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LEA SPECIAL ISSUE - Groove, Pit and Wave: Recording,
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in conjunction with *Leonardo Music Journal* Volume 13

Despite Thomas Edison's assumption that the gramophone was nothing more than a sonic autograph album - suitable only for playing back the speeches of famous people - over the last 100 years recording has radically transformed the composition, dissemination and consumption of music. Similarly, the businesslike dots and dashes of Morse and Marconi have evolved into a music-laden web of radio masts, dishes, satellites, cables and servers. Sound is encoded in grooves on vinyl, particles on tape and pits in plastic; it travels as acoustic pressure, electromagnetic waves and pulses of light.

The rise of the DJ in the last two decades has signaled the arrival of the medium as the instrument - the crowning achievement of a generation for whom tapping the remote control is as instinctive as tapping two sticks together. Turntables, CD players, radios, tape recorders (and their digital emulations) are *played*, not merely heard; scratching, groove noise, CD glitches, tape hiss and radio interference are the sound of music, not sound effects. John Cage's 1960 *Cartridge Music* has yet to enter the charts, but its sounds are growing more familiar.

Leonardo Music Journal Volume 13 (LMJ13) and this accompanying special issue of LEA (the first of two) focuses on the role of recording and/or transmission in the creation, performance and distribution of music: contributing their thoughts on these topics here in LEA are, in this issue, Michael Bussi re, Marlena Corcoran and Trace Reddell; and in the February issue, Christopher Burns with Matthew Burtner and Tobias C. van Veen. 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,  lvaro Barosa, Holger Schulze, S rgio 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 L pez, 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>.

[Ed. note - Following is the complete table of contents for LMJ13 (information available at the above-mentioned links). This is provided for reference and is different from the table of contents of the present issue of LEA.]

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FEATURES

Performance space meets cyberspace: seeking the creative idiom and technical model for live music on broadband

by Michael Bussière (media artist and educator), Sonic Design Interactive Inc., 12 Clarey Avenue, Ottawa, Ontario, K1S 2R7 Canada.
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Abstract

Initiatives throughout the post-industrial world are supporting the proliferation of advanced networks that connect governments with the public, research facilities with one another and consumers with new content portals. While this is currently the domain of the engineer, there is an acknowledgement through public policy and targeted investment that wider deployment of these networks is on the horizon and that this deployment is dependent on the creative insights of media artists to devise new forms of content. The following article documents a series of tests involving the creation and presentation of musical content within a distributed environment on Canada's CA*net3/4 - the world's first national optical Internet research and education network.

Background and Context

To begin, I write as a multi-media artist and educator (trained in computer music), not as a computer scientist or engineer. I was invited in 2001 by a consortium of several Canadian research agencies to participate in a national project to develop content for CA*net4. My experience as a composer, producer and music technologist led me to create a series of initial investigative events (as outlined in this article), focusing on the creation and presentation of experimental multimedia over high-speed networks with particular emphasis on live, interactive performance forms. These initial events evolved through ever-increasing levels of technical complexity, while furthering the participants' experience of a "distributive performance environment" (my term for performance taking place among several geographical locations).

We addressed some of the following questions: Is there a definitive continuum from audience member, to spectator, to inter-actor (i.e. why do theatrical performances have "audiences," and sporting events have "spectators")? Can music incorporate network latency (that is, time delay from one point to another) as a fundamental design challenge? Is there an historical repertoire that was written almost in precognition of latency as a context? Does this repertoire anticipate a new network-based musical idiom? And finally, what is the proscenium of cyberspace? This project continues to this day.

Strictly speaking, the video-conference medium cannot be described as transmission [1], where content radiates from a

single point of origin. It is rather an unfolding, a re-distribution of space, in which access points co-determine the experience and content and in which no one perspective outranks another. The perceptual consequences of each locale are unique. If we start from Michael Benedikt's proposition that "space presents itself to us in the 'freedom to move'" [2], then performance space is defined by specific restrictions of that freedom. With rare exception, contemporary performance space exists on one side of a line, beyond which the spectator cannot pass. The proscenium, rooted in ritualistic traditions, acts as a divider separating the "sacred" space of the performer from the access space of the observer. The observer hands near-total control of the personal experience, for a period of time, over to the creators of the event. Cinema presents probably the most profound example of such an agreement, presenting the "performance" in absence of the "performer" within a ritualized social space. In the case of distributive performance, the penetration of virtual portals into performance spaces enhances the sensation of physical movement with a set of traversable pathways.

This project, **Performance Space meets Cyberspace**, further assumes the core premise that the only truly interactive experience is that of person-to-person "live" communication [3], as opposed to machine-simulated interactivity, which suggests a different set of intentions. Hints of this are found in television viewing habits of English-speaking Canadians, who watch a great deal of pre-packaged foreign (i.e. American and British) television content. The attribute of foreign-ness is generally discounted, as is the case with other globalized consumer products. Pre-packaged television, like commercial urban radio, has, after all, taken on a kind of worldwide timbre, tempo and formulation. The exception for Canadian viewers is the high degree of consumption of live-to-air domestic programming, namely news and sports. In effect, the live-ness of the content is apparently associated with the intimacy and immediacy of home. Intimate media is further achieved when an intrusive capture device, such as a camera (typically interpreted as being "aimed" at an individual), is re-contextualized as an extension of one's physical presence. This is perhaps most profoundly felt when one views a feedback loop of one's tele-presence onscreen at a remote location: a remarkable "house of mirrors" effect, enabled by distributive technology.

National context is particularly relevant here, as this ongoing project is partially funded by the Canadian government. The principal public policy issue is one that faces most nations that are on the World Wide Web: how is national identity expressed and supported outside of the English language and beyond the sphere of dominance held by the United States? Public policy in Canada (and France, for example) is addressing similar challenges with respect to cinema. The added complexities in the Canadian context include official multiculturalism (with 21% of the population born abroad), official bilingualism, a northern climate and remote communities scattered about the world's second largest country.

Experiments and demonstrations

Phase one of this project consisted of four experiments conducted among classrooms, studios and labs in five locations, across six time zones. Content was designed to increasingly challenge CODEC (compression/decompression), capture

technologies and network capacity. The so-called "last kilometer" was a recurring challenge, meaning that connectivity is only as broad as the tightest link in the chain. Master control for all four events was located in Ottawa, Canada's capital.

The first event took place on 25 October, 2001 and connected the Luscar Digital Recording Studio of the Banff Centre for Continuing Education (Banff, Alberta, Mountain Time) with Carleton University in Ottawa (Eastern Time). The participant group was an undergraduate course in computer music at Carleton University, who occupied a video-conferencing classroom furnished with desk microphones, six large suspended monitors, front and rear cameras and a control lectern. The space, clearly retrofitted from a conventional classroom, is an excellent example of how *not* to design a cyberspace portal - all capture and presentation technology was oriented from the ceiling, discouraging a natural feeling of penetration into and from a remote location.

Carleton's facility utilized a V-Tel H.320-based video-conferencing unit served by six ISDN lines, leased from Bell Canada [4]. The Banff system, known as the Client Learning Environment (CLE), is built on a VCON ViGO H.323-based CODEC [5], and was installed in Banff's Luscar Studio for this event. The incompatibility with H.320 was resolved via the University of Ottawa's Accord gateway, which served as the multipoint control unit.

The lesson plan included a discussion of the video-conferencing setup itself, with numerous questions from students regarding its configuration. A Banff associate audio engineer provided a tour of the Luscar studio and fed the CLE a variety of musical projects and test materials. Luscar is built around a Euphonix CS-3000, 56-channel digitally controlled analog console with a 24-track digital recorder. Its developer, Professor John Celona, associate dean of fine arts at the University of Victoria, provided a demonstration of leading edge computer music software. The lack of auxiliary video inputs prohibited the connection of a second computer to the CLE; a solution was found by simply utilizing a camera and second monitor.

The event was characterized by a 1-2 second perceivable delay, which made conversation clumsy, although overall stability supported a naturalistic continuity in the lesson plan. There were occasional freezes and pixilated video effects and the audio suffered when a signal was rich enough to saturate the bandwidth. A test of Luscar's console sent a variety of instrumental (mono) mixes to the CLE. It was discovered that an overly demanding audio track would cause sound to deteriorate into an indiscernible garble. In addition, inexplicably, the "density" of the mix (number of tracks, signal characteristics) also provoked this breakdown. Microphones left open at both locations also led to intolerable audio.

Event number two took place on 27 November, 2001 and extended the participatory dimension into the realm of distributive performance. In attendance at Carleton were 18 first-year students enrolled in a course titled "Introduction to Media and Technology in Art and Culture." The Banff contingent was comprised of 10 visual and media artists participating in "SloMo," a thematic residency whose subject was the analysis, measurement, effect on and manipulation of time by the artist. Appropriately, the residency's launching point was the following

quoted observation from Marshall McLuhan, which headlined the Banff Centre's descriptive document, one that dovetailed elegantly with this project: "Today, the instantaneous world of electric information media involves all of us, all at once. Ours is a brand new world of all-at-onceness. Time, in a sense, has ceased and space has vanished" (from *On McLuhan: Forward Through the Rear View Mirror*, 1966).

We developed a week-long collaborative effort between the SLoMo residents and sonic design students at Carleton. The interwoven themes of time, art and perception led to the repertoire of John Cage as a catalyst for exploration (indeterminacy being time dependent). At 17:00 MT on Tuesday, 27 November, I conducted a performance of Cage's *Imaginary Landscapes No. 4* (1951) for 12 Radios. This work is an early example of a music that combines human performance gestures with electronic instrumentation. Its unique character is entirely dependent upon location and time of day for its content. It is the perfect music for realization within the inherent attributes and limitations of a videoconference, with respect to an aesthetic point of departure (remoteness rendered locally, time/space layering, "captured" content, signal manipulation, etc.). *Imaginary Landscapes No. 4* is also an excellent example of the content inhabiting the medium and being highly, inherently suited to the medium. The work utilizes changes in radio frequencies and volumes to articulate a temporal strategy "based on a number of measures having a square root, so that the large lengths have the same relation within the whole that the small lengths have within a unit of it" [6]. Indeterminate events occur as a result of geography, time of day, radio programming and human intuition. I believe this to have been the first distributed broadband rendering of a John Cage work.

Several tests and rehearsals took place prior to the event, and three executions of the work were realized and recorded. The CLE unit was deployed again, this time in a boardroom equipped with a compatible ISDN connection, meaning that no bridge through Ottawa University was required. While bridging costs were eliminated, there were now long-distance costs incurred. The direct dial-up improved the delay and signal quality, although a transfer speed limited by ISDN meant that overall performance upgrades were negligible. All in all, this event was very compelling and produced a lot of laughter and enthusiasm.

On 9 April, 2002, audiences in Ottawa and Kanata, Ontario were connected with St. John's, Newfoundland (Atlantic Time plus one half-hour) in a large-scale interactive performance event. Carleton University's sonic design students presented creative projects in digital media and performance and collaborated with musicians at Holy Heart High School in St. John's, for what I believe to be the first student work composed for a multimedia broadband event. Of all the events in the series, this was by far the most elaborate in terms of programming and technology.

This event was co-produced with the National Research Council of Canada (NRC) and the Virtual Classroom of the Communications Research Centre (CRC). Dr. Martin Brooks of the NRC's Institute of Information Technology led the technical team. The CRC "BADLAB" was set up as the master site, with Carleton and St. John's connecting to CRC as interactive sites. The event's backbone was CA*net3 [7]. The BADLAB, St. John's and Carleton University were all connected to CA*Net3 via CRC GigaPOP [8], Memorial University of Newfoundland GigaPOP and ONet GigaPOP, respectively. Three high-end Pentium boxes running Linux

utilized ISABEL, a conferencing application designed to create multi-media, multi-point distributed events.

Three workstations were set up at Carleton, with two running as separate interactive sites equipped with cameras to capture the audience and performers, and the third to act as flowserver (the computer dedicated to streaming data from point to point). This flowserver in turn connected to the CRC flowserver to compensate for limited bandwidth to the architecture building. CA*net3 was accessed via the university ethernet, whose bandwidth provided 10 Mbps (megabytes per second) of transfer, although actual transfer speeds were affected by general network activity on the campus at the time of the event. The single workstation in St. John's would connect directly to the CRC flowserver.

A principal goal of this event was the merging of interactive cyberspace with a large performance venue. Projections were utilized to create a sense of presence in the main audience venue at Carleton. Data projectors cast light on adjoining wall surfaces, offset by a 90-degree angle. ISABEL provides multiple programmable window sets within each projection. This, for example, made possible a kind of theatrical depiction of actors facing one another in a naturalistic, conversational style. However, the scale of the projections produced a kind of cinematic amplification. Furthermore, roving cameras allowed me (as director and host located across town at the CRC) to remotely "reach" into the locations and provoke participation from the audience. Indeed, the traditional distinction between audience and performers was deliberately blurred through a variety of engagement devices.

The main venue on the Carleton campus was not an electronic presentation space. The closest ethernet port was several meters outside of the site in a small meeting room and the 10 Mbps nominal connection speed at this port was seriously hampered by general network activity on the campus. This resulted in a recurring freeze effect to and from Carleton, although the connection from CRC Kanata to St. John's was unaffected. A fundamental challenge exists in locating a public performance facility that is directly wired to broadband. Such a facility would also require professional caliber presentation systems found in conventional theater, stage or television production.

Of participants' responses, two were particularly noteworthy. The usual shyness of being on-camera was very evident among the students and the default posture was to attempt eye contact via the videoconference. Participants tended to address projections rather than cameras, tending towards eye contact and facial images. Participants occasionally had to be directed away from the projected facial image of a conversational partner and towards the camera lens. The makeshift venue also produced clumsiness with respect to more normal videoconference interaction. Separate monitor kiosks would allow an individual to engage in cyberspatial conversations on a more human scale, with split video feeds generating the large-scale audience depiction. Issues relating to theatrical lighting, audience illumination and large-scale projections also require some kind of solution. The challenge in using Linux-based computers was the non-commercial, non-thoroughly tested nature of the operating system. Applications, drivers, etc. were rife with incompatibilities, with devices, such as the data projectors, failing without warning.

Students were guided to explore creative musical/multimedia

that best exploited the idiomatic nature of a network-based, ageographical performance medium. The program included a musical multi-media work by Carleton student Nic Paradis (localized in Ottawa), videos and a networked game and audience interaction between St. John's, Ottawa and Kanata. The evening concluded with a unique musical performance work, composed by sonic design/music student Barry Promane. I believe it to be the first student work composed for the broadband medium. The Promane work was scored for chamber group (located in St. John's) and spoken word performer (located in Ottawa), an idiom chosen to accommodate inherent delays and brief network freezes while avoiding the necessity of common time. A second version employed pre-taped material of a St. John's musician reading the text. Once again, this event was met with great excitement and enthusiasm. My personal reaction was one of adrenaline and presence amplification. It was an electric, larger-than-life kind of experience, balanced with a touch of controlled chaos.

I returned to the Banff Centre on 27 November, 2002 for the final event of phase one. As was the case at the start, this event connected Banff with a class in Ottawa for a studio tour with demonstrations. The CLE was again deployed; this time with extended audio, VGA and NTSC (National Television System Committee) video inputs via mixers. Cabling allowed for a walk-about from room to room, with a floor crew including a switcher/director, two cameramen and a floor director. Students in Ottawa were located off-campus in an auditorium of the National Research Council. While the NRC is a primary node of CA*net3, Banff's connectivity was again influenced by local network activity. However, the point-to-point connection exhibited dramatically improved audio and video quality.

Students were again given a demo/tour of Luscar, plus the Rice Studio television and video production facility. Rice includes a fully equipped 2500-square-foot studio space with cyclorama and computerized lighting board. The production complement includes a Panther dolly, portable crane and an extensive lighting package with both Tungsten and HMI lamps. Visually, the project now began to approach broadcast quality.

Following the tour, students presented electroacoustic/audio projects from Ottawa. One project, entitled *Among Trees*, stood out for its thematic content. Its creator, Craig Aalders, describes the work as "encouragement for and the awareness of true individual identity and the relation that one's identity has in the overall global community." Aalder's work can be described as trance-electroacoustic with embedded and processed spoken word. The text reflects on an individual's search for identity through a retreat into the depths of a forest. We took advantage of our central location in Banff National Park, took a camera into the forest and created location footage for synchronous visual playback. The synchronicity was further exaggerated by the date and time link to another imaginary landscape, exactly one year to the hour after our Cage performance.

I feel this final point requires a purely subjective indulgence. Our experience with broadband has produced evidence of a subtle emergent property. Does a distributed experience of presence alter our quality of response (as distinguished from intellectual processes)? Perhaps it is an awareness of something larger than normal time/space, human sentience smeared about an inter-operational multi-location reality, the paradox of sharing space while dwelling in separated spaces. Music's invisible

spatial nature perhaps illuminates this effect. Do synchronicity, consciousness and musical and aesthetic phenomena interlace with a greater elegance, by virtue of, and enhanced by, this medium? "Everything at once, no matter when/where we are?", as Cage speculates [9]. If cyberspace is indeed a habitat for the imagination [10], then perhaps live cyberspace is the habitat of the spontaneous expression of the psyche?

Technical Findings

A number of significant production issues emerged from these early experiments, all of which relate to the merging of public performance space with cyberspace. In its present phase, this project is introducing production techniques derived from television and cinema, as well as developing original solutions to address the following objectives:

Lighting. Large projections, monitors, performers and a participatory on-camera audience all require that specific solutions be resolved within the same physical space, and cyberspace.

Audio. Increasing the capacity of audio transmission to a stereo (and possibly surround 5.1) format, to better suit musical events and to create an ambient envelope that more readily expresses the feeling of a physical space that has been virtually "transposed" from one location to another.

Performance space design. Devise a solution that allows for large-scale presentations and human scale interaction to co-exist within the same event, among other issues.

Audience/participant engagement. Through applied evaluation with focus groups, this project will seek to position the threshold between audience and participant and will experiment with various creative methods of "reaching through" a portal to engage participation at another location.

Remote control options. To what degree can remote technological intervention further encourage participation?

Conclusions

Computer-generated realities can be defined simply as a light source with associated audio elements. Comparisons with other light-source media are therefore unavoidable. Distributive performance requires sophisticated production to hold its own against the formalism and refinements of conventional television, cinema, gaming, etc. The current state of broadband harks back to the days of live television, to an era where the old medium of the proscenium became the content (as seen in numerous staged television shows of the early era), finally displaced by an exposed television sensibility with resident attributes. Similarly, broadband holds the potential for revealing a creative idiom for new musical and other performance forms.

Finally, there is the issue of public deployment and the eventual opportunity to test a streaming method to make such an event readily available to a larger audience on the Web. In this instance, new issues such as content and participation controls, bandwidth management and so forth, enter the picture.

Video documentaries for all events in this series are available for viewing at: [HYPERLINK "http://www.marsville.tv"](http://www.marsville.tv)
[phttp://www.marsville.tv](http://www.marsville.tv)

Acknowledgements

With special thanks to Sara Diamond, Tom Montvila and Shannon Mcdonnell of the Banff Centre, Peter Homulos, Deputy Minister of the Department of Canadian Heritage and Dr. Martin Brooks of the NRC. Also all of my daring, inventive students.

Notes and References

1. I use the term "videoconference," which typically describes a point-to-point business application, for convenience only.
2. Michael Benedikt, in **Cyberspace: First Steps** (Cambridge, MA: MIT Press, 1991) p. 126
3. This includes that which is enabled by technological intervention.
4. ISDN supports data transfer rates of 64 Kbps, or the equivalent of a phone line.
5. H.323 offers IP conferencing rates up to 1.5 Mbps.
6. John Cage, **Silence** (Middletown, CT: Wesleyan Univ. Press, 1961) p. 57.
7. CA*net4 is Canada's national optical Internet, devoted to research of advanced broadband applications. See [HYPERLINK http://www.canet3.net](http://www.canet3.net)) [µhttp://www.canarie.ca](http://www.canarie.ca)\$.
8. GigaPOP means gigabit Point of Presence and is a network access point that supports data transfer rates of at least one gigabyte per second (Gbps). Only a few gigaPOPs currently exist.
9. John Cage, **A Year from Monday** (Middletown, CT: Wesleyan, 1963) p. 89.
10. See Marcos Novak, **Cyberspace: First Steps** (see [2]), p. 226.

ABOUT THE AUTHOR

Michael Bussière is a multimedia artist specializing in computer music. He has been making computer music and multimedia since the mid 1980s, when he shared the stage of the Toronto's Dumaurier Theatre Centre with Australian performance artist Stelarc. A graduate of the University of Toronto and the State University of New York, Bussière received two national gold prizes in 1987 from CAPAC.

Bussière's works have been commissioned and presented by such venues as the Summit of the Americas, Boston's School of the Museum of Fine Arts, Chicago's Ravinia Festival, Bourges

(France) Festival, Video Roma, The Banff Festival of the Arts, Music Toronto, the Dumaurier Theatre Centre and the Canada Dance Festival, as well as being broadcast nationwide on CBC Stereo and Radio-Canada.

In recent years, Bussière has turned his attention to the development of interactive installations that expand current notions of computer music as a performance form. One such work is the VIP, a highly popular, interactive computer music sculpture commissioned for the Festival Plaza in front of Ottawa City Hall.

Bussière directs Carleton University's Diploma in Sonic Design, where he is an adjunct professor to the music program and the School of Architecture's Immersive Media Studies graduate program. He recently founded Sonic Design Interactive Inc. to conduct experiments in interactive art and to investigate the creative possibilities of performance-based broadband content.

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The Gallbladder Sonata: Transmission Time on the Internet

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The Gallbladder Sonata is an improvisation combining sound, narrative text, Internet and live performance. The uncontrollable speed of internet transmission is a second-by-second co-determinant of the tempo of the piece. The traditional order of musical events - namely composition, then performance, then transmission - here becomes one single event. What is performed is the act of composition and the order in which the improvised responses are uploaded and displayed depends on the eddying currents of transmission time on the Internet. The new medium - of composition and performance, not merely of distribution [1] - raises questions about the aesthetic apprehension of time. Music is par excellence the art of time and the new medium of the Internet has something to teach us about our experience of time itself.

The first version of *The Gallbladder Sonata*, performed in 1998 [2], began with free-flowing time - and gall - which, in a crisis, was blocked. An ultrasound interlude (which is inaudible) followed this section and then, surgery. A five-part drip motif in uncertain time, a significant technical failure and an interactive free-for-all waltz brought *Gallbladder One* to its bilious conclusion.

In fact, the first version of *The Gallbladder Sonata* was a strictly textual online performance, where the logged-in audience heard no sound whatsoever, making it the most radical of the three performances to date. It stressed the temporal rather than the acoustic dimension of music as part of my ongoing inquiry, "What is music without sound?" - a question especially meaningful to me, in that I was born hard of hearing [3]. A second work in this series is *Stay (Tuned)*, a silent aria employing elements of American Sign Language and intense

listening, which I performed as part of Ione and Pauline Oliveros' *Lunar Opera: Listening For Tunes* at Lincoln Center in 2000. These two works were performed together in Munich in 2000 [4] and in Mainz in 2001 [5] .

Sonata as Text

As at a classical concert, the main performer of *The Gallbladder Sonata* was seated in front of the audience before an instrument. The performer's costume, which looked like crumpled paper along with a mask made of manuscript fragments, stressed the important role of text. In the performance, the text is projected in large format and is produced not only by the performer on stage, but by several other online performers, who were logged on at physical locations ranging from California to Germany. (Photo and audio documentation of the performances can be seen and heard at: <http://lea.mit.edu>)

The narrative text called into being a strange and abstract concert hall in which characters, such as "Stage.Hand," and conceptual entities, such as "sound" (later morphed to "ultrasound"), dragged around furniture and handed out programs to the late arrivals, "John.Cage" and "Beethoven.de." Direct address to the audience included them in the imaginary stage setup, which functioned like a prologue that was an integral part of the performance. Within this text, a character named "Stay (Tuned)" sat down at a minutely-described imaginary piano to perform the sonata within the sonata [6] .

The Computer as a Keyboard Instrument

On the physical stage, too, "Stay (Tuned)," played by myself, sat at a computer as one would at a concert piano, ready to produce the auditory component to *The Gallbladder Sonata*. The acoustic dimension of the performance was created in the concert space by the monumentally amplified sound of the main performer's typing. A microphone lay close to the keyboard and the sound of composition was carried over loudspeakers. One heard Stay typing, at different speeds and with different levels of passion. The sound is thus the sound of the keys themselves.

Usually, depressing the keys is understood strictly as the means to an end. In a piano concert, for example, the keys are struck as a means to activate the piano strings. The barely audible sound of the keys themselves is hardly perceived; it is beside the point. In *The Gallbladder Sonata*, this sound is not a means but an end: the keyboard itself is the instrument. The percussion produces sound - and also lyrics.

Concert Out of Synchrony

During this performance, the unpredictable rate of delay in transmission on the Internet resulted in discordant timing of the visual and auditory levels of the performance. That is, one saw and heard the performer, Stay, enter data, which appeared on the screen only after an unpredictable, usually brief, delay. This décalage made attending *The Gallbladder Sonata* unlike going to traditional concerts, whose visual and auditory dimensions are so well integrated that we never even think about it: the pianist hits a key and we immediately hear that note. The disruption of synchronicity in this case exposes our voyeuristic expectations of concert performance: we want to see the performer make the music. In *The Gallbladder Sonata*, however, several different tempi were in force. What one heard

in the performance space, saw onstage and read on the screen happened in different time frames. It bears note that not even the amplified sounds of typing corresponded one-to-one with the letters that appeared on the projection screen, because only one performer's keystrokes - Stay's, onstage - were audible.

With the displacements occasioned by such a mode of composition, performance and transmission sometimes segue into frank failure. Things can get too complicated or take too long. At the extreme, transmission speed on the Internet can grind to a complete halt and lag becomes a computer crash. This too was incorporated improvisationally into the sonata. Such complexities of form were echoed in the content, as the improvised text referred increasingly often to failure. The transmission thus fed back into the composition.

Comic relief was provided by the words of a mnemonic device whose text and tune were meant to recall the sound of another problematic work, abandoned by its composer. The inane lyrics are meant to help schoolchildren prepare for tests in which they are asked to identify music and are sung to the melody of the subsidiary theme of the first movement of *Symphony no.8, B minor*, by Franz Schubert:

"This is the sym-pho-ny
That Schubert wrote
And never fin-ished" [7].

As poets and musicians have long known, sometimes it just doesn't work out.

Why do this? Why play with time, and let the time of transmission play with us? Perhaps *The Gallbladder Sonata* serves as a form of "fort-da" exercise, as Freud analyzes it in *Beyond the Pleasure Principle* [8]. The structure of the fort-da performances is similar to Freud's great insight into the death instincts: not only that we are drawn to death, but that we vacillate between the great poles of the sexual and death instincts [9].

The artistic exercise of submitting to the uncontrollability of transmission time on the Internet invites us to rehearse our desire and fear of the most significant thing about our subjection to time and the most radical form of failure: death. Time, failure and death: playing, in all seriousness, with poetry and music, sight and sound, the performance of *The Gallbladder Sonata* is a musical rehearsal for the ultimate experience in time that we fail to control: we do not know the hour of our death.

Transmission as Feedback

Three short audio files, recorded at the Munich performance of *The Gallbladder Sonata*, are posted at [HYPERLINK "http://lea.mit.edu"](http://lea.mit.edu) `phhttp://lea.mit.edu$`. In the first audio clip, one hears Stay compose a scene involving three characters: Stay, the Ghost.of.Stay's.Mother and the Ghost.of.Stay's.Mother's.Mother. The ghosts enact, at a characterological level, the effect of an echo at an auditory level: as can be seen in their names, the characters echo through three generations, much as an acoustic echo repeats a sound wave over time. Stay asks the ghosts if they remember a "patty-cake" song, through which children learn to keep time by clapping. It is a song from around 1900, when Kaiser Wilhelm had

a railway constructed from Berlin to Beijing. The railway turned out to have a surprising feedback mechanism, in that it not only transmitted German-ness to China:

"Es war ein' chinesische Eisenbahn
Da sass ein chinesischer Mann."

"(There was a Chinese railway.
There sat a Chinese man.)"

In the clip, one hears me type the text, pause to sing it silently to myself and clap three times at the end of each line, at the projected words "Eisenbahn" or "Mann." This is another instance in which the transmission feeds back into the composition and performance. The audience hears the words being typed, then with some delay sees the words on the projection screen, then hears the lyrics replayed as clapping.

In the second and third audio clips, the playing is loud, fast and passionate. The sound of banging on the keys is a sensory correlate of the intensity of thought in the process of composition. At one point, I type a long, empty space in the projected text. While the screen displays a long blank, the auditory level of the performance is, on the contrary, particularly intense: one hears the rapid jangling of the space bar on the keyboard. Like the auditory pauses in the first clip, the visual blanks here mark the gestures of composition. The clip ends in another instance of the three beats, which reminds us of the lesson of the Chinese railway song: lyrics and sound are separable and sometimes the feedback is not what you expected.

With regard to the clips, my point again is that what one would normally regard as an artifact of keyboard performance, namely the sound of depressing the keys, is here elevated to the status of music. The variety of sound effects that can be created is greater than one might think, and these correspond to different mental activities, including pausing to reflect or singing to oneself. The sound is related in various and complex ways to the production of the visualized lyrics. The computer is a keyboard instrument, and the sound of *The Gallbladder Sonata* is the sound of thinking.

Shhhhh--It's Music

The key comic element in the first performance of *The Gallbladder Sonata* was a technical failure on the New York-based internet art show, *Here's Pangloss!* When it came time for me to play the strictly textual piano, Pangloss invoked the so-called "gag" command to silence the audience and clear the screen for the sonata (the gag command suppresses the display of any lines typed in by a player or group of players so gagged). Unfortunately, instead of gagging the audience, Pangloss gagged me. Every time I uploaded a line of the sonata, the screen displayed the bounceback message: ".....Shhhhh....."

We continued to read the perplexed comments of the still-ungagged online audience members, wondering what kind of musical performance this could be, consisting of the repeated instruction, "shhhhh" - "be quiet." In the ensuing pandemonium, Pangloss offered me the chance to replay the sonata. However, I accepted the failure as art, and replied in the words of Keats, that: "Heard melodies are sweet, But those unheard are sweeter"
[10] .

I hung around online after the show, chatting despondently with another artist. "Do you have any idea," I asked, "how long I worked on the unperformed sonata?" She nodded. "It's always like this," she said. "Horrible. Every single week, a disaster." It had been her turn the week before. "The real question," she said, "is: Why do we even agree to be on the *Here's Pangloss!* show?"

We considered this silently for a long time. In a sense, the second and third versions of *The Gallbladder Sonata* are my response to this question; why, time and time again, we are drawn to fail. Maybe the sonata should be retitled *The Death Instinct*.

Time is a River - But Not the One You Thought

In earlier, happier times - at least, the fairy-tale version of them - a composer might have sat down and said, "Alright, I will now compose a work in three-quarter time." Later, at each performance, the conductor would raise a baton and every musician would keep the beat. *The Gallbladder Sonata* tries to loosen our grip by playing with irregular, uncontrollable and very contemporary modalities of time. Transmission time on the Internet affords performers an unprecedented opportunity to work with one such contemporary form of time, namely time zones; both those defined by distance from the Greenwich Meridian and those that arise of themselves. Working with performers spread over several time zones poses practical difficulties, but yields the highest probability of generating the peculiar nature of time as it is formulated in traffic patterns on the Net.

The main characters in the third performance of *The Gallbladder Sonata* were logged on in Irvine, California; Austin, Texas; Atlanta, Georgia and Mainz, Germany. Our data input traveled to the server of the Post Modern Culture MOO at the Institute for Advanced Technology in the Humanities at the University of Virginia. That server then relayed the developing series of lines back to all concerned, including the live audience.

A lot can happen in the meantime. Most importantly, the various events do not affect each of us in the same way. It would be incorrect to think that the Internet, as a whole, is running either quickly or slowly. For instance, lag - waiting time - may set in in one part of the Internet and not affect another. A particular server may have hardware problems. A router serving an entire region may slow down due to overload. If Texas were busy, the character "sound's" lines may have had to wait longer at times than mine, though sound and the IATH server were on the same side of the Atlantic, while I was in Germany, six time zones away. And of course, there are those rare times when everything runs splendidly.

The old metaphor that time is a river still holds true - but it is not the river we thought we knew, a river that flows smoothly forward and never back. Time flows more like a burbling stream that falls rapidly in cascades, swirls back on itself, stagnates in pools, leaps up when it hits rocks and yes, sometimes flows smoothly on. To account for this kind of irregular movement in flowing water, mathematicians have developed chaos theory. *The Gallbladder Sonata* too works with complex forms of time: time that can be local, or fractal, or something we were not expecting at all. Artists, as well as scientists, must exercise our imaginations in such new ways of thinking. Musicians and

music theorists are well positioned to work with and reflect on the burbling time of the Internet.

My Time is Up

While such thinking, and such music, may seem new and strange, I believe that in fact they accord very closely with the way people experience time, and not only on the Internet. Our experience of time can be a factor of attention: time flies when we are listening intently and crawls when we are bored. Our sense of time is affected by emotion: time flies when we are joyous and crawls late at night in the hospital.

Perhaps the most significant aspect of time for us mortals is that, as in **The Gallbladder Sonata**, we are at its mercy. **The Gallbladder Sonata** interacts with two great poetic moments in the history of, as it were, "stay-tunes": poetry that speaks to our urge to capture time. Fragments of these intertexts appear scattered in the improvised text of **The Gallbladder Sonata**, quoted increasingly frequently and fully by the performers, and gathering force toward the conclusion, as our time comes to an end. The first intertext is from Goethe's **Faust**. In this scene, Faust strikes a pact with Mephistopheles, agreeing that at the moment Faust begs time to stop, his soul will be forfeit:

"Shake on it! Done!
And should I ever say,
Stay! You're beautiful,
You moment, you!
Then lock me up.
I'll go down glad.
The death bell knolls.
Your job done,
The clock may stop, the hands fall.
My time is up" [11].

The second intertext is from "Ode on a Grecian Urn," Keats' great apostrophe to a moment frozen in time, where the figures pursuing are always striving after and never reaching the figures who flee, round and round on the urn:

"Heard melodies are sweet, but those unheard
Are sweeter; therefore, ye soft pipes, play on;
Not to the sensual ear, but, more endear'd,
Pipe to the spirit ditties of no tone. . ." [12].

Is there music without sound? The artifactual sound and discordant visual dimension of **The Gallbladder Sonata** attempt to "pipe to the spirit" and create music that works with our problematic, contemporary sense of time. The new medium of the Internet offers us an indeterminate, uncontrollable tempo in which to explore new forms of interplay among composition, performance and transmission.

NOTES AND REFERENCES

1. Throughout this essay, "transmission" is understood to be the equivalent of "distribution" for the internet-based version of a work like **The Gallbladder Sonata**. While some audience members were gathered in a performance space, others were online, receiving the transmission and, at points, also

contributing to it.

2. *The Gallbladder Sonata* premiered in 1998 on the internet show, *Here's Pangloss!* (Heather Wagner, host, New York). Pangloss invited digital artists to talk about and/or perform their work. The text of *Gallbladder One* is posted at:
<http://www.marlenacorcoran.com/gallbladder/index.html>.

3. Rhythm, especially the interplay of sound and silence, is one important element of music as time-shaping; repetition is another. The dissonance between sound and text in the performance reflects the *décalage*, for me, between noise and meaning. The acoustic dimension of *The Gallbladder Sonata* is percussive and related to touch; the feel as well as the sound of my fingers playing draws me to work with a keyboard instrument. I would like to thank Mary Johnson, editor of *Ragged Edge: The Disability Experience in America* (<http://www.raggededgemagazine.com>) for featuring the Munich performance on the cover of the online edition of *Ragged Edge*.

4. *Stay (Tuned)*, including *The Gallbladder Sonata*, was performed online/offline at the Maximiliansforum, Munich, Germany, in 2000, presented by the Mathias Kampl Gallery. For their help with the live event, my thanks go to Mathias Kampl, Detlef Hartung and Christian Ziegler. The online cast included myself, Antoinette LaFarge and Laurent Oget. Laurent Oget also programmed the online theater we used for both *Gallbladder Two* and *Gallbladder Three*, below.

5. *Stay (Tuned)*, including *The Gallbladder Sonata*, was performed online/offline a third time at the Mainz intermediale, *Art Happens!*, which ran parallel to the Performance Studies International 7 conference in Mainz, Germany, in 2001. For their help with the live event, I am very grateful to Ute Ritschel and Christian Ziegler. The online cast included myself, Kari Banta, Antoinette LaFarge and Laurent Oget.

6. In one movement, the characters "Stay (Tuned)" and "sound" played together. Far from being passively determined by the wishes of the composer/performer Stay, sound had its own ideas about the sonata. The movement thus dramatized a struggle between the composer and the music.

7. I do not know who created the mnemonic device, though I remember my mother singing it tunelessly.

8. This refers to Freud's description of a small boy's "disturbing habit" of repeatedly throwing away small objects and then gathering them. Freud understands this once he sees the boy playing a game in which he makes a bobbin on a string disappear and return, while exclaiming a childish version of the German words "fort" ("gone") and "da" ("there"). The games are related to the absence and reappearance of the child's mother and the interplay of the child's instincts for renunciation and for satisfaction. This is discussed in Sigmund Freud, *Standard Edition of the Complete Works of Sigmund Freud*, translated from the German under the general editorship of James Strachey in collaboration with Anna Freud, vol. 18 (London: Hogarth Press, 1955) pp. 14-16. The passage can be found on the Internet at: <http://www.fortda.org/origin.html>. The relation between the fort-da game and Lacan's mirror stage is discussed at: <http://www.barbery.net/psy/fiches/fort-da-miroir.htm>

9. Freud discusses the death instincts in [8], pp. 38-64.

10. John Keats, "Ode on a Grecian Urn," lines 11-12, in *The Poems of John Keats*, ed. Jack Stillinger (Cambridge, MA: Harvard Univ. Press, 1978) p. 372.

11. This is my translation of the text that is cited in the original German in *The Gallbladder Sonata*, namely lines 1698-1706 from the study room scene in *Faust*, Part One. This translation suits *The Gallbladder Sonata* in that it is staccato. It has an effect on contemporary English not unlike that which Goethe's language had on the German of his time. For example, the phrase - perhaps the most famous in all of German poetry - "Verweile doch" - is deliberately, audaciously, and accurately translated by the name of the main performer of *The Gallbladder Sonata*: "Stay." For a modern edition of *Faust*, see: Johann Wolfgang von Goethe, *Werke, Kommentare und Register*, vol. 3, ed. Erich Trunz (Hamburg: Christian Wegner Verlag, 1972) p. 57.

12. see [10] .

ABOUT THE AUTHOR

Marlena Corcoran's most recent acoustic work was *Turp Girl*, a series of narratives on Berlin radio (2003). Her internet play, *The Birth of the Christ Child: A Divine Comedy*, was published in *PAJ: A Journal of Performance and Art* (2003). Her video, *Agnus Dei: Lamb of God Laundromat*, was shown twice in England (in 2001 and 2003) and at the Kassel Documentary Film and Video Festival (2002). *The Gallbladder Sonata* premiered online in 1997 and was performed for live audiences in Munich (2000) and Mainz, Germany (2001). She performed her silent aria, "stay (tuned)," in the *Lunar Opera*, by Ione and Pauline Oliveros, at Lincoln Center in 2000. She frequently performs with the online improvisational theater group, The Plaintext Players (Venice Biennale 1997, documenta X and many other venues).

Corcoran's articles on new media theory have appeared in *Leonardo* and other journals in the U.S. and Europe. She is writing a book on the role of time in digital media. Links to many of her publications and projects can be found at: <http://www.marlenacorcoran.com>.

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Mediating (through) Imagination: Web-based Sound Art

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Introduction: The Telharmonic Browser

The web browser functions as an imaginative cultural interface that intertwines various strands of media. The browser

remediates the readable surface of the printed page, radio, television, digital cinema, video games and more into a singular navigational device. Contextualized by the iconic conventions of the desktop-themed workspace, the browser participates in a general environment of datashare, in which digital utilities as divergent in function as word processors and granular synthesizers form hybrid technologies. Even without resorting to data-bending contortions, the acts of content-gathering and sampling, composition, performance, publication, transmission and distribution have increasingly complex ways to share information and modify each other's output. In the set of multimedia pieces that I will introduce here, the acts of writing and reading become digital audio performances that extend the theoretical practice of the literary critic into the domains of information access, retrieval and reproduction. In these works, the web browser acts as a literary transmitting device that invites participation from the receiver at several different levels. I will also discuss recent live performances and webcasts that incorporate the web browser into my own audio composition practices. Browser buttons, the layered windows of the graphic user interface, assemblages of plug-ins, embedded or downloadable sound files and media playback devices fuel aleatory improvisations and experimental DJ sets.

I am interested in the degree to which the browser serves as an analogy for the creative imagination, and how we imagine the world into being through juxtapositions of multiple sensory inputs. My work constructs an imaginary browser, a device in imagination that first broadcasts the world to us across channels of sensory experience and then provides us access to lucid participation in the flow of this transmission.

I measure the charge generated within the browser's zone of blurred media and their content in terms of its "telharmonics." This term, while embedding this work with an important historical layer, serves as shorthand for a poetics of digital convergence as networked telephony technologies mix with the forms and phases of musical activity in order to generate new modes of transmission and reception in shared imaginative space. Historically, I have in mind the Telharmonium, invented by Thaddeus Cahill in the early twentieth century [1]. In various models of the Telharmonium, two or three velocity-sensitive keyboards were attached to a massive array of sine-wave rotors. The device transmitted orchestral tones from a generator in the basement of Cahill's New York Electric Music Company over phone cables to various hotels, restaurants and private homes. Cahill's subscription music service anticipated both Muzak and Internet radio services, but immobility and inadequate bandwidth finally ruined him - his sound-generating dynamo weighed almost 200 tons, proving exceedingly difficult to move, and the signal corrupted reception on parallel phone lines. Cahill went bankrupt before the twentieth century was a decade old.

I retrieve the "telharmonic" principle as a way to describe a more recent convergence, along the lines of Cahill's intermingling of electric music performance with telephonic broadcast. Lisa Gitelman's analysis of emerging technologies in the Edison era points to the creative significance of those historical episodes in which all new media, in failure or success, in rejection or in erratic, faddish appropriation,

inspire conflicted cultural moments of self-consciousness about the making of meaning [2] . New media *as* new media all inspire a flicker in which the textual and other operational characteristics of old media seem particularly illuminated and, at the same time, decentered and decentering with regard to perception, authorship, reading and the like.

I believe that the convergence of prior media into new forms during a time of technological hybridization provides a precarious opportunity, at once clarifying and destabilizing. This is the opportunity to examine, and potentially direct, the embodiment of experience in imaginative cultural forms - the forms that provide our experiences with meaning and value. My work takes advantage of just such a highly energetic episode of Internet history in an effort to participate more deeply in the ongoing process of building our collective culture through the exchange of imaginative forms. In so doing, my work situates the web browser as a site of renewed telharmonic activity that cancels some of the major drawbacks of Cahill's Telharmonium by aligning with portable, decentralized and multilateral technologies.

Critmixers and Soundtexts

Electronic literature on the Web has only lately come to explore the possibilities of digital sound art and webcasting. Alt-X Audio is the first site that I can think of [3] . Their premiere webcast streamed from the now-defunct servers of GoGaGa Radio (Boulder, CO) in 1997. Largely the affair of Alt-X Director Mark Amerika and Erik Belgum, a writer of "ambient literature," the show promoted itself as "Streaming Word-Dub. Binary Dissonance. Situational Performance. Net.Radio [4] ." "Net.Radio" was still fresh enough to seem more a part of cyberprose than the vernacular. Most of the early literary webcasts I recall were heavy with recognizable spoken-word, but later experiments became increasingly processed and indecipherable, as complicated digital editing technologies worked their way into even modest home studios. In terms of sonic parallels, I am tempted to trace a 6-year lineage from the domains of Laurie Anderson into the granular microsound poetics of Scanner and Kim Cascone, but this lies beyond the scope of the present article.

For several years, literary internet radio art mostly bypassed the browser in favor of plug-ins (programs that function independently of the web browser), particularly stand-alone media players like Real Player, which copied the typical radio console for its interface and turned the home computer into a tuner scanning on a global scale. The more the listener could run the radio application in the background and continue routine work or net-surfing, the better. Recent innovations in the field of Web-based audio delivery are blessed by fatter bandwidths and more sophisticated platforms for embedding sound within open browser windows. More importantly, software such as Macromedia's Director and Flash can run scripts that deepen the usual "click'n' scroll" browser experience into complex interactions, so we now find such sound-heavy works of literature as the "Filmtext" project (2002) of Mark Amerika, Chad Mossholder (Twine) and John Vega [5] , as well as August Highland's "Alphanumeric Lab Series" (2003) [6] . These are largely opaque hypermedia works that construct narrative through ambience or evoke poetic resonance by means of driving, fragmented beats. More subtle in delivery but compelling in conception and content

are Glenn Bach's drifting, sonified poems [7] . Bach explores composition in terms of data-sharing, so that blur across file formats corresponds to a similar synaesthetic mingling of sensory domains.

My own literary sound work began in 2000, from the assumption that literary critics must also explore the performative dimensions of networked sound environments - especially as a way to comment on networked sound environments. Central to three of my web-based multimedia projects, spanning the past three years, is a desire to refigure literary actions (writing, publication and reading) in terms of digital audio's media and strategies for sample-based composition and remixing, networked performance and webcasting.

: critmixers

Litmixer: The Literary Remediator appeared in November 2001 in the "music/sound/noise" issue of the *Electronic Book Review*, edited by Mark Amerika, Joseph Tabbi and Cary Wolfe [8] . *Litmixer* applies the tools and strategies of the DJ to the performance of literary interpretation and critical speculation. The project consists of two pieces: an interactive multimedia application for the Web and an accompanying critical discussion, housed in the format of a user's manual. The multimedia component of *Litmixer* is what I call a "groove-book," an imaginary technical hybrid between a Roland Groovebox and a book. The literary sampler comes with 14 banks of spoken word samples, plus additional banks of glitchy beat patterns and ambient backdrops. *Litmixer* allows the user to remix my own reading of passages from Jacques Derrida's 1968 article, "Plato's Pharmacy" [9] . The user's manual that accompanies the *Litmixer* features my fairly straightforward critical article, "The Literary Remediator," which draws attention to itself as an experience of mixed quotations, remastered theories and speculative tracks.

The treatment of Derrida's work on Plato holds the two elements of the project together, particularly with three main resonances: first, I was attracted to Derrida's emphasis that hearing something incorrectly is still productive of meaning. Second, the work actually progresses by a series of literary echoes, reverberations and overtones, which cause the ear to hear incorrectly. Finally, Derrida provocatively constructs a model of imagination that provides a technological corollary to the transcendental imagination of metaphysics. The pages of "Plato's Pharmacy" spin multiple nuances of the single word "pharmakon" into a complex sonic mesh. The mix functions as the medium *and* activity of imagination, "the medium in which opposites are opposed, the movement and the play that links them among themselves, reverses them or makes one side cross over into the other [10] ." Reading this passage, I was struck by its suggestion of the DJ's mixing desk, with its channel-level sliders and cross faders, and the stack of sources waiting to be dropped into the on-flowing mix. Derrida was "spinning" Plato.

Thinking of Derrida's work as a "remix" of Plato's *Timaeus* prompted my creation of a device that could transmit a critical reading of the Derrida article through a DJ-inspired medium, a "critical mixer," or "critmixer" for short. As a mode of theoretical writing, the literary mixer operates in the real time of the performative act of re(ad)-writing. The "critical gloss" function of traditional literary theory thus turns to digital signal processing as a means of generating new readings

of a primary text. Distributed over the performative platform of the web browser, *Litmixer* also offers a model of publishing critical theory geared more toward an audience familiar with browser-based soundtoys and VST plug-ins than traditional academic channels.

: soundtexts

My two more recent multimedia projects move away from browser-based interactives to explore the literary, critical potential of databending, particularly text-to-audio conversion. I created *Machinery for Dreaming* for the Palimpsest Project, an ongoing "remix" exhibit at John Kannenberg's Stasis_Space gallery, which launched 30 September, 2002 [11]. This work in multiple media was followed in the summer of 2003 by another Stasis_Space contribution, *Eliot's Magic Lantern,* for The Audible Still-Life [12]. In these projects, I construct "soundtexts" by using data derived from .txt (text) files to generate various layers of MIDI events. The main audio pieces of each project derive from the writings of Thomas De Quincey, *Confessions of an English Opium Eater* (1821) and *Suspiria de Profundis* (1845). In some cases I would work from large chunks of unaltered text, while in others I used Esoteric Sensationalism's Cut'N' Mix program [13] - a four-channel .txt mixer that parses out Burroughsian cut-ups - to remix shorter vignettes. I then processed the batch of .txt files in various sets to generate raw MIDI data based on numerical information from the documents. Recurrence of key words corresponded to note messages, including start time, duration and pitch, while total word count and the number of sentences and paragraphs determined velocity values and continuous control settings.

In each case, information from the longest, unaltered sections of the De Quincey documents was used to compose primary scores for the completed pieces, which were performed through a bank of software synthesizers. The shorter cut-ups were used exclusively to create continuous control values for audio effects such as aftertouch, sustain, pitch bend and modulation of parameters, which changed according to a given synthesizer. This MIDI data was also used to automate control over reverb and delay plug-ins applied to the combined output of the layered synthesizer tracks.

In both cases, the finished soundtext projects are a proliferation of multiple file types. In the Stasis_Space exhibit, *Eliot's Magic Lantern* includes a digital photograph of a posed still-life with books and a field recording of the home library that also contributed source material to the finished audio piece. Taken as a set, each element presents an experience of information in terms of multiple objects related along microlines of influence and relation, usually in occulted fashion. *Machinery for Dreaming* includes the entire audio piece for streaming or download, as well as a set of the cut-up .txt files generated out of De Quincey's *Opium Eater* and a few of the MIDI files generated from the text.

The first round of entries in The Palimpsest Project are meant to provide opportunities for other artists to build layers of their own material from these sources, thus adding new layers to the palimpsest. The multiple file types therefore expand avenues into the ongoing exhibit, which situates the delivery of content as an opportunity for gallery visitors to become producers and distributors in their own right.

Ongoing explorations of literary databending include an

upcoming release on No Type's Sine Fiction sub-label, an ongoing thematic project in which various artists compose soundtracks to classic science-fiction novels. One of my projects, Galactus Zeit, will contribute a soundtrack to Philip K. Dick's novel, *Radio Free Albemuth*, largely based on data-conversion scores and thus continuing my fascination with the intersecting literary and sonic forms of composition as well as with imagination as a form of broadcast technology [14] .

Performances and Webcasts

One cannot have control "over" that of which one is part, or even formulate it completely - one can only participate more deeply in it.

-- Ronald Sukenick [15]

In recent performances at Denver's Museum of Contemporary Art and the University of Denver, I have worked with the browser as a tool for spontaneous composition. Under the project names of Galactus Zeit and pharmakon.t (DJ Webspinna), I have used Internet search engines, multiple browser instances, embedded audio files, links for direct file download and assemblages of plug-ins and playback devices as the key components of live aleatory pieces and DJ sets. I have also brought these approaches to experimental webcasts.

: The Internet Download Sound of Galactus Zeit

In my Galactus Zeit performances, the Web browser's search engine becomes a generative tool for sound work, inspired by John Cage's *Imaginary Landscape No. 4.* Based on the theme of a particular event, keywords and file types are arranged in various combinations and fed into a search engine. This search yields web pages that contain embedded or linked audio files. Unpreviewed audio content is then downloaded throughout the performance and fed directly into software samplers with granular "slice'n'loop" sequencers. The resulting live set consists of improvised sequences of abstract sonic textures, cascading sheets of noise, minimal melodic phrases and short slices of recognizable spoken word. At Tyler Potts' Evening of Chance Operations, held at the University of Denver in Spring 2002 [16], search phrases such as "audio chance evening" and "chance operations .wav" brought up web pages with sound files ranging from an ambient field recording entitled "rainforest evening" to a news clip in which Bob Dole described his chances of surviving an open-heart operation. Audience members interacting with computers projected throughout the concert hall suggested additional search combinations. I soon had a folder of more than 50 files for sampler processing. In this case, the browser's text-based search engine establishes an interface between the Internet as a file distribution resource and compositional device.

: Radio Pharmakopolis

The Radio Pharmakopolis webcast streamed from the Digital Media studios at the University of Denver on 10 September, 2002, as part of the OpenAir Radiotopia at the Ars Electronica 2002 Festival [17]. For this event, I collaborated with fellow browser-based DJ em.chia (Matthew Chiabotti) [18]. Our two-hour set sampled and re-processed several other live Radiotopia streams; audio files made available through OpenAir's "Input" database and "Transformation" mixer; and a variety of other

webcasts and pages with embedded audio files. We also remixed our own stream to generate digital delays and feedback loops. In keeping with the Open Air project's emphasis on multilingual content, our performance drew heavily on online newscasts, sermons, lectures, talk shows and interviews. Throughout the performance, I worked on a computer with granular synthesizers to reprocess both downloaded files and incoming streams. I sent this mix out as its own stream, which em.chia then incorporated into his own browser-based webmix.

The collaborative elements of the OpenAir Radiotopia were many. We witnessed multiple layers of global webcast, broadcast and remixes of signals both streamed over the Net and played over live P.A. in Linz, Austria. The close loops of webcasters reworking each other's live streams points contemporary webcasting to the telharmonic model as well as back to the origins of early radio, when operators resisted the idea that broadcast might become a unilateral mode of passive entertainment, rather than something that people did with each other, a mode of conversation [19]. Since the Radiotopia event offered a global festival of re-processed files and streams, participating through the Radio Pharmakopolis performance was a natural stage in the development of my own recent works and live sets using the web browser as a source for imaginative revitalization of our connections to the world and others.

: pharmakon.t (DJ webspinna) and PBS

I have several current projects that continue to explore the possibilities of the webmix as applied to live performances and webcasts. Under the moniker of pharmakon.t (DJ webspinna), I am part of the DJ Rabbi collective, a performance group creating various digital remixes of important texts defining political, religious and media cultures [20]. Pharmakon.t performed at the A:D:A:P:T Festival of digital media, held at Denver's Museum of Contemporary Art on 15 May, 2003 [21]. Here, I worked entirely from multiple streams and embedded MP3 files submitted for inclusion in an online compilation related to the festival. I have also released several webmixes at the djrabbi.com site, and recently scored the audio for a digital remix of Guy Debord's *Society of the Spectacle*, largely based on .txt-to-MIDI conversions of Debord's text. I have also formed the Bureau of Pharmakogeographical Surveying, a division of Randall Packer's U.S. Department of Art and Technology [22]. PBS, the broadcasting wing of this bureau, provides a web-content corollary to Packer and Wesley Smith's Media Deconstruction Kit, which remixes and processes live commercial news broadcasting in concurrent, alternate streams. PBS launched its first webcast on 1 October, 2003, as part of the Open Air: Open Radio event in Barcelona. A channel of Randall Packer's "Department Works, Mixologies, and Transformations" exhibit (22 August - 6 October, 2003), the PBS project brings my interest in databending to visual content as well, with reprocessed screengrabs of text and imagery from the Web forming the basis of streaming video mixes.

As used in my live performances, the web browser becomes an improvisational vehicle for deepening imaginative engagement with a world characterized in terms of information access and bandwidth speeds. It does so by playing with the presence of spontaneous microstructures, meaningful designs and new threads forming within the massive weave of data-trails throughout the Internet. Reconsidering the processes of audio composition and distribution in terms of the browser function, I attempt to

sustain a connection to the outside world through an imaginative form, distributed in point of origin but drawn together through communication networks and filled with the raw creative charge generated by the transformation of information-clusters through sequences of unforeseen associations. I enact this process by looking to the web browser as a fairly transparent avenue into content and technique. This transparency reveals the process of composition as the ongoing exchange of multilateral transmissions between the mind and the shifting content on the screen.

Notes and References

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2. See Lisa Gitelman, **Scripts, Grooves, and Writing Machines: Representing Technology in the Edison Era** (Stanford, CA: University of Stanford Press, 1999) p. 16.

3. See <http://www.altx.com/audio>.

4. From the liner notes to Alt-X Audio #1 (1997).

5. See <http://www.markamerika.com/filmtext/>

6. See <http://www.alphanumericlabs.com>

7. See <http://www.csulb.edu/~gbach/>

8. See <http://www.electronicbookreview.com>

9. Jacques Derrida, in **Disseminations**, trans. Barbara Johnson (Chicago, IL: University of Chicago Press, 1981) p. 127.

10. See [9] p. 127.

11. See <http://www.stasisfield.com/space/present/palimpsest>

12. See <http://www.stasisfield.com/space/present/index.html>

13. Esoteric Sensationalism is a web site devoted to an exploration of techniques for experimental electronic composition in text and sound. Drawing on the traditions of William S. Burroughs' literary cut-ups and cassette tape "drop-ins," C.P. Bryant's program is a four-channel .txt-file mixer that parses out "cut-ups." I used this program to remix shorter vignettes out of longer texts. See <http://www.esoteric-sensationalism.com/>

14. See <http://www.notype.com>

15. Ronald Sukenick, **In Form: Digressions on the Act of Fiction** (Carbondale, IL: Southern Illinois University Press, 1985).

16. See <http://www.du.edu/~tpotts/chanceoperations.html>

17. See <http://alien.mur.at/radiotopia>

18. Em.chia's browser-based DJ mix, "metaxalogical mo(u)rning methods," is included in the Palimpsest Project exhibit (2002) at the Stasisfield site:

<http://www.stasisfield.com/space/present/index.html>

19. See L. Gitelman [2] p. 228.

20. See <http://www.djrabbi.com>

21. See <http://www.pharmakopolis.com/adapt>

22. See <http://www.usdat.us>

Works and Performances by trace reddell

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Radio Pharmakopolis, OpenAir Radiotopia, Ars Electronica 2002, <http://alien.mur.at/radiotopia>, 10 September, 2002.

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<http://www.markamerika.com/filmtext/>, 2002.

August Highland, *Alphanumeric Labs*,
<http://www.alphanumericlabs.com>
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Glenn Bach, <http://www.csulb.edu/~gbach>

about the author

Trace Reddell is an Assistant Professor of Digital Media Studies at the University of Denver, Colorado and the graduate director of the M.A. program in Digital Media Studies. Trace teaches courses in digital audio production, the critical theory and praxis of technoculture and digital research methodologies. He guides numerous graduate research projects and directs the DMS program's digital art/theory journal, *Perspective House*. Trace received a Ph.D. in English Literature from the University of Colorado, Boulder, in 1996. Since that time, he has sought to articulate a digital poetics taking shape at the intersection of multimedia production, networking technologies, media theory, literary criticism and the history of drug culture. Trace's works may be found at Electronic Book Review, Stasis_Space, DJ Rabbi.com and on several microsound.org compilations, The Communications of Tomorrow label, Open Air Radiotopia (Ars Electronica 2002), Platoniq's Open Radio Festival (Barcelona 2003) and the U.S. Department of Art and Technology's Tel-SPAN project. His publications include articles in *Leonardo Music Journal* and *Leonardo Electronic Almanac* and *Contemporary Music Review*. Trace edits an ongoing thread at *Electronic Book Review* (music/sound/noise) and produces shows for Alt-X Audio. He curates the monthly visualsoundings series of electronic music at Denver's Museum of Contemporary Art. He also founded Denver's first annual digital media festival, A:D:A:P:T, in Spring 2003. More may be found at Trace's website:
<http://www.du.edu/~treddell/>

article received 18 November, 2003

LEONARDO REVIEWS 2004.01

Leonardo Reviews opens the new year with a bumper crop of no less than 25 reviews, including the first by Eugene Thacker, our most recent addition to the panel. Eugene is Assistant Professor at Georgia Tech's School of Literature, Communication and Culture. He is also the author of *Biomedica* and part of the Biotech Hobbyist collective. We are also delighted to open the year with an addition to the *Leonardo Reviews* editorial team; Dene Grigar, already familiar to most of us as a very active reviewer, will be undertaking some editorial work, directing her

interns in preparing the texts prior to publication.

Obviously, with 25 substantial reviews to choose from, the task of featuring one or two for *Leonardo Electronic Almanac* becomes increasingly difficult and inevitably more subjective. Along with Roy Behrens' economical reports, this month we have a raft of new reviews by Mike Mosher and contributions from Chris Cobb, Dennis Dollens, Rob Harle and Stefaan van Ryssen. Highlighted here are four reviews of special interest: Pia Tikka's report on *The Trouble with Nature: Sex in Science and Popular Culture* identifies a growing criticism of genetic determinism that seems to have gained ground recently. This debate is given considerable depth with George Gessert's review article stimulated by *Enough*, by Bill McKibben. We are reminded of the relevance of these discussions to art and art historians in *The Edge of Surrealism*, reviewed here for us by Allan Graubard, and Robert Pepperell's discussion of Steve Grand's book, *Creation: Life and How to Make It*.

These and the rest of the month's offerings are at [HYPERLINK](http://www.leonardoreviews.org)
<http://www.leonardoreviews.org> [µwww.leonardoreviews.org](http://www.leonardoreviews.org)§.

Michael Punt
Editor-in-Chief
Leonardo Reviews

Leonardo reviews posted January 2004:

Absurd Summer, by Koji Asano
Reviewed by Stefaan Van Ryssen

Anecdotal Theory, by Jane Gallop
Reviewed by Stefaan Van Ryssen

Creation: Life and How to Make It, by Steve Grand
Reviewed by Robert Pepperell

A Culture of Fact: England, 1550-1720, by Barbara J. Shapiro
Reviewed by Michael Punt

Digital Creativity: A Reader, edited by Colin Beardon and Lone Malmborg
and
Digital Media Revisited, edited by Gunnar Liestol, Andrew Morrison and Terje Rasmussen
Reviewed by Michael R. (Mike) Mosher

The Edge of Surrealism: A Roger Caillois Reader, edited by Claudine Frank; translated by Claudine Frank and Camille Nash
Reviewed by Allan Graubard

The Eighth Day: The Transgenic Art of Eduardo Kac, edited by Sheilah Britton and Dan Collins
Reviewed by Michael R. (Mike) Mosher

Eloquent Images: Word and Image in the Age of New Media, edited by Mary E. Hocks and Michelle R. Kendrick
Reviewed by Dene Grigar

Els Altres Arquitectes (The Other Architects), Museu de Zoologia, Barcelona, Spain

Reviewed by Dennis Dollens

Enough, by Bill McKibben
Reviewed by George Gessert

Genetic Architectures / Arquitecturas genéticas, by Alberto T. Estévez et al.
Reviewed by Rob Harle

Hacker Culture, By Douglas Thomas
Reviewed by Eugene Thacker

In the Garden, CD by Yusef Lateef, Adam Rudolph, Go: Organic Orchestra
Reviewed by Michael R. (Mike) Mosher

Late Beethoven: Music, Thought, Imagination, by Maynard Solomon
Reviewed by Richard Kade

Masks of the Universe: Changing Ideas on the Nature of the Cosmos, by Edward Harrison
Reviewed by Rob Harle

Matters of Gravity: Special Effects and Supermen in the 20th Century, by Scott Bukatman
Reviewed by Michael R. (Mike) Mosher

The People's Music, Jon Rose
Reviewed by Michael R. (Mike) Mosher

Stalinist Values: The Cultural Norms of Soviet Modernity 1917-1941, by David L. Hoffman
Reviewed by Michael R. (Mike) Mosher

The Trouble with Nature: Sex in Science and Popular Culture, by Roger N. Lancaster
Reviewed by Pia Tikka

Undead Science: Science Studies and the Afterlife of Cold Fusion, by Bart Simon
Reviewed by Michael R. (Mike) Mosher

Vingt Chansons pour Jean Cocteau (Twenty Songs for Jean Cocteau), by Maurice Methot
Reviewed by Chris Cobb

The Trouble with Nature: Sex in Science and Popular Culture

By Roger N. Lancaster, University of California Press,
Berkeley, 2003. 442 pp., illustrated. Trade, \$55; paper £15.95.
ISBN: 0-520-20287-2; ISBN: 0-520-23620-3.

Reviewed by Pia Tikka, Researcher in University of Art and Design, Hämeentie 135 C, 00560 Helsinki, Finland.
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If there is any "trouble" with nature, it must be a cultural phenomenon, conceptualized by human beings only. In this vivid, sharp and fun-to-read study, anthropologist Roger Lancaster describes his "trouble" from the perspective of social

constructionism. His criticism points out that the popularized pseudo-scientific claims about nature and laws of evolution applied to social life sustain identity politics that tend to be conservative, and even harmful, where they ought to be "as radical as reality." Lancaster is concerned about what he calls "genomania" - the rise of naturalizing tendencies in society, shaped by sociobiology and evolutionary psychology and put forward by short-sighted media. These tendencies nest reactionary attitudes, giving "natural" explanations to unjust institutions, e.g. gender inequalities, racism, class stratification, war; even genocide. According to Lancaster, they ultimately derive from the maximalist logic of "genetic competition" and heteronormativity, thus undermining the progress in acknowledging rights of sexual marginal groups as well as squeezing a range of other real-life diversities to the edge of socio-political "normalcy."

The book includes a wide range of examples from popular culture, carefully analyzed and exposed with witty irony by Lancaster. In the process of reading, I started to pay attention to how the views of sociobiology and evolutionary psychology invade my everyday communication channels. In one of the cases, a personal e-mail to a group of female friends casually cites in length the research by Laura C. Klein et al. [1], which suggests that when a woman is in a stressful situation, instead of the male "fight-or-flight" response, the hormone oxytocin is released, encouraging her rather to tend to the children and gather with other women. In another case, an *International Herald Tribune* columnist celebrates the fact that a particular scientific book supports his intuition about the difference between male and female brains: "Men - because of a tragic genetic flaw - cannot see dirt until there is enough of it to support agriculture" [2]. These extracts, from both private and public media, taken more or less seriously, can be seen to implicate what Lancaster is most critical of - the idea of heteronormality as the dominant sociocultural (and assumed ancestral) environment.

Before getting Lancaster's book in my hands, I read an extensive approach to human evolutionary psychology [3], in which I was amazed to find research questions like "Why do women live after menopause?" So, I agree with Lancaster's notion that evolutionary psychology seems to reduce some of the socio-cultural complexity to simplicities: women are genetically oriented to social communication, household and children, while men are for fighting, football and other goal-directed aggressions. All other social gender diversities are recognized only in relation to these evolutionary necessities.

Lancaster's criticism is aware that the ossified sexual identities embodied in reproductive goals, combined with the idea of unchanging human nature drawing from imaginary ancestral life's form, are not the "trouble" of only natural reductionism, but also appear as a pitfall for lesbian/gay studies, queer theory and related forms of critical culture studies. He reminds us that if alternative views are established on the domain regulated by these pre-conceptual premises, there will be no real possibility for flux of radical changes.

According to Lancaster, the "natural" or "necessary," or the point where biology and culture meet, cannot be determined by genetic algorithms adapting to the environmental survival game. Instead, it confirms the biological consequences of actual social arrangement - the cultural plasticity relating sexuality,

gender and the family. In my view, this is not in direct conflict with the evolutionary psychological view, which suggests the phenotypic plasticity. The complexity of human behavior, based on an organism's ability to learn from experience, derives from a wide range of demographic, ecological and social environments. Maybe all the "trouble" reflects the need for dialogue in relation to the emergence of novel cross-disciplinary perspectives. Even more so, if it is about learning it needs to be, in Lancaster's words, "as radical as reality."

Notes and references

1. This citation refers to research by S. E. Taylor, L. C. Klein, B. P. Lewis, T. L. Gruenewald, R. A. R. Gurung and J. A. Updegraff, "Female Responses to Stress: Tend and Befriend, Not Fight or Flight," in *Psychological Review*, Vol. 107, No. 3, pp. 41-429.
2. D. Barry, "True Fact: Guys Brains Really Are Different," in the *International Herald Tribune*, No. 37545, p. 22, (22-23 Nov., 2003). Barry refers to the book by M. Gurian, *What Could He Be Thinking? How a Man's Mind Really Works* (St. Martin's Press, 2003).
3. L. Barrett, R. Dunbar, J. Lycett, *Human Evolutionary Psychology* (New York, NY: Palgrave Publishers Ltd, 2002).

Enough

by Bill McKibben. New York: Henry Holt, 2003. \$25.00 hardcover.
ISBN:
0-8050-7096-6.

Reviewed by George Gessert
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Will biotechnology give us wings? Make us posthuman? Damage us irreparably? These are a few of the possibilities that Bill McKibben considers in his book, *Enough*. According to McKibben, biotechnology will soon be able to deliver better health, greater intelligence, longer lives, genetically determined happiness and maybe even dazzling good looks. However, if we pursue these goals through germline engineering, the costs will be prohibitively high. According to McKibben, germline engineering, which involves making genetic changes that can be inherited, will "break us free from the bonds of our past and present" and make our children into "putty." This will lead to an "arms race" of all against all, in which parents will be forced to engineer their offspring or practice neglect comparable to child abuse. Every engineered baby will be followed by more advanced models. "Once the game is under way," McKibben warns, "there won't be moral decisions, only strategic ones." A host of unprecedented family problems will arise. Children will acquire characteristics of consumer products. There will be children seen as "upgrades" from older siblings, and "lemon" engineered children. Some parents will suffer buyer's remorse. Consumer decisions will create a genetically based class system and this will eventually lead to new, posthuman species, with interspecific violence to follow.

McKibben's warnings about "keep-up-with-the-Joneses" genetic engineering bear consideration if only because his picture of the future derives from predictions made by advocates of germline engineering. For example, in his 1997 book **Remaking Eden**, Lee Silver, a molecular biologist at Princeton, wrote that germline engineering to eliminate severe inherited disease would "ease society's trepidation" and open the door to other sorts of gene enhancement, such as improving intelligence. Silver "conservatively" speculates that by the year 2350, society may be divided into 10% "GenRich", or genetically enhanced individuals, and 90% "Naturals," or unenhanced individuals. The GenRich would control everything: the economy, the media, entertainment, "the knowledge industry," art. Silver envisions Homo sapiens divided into four species by 2600, and by 2750 into more than a dozen. Eventually, millions of human-derived species may be scattered across the galaxy. Silver's vision of the distant future is epic and he is a lucid writer, especially when he describes biotechnological techniques. However, he has a weakness for absurdly grandiose statements such as "We, as human beings, have tamed the fire of life." He also gives very limited attention to the suffering that biotechnology is almost certain to produce.

McKibben argues that germline engineering will not only damage families and cause social disruption, but will lead to widespread loss of meaning. Biotechnology, he believes, is the culmination of a long historical process, greatly accelerated by the industrial revolution, that favors individuals over context and leads to empowered but pitifully isolated and disconnected people. Germline engineering will eliminate the last source of meaning: the individual self. This will take place because an engineered "self" is not a true self, but something more like a robot. "We will float silently away into the vacuum of meaninglessness," he writes.

McKibben doesn't use the word "soul," but that is what he suggests when he characterizes the true self as a providentially-given, unchanging essence and a primary source of meaning. However, this concept of self is a cultural construct. Buddhist and other civilizations have flourished without cultivating it, and without unleashing epidemics of meaninglessness. Science conceptualizes human beings as exquisitely intricate electrochemical phenomena operating within much larger, almost infinitely complex material contexts. According to common, present-day cultural values, we already bear qualified comparison to robots.

Since McKibben's concept of the self is nostalgic and dubious, his argument that engineered people will be essentially different from the rest of us is also dubious. He provides no convincing evidence that for them, life will not continue to be a succession of surprises, intermittently a profound mystery and mathematically so improbable as to constitute a miracle.

This is not to say that germline engineering may not reshape our species or cause suffering. Quite the contrary. McKibben does a service by highlighting some profoundly troubling possibilities. He argues that we may already have gone far enough along certain technological paths. He favors some kinds of innovation, for example gene therapies that are somatic and not inheritable, but draws a line at germline engineering and at the world-destroying potentialities of robotics and nanotechnology. He believes that anything with the power to make us posthuman should arouse our deepest skepticism. The momentum

of the new technologies may be difficult to stop, but momentum is merely inertia and has never had anything to do with progress - that is, if progress consists of movement toward human fulfillment. More to the point, we cannot predict the future. McKibben believes that flat statements that technological innovation is inevitable are ruses to stop discussion before it can begin.

What drives technological innovation? McKibben quotes leading innovators to suggest that in our time a basic force is hatred of life. For example, robotics pioneer Hans Moravec, reflecting on an Isaac Asimov story about an android who wanted to become a human, said (with his typically aggressive use of the second person) "Why in hell do you want to become a man when you're something better to begin with? It's like a human being wanting to become an ape. 'Gee, I really wish I had more hair, that I stooped more, smelled worse, lived a shorter life span.'" No doubt Moravec speaks for many. The very widespread belief that we may go extinct arises both from awareness of the immense destructive power of high technology and from disgust with what we are, or have become. Today there are plenty of reasons to loath our species. Who has not felt at one time or another that we deserve to go extinct? McKibben acknowledges this inner crisis, but does not address it. His appeals to reason and essential goodness are inadequate in the face of extinction's appeal and the misanthropy of leading scientists. This is the most serious weakness of the book.

I am less sanguine than McKibben about who we are, which paradoxically makes me less pessimistic about the prospect of germline engineering. He points out that for a while, germline engineering will be extremely expensive, so only a small minority will be able to afford it, but he does not explore implications of this. From a Darwinian perspective, wealth today functions counter-intuitively: it affords no obvious evolutionary advantages. In fact, there is an inverse relationship between income and education on the one hand, and number of offspring on the other. As a group the poor, or rather the relatively uneducated working poor, are indeed blessed when it comes to progeny. The rich tend to be Darwinian losers.

Furthermore, no one really knows how biologically advantageous, as distinct from socially advantageous, characteristics such as slimness, athletic ability and intelligence are. Unless they produce more progeny, they have no Darwinian advantages. A potato-shaped, dim-witted nonentity with a swarm of children is biologically superior to a brilliant public figure, streamlined as a cheetah, and childless. In other words, from an evolutionary standpoint it may not matter whether most of the germline manipulations that McKibben mentions take place: they may amount to genetic froth. The market has always generated froth. Capitalism, which moved onto the world stage with trade in sugar and tobacco, involves bypassing our evolutionary defenses and exploiting our genetic weaknesses. We are the animal who plays tricks on itself. Consumer culture is the trickster spirit incarnate.

McKibben makes a convincing case that we would be wise to favor sustained public debate about germline engineering and to exercise great caution about this immensely powerful and potentially disruptive technology. However, if our society does go down the path of germline engineering, there is something to be said for having the rich, the well-educated, and the self-loathing conduct the first experiments on their own children.

When the poet Edith Sitwell was a child in the 1890s, she had a slight curvature of the spine. In her autobiography she tells how her father, Sir George Sitwell, who would tolerate no imperfections in his offspring, had her subjected to the best available medical treatment of the time. "The steel Bastille" was a metal contraption that encased young Edith's body and caused her excruciating pain. Only the rich could afford this particular torture, or permit this particular childhood. It is not inconceivable that humanity will learn important lessons from the rich about the consequences of germline engineering, just as earlier generations learned from the cruel and useless medical treatments that premodern doctors inflicted on aristocrats and their children. One doesn't have to agree with every detail of McKibben's argument to believe that today most of what we need to learn is what not to do.

The Edge of Surrealism: A Roger Caillois Reader

edited by Claudine Frank; translated by Claudine Frank and Camille Nash. Duke University Press, Durham, NC, U.S.A., 2003. 423 pp. Trade, \$79.95; paper \$22.96. ISBN: 0-8223-3056-3; ISBN 0-8223-3068-7.

Reviewed by Allan Graubard, 2900 Connecticut Ave., NW, Washington, DC 20008, U.S.A.
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Roger Caillois holds a distinct place among French intellectuals between the two world wars and after the defeat of Fascism. First seen as a member of the Paris surrealist group (from 1932-34), he contributed to the then vital discussion on the origins of myth by balancing his interest in poetry, as a project of being and a means of becoming, with a scientist's rationality through the lens of biology. His attempt to bridge the distance between the two provided him with a particular view of how acute the project is, given the values each term promotes, the traditions they stem from, and the variable confusions attending "rapprochement." That we are still prey to a general failure here, which Caillois could not extricate himself from, does not in the least diminish the project's urgency, especially now with technology's ever more attractive simulations that the two are merging at last - and that the "absence of myth," a subject that compelled so much comment during Caillois' time, no longer matters.

I do not know what Caillois would have made of all this, save for returning perhaps to his analysis of biology as a basis for myth, eschewing much else as a detour, and his fascination with mimicry in the insect world - the subject of his influential 1937 text, *The Praying Mantis: From Biology to Psychoanalysis* - all in the service of an attempt to discern, as he put it, a "lyrical ideogram" as an objective nexus where poetic thought and lucid reason intersect.

Caillois' contestive spirit here also characterizes him and our current interest in him, at least in terms of the world we know and our need for forceful intellects with wide-ranging passions, free from careerism or institutional constraints - a freedom that Caillois advocated more in principle than in fact. But of course it was there, an animating force and a horizon toward

which to turn, as he did. In this regard, his break with surrealism as being overly "indulgent" on the side of poetry is also born from a desire to recast the movement's focus on myth and myth-making: from its collective origins and orphic cast to its sectarian momentum, social economy and general phenomenology.

It is here as well that we can chart his collaboration with Georges Bataille, his work with Michelle Leiris and Jean Paulhan, his arguments with Levi-Strauss, whether for good or ill, during and after the College of Sociology (which Caillois helped to form and sustain). Among his other accomplishments, I include **Les Lettres française**, which Caillois launched from his inter-war exile in Argentina (1941-1947) and the magazine **Sur**, edited by Victoria Ocampo, in which he played a pivotal role, along with the UNESCO-sponsored "transdisciplinary" journal **Diogenes**, which he established as editor in 1952, and, of course, his books.

Thus has Claudine Frank given us a sampling of Caillois' texts in translation, the most complete in English so far, written over four decades (from 1934 to 1978), along with informative introductions to each period, at times to each text. Indeed, I am indebted to Frank for the historic frames she provides despite her passing disputes with other commentators, which may be of interest to experts alone, and her occasional opacity.

I have mentioned myth, myth-making and the absence of myth; I do so again. It is the ground Caillois believes his own, at least as far as his analyses take him. But as Caillois' thought matures, his sense of the poetic, its orphic heritage, and myth change. He comes to recuperate a type of formalism that reason embraces as an epitome of Western civilization and which Breton, for one, repudiates (see Breton's brilliant response to Caillois' thoughts on poetry in **Ars Poetica**, coauthored with Jean Shuster, which appears in the surrealist review **BIEF/Jonction surrealiste**, no. 7, June 1959). Nor is this repudiation an abstract or literary affair. It focuses on the heart of a dispute that anthropology finally came to grips with and which Aime Cesaire targeted in his scorching critique of Caillois' defense of Western civilization and the blind eye he turned to its murderous impulses; a critique to which I refer readers of Caillois as a clarifying lens (see Cesaire's **Discourse on Colonialism**, first published in 1955 by Editions Presence African, republished in translation several times thereafter).

Who was Roger Caillois? Certainly, this book will help us draw the character. Will it also act as a mirror to the reader and the intellectual or poetic currents that resonate within him or her? That is another question. It is not a small one.

Creation: Life and How to Make It

By Steve Grand, Cambridge, MA: Harvard University Press, 2000.
Paper, 218 pp. Illus. b/w. ISBN: 0-674-00654-2:

Reviewed by Robert Pepperell
pepperell@ntlword.com

Steve Grand is a popular science writer in the best tradition

of the genre. He is motivated by the need to explain, to popularize, an intellectual vision in which he passionately believes, a vision driven by his sustained investigation into some deeply perplexing scientific questions: What is life? Can living processes be replicated? What is consciousness and can it too be replicated? Anyone who has seen or heard him speak will know this passion is fuelled by his conviction that some of the greatest enigmas in human thought (the nature of life and consciousness) are not only explicable but susceptible to synthetic regeneration, given the appropriate tools and methods. Hence the claim made on the book's subtitle would be, for Grand, a reasonable summary of his project rather than, as it would be for others, a ridiculously bombastic declaration.

Grand's approach is essentially synthetic rather than analytic. He takes contemporary ideas in physics, mathematics, biology, computer science and neurology and synthesizes a coherent, transdisciplinary model that has the benefit of being more than purely theoretical. His previous experience as the inventor of the artificial life computer game *Creatures* and his more recent work constructing "artificial beings" give him a practical insight into the problems of generating complex behavior with computer code.

To summarize his position, he advocates a theory of emergence, which is to say that the properties of natural phenomena, such as intelligence and life, emerge from the interaction of a multitude of variables without being reducible to any one of them. Nor can any one variable be said to be the first or final cause of any particular event. Even the notion of control we associate with, for example, human agency is seen as the effect of some prior cause or causes rather than as a determining influence itself. Higher order phenomena, such as consciousness, are less the attributes of a particular substance than consequences of the behavior of a certain pattern or arrangement: "Consciousness cannot therefore be a property of matter, only a property of certain *configurations* of matter" (p. 38). It is these principles that Grand seeks to implement through computer simulations, thereby creating virtual laboratories for exploring the creation of life, intelligence and consciousness.

The nub of Grand's formula for the creation of life is to combine a number of mechanical building blocks such as modulators, transducers, differentiators and integrators (what he calls "God's LEGO set"), each relatively simple but capable of producing complex behavior when acting in concert. Crucial to the whole enterprise is the provision of some basic impulses and drives, like the need to eat, communicate, learn and mate, without which, he argues, a living thing would lack purpose. All these behaviors can be simulated in a virtual world-space wherein the life, or computer code behaving as life, is born: "Our task is not to program in intelligent behavior, but to enable such behavior to emerge from simulated objects that embody the cybernetic properties from which life emerged in the natural world" (p. 147).

Grand has an engaging style, his arguments are almost always persuasive, and his examples and analogies genuinely illuminating. Given the complexity of the subject matter, the text moves at a lively pace, yet without compromising the seriousness of his thesis. I have to admit that in my case Steve Grand was preaching to the converted, but I hope this book will have a wider impact, in particular on those in the AI and A-Life

communities, and indeed in the scientific community in general, who seek to reductively analyze complex phenomena. Although the book might be criticized for sometimes conflating life, intelligence and consciousness, nevertheless *Creation* stands as a model of clear, independent thought, impassioned reason and well-founded speculation.

LEONARDO ABSTRACTS SERVICE

The Leonardo Abstracts Service (LABS) is a listing of Masters and Ph.D. theses in the art/science/technology field, for the benefit of scholars and practitioners.

LEA also maintains a discussion list open only to faculty in the field. Students interested in contributing and faculty wishing to join this list should contact: leo@mitpress.mit.edu

Author
Robin Petterd
robin@otheredge.com.au

Languages familiar to the author
English

Thesis title
Liquid Sensations: Evoking Sensory Experiences with Interactive Video Installation Art

Abstract
This project has developed methodologies for evoking sensations using interactive video installation art. The research has resulted in three interrelated video installations about the experiences of entering the sea, shallow breath diving and floating under the surface of the water.

The installations have been developed through studio-based methods by a solo artist working on all aspects of the process. The project's methods have been focused on the imagery and sounds and the placement of these elements in the gallery, the development of a system where interaction is an integral part of the viewer's engagement with the works. The exegesis and accompanying CD-ROM summarize this process.

The physical sensations associated with water were chosen because they are immersive experiences that have a personal resonance for the investigator. Suggesting the sensory experience of submersion in water has many challenges. Interactive video installations can meet some of the these challenges.

Our bodies are more than 90 percent water; we wash in it; we play in it; we need it to survive. While our bodies are mostly water, it is an environment with which we have an uneasy

physical relationship as there is always the risk of drowning. Humans find pleasure in this struggle with an alien environment. The contrasting aspects of the experience are what this project seeks to suggest.

This project is part of the tradition of depicting water in the history of visual arts. Other contemporary artists use water as part of their practice. The exegesis examines some of these contemporary artists' works and related practices with time-based media that have informed the studio-based experiments.

New technology offers unprecedented means of making art. Technological development has been rapid and there exists a gap between the pioneering use of new technology and later detailed exploration. This has created a need for research to be undertaken. The approach this project has taken is to apply the well-tried technologies of interactive video and to explore the application of those technologies and related methods in detail. This has resulted in an exhibition of works that contribute to the area of interactive video installation art as a medium to evoke sensory experiences. The contribution this project has made is to create experiential art that evokes sensory experiences related to being in aquatic environments. It has enhanced the viewer's engagement with the works by using unobtrusive sensing and temporal sampling techniques and has developed methodologies for producing interactive video installations to evoke sensations.

Keywords

Interactive, installation, sound, video, immersive, water, aquatic, sensory, experience, studio based

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University / Program Affiliations

University of Tasmania

Thesis available upon request: University of Tasmania Library

LEONARDO Call For Papers: 7th Workshop on Space and the Arts

Leonardo is pleased to announce its co-sponsorship of the 7th Workshop on Space and the Arts. Deadline for submission of proposals is 29 February 2004.

Space: Science, Technology and the Arts (7th Workshop on Space and the Arts)

18-21 May 2004

European Space Research and Technology Centre (ESA-ESTEC)
Noordwijk, The Netherlands

Announcement and Call for Papers

"Space: Science, Technology and the Arts" is the theme of the 7th workshop on space and the arts, which is being co-organized by the European Space Agency (ESA), the International Academy of Astronautics (IAA) and its Commission VI, Leonardo/OLATS and the OURS Foundation. It is scheduled to be held at ESTEC - ESA's European Space Research and Technology Centre in Noordwijk, The Netherlands from 18-21 May 2004.

Since the birth of space exploration, artists and space scientists have inspired each other in the development of humanity's space programs, regularly exchanging information, ideas and visions. Artists working with space subjects and themes invariably become heavily involved in both the physics and the technologies of space either as a muse, a metaphor, a subject or as a tool necessary for the development of their artistic creations. Artists, wanting to explore space on their own artistic terms, often must become very knowledgeable about the utilization of space technologies, materials, mechanisms and procedures in order to develop feasible art works and projects as such projects are subject to the same conditions and regulations governing scientific experiments designed for space. Such activities have broadened the idea of space exploration within the space community while making space exploration understandable in other ways and accessible by a larger public.

Now that the International Space Station (ISS) is nearing completion, the ISS partners have begun to investigate how this orbital facility can be utilized, not only as a platform for scientific experimentation, but also as a platform for cultural exploration and expression. This creates a new opportunity and challenge for artists and other cultural professionals to work closely together with space scientists, engineers, technologists and administrators in developing new concepts, projects and strategies.

The Space: Science, Technology and the Arts workshop promises to be an important and pivotal event as it provides a unique opportunity for professionals in the space and the arts communities to meet, discuss and exchange new ideas related to the cultural exploration of space.

Presentations are being solicited from space scientists, engineers, technologists, artists, writers, journalists, art critics, curators and philosophers who have a developed interest in the aims and theme of the workshop.

Objectives

The Workshop on Space: Science, Technology and the Arts aims to:

- Provide a platform where new ideas and experiments relating to the interaction of space science, technology and the arts can be exposed and debated
- Provide an environment where people, especially artists and other "culture professionals," together with space scientists and engineers can exchange ideas and projects about space from the perspective of their unique backgrounds, education and experiences
- Provide a meeting place where new space-art and technology projects can emerge and new teams and partnerships can be built
- Nurture a domain of space activities, which is becoming more recognized in both the space community and in the mainstream art world
- Disseminate the ideas and projects by publicizing the results of the event

Submission of Abstracts

Participation in the workshop will be limited to a maximum of 40 persons and participants will be selected upon review of abstracts of presentations proposed for the workshop.

Abstracts, limited to one A4-size page, should be submitted via the online form available at <http://www.congrex.nl/04c20>

The abstract should be in English and include:

- Workshop name
- Title of presentation
- Name and affiliation of authors
- Full contact details of presenting author, including postal and e-mail addresses, phone and fax

The deadline for abstract submission is 29 February 2004.

Following acceptance, a complete paper will be required and the author(s) will be invited to register for the Workshop.

Timetable

29 February 2004 - Deadline for abstracts
15 March 2004 - Notification of acceptance
20 April 2004 - Preliminary program
7 May 2004 - Deadline for papers
18-21 May 2004 - Workshop

Workshop Topics

Presentations can be about any aspect or issue related to Space: Science, Technology and the Arts. Since the scope of the workshop is large, potential authors might like to consider submitting abstracts for papers addressing such topics as:

- the impact of space technologies on the arts and vice-versa
- the transfer of space technologies to art and design
- the role and involvement of space bodies in the arts

- designing art for the space environment - the requirements, the limitations
- synergies between the arts and space communities
- the interaction between space, arts and the public
- space and the new media arts
- using the arts to explore space
- the arts in orbit use of the ISS for artistic and cultural expression

Authors need not, of course, limit themselves to these topics.

Organization

The Workshop will begin with a "welcome event" on Tuesday evening, 18 May 2004. The three-day formal workshop will take place in the Einstein Room of the main ESTEC building on 19-21 May 2004 and will consist of oral presentations from both invited and contributing speakers. There will be no charge for participation in the workshop. Travel and accommodation expenses are the responsibility of each participant.

Hotel Accommodation

A reasonably priced hotel with half-pension has been reserved in the nearby town of Noordwijk and booking information will be sent to all participants that are accepted. Transportation to and from the hotel and ESTEC will be provided.

Venue

Postal address: European Space and Technology Centre P.O. Box 299 2200 AG Noordwijk (The Netherlands)

Visiting address: European Space & Technology Centre Keplerlaan 1 2201 AZ Noordwijk (The Netherlands)

General telephone number: Phone: +31 71 5656565 Fax: +31 71 5656040

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- Patrick Gyger, (Maison D' Ailleurs, Yverdon, Switzerland)

Frank Pietronigro (Zero Gravity Art Consortium, San Francisco, USA)

Contact

Any questions concerning the Space: Technology and the Arts workshop should be sent to: workshop2004@arsastronautica.com

Background

Under the title "Rencontres du 13 avril," a series of small, one-day Workshops on Space and the Arts was co-organized by Leonardo/OLATS, the OURS Foundation and the International Academy for Astronautics between the years 1997 and 2002. Held in Boulogne-Billancourt, a suburb near Paris, these workshops attracted leading space scientists, engineers and artists on specific themes chosen to generate exchanges between artists and scientists concerning the cultural impact of space activities.

The topics of the past six workshops have been:

- 1997 - "Artists as Space Explorers"
- 1998 - "Space Art / Earth Art"
- 1999 - "Cultural Perspectives on Space"
- 2000 - "Life in Space"
- 2001 - "Outer Space - Cyber Space"
- 2002 - "The Collaborative Process in Space Art"

Documentation about each past workshop is online on the Leonardo/OLATS web site at <http://www.olats.org>

In order to provide a wider forum for the interaction of the scientific and technical community with artists, the 7th Workshop on Space and the Arts is being held at the European Space Agency's large R&D establishment, ESTEC, in The Netherlands.

Links

- <http://www.esa.int>
- <http://www.estec.esa.nl>
- <http://www.estec.esa.nl/conferences>
- <http://www.iaanet.org>
- <http://www.olats.org>
- <http://www.leonardo.info>
- <http://www.ours.ch>
- <http://www.arsastronautica.com>

Leonardo/ISAST collaboration with ISEA 2006
San Jose, California, USA

We are pleased to inform the Leonardo network of our involvement in the ISEA 2006 conference. The city of San Jose has been selected by ISEA to host the 2006 conference. Steve Dietz will serve as the Symposium Director.

Leonardo/ISAST, under the leadership of ISAST Advisory Board chair Beverly Reiser, will collaborate with the 2006 ISEA Symposium in a number of areas, including:

- a) Facilitating of the Pacific Rim New Media Centers summit in

connection with the Leonardo Global Crossings (Cultural Roots of Globalization) project.

b) Publications dedicated to documenting the work of emerging artists and of new media programs internationally. The publications will be produced as part of the Leonardo Experimental Publishing Project, under the direction of Pamela Grant Ryan.

Leonardo/ISAST welcomes involvement and suggestions from the members of the Leonardo network.

For further information, go to <http://www.leonardo.info>

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