts" in interpreting the script. The necessity of abstraction conjoins an equally necessary physicality, as the mindwork of preparation meets the bodywork of improvisation, a work of manifold temporalities in the performance of sound.

The script calls for a (re)interpretation of its body from the beginning. The permutations of the script, in their immediacy, call for an engaged *embodiment in performance* at the same time that mental abstracts are schematized, before the actual performance, to de/construct a *performative hermeneutics*. The primacy of the mental conjoins the body, as question mark, through the force of touch, while an embodied immediacy calls for the challenge of interpretation in the demands of otherness from the script's graphic-logic. To fail to perform this script, or to perform it poorly, in my mind and felt with the strains of my body, would be to fail to struggle with the demands of its peculiar *scriptual-logos*.

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The representation of *logos*, as the sign of *possible logic*, or performative order, is questioned here through the manifold nature of the Mayan calendar used to construct scriptual authority. Whereas the Gregorian calendar sets into stone the demarcation of days and their purposes in a fixed manner, the Mayan calendar permeates each day. According to Kasemets' script, the Mayan calendar combines 52 solar cycles, each consisting of 18 months of 20 days, plus 5 extra "unlucky" days, totaling 365 days, which are permutated with 73 ritual cycles, which are "intermeshing rotations of 20 day names and [the] numbers 1 to 13," totaling 260 days. The "same combinations of month and day names and numbers recur only [once] in 52 years" [7]. (One can possibly experience every day as unique during one's lifetime.) The "nameless days" fissure, that which is beyond or before the *logos*, consists of days of fasting and mourning. The Mayan calendar autodeconstructs a *logos* that, if we continue to utilize these Western philosophical paradigms, dances an embrace with *khõra*, the mourning of futurity and the difference of each moment.

SCRIPT TEMPORALITIES: NUMBERS

Along with the complex score of 52 chronologically sequenced notations, temporally delimited by randomized playing cards, "each performer prepares two distinct sets of sound 'samples.' Each 'sample' has to be of such a nature that it can be treated in multiple ways in matter of durations, amplitudes and other parameters, and also that it can be comfortably combined with other 'samples,' either linearly or simultaneously." The "samples" are broken into two groups: set 1 consists of 20 samples represented by the binary numerals (the 20 day names of the Mayan calendar). The corresponding day names and their symbolic meanings provided by Kasemets offer further signifying material.

Playing proceeds as follows:

The score indicates which "samples" are to be activated (either singly or jointly) during a given time segment. The Arabic

numeral accompanying a given binary set indicates the number of "events" to be presented during the segment. The underlined numeral represents the name of the day of the segment, thus denoting a somewhat predominant treatment.

Set 2 consists of four samples - x, y, z, Ø - which represent the "names of three Mayan months and the sequence of five nameless days." These "samples" should be, if possible, original or modified recordings of nature sounds (e.g. water, wind, whales, insects, birds). They may or may not mix with, or influence, or be influenced by the "samples" of the other set.

In my performance of the work, Set 2 consisted of four records of Top 40 pop tunes. These included the 1999 Grammy Award winners for rap double-pack, 12" remixes of Donna Summer and remixes of recordings by TV actor William Shatner (these records were given away to eliminate all records of these records). The choice of highly culturally encoded pop records over "natural" sounds constituted a way to begin acknowledging the technological medium inherent to the production of permutative temporal sound. The first set of samples was *processed* from the burning and cutting of the second set, operations determined

by the "relative durations of the activation of the 'sample' of the given letter. A vertical line (I) stands for a long(er), a dot (.) for a short(er) sound."

Amplification was determined through the playing cards. The cards themselves signify the following attributes: red - loud(er); black - soft(er); rounded (hearts, spades) - sustained, smooth, long(er); pointed (diamonds, clubs) - detached, edgy, short(er), as well as determining the set time for a series of actions (3 = 30 seconds, etc.). The performance should end at the same time for all performers, despite each performer working with a unique and random time-line.

TURN/STILE PROCESS: LAPTOP VS. TURNTABLE

Although I have previously performed experimental turntablism [8], it was the *quantitative impossibility* of the turntable, unlike a laptop, that irrupted the phonograph as a manifold time-machine. To assemble 24 samples in software such as Max/MSP and to code a patch that simply accounts for the variables *executes* the *body* of the script [9]; the lack of performativity and the ease with which the software would negotiate the challenges of the script scrubs the body of its sweat. The laptop becomes William S. Burroughs' "Grey Room," the center of *control*: a deep schematization of random elements is established and the laptop recites its enclosed domain of *techne*. Would there climax the erotic, the number-stroking card-flipping intensity? Would one love the machine or watch idly? Would there become the ability to radically interact with the machine as a de-territorialized instrument, the way the turntable became? For the script is already *techne*, the code of the prosthetic body or soft-machine, that which temporalizes the sweat of impossibility.

Although the "lack of gestural theater" inherent to laptop performance decodes pop-music spectacle, as Kim Cascone suggests [10], its newfound status as the academic acousmatic leaves *much to be desired*. The lack of gestural theater allegorizes a broader schematic: the negation of interpretative impossibility through technological control [11]. Although there exists the possibility of improv-coding software patches during performance, is it possible that we mime only an *encoded* impossible, an impossible not at all?

Thinking of Baudrillard, I realized that I would not be watching the laptop, but that the laptop would be watching me and the audience would be watching me being watched [12]: a double panopticon, double simulacrum of power-gazing, control of control. To where is the rift assigned: the script or the software? To where is manifold, Mayan memory encoded? To be memory-lost and moment-forsaken in having *neither record nor way of reproducing that same performance again*, is it possible to use a digital encoding system? To perform times of multiplicity is to *touch* duration, not program the memory bank of our current incarnations of the binary machine.

During the practice of *CaleNdarON*, Kasemets would say, "It's all music." The transactions between performers - as this script calls on six bodies not only to interpret the script but to watch and hear the others - was by far the most pronounced amongst those who could conjure sound with impossible speed. With two performers on laptops, two on CD players, one on an electric violin and myself on turntable, the dominant sonic-cues were between myself and the violinist. Yet to conclude the

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purity of an atechnology or Ludditism would erase the ways in which one transacts with the machine through the other, the body of the script, which is to say, the bodies of the *other* performers, wired as the machinic-ensemble.

SCRIPTING TURNTABLISM

The turntable has a history with script, not only through the avant-garde, but also in the realm of hip-hop. Several script-notations for scratching vinyl, including all manner of fader tricks and manipulations, have been developed, as well as scores for "hip-hop operas." A competitor in the DMC Championships for scratch-turntablism and beat-juggling is working from her own composition, which determines the timing and placement of records and the tricks to be utilized [13]. Although in the past this script has been memorized aurally and through touch, scripts by the likes of DJs such as Radar, A-Trak and Jon Carluccio [14] have inscribed these difficult routines.

My own history burns another path, of the experimental, of African-American music, if not Afro-futurist, via the advent of Detroit techno. Unlike hip-hop turntablism, the recognition of techno-turntablism has been scarce among academia and the electronic music world. Focused less upon the scratch, techno-turntablism emphasizes the speed and improvisation of each mix. Although scratching is common, it is the cutting of faders and the inventing of disruptive tricks - such as feedback utilization and off-beat synchronization, while engaging the moving bodies of the audience through the transactive composition of a sonic voyage - that challenges the techno-turntablist [15]. Techno-turntablism is only at the dawn of its efforts to engage avant-garde techniques, including those pioneered by Janek Schaefer, Philip Jeck, Martin Ng, Martin Tétreault and others, as well as the turntable-instruments of Schaefer and Kitundu [16].

It is with a desire for rhythm and the otherworldly (the alien technologies of techno) that the first set of samples became *differential processes* upon the four records of the second set, which were also not the "nature" sounds Kasemets called for. Given the permutative *nature* of the script, it became *necessary* to revolve the binary with manifold temporality - from high-art "culture" to *pop culture*. At a surface, yet institutional, level, Kasemets' script is considered avant-garde, at the edge of pop-culture. If the script *is culture*, pop culture must be, by force of the binary (note the uses of *binary numbers* in this script), *nature(al)*. By embodying a logic that *spins* the *scriptual-logos* - a (dj) *mix* of theory and practice - the performative interpretation affects not through representation, similitude or mimesis but through the movement of the permutative "nature" of the script itself.

SMOOTH SPACE, STRIATED SPACE: TWO TECHNIQUES, CUT AND BURN

There are two primary processes that construct the samples in Set 1: cuts and burns. To parse the set, 20 sounds from and for each record letter were marked, using tape, where either knife or fire were employed (remixed from the script, where 0 is "fire," 1 is "knife").

Smooth and cut space [17]:

1. In *cutting* vinyl, one striates space across a predetermined spiral of grooves that rotate a highly structured

arrangement of sound. By cutting the record's grooves, one engages the pre-cut groove through the slicing and carving of grooves, the incision of inadvertent grooves (or skips or loops). Eventually, a heavily striated surface will cease to be normatively playable and a multiple temporality of playing and listening must arise, as we cut this paragraph, as something beyond demonstration, with the knife itself. The Mayan calendar is a cut-up (the cut-up according to Burroughs is erotic); the sounds cut-up IN *CaleNdarON* - to cut is to think - have been cut before this thought.

2. In *burning* vinyl, one melts the groove to smooth, soft space, warm to the touch, accentuating the random travel of the needle across glacial sound-space. Eventually, a heavily-burnt surface will cease to contain grooved sound, save for the whirring rotations of the turntable system and sounds normally unheard (such as electrical hum). "Silence," as *heard* by John Cage [18] - the amplification of miniscule sound, the vibration of warm record-molecules and sound of melting, dripping wax - liquefies the burn, calling for a *burning ear*.

ASSEMBLY MARKINGS

i. After cutting or burning the vinyl, a number of separate and distinct sounds, as called for by the script, are performed, utilizing turntablist aspects (EQ, fader techniques, tone-arm rubber bands, mixer effects, reverse-playing, feedback, line noise). As these sounds are in relation to the *notes of duration*, an element of impossibility often arises, consisting of more durations than sounds. This means that *one of the durations has to be an amount of silence*. The performance became the work of a complex and unfolding remix, random and desperately haptic.

ii. When the record became so fully manipulated and affected that it became, in a movement of fury and love, *a time* to play the needle directly across spinning surfaces, such as the platter, tinfoil and sandpaper (as the Mayan letter became effaced), the subjectile was touched there - as the rip, the surface beyond surface - and *heard* [19].

iii. When faced with a scriptual notation, such as "Event-Sound 13," performance process became *machinic* (scratch marks from this turntable beast). Body and hermeneutics became an all-encompassing act of irruptive and interruptive interpretation.

Event-Sound 13 is as follows:

Record: Ø
Duration note: .
Predominant Binary: 01
Further Binaries:
0101 1101 0011 1011 0111 1111 00001 10001 01001 11001 00101 10

With record Ø, one short duration, from a burn, of 13 sets of binary coda, drawn a 3 of clubs, calling for quiet, and the total event (preparation, interpretation, in/decision and action) to resound within 30 seconds. This meant one had to incorporate silence with one single duration of 13 distinct sounds, through one quick sonic movement from the surface of a burn. Simultaneously, the process was as follows: scratching the burn, the echo parameter on the mixer, EQ mid-hi and taps to the needle-head, final sideways scratch, the needle off the record, with the lighter held under its point, resulting in the needle

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catching fire and acidic smoke.

iv. Beyond the capacity of interpretation, although perhaps not the senses, was the symbolism of the Mayan day. Kasemets' *temporalities* abandon at least one element to evade the *script* (although it might be sounded, even in its absence). Just as there is silence, there is an interperformative gap where the meanings of the script resound via *infiltration*, as the moments of random accumulation, mixture, construction and destruction cut-up silence. One grasps *interpretative silence*, a moment where *bodymind* can neither account nor perform. The script, as the demands of manifold, Mayan - if not alien - temporalities, overwhelms the performer's dedication (or lack thereof) to the *scriptual-logic* of the script. The script rips itself apart. It temporalizes rifts, and these are heard, even in their evasion. The script rips its scriptuality. It is at such a moment - and such moments abound - that movements of disjunction and synchronicity transact with the performers, the machinic-ensemble. Too absorbed in the script itself, the *movements of failure* constituted the ensemble's improvisation as a bodymind machine failing its programs, failing to grasp all variables and, in their failure, giving chance to manifold time, to an experience of time beyond linearity, to alien, Mayan temporalities. The playing of the impossible calendar, from riotous cacophony to solitary silence, becomes *CaleNdarON*.

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ACKNOWLEDGEMENTS

UK; VT; GM; optic mystic; CP.

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16. See Kitundu's website: http://www.cpcarts.org/kitundu/instruments.htm/, and Schaefer's: http://www.audioh.com/. In the context of North American techno-turntablists, a few notable practitioners are (among a growing contingent) Toronto's Jeff Milligan, Montreal's the Mole, Windsor's Richie Hawtin, Winnipeg's Fishead, and Detroit's Claude Young and Jeff Mills.

17. See Gilles Deleuze and Félix Guattari, "1440: The Smooth and the Striated," in *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 2000): "Smooth space is constantly being translated, transversed into a striated space; striated space is constantly being reversed, returned to a smooth space" (p. 474).

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19. See Jacques Derrida, "To Unsense The Subjectile," in *The Secret Art of Antonin Artaud*, Trans. Mary Ann Caws (Cambridge, MA: MIT Press, 1998) pp. 59-148.

ABOUT THE AUTHOR

Tobias c. van Veen is a sound and Net artist, techno-turntablist and writer. He has been enmeshed with musical resistance culture since 1993, curating, DJing, performing and provoking via interventions and events, sounds and words. Hailing from Vancouver, BC, tobias was intricately involved in

the West Coast anarcho-techno scene as founder of the <ST> Projekt and techno.ca's technoWest.org. Tobias holds editorial and columnist positions for several arts, music and politics publications, including *FUSE*, *e|i*, *Capital*, *Dustedmagazine.com* and *Discorder*. He has freelanced for *The Wire*, the CBC and Austria Kunstradio.

His tactical media, performance and Net-art have surfaced on CTheory.net, 120seconds.com, Rhizome.org, Javamuseum.org, thisistheonlyart.com, Juniradio.net, at the Centre for Contemporary Culture in Barcelona, Steim.nl in Amsterdam, and the Museum of Contemporary Art, Denver. A DJ set still resides on Betalounge.com. He is author of the 2003 Canadian Electronic Music Directory and is currently writing a book on the politics of sound and postsubcultures. Although he can be found in the halls of McGill's Department of Communications, his blog resides at http://www.quadrantcrossing.org/blog.

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LEONARDO REVIEWS 2004.02

This month, *Leonardo Reviews* includes contributions from new members of the panel, Malcolm Miles and Enzo Ferrara. In addition, reviewers whose names will be familiar to regular readers ensure that the latest listings reflect the intellectual breadth of the *Leonardo* constituency. Stefaan van Ryssen's review, featured below, responds to a formidable piece of scholarship by Barbara J. Shapiro, while Rob Harle has taken time out to experiment with discursive form in his review of *Intermedia*. Amy Ione, Robert Pepperell and Roy Behrens continue to feature among our reviews, while newer members Denis Dollens, Chris Cobb and Aaris Sherin have also filed copy this month, making it a rich and fascinating selection of topics and styles. Finally, a special welcome to the familiar names of George Shortess and Kasey Asberry, who make a return with fascinating contributions to *Leonardo Reviews* after a brief absence.

Altogether, a rich and varied selection that can be accessed in full at: http://leonardoreviews.mit.edu

Michael Punt
Editor-in-Chief
Leonardo Reviews

Reviews Posted February 2004:

The Abyss of Representation: Marxism and the Postmodern Sublime, by George Hartley
Reviewed by Malcolm Miles

American Modernism: Graphic Design, 1920 to 1960, by R. Roger

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A CULTURE OF FACT - ENGLAND, 1550-1720

by Barbara J. Shapiro, Cornell University Press, Ithaca, 2000,

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284 pp., trade. ISBN: 0-8014-8849-4.

Reviewed by Stefaan Van Ryssen, Hogeschool Gent, Jan Delvinlaan 115, 9000 Gent, Belgium.
stefaan.vanryssen@pandora.be

Over the past decades, critical observers and suspicious citizens have learned to mistrust reports about the facts of military campaigns, corporate (ir)responsibility, royal mishap and scientific success. The media, we have gradually come to understand, are as easily creating "facts" as they are hiding others from public view. Misters Bush and Blair "know for a fact" that the former Iraqi regime was producing and hiding weapons of mass destruction, and it is a well known "fact" that man never walked on the moon. Yes, Elvis lives, as a matter of fact, I have met him at a recovery center in the South of France, where lady Di has gone in hiding too.

Facts are no longer facts, it appears, but how have they ever become facts in the first place? What does this overworked four-letter word - derived from the Latin "factum" or "man-made thing" - really stand for? When was it used and what were the events or pieces of information that received this seemingly untouchable label? Who elevated mere descriptions, stories, anecdotes and gossip to the semisanct status of undoubtable, solid and fool-proof status of factual evidence?

Barbara Shapiro, a professor of history in the Graduate School at the University of California, Berkeley, retraces the early history of the concept of "fact" in the United Kingdom in the sixteenth and seventeenth centuries. It starts in the courts, when juries and judges were urged by early modern thinkers to ground their verdicts on facts as witnessed by reliable and trustworthy observers. Sir Thomas More and Sir Francis Bacon (himself a professional lawyer), among many other lesser-known philosophers, contributed to the advancement of the "fact" in the legal arena, although it may come as a surprise that they thought gentlemen to be more reliable than commoners and men more trustworthy than women.

In a matter of decades the concept gradually spread from law to historiography, chorography and travel reporting. By the end of the sixteenth century, reporters of "marvels," "wonders" and other "news" in the periodical press had adopted the practice of quoting witnesses and their antecedents to support the factual status of their stories and with the founding and the development of the Royal Society, "facts" became part and parcel of scientific discourse. Finally, at the beginning of the eighteenth century, the use of the word had become so common in English culture that it appeared even in religious texts.

Barbara Shapiro has taken the work of Shapin and Shaffer (see *Leviathan and the Air Pump, Hobbes, Boyle and the Experimental Life*, Princeton, 1985 - a landmark work on the development of early scientific thought and on the societal nature of science and knowledge) to heart and clearly demonstrates how the fact originated in law, not in science, and how this epistemological concept moved from one realm to the other, reshaping the structure of knowledge in its wake. She does so in eight thematically arranged chapters, rather than one chronologically ordered narrative, giving enough side information for the reader to get the complete picture. She draws from a truly formidable range of reference, appropriately organized in the footnotes to

keep the prose clear and readable, and she strikes a balance between "factual" description and epistemological interpretation. This makes this book a good read for both historians and amateurs - in the modern sense - of intellectual and cultural history.

AMERICAN MODERNISM: GRAPHIC DESIGN, 1920 TO 1960

by R. Roger Remington with Lisa Bodenstedt, New Haven CT: Yale University Press, 2003. 192 pp., 250 color illustrations. Paper, $35.00. ISBN: 0-300-09816-2.

Reviewed by Roy R. Behrens, Department of Art, University of Northern Iowa, Cedar Falls, IA 50614-0362, U.S.A.
ballast@netins.net

To the extent that any country is a melting pot, its culture is indebted to the traditions that were brought in by its emigrants, whether European, Asian, African or whatever. But with luck, those same traditions mix, through synergistic alchemy, into new and original cultural forms, of which perhaps the most famous example is jazz. At times, related claims are made about a cluster of graphic designers who flourished in the U.S. in the years before and after World War II, and whose styles are sufficiently different from other influences as to merit the special, distinguishing tag of "American Modernism."

A surprising number of these designers were born and raised in the Midwest (e.g. Merle Armitage, Lester Beall, Bradbury Thompson, Noel Martin and Charles Eames), while others grew up in the cities (Paul Rand, Saul Bass and Alvin Lustig). Without exception, they were wonderfully smart and resourceful; they were also eager for experimentation, so much so that they all embraced the European avant-garde (in particular De Stijl, surrealism, the Bauhaus, and Tschichold's new typography), acquired firsthand in some cases by working side by side with recent emigrants, among them Ladislav Sutnar, Alexey Brodovitch, Herbert Bayer and Will Burtin. At the same time, they did not complacently align with that influence, but practiced what in retrospect is a seamless amalgam of European modernism and American regionalism, in the sense that its softened geometry is not unlike the art produced by Grant Wood, Thomas Hart Benton, Edward Hopper, Charles Sheeler, and others who were active in the WPA-era.

The author of this beautiful book, design historian R. Roger Remington, is as well-informed about this subject as anyone, and is widely known for his efforts as the founder of the Graphic Design Archives, a large collection of printed ephemera and other research materials in the Wallace Library at the Rochester Institute of Technology. This volume, which is his fourth and largest study of various aspects of this segment of design history, begins in the nineteenth century and retraces the emergence of the European avant-garde. It slows down as it looks more reflectively at the major representatives of American modernism, then resumes speed as it surveys the 40-year period near the end of the twentieth century, in which modernism is replaced by the maze that we currently find ourselves in. In addition to Remington's wonderful text, it is exquisitely designed (as it really has to be, to practice what its text promotes) by Brad Yendle and stunningly illustrated by 250 color

illustrations of the finest, most unforgettable works from an historic period in which not just graphic design, but cinema, literature, dance, popular music and other forms of expression were produced at a very high level.

(Reprinted by permission from *Ballast Quarterly Review*.)

A THING IN DISGUISE: THE VISIONARY LIFE OF JOSEPH PAXTON

By Kate Colquhoun, Fourth Estate, London 2003. £18.99.

Reviewed by Dennis Dollens, Department of Genetic Architecture, Universitat Internacional de Catalunya, Barcelona.
exodesic@mac.com

Joseph Paxton, when he is remembered, is known for his design and supervision of the Crystal Palace - the 1851 cast-iron and glass structure that transcended its garden heritage (evolving from greenhouses) to become the world's most advanced, technological structure. Enclosing 21 acres and erected in a few months, the Crystal Palace housed England's first blockbuster international exhibition. Media and promotional support was so great during its development that the building became the exhibition's main attraction. Its physical structure came to embody early Victorian ideals of work and industry, as its image seeded future visions affecting urban building typologies such as glass atria, shopping arcades and railroad stations. Interestingly, the Crystal Palace's appeal and vision crossed social boundaries, receiving the early support of Prince Albert and Queen Victoria, then subsequently garnering working-class support in the form of massive attendances (it was one of Cook's Tours first destinations and workers could pay travel expenses through advanced weekly subscription). Such a building would be the life's triumph of a great engineer or architect, but a gardener built the Crystal Palace; and it was only one of Joseph Paxton's many triumphs.

So, while Kate Colquhoun's chapters describing the Crystal Palace are full of revelations, those surrounding them tell a fairytale-like story of a developing genius. They reveal Paxton's autodidactic path and his ongoing and deep relationship with his patron and later friend and colleague, the sixth Duke of Devonshire. Paxton's training ground was the Duke's Chatsworth estate where, over his lifetime, he transformed landscape, garden, waterworks and eventually architectural history, concurrently transforming himself into a Victorian icon of work and intelligence. His collaboration with the Duke resulted in botanic expeditions that added new and formerly unknown trees, plants and orchids to England's botanic patrimony; together, the Duke and Paxton made Chatsworth the botanic showplace of Europe. Through channels independent of the Duke, Paxton wrote and edited garden magazines and later founded a general London newspaper, hiring Charles Dickens as editor. Even as writing supplemented his healthy Chatsworth income, he also took on independent design work (notably designing Baron Mayer de Rothschild's 1855 estate), as well as serving as a board member and consultant for various railways.

If one nineteenth-century structure could represent the seed of a new architecture - and like botanic seeds, there are an abundance of architectural seeds - Paxton's 1835-38 "Great

Stove" (as his greenhouse masterpiece was known) would be my foremost candidate. Looking at pictures of it (it was demolished in 1920), one could be looking at a prismatic or origami-like structure from today's avant-garde. As a piece of pre-Victorian design it is dazzling, anticipating Bruno Taut's crystal architecture by almost 80 years. The Great Stove is a set of continuous folding facets or, as Colquhoun tells us, "furrow and ridges," arched and curved to cover an enormous 30,000 square feet.

Primarily a wood-framed building, the stove's elements were steam-milled on site. Its glass scales were the largest panes available (48 x 6 in) and, when inserted into the skeletal-like frame, created a lightweight, undulating skin supported by 36 interior, cast-iron columns. A material hybrid not possible before the industrial revolution, this building's morphological shape also owed nothing to architectural history. Yet, it was effectively Paxton's testing-ground for prefabrication and a model for techniques he later refined for the Crystal Palace. Therefore, if the Crystal Palace is considered the beginning of enormous-scale prefabrication projects, eventually leading to modernism, the Great Stove and other works at Chatsworth, especially the glasshouse sheltering the gigantic Amazonian water lily, Victoria regia, were its germinating bed. Colquhoun's book rights this neglected parentage.

A Thing in Disguise charts Paxton's development as gardener, landscape designer, writer, architect, politician, family man and friend; all part of his historic role in nineteenth-century England. Paxton was a determined, hard worker who became a national figure - the common man who worked his way to the top - he was elected to Parliament and knighted by Queen Victoria. This is a benchmark biography and deserves an honored place on every library shelf serving architects, engineers, gardeners and those interested in Victorian technology and culture.

THE BOOK OF THE PHARAOHS

by Pascal Vernus and Jean Yoyotte, translated from the French by David Lorton, Cornell University Press, Ithaca and London, 2003, 233 pp., illus. Cloth, $35.00, ISBN: 0-8014-4050-5.

Reviewed by Enzo Ferrara, IEN Galileo Ferraris, Materials Department,
Strada delle Cacce, 91, 10135 Turin, Italy.
ferrara@ien.it

"The universe rests on the pharaoh, who is mandated on earth by the creator god to repel evil and chaos" - Christiane Ziegler (Louvre Research Unit Director)

The term "pharaoh," handed down through the Bible, comes from the Egyptian "per-aâ," which originally designated the royal palace but later referred to its ruler, emblem of the rich and complex Egyptian civilization. The pharaohs, almighty kings of many forms, dominated the whole Egyptian perspective on human life and ruled over a huge, unified territory spanning 4,000 kilometers along the banks of the Nile.

Egyptian society could not have functioned properly without the pharaoh's presence. The importance and the role of the pharaoh

as an intermediary between the natural and supernatural realms can be appreciated through the quantity of his effigies, multiplied everywhere in ancient Egypt to grant that divine forces take care of human affairs. The most eminent pharaohs amount to no more than 50; among them, the names of kings such as Cheops, Akhenaten, Ramesses, Tutankhamon and Alexander the Great have become part of popular culture. Their profiles are well-known, extensively sketched in portraits, busts, decorated heads and bas-reliefs worldwide.

However, the images of the pharaoh we have inherited are always stereotyped, as imposed by the ideology to respect and testify to the continuity of Egyptian culture and art. For all the tombs, statuary and other relics that have survived, little deals with the daily work of the government, the court, or the private life of the royal family. Historians can scarcely uncover the individuality of kings, although they can scrutinize the policy and warfare during each period and each reign. Thus, this effort by the French Egyptologists Vernus and Yoyotte to write down *The Book of the Pharaohs* is appreciable. Their volume examines what lies behind the formalism and monumental majesty of the pharaohs, offering critical and practical information for an objective characterization of the reigns and personalities of the "great" pharaohs, but also to make account of the greatest possible number of less-celebrated sovereigns.

As suggested by the original title of the French edition, *Dictionnaire des pharaons* (1996), the book resembles an encyclopedia, with alphabetically ordered short essays on the places, dynasties, subjects and themes relating to the kings and their rule in ancient Egypt. Each entry contains information on the etymologic origin of the name, along with genealogical and historical data, and most of them conclude with an essential bibliography for further reading on the major sources of Egyptian history. Entries on specific cultures such as Hyksos, Hurrians and Hittites have been integrated and, to broaden the cultural "landscape," brief chapters also deal with non-royal personalities, institutions, practices and concepts.

It is difficult to recognize plain chronological connections in the history of ancient Egypt. For the Egyptians, time was a cyclic progression: the ascension to the throne of a pharaoh marked the first year of a new era, to be ended with his death. Everything written or materially reproduced thus became eternal or, more properly, outside of time: artistic expressions, whether utilized in a tomb or a temple, mainly served a functional, rather than an artistic end. Thus, the sequences of dynasties, the classification of reigns and periods with coeval sovereigns are not easy to reconcile with the continuity apparent in the artistic tradition.

Vernus and Yoyotte recognize this limitation: "The dates in this table, as well as those in the entries ... cannot pretend to fix in time precisely and irrevocably the important moments and the major events. The textual and archaeological realities condemn us to this humility ... or rather, to this humiliation" (p. VIII). Even so, they offer information to place the monarchs, at least approximately, in the historical context of their respective periods and the volume contains entries devoted to the "Kingdoms" and "Intermediate Periods" and to each of the dynasties as they succeeded one another.

Queens are considered as well, from Hatshepsut, the first, to Cleopatra VII Philopator, last representative of the Ptolemaic

dynasty and, after Teye and Nefertiti, the fourth female pharaoh of Egypt. The last entry is the "Zero Dynasty," inserted in the revised English edition. This is a strange but appropriate indication of the pre-dynastic period that was recognized as have existed earlier than the foundation of Memphis and the unification of Low and High Reigns.

The Egypt of the pharaohs still attracts scholarly attention and highly publicized exhibits continuous to inspire popular fascination. *The Book of the Pharaohs* is intended for a wide audience. It efficaciously spans, although concisely, 3,000 years of history of the Egyptian kings, offering readers a reference to the human reality of royal Egypt.

The volume includes a bibliography of recent books for general readers and a chronological table that organizes the major periods of Egyptian history, along with the most illustrious royal names.

LEONARDO JOURNAL

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< Daniel Mange and Gianluca Tempesti: BioWall - An Electronic Tissue That Pulsates Like Skin >

Artists' Statements from selected participants in the Third @rt Outsiders international digital art festival, 18 September-20 October 2002, Paris.

Participating in the creation of a genetically modified and living work; touching a "biological wall" and seeing artificial life emerge; creating creatures that visibly evolve before our eyes within a virtual jungle; observing a living microcosm activated by our footsteps: This was the passionate journey that

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awaited visitors to the third @rt Outsiders international digital art festival, which took place 18 September-20 October 2002 in Paris and on www.art-outsiders.com.

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ARTIST' S NOTE

< Franc Solina: *15 seconds of fame* >

ABSTRACT

15 seconds of fame is an interactive installation that every 15 seconds generates a new pop-art portrait of a randomly selected viewer. The installation was inspired by Andy Warhol' s ironical statement that "in the future everybody will be famous for 15 minutes." The installation detects human faces and crops them from the wide-angle view of people standing before the installation. Pop-art portraits are then generated by applying randomly selected filters to a randomly chosen face from the audience. These portraits are then shown in 15-second intervals on the flat-panel computer monitor, which is framed as a painting.

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GENERAL ARTICLES

< Roy Ascott: Planetary Technoetics: Art, Technology and Consciousness >

ABSTRACT

As the planet becomes telematically unified, the self becomes dispersed. The convergence of *dry* silicon pixels and biologically *wet* particles is creating a moistmedia substrate for art where digital systems, telematics, genetic engineering and nanotechnology meet. A technoetic aesthetic will not only embrace new media, technology, consciousness research and non-classical science but will also gain new insights from older cultural traditions previously banished from materialist discourse as esoteric or shamanic. As the century progresses, we may find ancient plant technology allied to the emerging moistmedia technologies of our constructed realities and new or rediscovered realms of consciousness contiguous with new domains of the planetary web. In the present post-9/11 crisis, with its competing ideas of reality and morality, collaborative transdisciplinary research is needed if a truly planetary culture is to emerge that is techno-ethical as well as technoetic. Entirely new organisms of communication, learning and creativity must be engendered.

< Robert Thill: Intellectual Property: A Chronological Compendium of Intersections between Contemporary Art and Utility Patents >

ABSTRACT

The author presents a group of projects in which the roles of inventor, artist, amateur and institution variously overlap, merge and blur, offering new perspectives on the relationship between contemporary art and patents. Addressing issues of originality, aesthetics, labor, ownership and value, these projects demonstrate a continuous link between art and patents

and encourage thoughtful speculation about shared concerns, guiding ideologies and forms.

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ARTIST' S ARTICLE

< Katherine Lubar: Color Intervals: Applying Concepts of Musical Consonance and Dissonance to Color >

ABSTRACT

Throughout the centuries, there have been numerous attempts to correlate elements within the fields of music and visual art. The author compares the 12-tone musical scale to the 12-hued subtractive pigment color wheel commonly used by artists and applies the principles of consonance and dissonance in musical intervals to their counterparts in color "intervals." The main function of this paper is to put forth a paradigm that can be used by artists as a point of departure for their own explorations into the use of color as well as to create a possible method of analyzing works of art to understand why certain color combinations may work well together.

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STATEMENTS

< Kok Kee Choy, *T2000* >

< Thomas Jacobsen, Kandinsky' s Color-Form Correspondence and the Bauhaus Colors: An Empirical View >

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SPECIAL SECTION - ARTMEDIA

< Annick Bureaud: Introduction: From Aesthetics of Communication to Net Art: The ArtMedia VIII Symposium >

< Wolfgang Strauss and Monika Fleischmann: Artistic Practice as Construction and Cultivation of Knowledge Space >

Selected papers from the international symposium Artmedia VIII: From Aesthetics of Communication to Net Art, co-organized by Fred Forest, Mario Costa and Annick Bureaud, Paris, December 2002.
http://www.olats.org/projetpart/artmedia/2002eng/mono_index.html

ABSTRACT

This article presents the netzspannung.org Internet platform, a media laboratory on the Internet that not only collects high-quality information on digital culture and media production but also interlinks this information, contextualizes it and makes it available on-line as a constantly expanding knowledge space that, like a library, can be explored by the public as an interactive installation and an educational space. In the broadest sense, the aim of this project is to visualize and semantically network information to create "knowledge spaces" that can be explored interactively and in real time and that are accessible to the user through play. Technologies, on-line tools and intuitive interfaces are being developed that support communication between the digital and physical spaces and

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investigate new forms of knowledge acquisition as "knowledge-based arts."

< Maurizio Bolognini: The *SMSMS* Project: Collective Intelligence Machines in the Digital City >

ABSTRACT

The author's *SMSMS* project, a computer-based interactive installation, is presented, and some implications concerning art and new technologies are discussed. *SMSMS* derives from a previous work, *Computer sigillati*, in which 200 machines have been programmed to produce an endless flow of random images and left to work indefinitely without being connected to a monitor. In *SMSMS*, one of the *Computer sigillati* programs is employed to create images that are visible and can be modified by the public using cell phones. It is argued that *SMSMS* could be considered indistinctly as either an exercise in collective intelligence or, in contrast, as a disturbance to the perfectly unpredictable working of the machine. It is concluded that this apparent contradiction, as well as the oppositions between control and randomness, intelligence and chaos, should itself be recognized as one of the most significant themes for artistic research using new technologies.

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HISTORICAL PERSPECTIVE

< Rui Moreira Leite: Flávio de Carvalho: Media Artist Avant la Lettre >

ABSTRACT

This paper examines the work of Brazilian artist Flávio de Carvalho (1899--1973) from the perspective of contemporary media art, highlighting his practical and theoretical legacy. Initially associated with the Anthropophagy art movement, Carvalho used mass media creatively and incorporated insights from psychology, sociology and anthropology into his art. He realized events that went beyond "performance art," including a pioneering presentation on television in 1957. This article offers a brief overview of Carvalho's trajectory.

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LEONARDO NETWORK NEWS

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AUTHOR
Jennifer Henderson
jenniferhenderson@sbcglobal.net

LANGUAGES FAMILIAR TO THE AUTHOR
English

THESIS TITLE
Portrait of the Artist in Red Ink

ABSTRACT
"Portrait of the Artist in Red Ink" was an installation of artists' financial portraits on canvas. The work, which resulted from the application of twentieth-century capitalist financial analysis models to artists shows, through application of these socio-economic research models, the precise, albeit estimated, economic and class impact of the artist's occupation.

Extensive interviews with artists about their professional, lifestyle and family goals as well as income, expense, debt load and desired geography form the basis for the custom interactive financial model I created of the artist's financial future. This model enabled the artist to explore different choices and see the effect on income and expense for his life expectancy. Lastly, I created the art object, a financial portrait that contains symbols of class from portraiture (such as home, pet and children) combined with contemporary business graphics (income and expense graphs) to represent the desires of the artist against the reality of existence.

The application of financial planning models to artists highlights the flaws in the art economy that an artist must contend with and shows that living a life with enough money to create art is perhaps the most creative endeavor of all.

KEYWORDS
capitalist, financial analysis, modeling, agency, portrait, money, art economics, design science, installation, business graphics, class

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THESIS AVAILABLE UPON REQUEST: contact author

OPPORTUNITY

Faculty Position: Assistant or Associate Professor, New Media§Arts University of California San Diego

The University of Californa, San Diego Division of Arts and Humanities (http://dah.ucsd.edu) invites applicants for an assistant or beginning associate professor of new media arts, to begin July 1, 2004. Salary will be commensurate with qualifications and experience and based upon UC pay scales.

Candidates should have creative and/or theoretical work that demonstrates a substantial engagement with computing in any field of the arts such as (but not limited to) the visual arts, music, theatre and/or dance. The position will be affiliated with
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Technology and Telecommunications [Cal-(IT)2 - http://www.calit2.net],
and with the Center for Research in Computing and the Arts (CRCA -
http://www.crca.ucsd.edu). The position will involve teaching within the Interdisciplinary Computing in the Arts Major and the development of new digital arts graduate programs. The candidate will join one of the departments of Visual Arts, Music, or Theatre and Dance.

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Digital Arts Search Committee
CRCA 0037
UC San Diego
La Jolla, CA 92093-0037
The application deadline is March 10, 2004, or until the position is filled. Please reference position #4-332-fAf in all correspondence.

Enclose self-addressed postcard for acknowledgment of application and SASE for return of work samples.

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slant towards shorter, less academic texts.

Contents include Leonardo Reviews, edited by Michael Punt, Leonardo Research Abstracts of recent Ph.D. and Masters theses, curated Galleries of current new media artwork, and special issues on topics ranging from Artists and Scientists in times of War, to Zero Gravity Art, to the History of New Media.

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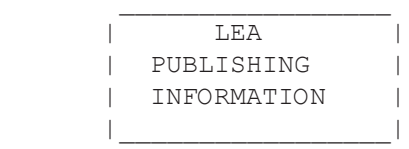

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Leonardo Electronic Almanac
Studio 3a, 35 Place du Bourg-de-four
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