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INTRODUCTION

by Wolf Gowin

ANNOUNCEMENTS

< About the Center for Design Visualization, University of
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< The New Leonardos >
by Roger Malina

The editorial office of Leonardo can be compared to an astronomical
observatory: as we receive information we become aware of emerging
trends and patterns within our universe of the art, science and
technology community. We receive hundreds of manuscripts, texts and
proposals each year. As the interest and activities of this
professional community evolve, so does the content of Leonardo.

It seems that a new trend is emerging: we are now receiving texts
from a new generation of artist-researchers, artists very well versed
in contemporary science or technology. It could be that some of these
artists over the coming years will not only develop significant art--
-and art forms---for our times, but may also make very significant
contributions to technological innovation or even to the testing of
new ideas in science. Perhaps we will look back some day and find
documented in the pages of this journal some of the early work and
seminal ideas of these "New Leonardos."

A number of factors are catalyzing the new situation. Institutional
barriers to art/science/technology work have been broken down through
a number of innovative programs worldwide. New sponsors in
foundations, corporations and governmental programs have begun to
support such work as well as the establishment of hybrid art-science
organizations. The shared language and tools of computer science have
provided the basis for shared approaches for problem-solving, new
collaboration environments and, ultimately, the beginnings of
overlapping epistemologies. And this new generation of artists has
been finding the necessary training and education to work
productively in these new areas.

The "weak claim" for these new approaches is that, through such
hybridization, "better" science, more rapid innovation and more
meaningful art is being produced. There are numerous examples of such
work both within the pages of Leonardo and elsewhere. A "strong
claim" would be that these approaches offer the promise of carrying
out science, making inventions and creating art that could never have
been achieved without such symbiosis between the very different
disciplines of art, science and engineering. If the strong claim
proves to be valid, then indeed we will start seeing the spectacular
work of New Leonardos.

Art, science and technology are very different disciplines and there
is no a priori reason why the strong claim should prove to be true.
Artists, scientists and engineers have different goals, different
working methods and success criteria, and different time scales and
institutional settings for the creation of work. It will take a very

long and sustained investment to create the conditions in which the New Leonardos can emerge, be recognized and have their work supported.

The cross-fertilization of artistic, scientific and engineering inquiry can be enhanced through a number of mechanisms. Ideas fleshed out within one discipline can be intentionally transferred and tried in another. Certain ideas can gain prevalence in the culture at large and emerge simultaneously in their application in many areas---one is struck by how the network model of the Internet is developing such deep metaphorical cultural validity in so many domains. Collaborative teams of experts can work together for shorter or longer periods on a common project. Experts in one discipline can be invited in as "outsiders in residence" to provoke "out-of-the-box" thinking within institutions with more focused objectives.

One important mechanism is the bringing together of collaborative teams working together for shorter or longer time periods on a common project. Although there have been a number of good examples of such work in the past 50 years, it appears that the Internet and associated information technologies enable new modes of effective collaborative work. In some cases this can lead to situations of true multiple authorship, situations where audiences outside the team can be critical to the development of the work, and even situations of collective creation and authorship. When "open source" approaches are followed, numerous individuals may contribute to a developing project in such a way that it becomes impossible to identify clearly the origin and development of particular ideas or innovations. It may be that the New Leonardos may not conform to the romantic/Renaissance model of the solitary creative genius, but rather provide a new model of invention and creativity in artist-driven teams and collective work.

It must be admitted that in all these situations, there is the continual danger that ideas may get diluted, rigor may suffer and second-rate work may be disguised in "cross-", "multi-" or "trans-" disciplinary clothing. Nevertheless, the emergence of New Leonardos, artists sufficiently well versed in science or technology to drive such cross-fertilization, is a new development that offers promise for the future.

Forty years ago, C.P. Snow decried the growing gap between the "two cultures." Subsequently, this journal, Leonardo, was established to champion work that bridged the cultural divides. At that time, the founder of Leonardo, Frank Malina, also laid out plans to start a society of artist-researchers, that is, an association of individuals who not only were active as professional artists (exhibiting and selling artwork) but also were professionally active as researchers (publishing scientific papers or filing technical patents). The list of individuals identified at that time was so short that it fit easily on a small paper napkin; and so Frank Malina shelved the idea of such an organization. Some of those unusual individuals, however, served and continue to serve on the editorial board of Leonardo.

Perhaps the time is ripe to re-examine the situation. Leonardo has been documenting the achievements of artists who work within research organizations, receive funding from traditional science or technology funding sources, exhibit their artwork in art shows while publishing their technical work in more scientific and technical venues, or are involved in long-term projects in teams whose goals are overtly scientific or technological. In other cases, individuals may have worked for a number of years in primarily scientific or research settings and at some point changed focus or objective and began to work in other settings with primarily artistic objectives. We will

continue to make the pages of this journal available to such unusual
individuals, while continuing to urge funding of agencies and
organizations to identify and support the work of these New
Leonardos.

Roger F. Malina
Executive Editor, Leonardo
E-mail: <leo@mitpress.mit.edu>

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           | LEONARDO JOURNAL      |
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< More Symptom than Cure---Conference Report: Moving Images:
Technologies, Transitions, Historiographies >
3-5 December 2000, Department of Cinema Studies of Stockholm
University, Sweden.
by Michael Punt. E-mail: <mpunt@easynet.co.uk>.

The term "moving images," for most of us reading this, has a limited
definition---it means the images that we see at the cinema and on our
televisions. Such an obvious point is worth repeating occasionally,
if only to remind ourselves that images also move elsewhere: in other
trans-national media such as the Internet (GIFs and webcams),
computer games and the like, as well as in the relatively local
realms of home movies and videos, artworks, museum displays, teaching
aids, street advertisements, road signs, mobile phone menus and
scrolling text messages (of which we sent 65 billion last year). The
number of technologies that make images move are equally huge. Film
projectors, video players and the various digital image processors
that are used to move the images before our eyes are the most
identifiable, but we might also want to consider those machines that
move our eyes before the image: escalators and travelling walkways,
various modes of transport such as planes, boats, trains, cars,
cycles and scooters, as well as swings, roundabouts, rollercoasters,
to say nothing of transcendental visions and spiritualist table-
turning and all the other techno/cultural experiences that were
supposed to prepare us for the invention of cinema.

Given the small place that cinema and television have in this
spectrum of moving image technology, it is perhaps surprising that a
conference called Moving Images: Technologies, Transitions,
Historiographies focused almost exclusively on television and cinema.
Of course, this is easily accounted for since it took place in the
Film Museum and was hosted by the Department of Cinema Studies at
Stockholm University (public thanks are due to John Fullerton and
Elaine King for making it happen). However, in view of its European
venue, it was not entirely clear why the conference was predominantly
concerned with those Hollywood films that manage to cross the
Atlantic and U.S. broadcast television (which most of us know only
through syndicated programs and channel-zapping for a depressing half
hour in a hotel room). But perhaps this too is to be expected as the
globalization of audio-visual economics and the apparently
unstoppable colonization in both academia and popular culture by the
English language erodes cultural diversity.

The limited methodology used to analyze these extremely limited
manifestations of moving image technology was perhaps the most
unwelcome aspect of what transpired. The orthodoxy of "Visual
Culture," as it was represented by high profile academics from North

American universities, dominated the papers and subsequent discussions almost exclusively, even when other kinds of evidence such as empirical data, biographical information or discourse analysis underpinned the presentation. Even the most grounded research based on artefacts and documents fell victim to the trend to make judgements based on interpretations of the evidence of an image. Two examples come to mind immediately. A slide of a drawing of Emile Reynaud presenting a moving picture show at the Musé Grevin in 1894 provoked an extended discussion of contemporary DJ "jamming" as a moving image technology simply because (in the drawing) the frock-coated Emile had each hand on a horizontal drum of film so that he vaguely looked like a DJ at a twin deck. Similarly, a painting by Edward Burne-Jones, a bastion of the mid-nineteenth century British Academy, was linked to the chronophotography of Edweard Muybridge and Jules Etiene Marey as well as to the 1911 Marcel Duchamp painting, Nude Descending a Staircase. The vast discrepancies between the images (small photographs, large paintings, monochrome, polychrome, etc.), the various channels of distribution and their reception were elided in a morphological resemblance of the images to the movie film strip, in which movement is recorded in small incremental changes (something of which we are inevitably unaware). Most easily masked by this approach were the various individuals' intentions. Duchamp's painting was, of course, intended as a criticism of Futurism (movement of the object relative to the artist) and an intervention in Cubism (movement of the artist relative to the object), while Burne-Jones' piece was intended as an endorsement of the Academy's ideas of craft and its repetitive teaching method in which practice made perfect (an artistic movement). Similarly, the great difference between what Muybridge intended to do with his photographs (moving object past a moving viewpoint for pictorial effect) and Marey's work (tracing the movement of the object for scientific purposes) was also reduced on the basis of the fact that the outcomes appeared similar. As with the Reynaud example, however, the basis of this judgement was on a visual resemblance between the images produced by various operators as they subsequently mediated in the presentation by way of 35mm colored slides projected on a screen.

Visual analysis is an invaluable tool for the cultural historian and critic, but it is not a panacea. Throughout the last century the circulation of mediated images in magazines, books, newspapers, films, television, videotape and digital communications developed exponentially in Europe and America. So too did personal mobility, which also amplified the visual information that could be---even had to be---experienced and decoded. Using spectacle, narrative and the illusion of movement, popular entertainments such as cinema and television evolved ingenious ways to include a great range of visual information in "easy-read" formats that evoke normal perception. Academic routines and publishing norms, however, have tended to reduce the complexity of experience to the prevailing conventions of the mid-nineteenth century as they were ossified by the single lens of a photographic camera. This has been so effective that although the movies are seldom confused with reality in daily life, in the discourse of the academy an image of an image is increasingly seen as indistinguishable from the original. The chief casualty of these limitations is that the three dimensionality of the solid objects that comprise the material world is lost. A history of moving image technology that includes the determining effects of architecture, sculpture and the appearance and design of other machines as they were intended to be experienced by the mobile viewer (as for example in Baroque sculpture, nineteenth-century tombs or the amusement park) now seems almost out of reach.

Moving Images: Technologies, Transitions, Historiographies was the last in a series of conferences to be held in Stockholm on the topic.

The department of cinema studies is to be congratulated in bringing together a group of leading scholars in the field around an issue that could reinvigorate a "Mid-Atlantic" film studies that seems increasingly deadlocked. Like all good conferences, it was productive in that its conclusion posed questions that need to be addressed as a matter of urgency. These have to do with the scope, limits and methodologies of critical, historical and theoretical writing about the cinema in response to shifts in technology since the subject was admitted to the academic curriculum. In the mid-twentieth century, the strongest social and intellectual justification for a critical engagement with any aspect of audio-visual history, including film studies, derived from the belief that the ways in which the world is mediated function like a cybernetic system so that the output has a determining effect on the input rather than the other way around. At times during the conference, early twenty-first century film studies seemed to be more a symptom of the disease it was expected to cure and one could only hope that this malign condition will not be terminal as new research conforms to dubious methods.

The challenge to film scholars and media historians presented by this conference is how, in our intellectual and academic maturity, we can manage to critically engage with the growing diversity of moving image technology without enforcing restrictive methodologies and interpretations that are blind to the determining effects of the media themselves. It seemed quite appropriate that, during the taxi ride to the airport, the driver talked non-stop about the weather. Instead of crisp white Swedish snow and snappy cold, there was grey drizzle and temperatures that made those of us clutching woolly hats bought especially for the trip feel rather silly. As far as the driver was concerned, the unusual weather was the consequence of global warming---yet more evidence of our contribution to nature's tendency to reduce diversity and chaos to similarity. Pointing to the "environmentally friendly" engine, he made us feel guilty about our own disappointment that Stockholm was beginning to look like everywhere else by reminding us of our own agency in resisting entropy.

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 |    LEONARDO DIGITAL REVIEWS    |
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There is something rather eerie about the major offerings in this month's Leonardo Digital Reviews: in various ways, there appears to be an underlying sense of the present delayed. For instance, there is Mike Leggett's review of Takahiko Iimura's OBSERVER/OBSERVED and other works of "video semiology," co-produced with the Banff Center for the Arts. This review has, for no apparent technical reason, been bouncing around the Internet for several months in a fragmented form. Fortunately for us we were, with Leggett's help, able to get all the copy in one place. The result is that there is now a second review of this work on the website, which should have preceded Fred Andersson's review, which we published in February. Exactly why portions of the text disappeared in one machine is a mystery, but there is a certain poetic reflection that it should happen to Iimura's

OBSERVER/OBSERVED. Leggett's review helpfully situates the historical and research significance of this video/CD-ROM package in the broader history of representation and technology.

Elsewhere, Frieder Nake notes a significant value in the delay in reviewing the International Compendium Prix Ars Electronica 1998 after two more have taken place. Not least is that, in retrospect, some patterns can be recognized and conclusions drawn that may add clarity to our sense of contemporary "art history." Finally, as Robert Pepperell points out in the beginning of his discussion of Robosapiens: Evolution of a New Species, the future in which robots take over the world has also been delayed. Speaking from a "Post-human" position, however, he sees a certain ambivalence in the apparent cheapness of emerging solutions to artificial human intelligence, and the funding resources that are making these possible.

As the various coincidences and technical glitches that have converged in this month's LDR confirm, the past, present and future are never quite as separate as we claim for the sake of convenience. That it is the immediacy of today's communication networks that makes this ever more apparent is something of a paradoxical determinant that the historians of contemporary art will have to factor into the wider picture. Leggett's review, published in full below, begins to put these issues on the agenda.

Michael Punt, Editor-in-Chief, Leonardo Digital Reviews
February 2001

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In this month's reviews:

< Books >

Robosapiens: Evolution of a New Species by Faith D'Aluisio and Peter Menzel
Reviewed by Robert Pepperell

International Compendium Prix Ars Electronica 1998.
Reviewed by Frieder Nake

< Multimedia >

Takahiko Iimura OBSERVER/OBSERVED and other works of Video Semiology, by Takahiko Iimura. Reviewed by Mike Leggett (see below)

Takahiko Iimura - Retrospective de films et de video SEEING catalogue (in French and Japanese), Galerie nationale du Jeu de Paume 1999.
Reviewed by Mike Leggett (see below)

Visit Leonardo Digital Reviews online to read these reviews in full, together with the latest postings, in LDR Raw as they come in.
<http://mitpress.mit.edu/e-journals/Leonardo/ldr.html>
Your comments are welcome at <ldr@Leonardo.org>

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Takahiko Iimura
OBSERVER/OBSERVED and Other Works of Video Semiology
Video and CD-ROM (Mac & PC), conceived, directed and edited by Takahiko Iimura. Co-produced with the Banff Center for the Arts.

Takahiko Iimura---Retrospective de films et de video
SEEING catalog (in French and Japanese), Galerie nationale du Jeu de
Paume, 1999. Essays by Daniel Charles, Takahiko Iimura, Nicolas
Villodre, Christophe Charles.

Distributed by Heure Exquise! and Nuit de Chine!,
<Exquise@nordnet.fr>. CD-ROM, 400 FF, catalog 150 FF + freight. Art
Metropole, <artmet@interlog.com>.

Reviewed by Mike Leggett. E-mail: <legart@ozemail.com.au>.

These selected works on CD-ROM cover the period of Iimura's work from
1975--1998. Together with the catalogue Seeing, from the
retrospective exhibition at the Jeu du Paume in 1999, both works
significantly cover the central core of Iimura's oeuvre. His work
with filmmaking was first recognized at the 1963 Brussels
International Experimental Film Festival and, by the end of the
1960s, he had begun to produce work with video and moved easily
between the two mediums until the 1980s and 1990s, when he completed
only one film but thirty-two videos.

The ontological project he has consistently pursued was much admired
by the British group of "structural/material" film-makers in the
1970s and was described by Malcolm Legrice in his 1977 book, Abstract
Film and Beyond, as being a "detailed examination of our perceptual
and conceptual mechanisms." Iimura has maintained this tendency with
contemporary projects, particularly the Observer/Observed CD-ROM.

What makes the newer medium of CD-ROM useful to Iimura's broader
project? Clearly, analysis that sets out to define "seeing" in
relation to sound, language and linguistics must provide the audience
with the ability to participate in a process involving concentration
and provide opportunity for reflection and even meditation. This work
allows users to pace themselves through a medium that is part
gallery, part lecture room, part catalog and part auto-analysis.
Ingenious linking, judiciously designed, enables the user to move
easily within a matrix of cross-referencing.

The three original video pieces---Camera, Monitor, Frame,
Observer/Observed and Observer/Observed/Observer---are presented in
digital format, providing a complete facsimile version of the
original video (in itself a collector's item). In addition, this
version goes further with the option to then enter the documentation
of each piece and navigate between animated diagrams ("Picture
Plan"), a storyboard ("Program") or a narrative description. These
are linked to one of the two essays written by Iimura: "The Visuality
of the Structure of the Japanese Language" and "A Semiology of
Video," which can be read in extract form or complete as discrete
pieces. Access to such varied but related knowledge makes good use of
interactive multimedia.

When the essential elements of cognition are applied to the
ubiquitous video/television image, the complex play ("see") between
the subject ("I") and the object ("you") are interrogated such that
each element (image/sound) is perceived (seen/heard) in relation to
the video (closed) system by symbolically creating a diegesis of the
moment(s) of recording. Spoken description ("I -- see -- you")
extends beyond these Vertovian principles, a la revenant, and
introduces the semantic distinctions between English and Japanese and
the separation created by the predicate verb being placed (in
English) between the subject and the object. The emphasis placed on
the subject/ego in the technology of language is mirrored, but
problematized, in the closed system of the video installation and

that of the camera/operator.

The Observer/Observed CD-ROM was made at the same time as another, Interactive: AIUEONN Six Features (which is also based on a video piece, from 1993), and provides the extension to the reflexive process that the time-based work proposes, enabling a practically active engagement with the work rather than an intellectual non-passivity. The work of other artists (Valie Export, Simon Biggs, Nigel Helyer, etc.), has also made use of this technology, but these have mostly been archiving projects, pulling images and text into a conveniently searchable and viewable form. Iimura's recent projects go far further in combining the rigor of earlier work with the accessibility and tractability of this interactive medium.

The catalogue of the Jeu du Paume retrospective is a significant addition to the French/Japanese bibliography on the artist and a useful adjunct to the CD-ROM for English readers, providing hard copy of the diagrams and storyboards employed and a highly detailed listing of biographical sources.

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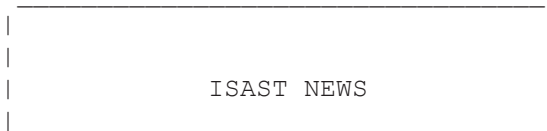
< Leonardo Virtual Africa Power and Spirit of Water Project: Miami Miautre >

The MIAMI MIAUTRE project has recently been linked to the Leonardo Virtual Africa Project, The Power and Spirit of Water. See <http://www.olats.org> for details on the Leonardo Virtual Africa Project.

Miami Miautre: Mapping the Virtual City
A project by the Florida Research Ensemble---Gregory L. Ulmer, Barbara Jo Revelle, William Tilson, John Craig Freeman
Contact: <gulmer@english.euf.edu>

Miami Miautre is an experiment involving the following elements:

1.   The Internet.
The Internet has been defined by Paul Virilio as the means of a potential "general accident"---a global catastrophe taking place everywhere simultaneously. The Internet is an institutionalization of the technology that has produced our "society of the spectacle," in which the image is said to have destroyed the civic sphere existing within the cities of modern nation-states.

2.   The EmerAgency.
A virtual, distributed, online consultancy, initiated at the University of Florida in 1998. The purpose of this conceptual agency is to coordinate the formation of public schools into a "fifth estate" that would allow students at all levels of education to participate in public policy formation by means of the Internet.

3.   Choragraphy.
This experiment tests a rhetoric of hypermedia formulated by Gregory Ulmer in his book Heuretics: The Logic Of Invention (1994). The rhetoric adapts for electracy the mnemotechniques central to pedagogy

in the pre-print era of literacy. It is a hybrid of inventional memory palaces and chorological cartography in which plastic arts methods were used to map regional locales. The neologism "choragraphy" signals the genesis of the rhetoric out of the encounter of architecture with deconstruction in the collaboration of Jacques Derrida and Peter Eisenman on a folie for the Parc de la Vilette in Paris. In this prototype, the Miami River is the basis for the design of an online "chora"---a holistic category made operational within digital imaging.

4.   Testimonial.
The proposed virtual consulting practice. The creative photographer Barbara Jo Revelle lived at an Inn on the Miami River for five weeks in order to attune the site---to discover the mood or atmosphere of the river zone. "Attunement" alludes to the tradition of "Stimmung," from Plato's TIMAEUS (the dialogue that introduced "chora" as the space of generation) to Heidegger's phenomenology. Revelle's mapping of the zone drew upon the poetic encounter perfected by modernist poets in Paris from Baudelaire's tableaux through Breton's NADJA and Walter Benjamin's dialectical flaneur to the drifting of the Situationists. The new element is that the modernist epiphany is literalized in the photographic image. "Crossroads" evokes an inner experience of recognition in the consultant by means of an external detail of the scene. The consultant witnesses the catastrophe of the zone, in an image that locates a virtual border or boundary--- logical, psychological, ideological.

5.   Interface Metaphor
The next phase of the project is to design a website that supports a virtual witnessing of the Miami zone (Miautre), and that is portable to zones in other communities. This interface between schooling and the Internet supportive of community witnessing of policy negotiations contributes to the formation of a civic sphere within the spectacle.

For further information on the Miami Mautre Project, see
<http://web.nwe.ufl.edu/~gulmer/>

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< Leonardo/ISAST Book Series Report >

The Leonardo Book Series mission is to publish texts by artists, scientists, researchers and scholars that present innovative discourse on the convergence of art, science and technology. Envisioned as a catalyst for enterprise, research and creative and scholarly experimentation, the book series enables diverse intellectual communities to explore common grounds of expertise. The Leonardo Book Series provides for the contextualization of contemporary practice, ideas and frameworks represented by those working at the intersection of art and science.

The Book Series continues to mature as a significant Leonardo publishing enterprise, the most recent book being The Language of New Media, by Lev Manovich. Soon to be released is Information Arts: The Intersection of Art, Science Technology and Theory by Steve Wilson. Five additional books have been recently signed: Making Cultural Machines, by Simon Penny; Desire to Descend Into the Image: The History of Virtual Art and its Future, by Oliver Grau; Visual Mathematics II, edited by Michele Emmer; Context Providers, edited by Victoria Vesna and the reprint of Linda Henderson's Fourth Dimension and Non-Euclidean Geometry in Modern Art. Developing new content terrain for the series is critical; therefore, a prospectus for the

Book Series was developed to help guide identification and selection of authors and an advisory committee has been established that includes Joel Slayton, Annick Bureaud, Michael Punt, Nicolas Collins, Roger Malina, Pamela Grant-Ryan and Margaret Morse. Leonardo/ISAST will also be working closely with MIT Press to develop and market the Book Series.

For more information, contact Joel Slayton, chair of the advisory committee, at <joel@well.com>.

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< Iannis Xenakis: 1922--2001 >
by Roger Reynolds

Iannis Xenakis: a musical voice without precedent. Born of Greek parents in Bra•la, Romania, 29 May 1922, he was sent to a boarding school on the island of Spetsai at the age of 10. There began the steeping in ancient Greek philosophy and drama which ignited and illuminated his creative acts throughout his life. Although he had early lessons in piano and music theory, his formal education culminated, rather, in science, at the Athens Polytechnic Institute, which he entered in the Fall of 1940. A year later, the impact of WWII was growing, and he joined the communist-led National Liberation Front, resisting first the German invasion, and later the British occupation of Greece.

Xenakis' music embodies inferential dimensions no other composer has managed to harness, dimensions only knowable, I think, to one whose very identity was branded by the indiscriminate violence of shrapnel during demonstrations in Athens on the last day of 1944. Three years later, after he had received his engineering diploma, political realities forced him to flee Greece, and to relocate, illegally, in France. There he began an association with the master architect, Le Corbusier; at first as a draftsman, then gradually also as a contributor to the design of, notably, the convent of La Tourette (1955) and the fanciful, tent-like Philips Pavilion (for the 1958 World's Fair in Brussels). Xenakis was a fiercely proud and egocentric being, and a dispute over what he felt was a denial of appropriate recognition for the design of this structure resulted in a rupture of his relationship with Le Corbusier (1959). Only then did he determine to focus his energies on composition, though architecture always remained, it was clear to me, an essential fascination for him.

His musical aspirations had been encouraged by contact with Messiaen in an analysis course at the Paris Conservatory (1950--52), but it was his own Metastaseis, for chamber orchestra (1953--54), that marked the emergence of a signature originality. It gave substance to his realization---nourished by architectural engagements---that sonic surfaces and masses could be *generally* asserted (as he would have it "out of time," which is to say as relationships not yet fixed in a concretization) as concatenations of straight lines, as statistical distributions of points (brief sounds such as string pizzicati). And

he made these surfaces concrete not only through the unprecedented sonorities of Metastaseis (by webs of glissandi, tendrils of sound with continuously varying pitch), but also in the hyperbolic paraboloid surfaces of the Philips Pavilion, and, later, in the conception of his other "polytope" structures.

In the 1950s, Xenakis' work attracted the attention of the Swiss conductor Hermann Scherchen, who championed his music and also began publishing (in his Gravesaner BlŠtter) the dense and daunting series of theoretical articles---on probability, stochastic processes, logic, sieves, etc.---which were eventually collected in Formalized Music (French edition, 1963). In 1962, Xenakis had been given limited access to an IBM computer, and had begun exploring the first of the two distinctive compositional algorithms he devised: Free Stochastic Music [FS]. The continuing need for a research environment in which he could test his musical theories led him to found EMMAMu (1966), and this facility metamorphosed, by 1972, into the Centre d' Etudes de Math□matique et Automatique Musicales (CEMAMu).

The particular insight that Xenakis told me he considered his signal originality---that the continuous variability of all of the dimensions of sound could be addressed in music---manifested not only in the unique compilations of vibrant, implacable sonic textures that characterize his compositions, but in an original interfacing concept (the UPIC System, 1978). This device allowed him---and untrained school children as well---to draw directly on an electronically monitored surface, describing to an attached computer not only the variation of pitch over time, but also the wave-shape identity (affecting the timbre) of the sound material itself.

Xenakis' work manifests an audacious and often a supreme command of materials and time; it bridges the humanely intuited and the mathematically engendered. It asserts the comprehensive, integrative vision that came naturally to him, that of the architect. He announced and celebrated the prospect of a conceptual consonance between the perspectives of music, science and philosophy. But the result of this consonance was unexpectedly *raw*: aroused by the mapping of presumed-to-be-non-musical phenomena into the sonic world, presenting him with sonic invitations that his informed ear then mediated.

Notable among his more than 150 compositions are Achoripsis (1956--57, for small ensemble), in which he established the conceptual basis for the computer automaticization of the ST series that followed; Herma (1960--61, for solo piano), written for the composer/pianist Yuji Takahashi, and first positing the link between the composer's uncompromising compositional methodologies and the performance athleticism that especially marked his solo writing; the flagrantly physical Eonta (1963--64, for solo piano and brass); Terretekthor (1965--66, for large orchestra), in which the audience and the orchestra members are interspersed; Nuits (1967--68, for 12 solo voices), asserted the characteristically harsh, folk-influenced intensity of his vocal music; a seminal work in this medium, Persephassa (1969, for 6 percussionists); La L□gende d' Eer (1977) a 46-minute, 4- or 8-channel, electroacoustic composition written for the Diatope construction at the opening of the Pompidou Center; the hallucinatory outcry of A•s (1980, for multi-registral male voice, percussion and orchestra); the string quartet Tetras (1983), which marked perhaps the apex of this composer's invention for strings; the texturally impish and infectiously rhythmic chamber ensemble work, Thalle•n (1984); GenDy3 (1992), a blistering electroacoustic piece which displayed the impact of his second major algorithm (Dynamic Stochastic Synthesis); and DŠmmershein (1993-94), the most impressive of his late orchestral compositions.

But whatever medium or methodology Xenakis embraced, whatever
strategies he employed, his intent was always, clearly, both
immediate (grippingly physical) and metaphysical (implying unnamable
things). In commencing the argument of Formalized Music, he wrote:

      Art ... must aim through fixations that are landmarks, to draw
[one] towards a
      total exaltation in which the individual mingles, losing his
consciousness in a truth
      immediate, rare, enormous and perfect.

The standard he set for himself is inimitable, the frequency with
which he met it astonishing. He is survived not only by his musical,
architectural and theoretical works, but by his spouse, the author
Franoise (Gargouil) Xenakis and their daughter, M‰hki. There will
not be another such voice.

Roger Reynolds,
Paris, March, 2001

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< Your Mind Is Your Best Fool: The Human Being and the Dilemma in
Relation to the Mental Environment and Art >
Wolf Gowin, Kronacher Str. 33, 12309 Berlin, Germany. E-mail:
<wolf1234@zedat.fu-berlin.de>.

The reason that understanding oneself and learning how to appreciate
art seems so difficult is because we are not taught how to do it when
we are young. In fact, we are usually taught exactly the opposite---
that the mental environment is a mysterious place that cannot be
understood. As a result, we end up defining mental components in a
haphazard fashion, without understanding either the relationship
between the components or the relationship that these components have
with the outside physical environment that determines how we
experience our lives.

Beliefs, dreams, thoughts and emotions are all separate parts of the
mental environment that interact in the same manner, at least
conceptually, as the way in which our hands interact with our eyes,
our fingers with our nose, or our lungs with our heart. We could
define the mental environment as a place where sensory information
from the physical environment is sorted, categorized, labeled,
organized, associated and stored. Here, beliefs are formed and
meanings are assigned. Such a definition, however, is limited---it
eliminates mental activities generated within and excludes the brain
as part of the mental environment, even though the activity of the
mental environment takes place inside of the brain.

The mental components are intangible, existing as energy. Energy does
not occupy space in the physical environment. This "no-space"
characteristic of energy gives it a non-dimensional quality, and the
character of our dreams clearly illustrates this non-dimensional
nature. The mental environment and energy also share the
characteristic of speed. In moments, one can scroll through all one's
experiences, regardless of how long it took to have the experiences.

In extreme situations, one can re-experience sights, sounds, tastes, tactile sensations, smells, feelings and emotions of one's entire life in a flash.

The most difficult concept to grasp about the nature of the mental environment is that it exists outside of time as we know it. To perceive time, two components are needed: space and movement. Our physical senses lock us into perceiving an environment bounded by the limitations of time and three-dimensional space. We are unable to go backward and experience the past as it existed in the physical environment; once it passes, it is gone forever. Nor can we move ahead into the future. What does exist are seemingly endless sequences of "now" moments in which we experience our lives. However, in the mental environment there are no spatial boundaries or time constraints; we can think in any temporal direction: past, present or future. The actual sequences of moments that exist in the physical environment have no effect on the energy in which our memories are stored. Sequences of time only have an effect on the mental environment relative to the impact the environment is having on our senses in energy terms. The attempt to reconstruct the last 24 hours, moment for moment, from our memory always ends with failure. Experiences are not recorded as moments of time but are rather stored as charges of energy and, as such, have no relationship to the passing of physical clock time. Our memories are like buckets of energy that we may organize chronologically without any restrictions on the truthful passing in clock time.

Essentially, our existence simultaneously straddles two different dimensions. We live in and perceive three-dimensional space and our physical senses are subject to the limitations of linear time, whereas we think in a dimension where time and space as it is perceived in the physical environment does not exist. This creates some very important psychological implications.

Each of our memories makes up a part of our identity, and because they exist as an energy form, they have the potential to act as a force on our behavior.

Positive energy, in a mental component, promotes growth or learning by creating a sense of confidence, which in turn results in an openness to explore. There is a direct inverse relationship between how much we have allowed ourselves to learn about the nature of the environment and the degree of negatively charged energy in our mental environment. In other words, an absence of fear is a critical factor in determining whether or not we will make ourselves available to learn anything new.

Associations seem to be a natural way in which we think. We associate experiences or knowledge with everything that has the same characteristics, and we link sensory information with some event of the past. Associations are an automatic function of the way in which information gets organized in our mental system. The pitfall is that we can hear, see, taste or smell things that cause us to feel emotions and yet not know why we feel this way because we cannot remember connecting the extraneous sensory information with the primary event.

Distinctions make separations in environmental information where no previous separation existed. The accumulation of distinctions is a learning process that takes time and intellectual capacity. In any given moment, there is a vast difference between what each of us perceives and what is actually available in possible distinctions from the environment's perspective.

At the most basic level, the world is transformed into electrical
impulses of energy: energy that carries information, as well as
feelings and emotions. Each first-time encounter creates a memory,
distinction or association that did not exist previously. Once we
learn something, mental energy will then act as a force on our brain
cells to recognize in the environment what we have learned about it.
When we perceive something, recognizing that we learned it already,
mental energy is acting as a force on our senses, instead of the
environment acting as a force on our senses. The meaning is already
in us. We tend to judge all subsequent events from the quality of
mental energy created by the primary event. What we experience of the
outside environment is shaped from the inside, not from the outside,
as most people would assume.

Beliefs create definitions, make distinctions and shape our
perception of environmental information by programming our senses to
select information that corresponds with what we believe. The belief
controls the information coming into the mental system. The
information that is actually perceived will be consistent with the
belief. The course of action taken will be consistent with the
information perceived and the subsequent experience will support and
reinforce the validity of the belief. A belief is not a fact of
reality, it is a belief about reality. Every belief system is a
closed system, inhibiting the flow of information into the mental
system. If we believe that things exist in only one, two or three
particular ways, then our beliefs will act as a natural mechanism to
block the acceptance of any conflicting information. In brief, what
we experience is shaped by what is already inside of us (mental
constructs such as memories, distinctions, associations and beliefs),
although such constructs may not be remotely close to information
that the environment offers us as a potentially new experience.

When we are in front of an artwork, for example, our belief system
acts as a mental management tool. The first filter determines whether
we will explore the work further. Then, instantaneously, without time
and space restrictions, memories of similar color and shape
experiences kick in and are associated with other thought systems and
feelings. As a last step, we come to approve of or dislike the
artwork.

Everyone has different reasons for such a decision, based on their
personal mental environment. Our initial experiences shape the
meaning and determine the quality of energy connected with it, and
once the meaning exists inside of us, it shapes our insights of the
external world as we pick and choose information and how we feel
about that information. This is why a group of people can all be in
the same exhibition, be exposed to the same artworks, and then
afterward describe the paintings/sculptures in different ways. The
exhibition does not choose the meaning that one places upon the
information offered; each individual creates his/her own experience
out of the situation presented. There are many alternate experiences
possible, each experience corresponding to the type of belief system
one may have. Therefore, by inhibiting the flow of information into
the mental system, beliefs do exactly what they are supposed to do---
they limit our awareness of data to avoid mental, psychological and
spiritual overload.

A perception and an experience have to correspond, since we cannot
experience something that we do not yet know about unless we are open
to the possibility that what we believe is very limited in
relationship to what the environment is offering. Refusing to
acknowledge the existence of these possibilities would be similar to
claiming that electricity did not exist before it was discovered.
When we continually argue for the status quo by defending what we

already believe we know, the environment will seem to constantly assault us, resulting in stress and anxiety. The outer environment becomes perceived as hostile because, although it offers us more to learn about the nature of how things exist, we simply refuse to learn.

Obviously, acknowledging that there is something we need to learn is not as easy as it sounds. Accepting that we do not know something or that what we do know is not very useful or effective presents us with one of the major paradoxes of life. The question is, How can we know what we do not know when what we have already learned will block our perception of what we have not yet learned? Once an experience becomes a component of our mental environment, it becomes a part of what is commonly believed to be our identity and is, therefore, beyond question. Our psychological makeup depends on this component, and our mind defends it.

Everyone assumes that what they have experienced and learned about the nature of how things exist is true and correct. The irony is that our version is correct by virtue of the fact that what is internal to us was initially experienced by our physical senses---if we saw it, read it, smelled it, heard it, felt it, tasted it or any combination thereof, we experienced it. However, not everybody's version is particularly useful or effective as a resource for interacting with the environment in a way that would lead to satisfactory outcomes. An even greater irony is that the more we accept the possibility that our version is not as effective a resource as it could be, the more we open ourselves to learning from the environment.

Since we cannot know what we have not yet learned and what we do know blocks the perception of other alternatives, we easily get caught in terribly unsatisfying life cycles, believing that this is all the world has to offer, when our predicament is merely the result of our inability to adapt ourselves. When we do allow ourselves to adapt, we learn that there are always more choices available than our beliefs will allow us to perceive. To adapt is to identify and actively change something that is already inside of us.

Learning is synonymous with change, whether we are changing something we already know or learning something completely new. If we refuse to change the inside, then we are not learning what we need to know to experience something different in the outer environment. If there is no change inside, there will be no perceived change outside, thereby locking us into recurring cycles of pain and dissatisfaction. We will continue to suffer until the pain becomes unbearable, leaving us with no choice other than to reassess how we go about managing our lives, that is, reassessing the usefulness of our beliefs.

How does all this relate to art? Art history is the greater part of the environment in which contemporary art exists and unfolds. Learning about the history of art, how we got to where we are, will help the person who values art as well as the artist to understand issues of technique, meaning (consensus of the time), concepts, composition, etc. What we do not understand in a work of art was already there before. What we have now has existed as various possibilities since the beginning of humankind. We are able to understand and appreciate even the toughest issues in life as well as in art by learning from the past and looking at the present. The past and the present will shape the environment of the future, both the external and internal environments.

In short, our intellectual capability is the best tool to change the fooling, status quo-defending mind.

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collaboration in architecture/engineering/planning, art/new media and
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have added to them to make them more useful. (The survey is
anonymous. Revealing your identity is optional and it will be kept
confidential.)

The survey consists of about 72 web-based questions, and comes in
four versions:

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See: <http://www.eprints.org/survey/ >

Many thanks,

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