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EDITORIAL

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Our feature this month by Brett Stalbaum, is about C5, a
collaborative group of artists and theorists. A description on
their website says that "C5 makes no distinction between the
research ambitions of business or art. Theory that is realized
through research serves to define significant conceptual
methodologies, techniques and strategies appropriate to both.
The opportunity for C5 researchers to conduct research that is
contextualized by both business and art is a unique aspect of C5
culture."

In LDR, highlights include Maureen Nappi reviews Don Ihde's
book on the body and technology providing a tempting insight to
the work of a writer who has always been valuable to our
discussions at Leonardo. Dene Grigar's criticism of *Inferno,*
by Tangerine Dream is informed by her own expertise, while
longstanding panelist George Gessert's witty confessional
opening draws us into a significant discussion of an important
book on the relation between drugs and culture.

Other news in this issue include abstracts from Leonardo
Journal Issue 36:3 (June 2003), call for papers for the Leonardo
Music Journal Vol.14, the launch of Michael Naimark's "Arts Lab"
report and much more ...

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SOFTWARE DEVELOPMENT PLATFORMS FOR LARGE DATASETS: ARTISTS AT
THE API
By Brett Stalbaum, beestal@cadre.sjsu.edu

In 1998, C5 had a problem; two problems, actually.

That year, we had organized as a business without a model to do
a data collection and analysis project at SIGGRAPH 98, called
the Remote Control Surveillance Probe project [1]. The impetus
for the founding of C5 was to see what kinds of business
opportunities were available to a collaborative group of artists
and theorists, already working for many years with information
as our primary medium. The expertise of C5 members was brought
under one umbrella to tackle problems in domains relative to our
collective experience, which included autopoietic theory,
artificial intelligence, information systems design and
programming, public relations, emergent behavioral systems,

semiotics, literary criticism, military studies, library science and fine art.

Shortly after organizing, we were invited by Steve Dietz of the Walker Art Center in Minneapolis to do a net-art project related to a work by C5's president, Joel Slayton - *Not to See a Thing.* The project had been exhibited as part of the 1997-98 exhibition, "Alternating Currents: American Art in the Age of Technology," at the San Jose Museum of Art, in collaboration with the Whitney Museum of American Art [2]. The *Not to See a Thing* project collected about 10 gigabytes of information about audience participation with the work during the time it was installed in the SJMA. What Steve Deitz was interested in was how we might hybridize the *Not to See a Thing* data with the infrastructure of the Internet itself to create a net-art project. This in essence created our two problems.

On the one hand, we had a fairly large but still manageable set of biometric data from Slayton's installation, which we had to mingle with the tremendous infrastructure of the Internet itself. And of course we had to find a way to make the manifestation of that data-mingling visible and navigable to the user. Thus the first problem was related to the size of the datasets and the need to develop a strategy for exploring them and exposing something about them. The second problem was that we were faced with two large sets of data that were superficially unrelated to one another. Our efforts culminated in the *16 Sessions* project [3] and the realization of the C5 IP [4] database that Lisa Jevbratt developed to facilitate the mingling between the *Not to See a Thing* data and IP space [5]. This article focuses on the strategies that emerged from these projects and how they inform the matter of how artists can and should contribute solutions to these kinds of problems.

I will begin with the scale problem first, because it is the less interesting of the two, and the solution is more obvious. The question is "How do you create a context in which information artists with different experiences and different sets of IT skills can participate in the exploration of and experimentation with large data sets?" We believe it is important to create a context that is amiable to both collaboration and independent endeavor at a variety of interface levels.

Technically, this requires the development of multiple interfaces to the data that are congruent with the experience of the various groups of people who will be working with it. To ensure this, whenever possible, artists should be involved with or completely responsible for the development of the various interfaces. Given that artists today are also computer programmers, database administrators, information architects, engineers and theorists, it is important that the data to be worked with be arranged for maximum access; access that ranges from the raw data (files or database interface) all the way through standard user interfaces that highly mediate access to the data through end visualizations at the presentation layer. In between these extremes, artists should have access to all of the APIs [6] and middleware layers and preferably be responsible for the development of these layers.

Working on "16 Sessions" and in subsequent software projects such as *SoftSub* [7], C5 had in place people with experience in all of these layers of software development and, importantly, experience working with each other, so the process was relatively smooth. Of course, this is not the situation with

larger sets of institutionally collected data, where the standards, data formats and APIs can often be quite obtuse [8].

Different challenges exist with the emergence of large collections of public data, such as those available from the United States Geological Survey, NASA, NOAA and the Human Genome Project. Such challenges are not only presented by the technical sophistication of the data and the tremendous size of the data, but in strategizing appropriate interfaces to the data that allow users of very diverse backgrounds to participate in the process of consuming the data and generating new knowledge from it.

C5 has been active in this area. For example, the C5 Landscape database is a relational database, Perl API and set of sample interfaces designed specifically to help users in creating their own programs that can easily access, analyze and display information about the shape of the earth [9]. The database is designed to eliminate much of the complexity in acquisition, database interface, processing and imaging common in the manipulation of geo-data, so that artists have a manageable platform in which to write their own software and perform mapping experiments. Artists using the software can work with the database from various levels of technical sophistication. These levels range from a web-based GUI to browse the dataset to the ability to write their own code to access the database directly through SQL, Perl DBI and Java JDBC programming techniques. An API also provides a variety of features and capabilities through easy-to-use Perl modules.

There are, of course, many projects that incorporate the idea of artists working with data at all levels. Especially notable are Lisa Jevbratt's *Mapping the Web Infome* [10] and Rhizome's *alt.interface* projects [11]. The *alt.interface* project involves exposing (to artists) the database API of the Rhizome website and its large text object collection, such that they can create alternative interfaces. Jevbratt's web-crawling project is especially notable because of the way that she worked with the invited artists to create both an interface for the "alternative" technical artists involved, as well as working at the database and API levels with many of the artists to collaboratively implement features suggested by artists.

It is appropriate for artists to be involved in the development of the public APIs and application layer interfaces through which the public at large will have access to large data, because in many cases artists working collaboratively already have experience in working out the inherent interface issues that are involved in making data available to "technically diverse" or even non-technical users. Artists in both new-media academia and fine-art practice have been involved in this kind of work for many years.

The second issue is a deeper one, involving how artists have contributed and can contribute to dealing with inter-relations between very different datasets, as well as unexplored intra-relations within single large datasets of considerable complexity. The exploration of large datasets is one of the most provocative and interesting issues for artists today because of the explosion of availability of such large data sets being made available to the public.

Why? Artists as cultural workers have always sought to contribute to the state of our knowledge near the edges of human

understanding. Among the new cultural problems we face today are the problems of big data. And lest you assume that this is exclusively the domain of computer science, the large datasets of today present new kinds of problems that computers and networks are not traditionally used to solve, and are perhaps even unable to solve.

The familiar notion of the "information-processing life cycle" is the basis of contemporary data-processing. This is the very colonial idea that data is something raw and primitive that needs to be tamed in order to become useful. The notion holds that data must be processed into useful information, and to accomplish this you normally start by considering the output you want, the available input, and then determine the algorithm that will take your raw and untreated data and turn it into a manageable, cognizable, useful thing we call information. The entire field of data mining and knowledge management, as we know it today, is predicated on the pre-existence of semantic models that allow data to be algorithmically mined for meaning. This is the basic philosophy and approach to data and information and is, of course, profoundly successful, but its application reaches severe limitations in dealing with contemporary data and the new kinds of problems it presents.

For example, traditional problem-solving is not at all applicable to the situation C5 faced with *16 Sessions.* We had two very different data sets, and although we had some preconceptions of what they meant, we had no idea how they were related or even if they were related and no clear idea of what kind of question to ask. Neither set of data was collected with a protocol that was designed to facilitate the type of endeavor that we were charged with performing. Again, standard information-processing techniques are not useful for all problems, especially when you do not have a question, when you have a poorly formed question, or when the dataset itself is not entirely understood or contains information potentials that were unplanned at the time it was collected. Data may have non-transparent semantics, or may be so complicated that you do not know where to begin to search, or it may take on new roles as new needs emerge after the data is collected. These issues are of course also related to the problem of what questions to ask. When you don't understand your data, you will naturally have poorly formed questions about it.

Why is this a critical problem? The answer is that there is ever more data being collected in various endeavors about which we do not know what questions to ask. For example, the Human Genome Project has sequenced and published the entire human genome, but that tremendous data set is largely unexplored, because in part, scientists have not sought the answers to questions not yet raised. While this may seem quite tautologically obvious, it is simultaneously a tremendous and real problem. As put by Lisa Jevbratt, the process of exploring genomic data can be "described as that of a group of people in a dark room fumbling around not knowing what is in the room, how the room looks or what they are looking for." Genomic data is not unique in this respect. There are, for example, vast datasets available from the United States and other governments regarding all kinds of interesting things that we do not yet fully understand, or things that we think we understand but which have behavior and relations that have been overlooked. Furthermore, artists, who do not always participate in the scientific method, may well make discoveries or observations in their aesthetic and conceptual pursuits with such data that lead

to such questions, even if the artists are participating as blind probe-heads in data space.

The exploration of such data, I argue, is the most productive and culturally useful position from which to perform as an artist in the twenty-first century. It is hard now to make interesting art without pursuing the solution to an interesting problem and being faced with large sets of data with neither a map nor a clearly defined problem. Definition is one of the most interesting and provocative problem-types we face in an era where our ability to collect data outpaces our ability to generate knowledge from it. Asking questions and exploring spaces in poorly defined problem domains consisting of huge datasets is the natural, useful and potentially highly productive cultural role in which artists should play a part.

C5's approach to these types of problems is to explore the application of autopoiesis as a conceptual framework for understanding the behavior of data and information. Autopoiesis takes place in systems that differentiate themselves from other systems on a continual basis through operational closure, and that produce and replace their own components in the process of interaction with their environment (structural coupling). This process occurs via a membrane containing the organization of the unity in question, thus allowing distinction between it and its environment.

A basic question for any analysis of the autopoietic potentials of data involves distinguishing a membrane, or the interface, where operational closure (inside) and structural coupling with an environment (outside) are expressed. It is in patterns of structural coupling that relations between complex data can be analyzed. If you can find a membrane, you have revealed a relation between or within data sets. To find membranes, you need to mingle data. For example, there are contemporary explorations within the social sciences that demonstrate that relations exist between data sets collected for quite disparate reasons. Global information systems containing information about the landscape (for example drainage, land cover or topography) can reveal insights when mingled with historical data [12]. C5 views these types of data-processing explorations as very interesting instances of structural coupling [13] between data sets, even those as superficially different as geological and historical data.

Most of C5's approach to autopoietic frameworks for the understanding of large data has been developed by Joel Slayton and Geri Wittig. Perhaps the key idea that emerges from their work is the notion of a composibility of relations [14], in that composibility indicates the potential for autopoietic membranes existing as data relations via third-order structural coupling in a coded environment. This allows for the analysis of data sets where the semantic relationships are uncertain. In a sense, this idea can be described as the search for algorithms in which superficially different data sets might be shown to couple based on their subject-less form through inherent sans-semantic or pre-semantic models, and to seek these relations specifically to flag the potential for the presence of immanent, unplanned or otherwise unrecognized semantics flowing from mingled relations, thus revealing something about the ontology of the sets that produces new knowledge about them. It is unlikely that there is a universal algorithm for this, (such as a universal visualization system for all data), but if there is, it is likely to be accidentally discovered by researchers searching for inter-relations between data sets. Obviously, artists should

be involved in this endeavor.

This is only one approach, undertaken by a small, self-funded organization that believes that a very particular theoretical framework can be expressed in coded relations that deliver their own answers. To explore this, we of course need a lot of data. It is important that science organizations create the circumstances that will allow a diversity of independently theorized approaches to emerge based on public interest in and public access to the data [15]. It is in casting large sets of scientific data into the realm of artists and, indeed, the public at large, that will allow a multitude of self-organized modes of discovery to develop.

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REFERENCES

1. http://www.c5corp.com/projects/rcsp/index.shtml

2. http://www.c5corp.com/walker/gateway.html

3. http://www.c5corp.com/projects/16sessions/index.shtml

4. The Internet protocol is the numerical addressing scheme used to identify devices on the Internet.

5. This later became the technical basis for 1:1, http://www.c5corp.com/projects/1to1/index.shtml

6. API is the acronym for "application programming interface," which is a group of public functions that exist in a library of code that other programmers can make use of to implement their own code. Artists should design APIs as well as use them.

7. http://www.c5corp.com/softsub/index.shtml

8. A good example of this is the Spatial Data Transfer Standard. According to computer scientist Gregg Townsend, "The adoption of SDTS was a giant step backwards. While previous DEM files could be read by relatively simple programs, SDTS file are difficult to read even with the help of a large external library." http://www.cs.arizona.edu/topovista/sdts2dem/

9. http://cadre.sjsu.edu/~gis

10. http://dma.sjsu.edu/jevbratt/lifelike/

11. http://rhizome.org/interface/

12. For an example, see http://fisher.lib.virginia.edu/projects/salem/ *The GIS of "Salem Village in 1692"* is part of an electronic research archive of primary source materials related to the Salem witch trials of 1692.

13. Wittig, Geri, *Expansive Order Situated and Distributed Knowledge Production in Network Space*, http://www.c5corp.com/research/situated_distributed.shtml

14. Slayton, Joel and Wittig, Geri, "Ontology of Organization as System," in *Switch* – the new media journal of the CADRE digital media laboratory, Fall 1999, Vol. 5, No. 3, http://switch.sjsu.edu/web/v5n3/F-1.html

15. http://cse.ssl.berkeley.edu/nvo/nvo.htm

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       |     LEONARDO DIGITAL REVIEWS       |
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This month, Leonardo Digital Reviews is pleased to post the
first review from a new member of the panel, Maureen Nappi from
New York. Her review of Don Ihde's book on the body and
technology provides a tempting insight to the work of a writer
who has always been valuable to our discussions at Leonardo.
Dene Grigar's criticism of *Inferno,* by Tangerine Dream is, as
one would expect, informed by her own expertise in the classical
references to Dante's poem, but identifies the considerable
pleasure from the performance. hile Longstanding panelist George
Gessert's witty confessional opening draws us into a significant
discussion of an important book on the relation between drugs
and culture.

More familiar recent contributors bring into the art/science
discussion burning questions as we consider what shifts are
taking place in the power relations between two quite distinct
ways of describing the world. They are most polemically
articulated in Robert Pepperell's short review article dealing
with *Einstein Picasso: Space, Time, and the Beauty that Causes
Havoc,* by Arthur I. Miller, and *Inner Visions: An Exploration
of Art and the Brain,* by Semir Zeki, the latter having been
given considerable attention by *Leonardo Digital Reviews* a few
years ago. Of the two contributions this month from Amy Ione,
that of *Exploring Science: The Cognition and Development of
Discovery Processes,* by David Klahr, coincidentally seems to
resonate with Pepperell's intervention, while her long review of
the Getty garden is both evocative and critically engaging. In
the last offering from our regular reviewers, Stefaan van Ryssen
offers three quite distinct takes: the first marvels at the
antics of tumbleweed and the second reminds us of the esoteric
fascinations of *Computer Music Journal* as he reviews an
edition dedicated to Iannis Xenakis. In his support for *The Art
of Humane Education,* by Verene, Donald Phillip will, I am sure,
chime with the thoughts of a wider audience, especially those
who hold teaching positions at the moment. Finally, *Leonardo
Digital Reviews* is pleased to be able to report on the
exhibition *Complexity/Art And Complex Systems,* thanks to the
collaboration of Adrienne Klein and Brian Schwartz .

These and all previous reviews can be seen at the Leonardo
Digital Reviews website:
http://mitpress.mit.edu/e-journals/Leonardo/ldr.html

Michael Punt
Editor-in-Chief
Leonardo Digital Reviews

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New reviews posted on Leonardo Digital Reviews, May 2003

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BODIES IN TECHNOLOGY

Reviewed by Maureen Nappi, man5@nyu.edu (Long Island
University, Brooklyn, NY, USA).

Ironically in the age of high computation and technological
focus on cerebration, the philosopher Don Ihde wittily begins
the introduction to his recent book *Bodies in Technology* with
the proclamation, "Bodies, bodies everywhere." Is this merely an
ironic gesture that harks back to the Cartesian split of mind
and body? Or is this precisely a reminder to resist the
temptation of such binary and omnipresent delusions, despite the
fact that our reach does seem to be, if even only at times,
globally extended through our technology?

In *Bodies in Technology,* Ihde, a longstanding
phenomenologist, discursively revisits the Cartesian bifurcation
of mind and body by traversing the polemical processes of
physical embodiment with that of contemporary technology by
initially asserting that "We *are* our body." Thereafter, Ihde
ontologically triangulates our experiences of our bodies in
[relation to] technology as: *body one,* a first order sense of
embodiment in which we experience ourselves as "motile,

perceptual, and emotive being[s]-in-the-world;" *body two,* a second order sense of embodiment that is engendered and constructed within the context of social and cultural definitional interplay; and *body [in technology],* a tertiary sense of embodiment that, while traversing *body one* and *body two,* places the body *in relation to* technology through some mediating form of technology or technological artifact.

Using data primarily derived from the author's family, students and associates, in *Bodies in Technology,* Ihde commingles the personal with the technical by interweaving the antidotal with the analytical. Thus, he consciously adopts a writing method that he attributes to the feminist writer Susan Bordo, by incorporating "the autobiographical within the experiential." As Ihde's early work in phenomenology includes flights into imaginative variations, he cites an in-class "thought experiment," which he uses to elicit from his students their articulation of the sense of the non-technological virtual body. The assignment: to imagine themselves jumping out of an airplane. Their responses, Ihde points out, fall into one of two possible categories. Either the student has imagined an "embodied" perspective as *self as actor,* which Ihde refers to as the "here-body" - a present-tense version of a "'be here now' body," or the student has imagined a disembodied perspective of *self as observer of the other as actor,* that is, "already a kind of virtual body in a nontechnological projection." This form of virtuality, which Ihde refers to as the "image-body," illustrates a body image that visually objectifies the body as a delayed and disembodied observer [temporal comments mine].

As each technology extends and culturally enwraps its participants within its unique environment, as Marshall McLuhan so evocatively illustrated, Ihde's distinctions serve to build on McLuhan's insights while further grounding us in the very physicality of our bodies. Thus, by articulating and differentiating the specificities of these experiential embodiments which we, perhaps unknowingly, sense in our bodies even as they extend into a shared, cultural embodiment, Ihde's categories prove conceptually meaningful precisely because they bring to light something that previously remained relatively concealed. This ontology, founded on Heidegger's interrelationship *between* the technological artifact and its cultural contiguities, serves to define technology not only by its raison d'etre, but also by other possible assignments it may be contextually allotted.

Moreover, just as technology must be defined *in relation to* the complexities of its assignments and its allowances for embodied agency, so too must the body be thus defined. Hence, as our bodies and technologies form a symbiotic relationship in which each are characteristically and relativistically adaptable to the other, they remain inextricably bound to each other within a cybernetic union of production. This *relationship* is once again emphasized by Ihde in *Bodies in Technology* when he reiterates, in the last paragraph of his conclusion, "We are our bodies....We are bodies in technologies."

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THE ART OF HUMANE EDUCATION

by Donald Phillip Verene, Cornell University Press, Ithaca and London, 2002, 80 pp., Trade. ISBN: 0-8014-4039-4.

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

It takes a lot of courage to go against the stream of
cognitivist, constructionist and neo-behaviorist reform in
education and it takes a lot of erudition and rhetoric to get a
message across that goes completely against the dominant
discourse of our time. Educational reform - an ongoing endeavor
to pull education into the stranglehold of private companies and
to subject it to the logic of the market, against all common
sense that says that young people are too important to throw
them before the lions - is dominated by neo-conservative goals
and their pedagogical representations: "preparing students for
their jobs," "making efficient use of human resources,"
"flexibility and life-long learning," etc. Teachers don't need
to know anymore, they are merely "coaches", "facilitators" or
guides standing alongside the track that the student himself or
herself has chosen to walk. Beauty, eros, ethics and truth are
not what educators or teachers are supposed to teach. They
should empower the students to define their own goals and to
pursue their own objectives, whether they be good or bad, right
or unjustified, idealistic or petty and materialistic.

Donald Verene, the Charles Howard Candler professor of
Metaphysics and Moral Philosophy at Emory University in Atlanta,
Georgia, does not confront reformists and supporters of the new
pedagogy head-on. That would be a suicidal enterprise for even
the most eloquent and venerable professors: only administrators
and managers seem to have the right to speak up in these matters
nowadays - and the large numbers of concerned parents who are
carefully protecting their precious offspring from any
opportunity to learn how to form ideas or to think by
themselves, of course. Instead, the eminent professor takes his
aim obliquely, casually destroying his enemies as he walks by on
the road to a better understanding and practice of "humane" education.

In four letters to "a friend who sought his advice," the author
proposes to return to the classical and humanist ideals that he
believes should guide education in the liberal arts and
sciences. These ideals are lost, he contends, in the corporate
atmosphere of colleges and universities, with their emphasis on
administration, faculty careerism and student performance.
Verene considers the aim of college education to be self-
knowledge through study of all fields of thought. Education, in
his view, must be based on acquisition of the arts of reading,
writing and thinking. The teacher should master the art of
speaking. The class lecture (imagine! Verene advocates lecturing
in the grand old style) is a form of oratory that should be
presented in accordance with the well-known principles of
rhetoric.

The arguments in this book are elegant and simple, impossible
to resist and difficult to criticize. Moreover, the author
supports his argument with well-chosen quotations and references
to classic authors on the one hand and an appealing
demonstration of the art he is teaching on the other hand.
Verene is never nasty, but often sharp: "Administration is never
simply content to concern itself with the pure business of the
university, paying its bills, maintaining its buildings. It sees
itself as necessary to the process between teacher and student.
But it constantly interrupts that process... "

His criticism of teachers, administrators and the system itself
can be summarized in a few words: the real objectives of

education have been lost. But he never stops just there.
Instead, he goes on to explain how the art of teaching can be
(re)mastered and how the relationships between teachers and
students and between teachers and the college can be restored so
as to make humane education possible.

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THE ROAD OF EXCESS: A HISTORY OF WRITERS ON DRUGS

by Marcus Boon, Cambridge, MA and London, U.K.: Harvard Univ.
Press, 2002.
$29.95, ISBN: 0-674-00914-2.

Reviewed by George Gessert, ggessert@igc.org.

As an art student, I learned to use oils, acrylics, vodka,
marijuana and mescaline. I also tried video and morning glory
seeds. My education in art was partly an education in drugs,
which was rather common in the 1960s, and probably is even more
common today. What is the significance of drug use among
artists? According to Marcus Boon in *The Road of Excess,*
visual artists, writers and musicians, by experimenting with
drugs and by recording and reflecting on drug experiences, have
aligned drugs with scientific-materialistic culture in such a
way that they have become indispensable to its functioning.

The word "drug" has several meanings, two of which are
important in *The Road of Excess.* First, it can refer to
illegal consciousness-altering substances. According to this,
marijuana is a drug, but tobacco is not. A second, less
politically-circumscribed meaning of the word, is substances
that people take to alter consciousness, irrespective of legal
status. Boon here recognizes both meanings of the word. His
primary concern, however, is not politics, but the effects of
consciousness-altering substances on writing and culture. In
this review, I will use the word "drug" in the broad sense.

According to Boon, modern constructs of drug use began in late
eighteenth-century Germany. German romanticism was a rebellion
against scientific-materialistic culture, but a rebellion rooted
in the belief system it rejected. A key feature of German
romanticism was the search for transcendence without resort to
traditional religion. Novalis, who had tuberculosis and used
opium medicinally, came to believe that sickness and opium,
which arose from nature, could lead the soul beyond nature. "All
sicknesses resemble sin in that they are transcendences," he
wrote. He associated his own sickness with "excess sensibility",
or extravagant soulfulness which, like opium, was a way of
becoming God, hence a sin. However, sickness and opium use were
also ways of perceiving the world anew. This interpretation of
drug experience, as a material path that partakes of sin and
death, but transforms perceptions and can renew life, has been
with us in one form or another ever since.

Novalis sought a realm beyond nature. English romanticism
tended to be less idealistic, having arisen as much in reaction
to the horrors of industrialism as to philosophical materialism.
In Britain, however, drugs answered many of the same needs as in
Germany. De Quincy tried opium because he suffered from
neuralgia, one of those vague nineteenth-century afflictions
that may or may not have been psychosomatic. The drug relieved
his symptoms, but also produced sublime visions, which he found

irresistible. In *Confessions of an English Opium Eater,* he evokes the German romantics and presents opium as a gateway to hells and paradises free of the theological trappings of institutional religion. De Quincy also used opium to enhance the pleasures of music and social life, but even his recreational use partook of the sublime, because of extreme highs and lows, and addiction.

During the nineteenth century, many writers and artists experimented with opium and, after 1840, with hashish and coca. Boon mentions Coleridge, Delacroix, Daumier, Sir Walter Scott, Poe, Baudelaire, Balzac, Alexandre Dumas, Rimbaud, Conrad Doyle, Robert Louis Stevenson and Yeats, among many others. Opium and hashish not only tied romanticism to science, but spanned Europe and its colonies, infusing into Western consciousness molecules of the mysterious East. Records of opium and hashish dreams during this period are overrun with Orientalist imagery.

Science added to the possibilities. By 1850, surgery and dental work often involved laboratory-derived anesthetics. Emerson established the transcendentalist position on anesthetics (and all drugs), as "quasi-mechanical substitutes for the true nectar," but when Oliver Wendell Holmes experienced chloroform on a visit to his dentist, he was thrilled by the philosophical possibilities. Thoreau and Margaret Fuller also had chloroform experiences, but were more circumspect. Other writers explored ether, and William James considered nitrous oxide a door to the Hegelian absolute. In *The Varieties of Religious Experience,* James wrote "Sobriety diminishes, discriminates and says no; drunkenness expands, unites, and says yes. It is in fact the great exciter of the Yes function in man."

Most nineteenth-century writers conceptualized drug experience as travel through exotic and dangerous realms. Such travel was only for people outside of ordinary life: the desperately poor, the sick, aristocrats and artists. The height of Western opium culture was in early twentieth-century Paris. Among the smokers were Debussy, Satie, Apollinaire, Alfred Jarry, Colette, Proust and the young Picasso. According to Boon, this was a culture devoted to "pleasure, passivity, control, measure," whose core values were nineteenth century. World War I was the watershed. It put an end to the aesthetization of opium and other drugs and brought the contemporary legal-medical apparatus into play. Prohibition in one form or another has been with us ever since.

After World War I, a culture devoted to power, speed and death emerged. Its drugs, such as morphine and heroin, were stronger than opium, darker and more dangerous. The image of the drug-user as an aristocrat or aesthete was replaced by new stereotypes: innocents seduced and ruined, evil Orientals, potent blacks, human parasites, zombies. Drugs became weapons in race and class wars, yet the typical addict in the 1920s remained the same as in the nineteenth century, a middle-aged or elderly person who had become habituated in the course of medical use. Boon writes that "There has been no major advance in the narcotic literature [writing about opium and its derivatives] since the 1950s - or even the 1930s ... [because] ... the situation of addicts is roughly the same as it has been since World War I."

Boon divides drugs into five major categories: narcotics, that is, opium and its derivatives; anesthetics, such as ether and sodium pentathol; cannabis, especially marijuana and hashish; stimulants, which include coca, cocaine, crack, caffeine,

amphetamines and methamphetamines; and psychedelics, which include peyote, LSD, psilocybin, DMT and, in certain circumstances, hashish and opium. Some artists specialized: Paul Bowles and Louis Armstrong favored cannabis, while Jules Verne, Ibsen, Zola, Victor Hugo and Rodin preferred coca. However, many artists used a variety of drugs. For example, Proust used ether, belladonna, aconite, opium, morphine, heroin, barbiturates, caffeine and injections of adrenaline. (We don't know what was in that madeleine.)

Many writers create under the influence. Kerouac wrote *Mexico City Blues* and *Doctor Sax* on marijuana and *On the Road* on benzedrine. Ginsberg wrote the second half of *Howl* on peyote. Sartre took barbiturates, caffeine, and corydrane (a mixture of amphetamine and aspirin) and wrote *The Critique of Dialectical Reason* "under the effects of contradictory drugs." In 1963 and 1964, Philip K. Dick wrote 11 novels while on Semoxydrine, a methamphetamine. One of these, *The Three Stigmata of Palmer Eldrich,* is among Dick's most powerful works. W. H. Auden used benezdrine every day for 20 years, beginning in 1938. Voltaire is said to have consumed 72 cups of coffee a day, but the first writer to fully exploit caffeine was Balzac. He recognized that to make a living from writing, quantity of words was at least as important as quality. Coffee fosters relentless production through what Boon calls "technologically assisted dictation." Balzac reportedly consumed 50,000 cups over his lifetime and apparently used coffee to write almost all of his works. Coffee brings up a question: why ask which works of literature were created under the influence of drugs? Isn't the more relevant question: which works were not created under the influence? The list might be short, at least after World War II. I should say that I am writing this review on Mountain Dew, a mixture of caffeine and refined sugar.

Although the literature of drugs contains many instances of non-material transcendence, the imagery and techniques of what Boon calls "chemically configured" writing tends to favor a purely material outlook. What drugs offer is not escape from matter, but control, re-evaluation, and reconciliation. Drugs achieve this by dissolving rigid or overly simple ways of organizing experience and by flooding consciousness with new constructs (or, in the case of anesthetics like sodium pentathol, by revealing the nonexistence that coexists with the flow of consciousness.) This may explain why many mammals and birds seek intoxication: new ways of looking at things sometimes improve the odds.

Today people take drugs not only to experience extraordinary states of consciousness, but to feel normal. Prozac is only one of a host of consciousness-smoothers. I read in the newspaper recently that an epidemic of depression is sweeping the world, costing billions in lost productivity in every quarter, so anti-depressants may be the wave of the future. Boon speculates little about the future, although he mentions *Brave New World,* *A Scanner Darkly* and *The Three Stimata of Palmer Eldrich,* all of which envision societies shaped by drugs. He might have added Stanislaw Lem's *The Futurological Congress,* in which an invisible world government dispenses drugs through air and water to create mass hallucinations of everything from food and social mobility, to free choice and, for those rare souls who seek it, drug-free reality.

The Road of Excess contains a few errors. According to Boon, the concept of addiction did not exist before the nineteenth century. However, addiction was well-known much earlier in the

East. He writes that recreational drug use was invented by DeQuincy, but in Europe and the Americas tea, coffee, alcohol and tobacco were well-established as recreational drugs long before the nineteenth century. *The Road of Excess* might have been strengthened with a discussion of the British opium trade, which could have provided perspective on opium use in Europe. However, here Boon may have faced a choice between saying almost nothing and writing another book, given the enormity of British crimes in Asia and their unfamiliarity to most readers. Fortunately these omissions and errors do not compromise *The Road of Excess* as a whole. This is an important book about the role of drugs in our culture. *The Road of Excess* is also quietly hopeful. At least, that's how I interpret Boon's story of ongoing exploration, experimentation and discovery.

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LEONARDO 36:3 (JUNE 2003) - ABSTRACTS

ARTIST'S ARTICLE

Ruth Wallen: Of Story and Place: Communicating Ecological Principles through Art

The author argues for the importance of art in the exploration of ecological interrelationships. Art can help engender an understanding of and connection to the natural world, illuminate values and illustrate the myriad of ecological processes. Various artistic strategies used by the artist are discussed, including performances that document close observation of place, site-specific artwork that offers the opportunity to look at the natural and cultural environment in a new way, and digital imaging and web design that encourage a careful reading of representation through juxtaposition of imagery.

HISTORICAL PERSPECTIVE

Stephen Jones: Synthetics: A History of the Electronically Generated Image in Australia

This paper takes a brief look at the early years of computer-graphic and video synthesizer-driven image production in Australia. It begins with the first (known) Australian data visualization, in 1957, and proceeds through the compositing of computer graphics and video effects in the music videos of the late 1980s. The author surveys the types of work produced by workers on the computer graphics and video synthesis systems of the early period and draws out some indications of the influences and interactions among artists and engineers and the technical systems they had available, which guided the evolution of the field for artistic production.

ARTIST'S ARTICLE

Manfred Friedrich: Polarization Microscopy as an Art Tool: Border Crossing between Art and Nature

Until recently, polarization microscopy has been little developed as an art tool. It holds, however, an enormous aesthetic potential. The author first reviews the theoretical and technical background of polarization microscopy and then discusses how selected microscopic structures imaged via polarization microscopy can be represented according to the artist's individual aesthetic choices, the most important of which is color design by interference. The conscious perception of the pictures by the observer is discussed on the basis of our present knowledge of cognitive neurosciences. Polarization microscopy leads to a crossing of the boundaries between nature and the forms of non-representational painting.

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ARTIST'S NOTE

Steve Mann: Intelligent Bathroom Fixtures and Systems: EXISTech Corporation's Safebath Project

EXISTech Corporation's computer networks, control systems and image-sensor technology facilitate hygienic, touchless control of plumbing fixtures. Two of EXISTech's sensors are described here in detail: an active infrared faucet sensor and a passive infrared autoflush sensor. These devices allow internetworked plumbing systems to help facility managers and law-enforcement personnel remotely monitor the operation of bathroom fixtures. Intelligent fixtures and systems based on quantimetric sensing technology enhance the privacy of law-abiding users by eliminating the need for invasive policing of restrooms. New computer-vision algorithms also automatically detect accidents, as well as vandalism and contraband disposal, to assist remote monitoring by law enforcement.

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GENERAL ARTICLE

Valery Adzhiev, Peter Comninos and Alexander Pasko: Augmented Sculpture: Computer Ghosts of Physical Artifacts

This paper describes an approach to computer-based sculpting concerned with the creation and modification of digital models based on physical abstract sculptures. The authors begin by presenting a survey of current methods for the creation of computer-based sculpted artifacts. They proceed to present some original methods and tools based on the Function Representation of geometric models. They introduce a specialized computer language, called HyperFun, that facilitates the modeling of complex objects. In addition to presenting computer-generated textured and animated models of pre-existing sculptures, they also show how novel shapes can be generated using the HyperFun system. Finally, they outline two advanced projects concerned with creating a sculpture-based augmented reality that allows for the interactive participation of the observer.

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GENERAL ARTICLE

Ivar Hagendoorn: Cognitive Dance Improvisation: How Study of the Motor System Can Inspire Dance (and Vice Versa)

This paper describes several dance improvisation techniques inspired by the study of the motor system. One technique takes experiments on interlimb coordination from the laboratory to the dance studio. Another technique, termed fixed-point technique, makes use of the fact that one can change which part of the body is fixed in space. A third technique is based on the idea that one can maintain the action, as it were, by "reversing the acting limb." All techniques target a specific capacity of the motor system and as such may inspire new psychophysical experiments. The present approach to generating movements, which merges dance improvisation with insights from cognitive neuroscience and biokinesiology, may also be fruitfully extended to robotics.

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Following is an abstract of an article by Jonas Mureika, to be published in a future issue of *Leonardo.*
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MULTIFRACTAL FINGERPRINTS IN THE VISUAL ARTS

By Jonas Mureika, newt@desert.jsd.claremont.edu (W. M. Keck Science Center, The Claremont Colleges, 925 N. Mills Ave, Claremont, CA, U.S.A., 91711-5916),

G. C. Cupchik (Division of Life Sciences, University of Toronto at Scarborough, 1265 Military Trail, Scarborough, ON Canada M1C 1A4), and

C. C. Dyer (Department of Astronomy and Astrophysics, University of Toronto, 60 St. George Street, Toronto, ON Canada M5S 3H8)

The similarity in fractal dimensions of paint "blobs" in samples of gestural expressionist art implies that these pigment structures are statistically indistinguishable from one another. This result suggests that such dimensions cannot be used as a "fingerprint" for identifying the work of a single artist. To overcome this limitation, the multifractal spectrum is adopted as an alternative tool for artwork analysis. For the pigment blobs, it is demonstrated that this spectrum can be used to isolate a construction paradigm or art style. Additionally, the fractal dimensions of edge structures created by luminance gradients on the canvas are analyzed, yielding a potential method for visual discrimination of fractally-similar paintings.

A pre-print version of this article can be found at: http://desert.jsd.claremont.edu/~newt/fractal/

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CALL FOR PARTICIPATION AND ANNOUNCEMENT - DIGITAL ARTS HISTORIES

Digital Arts Histories - A Birds-of-a-Feather meeting at SIGGRAPH 2003 - 27-31 July 2003, San Diego, USA, Digital Animation Room

To be convened by Paul Brown on behalf of the SIGGRAPH Art Show
Tuesday 29 July 2003 - 12:00 noon

Check the B-o-F Board at SIGGRAPH for confirmation of time and
location.

This open-call B-o-F meeting is intended to bring together
members of the international community who are interested in or
involved with projects intended to archive, document and create
historical and critical analyses of the use of and impact of
computing and digital electronics in the arts. An early
announcement has generated a significant interest in this
meeting and it is hoped that several major projects will be able
to report briefly on their work.

One intended outcome of this meeting is the formation of a
committee to help plan an international workshop (in 2004) and
conference (in 2005) addressing these and related issues.
Another outcome is a special issue of LEA (Leonardo Electronic
Almanac), devoted to Digital Arts Histories, to be published
later in 2003. The convener - Paul Brown - is Visiting Fellow at
Birkbeck, University of London, where he is working on CACHe -
Computer Arts, Contexts, Histories, etc... an AHRB-funded
project investigating the UK history from its origins to 1980.

http://www.bbk.ac.uk/hafvm/cache/

For further information: mailto:paul@cache.bbk.ac.uk

For more about SIGGRAPH 2003: http://www.siggraph.org

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LEONARDO BIBLIOGRAPHIES

The Leonardo Bibliography Project (http://mitpress.mit.edu/LEA)
places bibliographies of interest to our art/science/technology
audience on our web site. Types of bibliographies include
reading lists for classes and courses of interest to educators;
detailed bibliographies on specialized topics (e.g. Art and
Biology); and bibliographies of single authors of interest to
our readership (e.g. Rudolf Arnheim).

Recent bibliographies of note are: "Virtual Art and Artists"
(compiled by Frank Popper); "Aesthetic Computing Dagstuhl
Workshop Reading List" (compiled by Jon McCormack); "The
Cultural Roots of Globalization" (compiled by Julien Knebusch);
and "Pierre Schaeffer: A Survey of the Literature" (compiled by
Carlos Palombini).

Readers interested in publishing a bibliography on our web site
should contact the Leonardo Editorial Office (isast@sfsu.edu)
with a description of the bibliography.

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LEONARDO CO-SPONSORS COMPOSING MESSAGES TO THE COSMOS: PARIS

WORKSHOP

A group of 20 artists, scientists, and scholars from the
humanities gathered in Paris, 23 and 24 March, 2003, to
understand how we might communicate the idea of altruism to any
intelligent civilizations that could be circling other stars
(see LEA Vol. 11, No. 4, April 2003 – Special issue edited by
Douglas Vakoch).

The workshop – "Encoding Altruism: The Art and Science of
Interstellar Message Composition" – focused on messages that
could be transmitted by radio waves or laser pulses. These
communication techniques reflect the methods used in the Search
for Extraterrestrial Intelligence (SETI), including the world's
most comprehensive search, Project Phoenix, being conducted by
the SETI Institute.

"As SETI programs become increasingly powerful, we need to
think seriously about what to do if we succeed. Should we reply?
If so, what should we say?" asked chair of the workshop, Dr.
Douglas Vakoch. "How could we convey concepts as seemingly
abstract as altruism or our sense of beauty?"

Participants from a dozen countries pondered these questions
and other topics, including creating interactive interstellar
messages; preparing for interstellar contact by studying animal
communication; explaining the logic of altruism; conveying
religious views of altruism through artificial languages; and
composing interstellar "music" inspired by the structure of DNA.

More information, including complete biographies and abstracts
is available online at http://publish.seti.org/art_science/2003/

The workshop was sponsored by the SETI Institute, Leonardo/OLATS, the
John Templeton Foundation, the International Society for the Arts,
Sciences and Technology (ISAST), and the International Academy of
Astronautics (IAA) Permanent SETI Study Group.

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MIR/LEONARDO COLLABORATIONS

Space-Art Database (on-line) Leonardo is developing a space-art
database with funding from the European Space Agency. MIR
participating artists are strongly invited to populate the
database with their entries. It is a multimedia database and
therefore open to still images, moving images, sound samples.

Publication in Leonardo Electronic Almanac (on-line) Date:
SEPTEMBER or OCTOBER 2003 Organizer: LEONARDO / OLATS Roger
Malina and Nisar Keshvani (editor of LEA) have made the proposal
to publish a special issue/section with the topic of the MIR
2003 Campaign. Each participating institution, artist and
participant will contribute a text that will be included in LEA

Space Art Conference and show of artworks, to be confirmed
(Paris, France) Dates: 4-5 or 25-26 October 2003.

The conference is part of a festival for Maison Europienne de
la Photographie (whose dates are 1 October-9 November 2003).
Annick Bureaud of OLATS will direct a 2-day conference about
"Zero G: The Art and Experience of Parabolic Flight" and launch
of the space art database. Jean-Luc Soret is the curator of the
exhibition and will make the selection of the artworks.

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OLATS NEWS

OLATS (Observatoire Leonardo des Arts et des Techno-Sciences):
http://www.olats.org

1 - Artmedia VIII : online publishing of the proceedings
http://www.olats.org/artmedia8.html

The proceedings of the International Symposium Artmedia VIII
are now available online. This constitutes an ensemble of 37
texts, some in both French and English, on art practices and
theoretical analysis in the field of Aesthetics of Communication
and Net art, reactivating discussions hold during the December
2002 symposium.

2 - New in Global Crossing: The Cultural Roots of Globalization
http://www.olats.org/setF12.html

Opening of the " Links " section of the FCM project. In this
section we present links to websites concerning questions about
globalization as raised in this project. We are linking to
websites concerning related events (symposia, exhibitions, etc.)
and to artists' websites presenting projects regarding planetary
issues and revealing particular relationships to global
dimensions.

New text on-line: "Mapping the Database," by Karen O'Rourke and
Sharon Daniel. This text presents two artworks (*Subtract the
Sky* and *Une carte plus grande que le territoire*), which
question our relationship to cartography. Cartography is
considered an intersubjective manner of sculpting information
and modeling communication.

The bibliography has been updated and new words have been added
to the "Mots de la Mondialisation." The latter part is available
only in French, but is worth a look anyway!

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LEONARDO/ISAST "ARTS LAB" REPORT RELEASED FOR COMMUNITY
DISCUSSION AND DEBATE

A study released in early May proposes innovative new
approaches and models for art and technology institutions. The
study, sponsored by Leonardo/ISAST and funded by a grant from
the Rockefeller Foundation, assesses the current international
landscape, lessons learned from recent programs, and new
opportunities that would allow art and technology development in
a viable and sustainable way.

"Arts Lab," proposes a unique hybrid art center and research
lab designed to be "fast, competitive, market-savvy, and not-for-
profit." Its goal is to be financially sustainable with little
compromise of artistic or research values. "Can it work?" asks
the Arts Lab website, where researchers and students have been
accumulating data since last September.

"Almost" answers project director Michael Naimark. "Several
unique opportunities exist for supporting tech-based art, such
as commercializing invention and tapping a new generation of
sponsors and collectors," Naimark explains. "But having art and

research 100% dependent on the commercial marketplace misses even larger opportunities. There are examples in Europe, Japan and Canada where a dose of public or not-for-profit support leverages more ambitious things to happen, both culturally and commercially. Almost nothing like these exist for tech-based art in the US."

Naimark, who spent 7 months last year in Japan, has since visited eight European cities plus several in Canada and the US to visit art centers with an interest in technology and research labs with an interest in art. "They come from different pasts and have different cultures," he said. "Also, these are particularly challenging times in terms of the economy. Everyone seems excited about the future but uncertain about the present."

"We've decided to make Naimark's report available online immediately," says Leonardo Executive Editor Roger Malina. "It's very timely, and we feel this is the time to rethink what works and what doesn't. This report will encourage healthy discussion and debate. Naimark has written it from the perspective of an artist and researcher who has worked within several of the key institutions in the field. His conclusions are based on this experience."

"Truth, Beauty, Freedom, and Money: Technology-Based Art and the Dynamics of Sustainability," a 40-page report, is now available at http://www.artslab.net

Leonardo/ISAST, whose publications are published in partnership with MIT Press, promotes the work of artists involved in contemporary science and technology and seeks to stimulate innovative work between artists, scientists and engineers. For further information, please see http://www.leonardo.info.

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LEONARDO AWARD FOR LIFETIME ACHIEVEMENT - CALL FOR NOMINATIONS

Leonardo/ISAST offers one or more awards every year to recognize outstanding work in the areas of art, science and technology. Following the vision of Leonardo founder, kinetic artist and astronautical pioneer Frank J. Malina, the Frank J. Malina Leonardo Award for Lifetime Achievement recognizes eminent artists who, through a lifetime of work, have achieved a synthesis of contemporary art, science and technology. Former recipients of this award include: Gyorgy Kepes, Nicolas Schšffer, Max Bill and Takis.

We want to hear from you, our associate members, to find out who deserves recognition for a lifetime of activity, exploration and achievement in art, science and technology. If you would like to nominate an artist/scientist for the Lifetime Achievement Award, please send an email with the name of the candidate and a brief statement describing your reasons for nomination to isast@well.com. All nominations will be sent to the Leonardo Awards committee for consideration. The recipient will be announced late in 2003.

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provides reading lists on emerging and key topics in the field.
The Leonardo Pathbreakers and Pioneers Art History Project
provides key primary information for art historians. The LEA
Archive provides comprehensive resource and documentation
information. Access to the password-protected archive is
provided with your LEA subscription.

LEA is creating an abstracts index listing of Masters and Ph.D.
theses in the art/science/technology field. Students interested
in contributing should contact leo@mitpress.mit.edu. LEA
maintains a discussion list open only to faculty in the field.
Faculty wishing to join this list should also contact
leo@mitpress.mit.edu.

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CALL FOR PAPERS: LEONARDO MUSIC JOURNAL VOL. 14 (2004)

"Composers inside Electronics: Music after David Tudor"

"In my electronics . . . I try to find out what's there - not
to make it do what I want but to release what's there. . . . The
object should teach you what it wants to hear." With this simple
but subversive recipe, David Tudor articulated a profound shift
in the aesthetics of electronic music. Inspired by Tudor (and
other composer/luthiers like David Behrman and Gordon Mumma) and
aided by the Lego-like modularity of integrated circuits, the
experimental music community in the 1970s adopted a new working
method based on seat-of-the-pants electronic engineering. The
circuit - whether home-made, self-hacked or store-bought but
scrutinized-to-death - became the score.

A generation later, aspects of the Tudor aesthetic have spread
well beyond the avant-garde: hip-hop, house and other forms of
dance music and electronica share a similar obsession with the
quirks intrinsic to specific pieces of audio gear. Every pop
producer has a signature gizmo. The latest software plug-ins
emulate obsolete but beloved hardware. We've become virtuosos of
Tudor's practice of listening to the object, but the regularity
and repetition of Techno could not be further from the tangle of
Tudor's music.

For this issue of the *Leonardo Music Journal,* we invite
authors to submit articles on any aspect of the work of David
Tudor (both in its historical context and as it applies to music
and art today), on the influence of Tudor's ideas on their own
work, or on the role of technological idiosyncrasies in their
composition, performance or production.

Deadlines:
1 November 2003: rough proposals, queries
1 January 2004: submissions of finished articles

Address inquiries to Editor-in-Chief Nicolas Collins at:
ncollins@artic.edu.

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ERRATA

In the April LEA (SETI Special Issue), we forgot to include the
e-mail address for Mauro Annunziato, author of "Hybrid
Ecosystems: Searching for a Language." His e-mail is

plancton@plancton.com.

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Publications, Opportunities and Announcements. It is accessible
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