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TECHNOLOGY AND DIFFERENCE II

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This issue is the second of two parts on the theme of "Technology and Difference." This part has two essays and two project reports. In the first of the two essays, Eugene Thacker writes on "genetic difference" and globalization. Second, Raqs Media Collective explores the specific history of biometric procedures, their implications in relation to the notions of difference and identity and their connection to modern biometric applications. After this, the reader will find the two project reports: first, Radhika Gajjala critically addresses "mappings of globalization" and their figurations in India, followed by Seda Gyrses's report from Germany on the attempt to engage "computing and race" within a feminist framework.

Part one of this issue (LEA Vol. 11, No. 10, October 2003) featured essays by Gunalan Nadarajan and Faith Wilding, followed by two project reports: one by Robert Bodle and one by Diana McCarty. The "Featured Artists" section of part one presents work by interdisciplinary artists Mendi+Keith Obadike. Please go to the LEA website (http://lea.mit.edu) to find both parts.

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Irina Aristarkhova is assistant professor of new media at the National University of Singapore. She teaches courses on new media aesthetics and technology and embodiment and conducts research in cyberarts and cyberculture. She is currently writing a manuscript, provisionally entitled "Matrixial Technologies."

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TECHNOLOGY AND DIFFERENCE: ESSAYS AND PROJECT REPORTS

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GENETIC DIFFERENCE IN THE GLOBAL GENOME

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I. Genomics is Globalization

We can begin from a proposition: the genome is global, because
it generates, distributes and manages bodily differences and it
does this through informatics.

If one were to characterize the flurry of writings on
globalization today, there are three aspects frequently cited:
the economic aspect, the political aspect and the cultural
aspect [1]. These are sets of practices that are realized in,
respectively, material exchanges, power exchanges and symbolic
exchanges. In this view, globalization is a combination of the
World Bank, the UN and Bollywood film.

This is not the space to debate such characterizations.
Instead, we can diversify our understanding of globalization by
suggesting that there is a significant fourth aspect: biology,
or the practice of biological exchanges. An example is genomics.
On the economic level, genomics is tied to economic exchanges in
the form of proprietary databases and patents on genes or
genetic technologies. On the political level, genomics is this
century's "big science," fulfilling the ideals of national
identity (the pride of U.S. industry) as much as serving as a
research base for pharmaceutical, agricultural and military
research. And on the cultural level, the genome seems to be
cropping up everywhere in science-fiction films: in mutants (*X-
Men*), genetically modified spiders (*Spider-Man*) and
epidemiological zombies (*28 Days Later*).

But more than this, what makes current biotechnology
interesting in light of globalization is its network
infrastructure. In an era of AIDS, Anthrax and SARS, we are
reminded more than ever that biology is a network. In this
sense, biology is always more-than-biology. A virus or
biological agent exploits transportation networks, communication
networks, institutional networks and, of course, infection
networks. It is tempting to call our modern epidemics the new
epidemiologies of globalization.

The aim in this article is to begin to address some of these
issues of what I will be calling the "global genome." Again, the
basic proposition here is that biotechnology is forming new,

flexible modes of regulation surrounding the genetic, molecular body and it is doing this through informatics. It is here that the concept of "difference" plays a key role, for it fosters both a universalizing and an individualizing tendency, culminating in a kind of bodily difference that is simultaneously genetic and informatic.

II. A New Body Politic?

In his essay, "Scales and Eyes: 'Race' Making Difference" [2], Paul Gilroy raises a fundamental problem in the current relationships between race and bioscience: how is the concept of "race" - traditionally based on a model of physical difference - being transformed by the dominant scientific views of biological difference in genetics, biotech and nanotech? As Gilroy suggests, the connection between race and science has always been an intimate one, a mix of reason and unreason, science and superstition (we have only to think of the discourses of degeneracy, hysteria and eugenics). If the dominant scientific view of the body is now a genetic one, then science becomes the lens through which the relationship between exterior and interior, macro and micro-scale, is articulated.

As Gilroy notes, "[t]he history of racism is a narrative in which the congruency of micro- and macrocosm has been disrupted at the point of their analogical intersection: the human body ... what does that trope 'race' mean in the age of molecular biology" [3]? On the one hand, it appears as though race is disappearing as the scale of scientific research becomes ever smaller. But Gilroy also suggests that this disappearing act within the sciences is really a reconfiguration of the ways in which biological difference is refigured.

To address this, Gilroy raises the concept of "epidermalization," borrowed from Frantz Fanon. Epidermalization signifies the implosion of bioscience and racism in strategic, often subtle forms. Epidermalization is the management of the boundaries that demarcate difference as biological (as "natural" and "essential"), but also as ethnicity (that is, plugged into extensions of nation, place and culture). As its name indicates, epidermalization is a kind of membrane-management: a regulation of what is porous, what is flexible, what is permeable and what is identified as pathogenic. In this sense, epidermalization is the process by which biological materiality becomes a racialized and politicized materiality.

The broad historical course of this shift, as Gilroy notes, is

from an early modern, anatomical view of the body (observable physical differences amenable to categorization), towards the modern, microscopic view of the body (the "nanopolitics" of genes and DNA). The order of anatomical difference and comparative anatomy brings together anatomy, colonialism and cultural difference [4]. By contrast, the innovation of microscopes and cell theory radically shifts the scale of corporeal difference [5]. When combined with Darwinian evolution and Galtonian eugenics, a strange, secret link emerges between molecular biology's "new synthesis" and the biologizing - or geneticizing - of race in the U.S. and Germany [6]. In this process, the body as a holistic entity, available to the totalizing gaze of scientific observation, disappears and is replaced by something else which, curiously, Gilroy does not go on to specify.

We can extend this by suggesting a third type of corporeal difference: the order of informatic or bio-informatic difference. The key examples here are the various genome projects, new diagnostic tools such as DNA chips and the intensification of the pharmaceutical industry (including controversial cases of biopiracy and IPRs). Early on in the twentieth century, non-visual health records (genealogies, tests from blood samples, etc.) formed a kind of informatics of health care in the U.S., especially when combined with demographics, the census and statistics of populations or ethnic groups [7]. Currently, with the biotech industry in full swing, the life sciences have more than ever become information sciences, in their use of genome databases, gene prediction software and other informatics-based tools [8].

This is the shift that Gilroy doesn't specify: the shift from an anatomical view of biological materiality to an informatic or bioinformatic one. The situation is made the more complex by the fact that DNA or genes are not "the body itself" - they are sequences and structures that materialize particular types of biologies. Contemporary genomics, for instance, is less about the encoding of the biological body, than about the transference of two related but distinct tropes - genetic "codes" and computer "codes." The connections with race and difference here are many, in spite of the non-representational, non-anthropomorphic nature of the informatic body. Genetic diversity studies, population genomics, SNP mapping, genetic screening, bio-patenting and other practices each process the data of the genome as something that is both universal (defined by species) and particular (internally differentiated through genetic variation).

III. The Population is a Database

This intersection of genetic and computer codes is related to
an earlier moment, in which "life" is reconfigured in the
political domain, through the lens of information. Michel
Foucault's work on biopolitics focuses primarily on the ways in
which the modern state incorporates the biological domain into
its notion of its citizenry [9]. This "biologization of the
state" involves approaching the population on the biological
level as a particular kind of species with quantifiable
characteristics, for Foucault a significant move away from
earlier notions of the state grounded in territory.

However, far from a homogenizing strategy, this modern form of
governmentality is predicated, for Foucault, on a dual approach,
which both universalizes and individualizes the population. As a
gradated approach, populations could exist in a variety of
contexts (defined by territory, but also by economic/class
groupings, ethnic groupings, gender-based divisions or by social
institutions) - all within a biomedical framework analyzing the
fluxes of biological activity characteristic of the population.
As a defined unit, the population-species could not only be
studied and analyzed (for medical reasons), but it could also be
extrapolated, its characteristic behaviors projected into
plausible futures (birth/death rates, etc.). The proto-
information sciences of demographics and, later, statistics,
provided a technical ground for a more refined, mathematically
based regulation and monitoring of the population (and thus of
the state's prime resources) [10].

This governmentality directly applies to current approaches to
genetic difference in the biotech industry. While the various
efforts to map the human genome were concerned with constructing
a universal, representative genome, genomics has also become a
thriving business in terms of genetic differences, or
"polymorphisms." Increasingly, pharmaceutical companies and
research labs are realizing that the most powerful discoveries
(and patents) to be made are not within the universal, single
human genome but in the minute markers - "single nucleotide
polymorphisms" - which distinguish different human genomes from
each other [11]. In this is the dream of a genetic medicine, in
which gene therapeutics or tailor-made drugs can be applied to
the specifics of the individual patient or group.

As we know, our genomes are about 99.9% identical, which means
that only 0.1%, it is estimated, accounts for the genetically-

based differences that distinguish one person from another. Politically, this either points to a utopian democracy or a totalitarian homogeneity, perhaps with little space in between. Scientifically, it certainly belittles the humanist strongholds of individuality, authenticity and identity. But, considering that there are over three billion base pairs in the human genome, and something on the order of 30,000 genes, that 0.1% translates into a significant amount of genetic difference, when we consider the body as a complex network of interactions (30,000 genes interacting in all possible combinations gives an exponentially large field of possible functions).

In genetic terms, then, corporeal difference amounts to polymorphism. Given this, we can identify two basic types of genetic differences or polymorphisms in current research and each combines genetics and informatics to produce a unique concept of corporeal difference.

On the one hand, the field of population genomics involves the study of distinct populations on the genomic level and the ways in which that population-genome differs from other populations and from "the" human genome itself. Population genomics often seeks out and works with populations that have a genetically isolated history, as this affords a purer object of study. For instance, deCODE Genetics is archiving, sampling and studying the Icelandic genome, which has a history of low-migration, a regular birth and death cycle and a low degree of cross-cultural breeding. Similar projects by other companies are focusing on Mormon, Newfoundland, Tonga and Estonian populations [12]. Companies such as these are hoping that the differences in these genetically-distinct population genomes will provide valuable clues in the genetics-based fight against disease, spearheaded by the pharmaceutical industry. If the Human Genome Project constitutes one level of universalism, population genetics refines this by creating a gradation of universalisms, based primarily on race - and the ways in which race is tied to hereditary history, nation and territory.

On the other hand, the individualizing part of the equation is the research into single nucleotide polymorphisms (SNPs) - those minute, single-base pair changes (that .1%) that combines to distinguish one person from another [13]. While population genetics spreads its genetic-sampling net broadly, SNP research provides a degree of specificity hitherto unseen in Western medicine. When combined with powerful diagnostic tools such as microarrays, SNP research promises to become a foundation for the new genetic medicine, in which therapies, drugs and

treatments are designed to suit the needs of a specific patient.
Because patients often react in a variety of ways to medication
through side effects, SNP research suggests that a more exact
fit between medical treatment and genetic disposition can make
possible a customized, personalized medicine.

All of this happens, of course, through informatics. Medicine
is as much an information science as a biological one, and the
hope is that we will be taken beyond the banal maintenance of
medical records, to the use of informatics tools to best profile
the treatments needed for a particular patient, and the degree
of predisposition to certain diseases. While at first this
appears to unveil the dawn of a truly individualized medicine,
it also transforms the biological patient into a "data-patient,"
a result of profiling and the setting of genetic parameters. The
result is that, for therapeutics, your data-patient will always
precede you; in fact your data-patient will diagnose you.

Population genomics and SNP research provide examples of this
universalizing and individualizing of governmentality. There is
no binary choice between an oppressive homogenization and the
difference of individual people. Rather, one of biotech's
virtues has been to constantly diversify itself so as to
accommodate changes (technological, social, etc.) while sticking
to some version of genetics' "central dogma" of DNA, genes and
proteins.

IV. Biomaterial Labor

As we have seen thus far, the very idea of bio-informatics and
the data-patient takes the shape of a coordinated, strategic
confusion of genetic and computer codes. But we still have not
fully commented on the advantages that such a notion
(universalizing and individualizing) has for biotech as an
industry.

One context is economic, with the genetic patent as its
paradigm. In particular, we want to point to one specific
relationship in the patenting of biological life. Alongside the
ongoing debates over genetic patenting laws, it is significant
to also note the ongoing debates over intellectual property in
computer file-sharing. These are, perhaps, the most fragile,
most ambiguous domains of the current discourse on economic
property - that of the copying of computer code (file sharing,
software piracy, open source) and that of the copying of genetic
codes (gene patents, GMOs). In terms of emerging notions of what
constitutes property, and what is or isn't amenable to patenting

laws, there is a tight coordination between the concepts of
information, property and "life."

What is the nature of this connection between information,
property and life? One connection between them is a specific
notion of labor. While a number of theorists have commented on
the ways in which labor has changed in light of the processes of
globalization and informatization, we can suggest that something
unique happens in the biotech industry [14]. While there are
laboring bodies in the traditional sense in the lab, and while
there is also an "immaterial labor" in marketing, IT services
and so forth, there is another labor which biotech instantiates.
This is the "biomaterial labor" of genes, enzymes and cells -
the context in which life is literally put to work. This labor-
power does not produce any goods, and it does not produce any
service - it continually, biologically, "naturally" produces its
own processes. The productivity of life-production is at the
core of biotech as an industry; this is why the new field of
stem-cell research is often called "regenerative medicine" - the
vision of a body whose only "technology" is the body's own
ability to regenerate itself continually. In the biotech
industry, labor-power is cellular, enzymatic and genetic.

But biotech is not only an economic affair, even in the last
instance. It is related to the ways in which the link between
the body and the subject are forged in a distinctly governmental
concern over the "population." In our current context, this
interest in the population has diversified, giving us population
genomes and individualized genetic medicine. One of the key
lessons of the global genome is that the biopolitical concept of
the "population" has been redefined along the lines of genetics
and informatics. The inter-connection of genome databases, new
research technologies, transnational pharmaceutical research,
normalization in health care systems and corporate public
outreach campaigns should impel us to look at the global genome
in its many contexts. When we view biotech in its integration
with infotech, we see how the concept of biological information
serves to constitute a global genome, in which the medical,
economic, cultural and governmental effects of biotech are
distributed in asymmetrical ways.

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MACHINES MADE TO MEASURE: ON THE TECHNOLOGIES OF IDENTITY AND THE MANUFACTURE OF DIFFERENCE

by RAQS Media Collective, Sarai: The New Media Initiative, 29 Rajpur Road, Delhi 110 054, India. www.sarai.net
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"... We may classify human beings and human features but cannot bring about or find a precise agreement between any two; we have white men, red men and yellow men; we have well ascertained and defined types of humanity; we have in each type classifications of hair, eyes, noses, mouths and so on; but we have a large residue of difference between any two individuals and so on; but a large residue of difference between any two individuals remains, as it were, a recurring decimal which cannot be distinguished; the difference between each human face and every other of its species. Upon which evidence of identity has been always so firmly rested can be easily observed, but it cannot be specifically and completely isolated. We know that it is there, but we cannot, in any case, completely define the details.

But in the case of finger impressions, there is no question of dealing with those evanescent expressions which so largely contribute towards recognition of the identity of the human face. The exact differences in such impressions may be pointed out with as much certainty as the differences between the maps

of two countries..."

– Emp. Vs Sahdeo – cited in K. J. Aiyer, *Law and Practice of Evidence in Criminal Cases in India and Pakistan* (Allahabad, 1949) p.461.

BODIES AND MAPS

Images of human beings construct a map of the world. Even the judgement in a criminal case has to rely on the metaphor of the difference between the maps of two countries when talking about the difference between two impressions of the ridges and whorls at the fingertips of two human beings. As if the body were a territory and its features possible to render as lines, ridges and whorls on a map. As if the body were a territory, the mapping of which would be the first step in its governance and in the subjugation of its boundaries to regulation and control.

Images of human beings, like maps of the world, locate like and unlike, near and far, familiar and strange. These categories, are premised in the sense of what we see as being similar or different to who we are, or where we stand – on our sense of orientation. It is through these that power creates the binaries needed to inscribe in our minds *its* map of the world.

When this happens, images of the body (or of clusters of bodies) can become weapons of offence and the instruments of a siege. They can be used to maim or injure, or imprison. No war or skirmish (local or global) is fought without its own arsenal of images. Images are endowed with the ability to create proximities and distances that can impel or sanitize acts of violence. Consider the aerial photograph used to identify targets for bombardment in cities, or the identikit photograph of the "Wanted" person that often sticks to the walls of cities. Both kinds of images carry with them the charge of an anticipated act of violence, a bombing, an imprisonment, perhaps an execution. Both act as indexes, as maps, as locators of targets and as the means to zero in on them. They are both navigation aids for missiles in the mind, and the radar that locates the enemy for the eye.

Consider the image of the typical "other," the one who renders a distance between anyone we say is like "us" and anyone we are accustomed to thinking of as unlike us. At its barest, it is a measurement of the distance – between us, and those we are mobilized to think of as being different, or exotic, or banal, or inferior, or superior, subhuman, or superhuman in relation to

us. At its barest, this is what the issue of identity and difference are about.

IDENTITY AND DIFFERENCE [1]

Identity (following Liebniz) is an assertion that two expressions are equal regardless of the values of any variables. Difference is the residue that remains when any two entities stand in a relation to each other such that all that is identical between them is subtracted out.

Any unambiguous statement of difference in human beings presupposes a certainty about identity. Similarities, such that they are available to the naked human eye and to experience, are at best evanescent and do not yield certainties. In fact, the problem for those who have sought to mark out differences are that certainties do not exist *sui generis*, but need to be harvested or produced in order that a clear distinction can be ascertained.

The uncertainty about identity is not a reflection of the cognitive impossibility of identity. In a philosophical sense, identity is an enigma, but it is not an impossibility. We can say with a sense of certainty that a person x is indeed x, but we may not be able to completely spell out the reasons for our certainty.

It is possible to recognize that a person x is someone distinct - from ourselves, from another person y and from all other persons - and to give voice to our recognition of x's individuality. However, it is almost impossible to exhaustively list what it is that makes us recognize x's identity. At best, we can make an estimate that x is indeed x and not y out of the constellation of perceptible physical attributes, our memories of x and x's actions and utterances, what we have been told about x, and our affective responses when we encounter or consider x.

This constellation contains many items of information that will overlap with other constellations that we attach to our cognitive and affective map of other human beings. There are things that we could say of x, which could also hold true for y - these could be physical, or affective, or to do with x's and y's place in society, or in our lives. We may even say that it is difficult to tell x and y apart, but our very recognition of their similarity is at the same time a statement about their difference. No two objects may be seen as having attributes that

are similar, or even identical, if they are not in the first instance, different. In other words, even if x and y are clones of each other, they still are x and y, or at the most, x and x-, but it would be meaningless to say that they are x and x. A person cannot be one and another at the same time.

This statement does require a caveat. Person x may not be one and another at the same time, except for circumstances where x pretends to be or is actively engaged in becoming, or is seen to be "possessed of," or is under the impression that he/she is someone other than what we and he/she understand to be x. This covers a wide range of behavior - performance, "self-improvement," masquerade and imposture, ritual possession, trans-gendering of the self. In each of these circumstances our sense of who x is needs to be glossed against what x is in the process of becoming, or what x has become, as distinct from the x that we consider as the ground against which the said transformation of the self occurs. It may be difficult or even unnecessary to construct a hierarchy of the veracity of x and the other iterations of selfhood in such cases, and the conundrum of which "person" is "true" may tell us less about the person, and more about our anxiety to fix an overarching identity in the face of manifest ambiguities.

This anxiety describes a desire to see people as if there were "original" and "fake" aspects to their being, and to their performance of their self. If we understand that the self is a narrative and a performance (how else can we know another if they do not narrate and perform themselves to us), then the desire to privilege any one of these narratives and performances as the "original" leads to an automatic relegation of all other iterations to the status of the counterfeit. This idealization of what is arbitrarily assigned the status of the "original" is something that is fixed by the observer and is in turn based on what is processed from the information that the observer harvests from the person encountered in a chosen context.

It is also possible that with time, things may be added or subtracted from the constellation that we have used to describe x. We may recognize x after 20 years even if x loses his hair, or a limb, and our feelings about x may change over time from affection to indifference to desire to hostility. Nevertheless, we are still able to satisfy ourselves that x is not y, and that the x we meet after twenty years is still the same x that we knew earlier. Our recognition of x's individuality, in its specificity vis-ˆ-vis others, and its diachronic continuity vis-ˆ-vis the x we knew twenty years ago, is a function of our

ability to comprehend the "inextinguishable recurring decimal"
that marks the identity of x to our eyes. Perhaps the only way
we can talk of how we access this elusive reality of the person
before our eyes is by referring to something of the order of
"insight."

Faced with these difficulties, we can say that the identity of
a person is something that we experience, intuit and surmise
more than we know. Knowing would mean the processing of
information from the body and the being of the person into a set
of fixed data that can act as a metaphorical barcode of the
person in question. Such a barcode is constructed by abstracting
a set of pre-defined parameters of what is needed to be "known"
and "made known" about the person. This process involves a
transformation of the experiential and the intuitive in relation
to the fluid ambiguities of a person, to a set of insensate
certainties that stay frozen. It is in order to achieve this
fixity that blue prints are designed for the machines that
measure man.

What are these measuring machines that render the differences
that can then be computed? What measures do these machines
undertake and which measures do they conform to? What makes
these machines, which are made to measure, work?

THE MEASURE OF MAN

In a photograph taken in the year 1876, 46 men, women and
children, aboriginal inhabitants of the Andaman Islands (an
archipelago off the southeast coast of India), are portrayed
arrayed about a single measuring rod. The rod, at the very
center of the image, stands in relation to the people about it
as a scale would to features on a map, or a silhouetted,
stylized human figure would to an architect's drawing of a
building. Perhaps, more crucially, the rod can be read as an
indexical allegory, or as a barely concealed code inscribed into
the image that ironically points to an imputed and immeasurable
distance that separates the photographed from the photographer,
or, man from his measure [2].

The photograph, titled simply and prosaically, *Andamanese
Group with Measuring Rod*, is one of a series of images taken by
Ernest Horace Man, as part of his project to study Andamanese
aboriginals, then considered to be a "pure" primitive race in
serious danger of extinction. E. H. Man's copious photographic
record paved the way for an intense process of the scrutiny of
the bodies of living and dead Andamanese (which lasted through

to the early years of the twentieth century and which continues, somewhat erratically, till today). They were photographed against anthropometric grids, clothed as well as naked, their skulls were measured with calipers, and their nostrils, ears, eye sockets, buttocks and hair were measured and tabulated on cross-indexed tables. The photographs, which were circulated as ethnographic studies, images in travelogs, items in popular encyclopedias and museum catalogs, illustrations in missionary literature and as pornographic curiosities, continued to have a career well into the late twentieth century.

The measurements and images harvested from the Andamanese were worked on to compute statistical averages - means and medians that could then express the idea of what an "average" Andamanese might be. This in turn could then be taken to express the "identity" of the Andamanese, a figure that could substitute a mathematical metaphor for the inconvenient tendency of the individual human body to exhibit variation. The figure of the measure of the "average" Andamanese - expressed through calculations or through photographic composites - was then something that could be compared to other "averages" to create clusters of information about niches within the social spectrum. Photographic composites of Andamanese skulls, for instance, were mapped on to composites consisting of the images of the skulls of Irish indigents, prostitutes, convicts and the criminally insane.

Finally, there were more photographs and measurements than there were people. The Andamanese became more data and less a living community of human beings. It could be said that the technology that indexed their "identity" and hence their "difference" to those who did the indexing also measured out the terms of their subtraction from life, until they remained only as the ghostly prisoners of photographic negatives in the collections of anthropological museums and archives. The measure of man in the end became a calculus of cadavers - a detail in the arithmetic of violence of the nineteenth century.

THE SMEAR OF TRUTH

If anthropometry sought to compute an average that flattened differences in the name of a composite image of an identity, then fingerprinting, another way of reading the body for signs of identity, sought to locate and fix the individual as a unique and unvarying entity [3]. Nineteenth-century India, which was one of the greatest anthropometric field laboratories in the world, was also the prime experimental site for the development

of technologies for registering and interpreting fingerprints, and the rise of fingerprinting as a precise forensic science.

From the pioneering usage of fingerprints as identity markers in land records in the village of Jangipur in the Maldah district of Bengal, by James William Herschel in 1858, to Francis Galton's enthusiastic "anthropometric" endorsements of Herschel's experiments, to the systematization of forensic fingerprinting (along with "Bertillonage" or anthropometric measurements after the manner of Alphonse Bertillon) by Sir Edward Henry, Azizul Haque and Hem Chandra Bose of the Bengal Police in 1897, a rich body of knowledge about the principles that animated technologies of identification was created. In a sense, the techniques of ruling through information that were perfected in the colonies were then exported to the metropoles and thereafter became generalized as the standard technologies for the affixture of identity and the recognition of difference that we have come to know today on a global scale. Had the early experiments with anthropometric image-making not been undertaken in remote parts of the world, or the intense desire to read the smears of fingertips as markers of truth not taken root in the minds of colonial administrators in rural Bengal, the techniques of biometric identification and surveillance that we have become familiar with in recent years all over the world would not have had such a smooth and untrammelled career as the necessary exigencies of power, articulated as knowledge in and about bodies, read as maps and subjugated as conquered territories.

It is important to understand that this anxiety to produce certainties about identity emerged from a deep cognitive gulf that separated power from its objects in colonial Bengal. To the rulers of the day, the "natives" they governed were infamously disingenuous. Their "un-veracity" and the desire to confuse those who ruled them was a matter of great concern to administrators, judges, prison authorities and even to those assigned with the tasks of collecting taxes and revenue. Thomas Babington Macaulay once famously remarked - with some exasperation and considerable rhetorical flourish - "What horns are to the buffalo, what the paw is to the tiger, what the sting is to the bee, what beauty, according to old Greek song, is to woman, deceit is to the Bengalee. Large promises, smooth excuses, elaborate tissues of circumstantial falsehood, chicanery, perjury, forgery, are the weapons, offensive and defensive, of the inhabitants of the lower Ganges..."

It was against these weapons, this modest arsenal (deceit, circumstantial falsehood, chicanery, perjury, forgery) of

everyday insurgencies in the offices, courts and corridors of
power that the emergent colonial state invested into the
development of an armory for ascertaining identities and
recognizing differences. That this project of ascertaining who
was "what" took place at the broadly anthropological level (as
in the case of the Andamanese and many other ethnic groups
spread across the South Asian landmass) as well as the
microscopically forensic level (as in the case of the Bengali
peasant) tells us about the scope and pervasiveness of this
anxiety.

THE INEXTINGUISHABLE RECURRING DECIMAL

It is difficult to imagine why or when and under which
circumstances one would like to yield a complete transparency
about oneself to the scrutinizing apparatus of power. However,
the increasingly fraught operation of power in society requires
the harnessing of exponentially amplified means of visualizing
us as transparent vessels of bodies of data. This means that the
slightest shadow, the smallest reticence or hesitation in
yielding the substance of our selves and the iteration of our
selves through actions, encounters and interactions with others,
is liable in many places today to be read as "deceit,
circumstantial falsehood, chicanery, perjury and forgery." This
is the means by which the true test of citizenship is not a
level of commitment to and participation in the polis, but the
degree to which the subject is prepared to make him or herself
known to the state. This votive offering of knowledge about
ourselves to the guardians in power then guarantees us a place
in the polis, and a certainty that we are what the state says we
are, and distinct from those aliens that it seeks to protect us
from.

In an early book of the *Mahabharata*, one of the great epics
in the Indic tradition, Ekalavya, an aboriginal teenager, is
found copying and practicing the education being imparted to the
Aryan warrior princes, the Pandavas, the protagonists of the
narrative. Their teacher and guardian, who is concerned that
Ekalavya has greater mastery over the art of archery than his
favorite pupil - the Pandava prince Arjun - demands of Ekalavya
his right thumb as *Guru Dakshina* (a gift that every pupil must
make to his teacher on the completion of his education).

Ekalavya, bound as he is by the protocols and codes that govern
the transmission of knowledge in society, cuts off his thumb
(the one with which he grips the bowstring) and offers it to the
guardian. The subaltern exchanges his mastery of archery for the

knowledge that the warriors will always be different from him and that it is his identity as a lowborn aboriginal that will underwrite this difference. The difference will locate him, as well as them, in the places assigned to them by the guardians of social order and his bloodied thumb seals the terms of this inexorable contract.

The subaltern Ekalavya's bloodied thumb (the first demand for a digit as a mark of identity) remains with us as a resonant smear of the truth of power. Ekalavya's thumb, which guided his grip over the bowstring, can be seen as a symbolic place-holder for the inextinguishable recurring decimal, which makes the low-born aboriginal teenager similar to the warrior princes by the same logic that makes all human beings similar or different from other human beings - their individuality. It is that complex interplay between their genetic inheritance, their social experiences and environment and their specific desires. The rounding off of this digit, this inextinguishable recurring decimal to the nearest available whole integer, marks the "identity" of the subaltern, and the clear "difference" of the subaltern from the prince. The bloodied smear of the truth produced by the apparatus of identification tells Ekalavya, overriding all ambiguities, who he is, who he is not, and what he never can hope to be. A technology of location, registration and the production of knowledge does successfully extinguish the obstinate recurring decimal. The digit is cleaved from the body and Ekalavya, like all of us when we give up all our digits to the state, loses the means and the skills acquired with effort to defend himself.

What the technologies of identification do not take into account, however, is the ability of a person to enact different iterations of the self. Crucially, this means that the story of personhood and the narratives of identity that gather around a person are material available for constant re-fashioning. It means that the question of identity can also give rise to a hyperlinking of aspects of being - an expanding and cross referencing matrix of acts, attributes and attitudes that constitute the database of a person's "becoming" over time. Thus, even if Ekalvya's amputated right thumb is an emblem of the way in which a discourse of power wishes to reduce his identity, it cannot guarantee that Ekalavya, in some other narration of his story, may not decide to learn to use his left hand.

The identity of Ekalavya, then, is something that emerges from the relationship of two kinds or enactments of selfhood. It is

something that bridges the person whose right thumb got cut off
and the person who decided to learn to use his left hand and
cultivate a left-handed knowledge of the world. The
inextinguishable recurring decimal by its very nature resists
being rounded off to the nearest whole number and continues its
fractal dance on the adding machine. This takes us back to the
person x who cannot but continue to transform himself/herself,
and whose process of transformation holds in abeyance all
attempts to frame his/her identity in a timeless embrace. Let us
call x, Ekalavya.

Ekalavya's effort with his left hand may give rise to
speculations in some quarters about the distance between the
"original" and the "counterfeit" Ekalavya - the first, the
devoted disciple willing to efface himself out of deference to
the knowledgeable guardian and the second, the one who goes
against the "moral of the story" and rises above or beyond his
"station" to be something or somebody he never should have been.
This is not to say that the "fake" Ekalavya, who keeps the label
of his name but changes the content of his person, does not have
an identity. However, this identity is something that he
fashions, taking something from a story already told about him
and something from a story yet to be told, in such a way that it
is impossible to construct a hierarchy of veracity. What he is,
what he is reduced to, what he desires and what he becomes, are
impossible to place along a graduated scale of more and less
truth. They tell different truths about the different acts of
personhood that are possible to imagine on the ground of
Ekalavya.

EKALAVYA'S LEFT HAND

In these random reflections, we have tried to sketch an
itinerary that moves from a set of fading photographs in the
basements of archives, to the thumbprints on a ledger of
landholdings, to a strange story about a bloodied thumb. These
digressions have been a way for us to think about the present we
find ourselves in. A climate of paranoia about national security
has made it possible for key factions within the Indian state to
argue for the creation of a nationwide citizens identification
database tied to a system of smart cards containing biometric
data about every "legal" Indian citizen. This apparatus, which
is being touted as the solution to all problems ranging from
terrorism to the crisis of identities within contemporary India,
is in our eyes the worthy inheritor of the legacy that produced
Ekalavya's thumb in mythic antiquity, the measuring rod amidst
the Andamanese in 1862, the fingerprints of the peasants of

Jangipur in Bengal in 1858 and the system devised by Henry, Haque and Bose of the Bengal Police in 1897. In a single digital move, it is able to forge a solution to the problem of identity that bridges the realities of the twenty first century, the history of the colonial era and an ancient fable.

A continuous state of emergency (what Agamben has characterized as the state of "exception" peculiar to our contemporary reality) produces its own specific sense of fatigue – an exhaustion that comes from remaining alert to yielding oneself up to acts of random or routine scrutiny. This wakefulness and watchfulness, this baleful insomniac rendition of the self into units of meaningful information, is the unexamined personal collateral damage of the rise of a global apparatus of interlocking security and surveillance systems.

For some time now, many parts of the world, particularly those that are governed by the imperatives of the global war against terrorism, have learnt to live with a state of emergency, a moderate intensity level of panic and anxiety that makes the predatory excesses of the scrutinizing eye seem banal by the mere fact of exhausting repetition. And so, we succumb. We do so not only at airports and border posts, but also at workplaces and public spaces in large cities the world over, to routine and random searches of our persons, to scans, registrations, surveillance and recordings of the traces of our actions, our encounters with others, our presences and transiences, our itineraries, purchases and decisions, our intimacies and our public acts, our utterances and our secrets, our habits and our desires – the minutiae of all our lives.

We see surveillance, particularly new technologies such as facial recognition, retinal tracing and biometric scanning, as performing a similar set of operations to those undertaken by early anthropometry and fingerprinting. The body as data is also put to analogous uses, especially for "racial profiling" at airports and other transit points, just as anthropometric photographs were used to substantiate elaborate theories of racial typage. The intensive application of surveillance technologies at public places, work, and even in the home or in the private sphere leads to a monitoring of thought and affect to a degree that suggests that we can now begin to speak tentatively of an "anthropometry of the soul."

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3. For a history of fingerprinting in India, see *Imprint of
the Raj* by Chandak Sengoopta (Macmillan, London, 2003).

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Raqs Media Collective (Jeebesh Bagchi, Monica Narula and
Shuddhabrata Sengupta) is a group of media practitioners
working in new media, video, sound, photography and text. The
collective is based in Delhi. Together with Ravi Sundaram and
Ravi Vasudevan, Raqs co-founded Sarai (www.sarai.net) at the
Centre for the Study of Developing Societies, Delhi. Their work
includes the installations *5 Pieces of Evidence*, *Co-
Ordinates of Everyday Life - 28.28N/77.15E::2001/2002*,
Location(n), *A/S/L* and the *Temporary Autonomous Sarai* (in
collaboration with Atelier Bow Wow, Tokyo), amongst others. Raqs
has exhibited at the 50th Venice Biennale, Documenta 11, Kassel,
Emocao Artifical, Sao Paulo, Generali Foundation Gallery, Vienna
and the Walker Art Center, Minneapolis.

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< PROJECT REPORTS >

TRAVELLING ALONG DATA'S HIGHWAY: WHO GETS MAPPED OUT?

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"Who has the Internet empowered? What has been the process of
it, and how relevant is that process for, say, Venkatavva, a
dark brown Third World woman in India? Venkatavva, in Adilabad
in rural Andhra Pradesh, has seen the advent of roads, cars,
telephones and television in the short 30 years of her life, and
understands the advantages as well as disadvantages and the
illusion of access they give her. In a land of faulty cables and
unpredictable electrical supply, her children drink milk on the
days that the bus doesn't run, because on those days the milk in
the village can't be taken to the city and isn't worth money.
Modern technology holds no bogies for her, she has choices that
many women in the north don't have access to. On days the
electricity fails, she watches the traditionally performed story-
telling enacted in the village square instead of the distant
Santa Barbara on television. As of today, the quality and
quantity of her available choices are based as much on the
failure of technology, not its success. So, would modern
technology be working towards more quality and quantity in
choice or less? What, then, is the process by which a Venkatavva
is empowered?"
- Annapurna Mamidipudi, 1999 [1].

Software design, like railway tracks and overpasses, only
allows the mapping of globalization through certain routes, and
only for some populations of the world, allowing a mobility for
the transnational elite that is predicated on the immobility of
others. As has been noted often enough, it is no accident that
the metaphor of the information superhighway is what is most
often bandied about in relation to the Internet. Current
manifestations of the global village have no real or virtual
roads to places where there is no software, thus making it
possible for us to indeed make the claim that all roads lead to
software.

Writers such as Nigel Thrift have pointed out that "wherever we
go in modern cities, we are being directed by software . . .
[and] these programs have come to run cities in very strong
ways, and to direct human bodies around them" [2]. A key factor
to note in relation to software is that, while the ways in which
software is prevalent in urban locations can perhaps be mapped
through circuits of software use, the hidden ways in which
software is routed around certain geographic, socio-cultural and
economic spaces is not as obvious. Therefore, the implications
of software becoming a key technology of government and world
economies continues a "modern" and colonial legacy of
eliminating skills, communities and cultures based in modes of

production and everyday life that are not connected to or find
no entry point into the software-networked "global" society.

This project is centered around a questioning of existing
design of technological environments in order to understand how
the *process* of technological change in the Internet era
influences the way we organize economic activities and the
implications of such organizing of economic activities. Such a
critique might lead to the engagement with issues and concerns
of marginalized populations all over the world, for whose
benefit, the Internet as it is, does not work. Further, the
interweaving of socio-cultural and economic activity in relation
to e-commerce and various other types of cyberspaces invokes
multiple connections and complicities within processes of
globalization. As Amitava Kumar points out, "It is precisely the
Internet and computers, which were supposed to produce a
borderless world, that have thrown up, [in Silicon Valley], a
racially marked sense of the local" [3].

Processes of globalization rely on a complex layering of
discourses related to information technology, lifestyles based
on the celebration of globalizing consumer cultures as well as
on the seemingly contradictory invoking of national culture (as
defined through postcolonial bourgeoisie nation-building
ideologies), as exemplified in the various discussion lists and
websites that recreate religious and other cultural and
nationalist utopian discourses.

The purpose of our project is to open up theoretical
considerations for continued attempts at mapping these
connections. Such connections can be mapped at various
local/global intersections and every such contextual analysis
will reveal the various ways in which these work together and
contribute to the production of power relations within which
discourses and practices of globalization are situated. One such
local/global intersection that will be investigated in this
project is a continued examination and comparison between rural
Indian technological environments based in communal needs and
urban high-tech environments in India and the U.S. Previous
dialogues leading up to this project can be found in Gajjala and
Mamidipudi (1999) and Gajjala and Mamidipudi (2002)[4].

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AUTHOR BIOGRAPHY

Radhika Gajjala is associate professor in interpersonal communication and communication studies at Bowling Green State University. She teaches courses and workshops on cyberculture, building cyberfeminist webs, performing digitally mediated identities, humanistic research methods and feminist research methods in communication. Her research interests include new media technologies, critical theory, feminist theory, transnational communication and postcolonial theory. She is a member of the Spoon Collective and runs a few lists related to gender and postcolonial theory. Her publications appear in journals such as *Feminist Media Studies,* *Gender and Development* and *Works and Days* and in books such as *Technospaces: Inside the New Media,* edited by Sally Munt.

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EXPLORING THE QUESTION OF RACE IN FEMINIST CRITIQUE OF COMPUTING AT THE FINUT

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At the end of May 2003, the conference FiNuT (Frauen in

Natuerwissenschaften und Technik) [1], this year entitled
"standard:abweichung," took place in Berlin, Germany [2]. The
participants of the conference were invited to question the
position of scientists and engineers as producers of standards
and systems of deviance. The following is a report of the
workshop I offered at the conference, entitled "Exploring the
Question of Race in Feminist Critique of Computing" [3].

The main goal of the workshop was to bring questions of race
and class into the existing feminist critique of computing [4].
My suggested method is to look at the building blocks of
computing, to discuss the assumptions in terms of gender, class
and race made within these building blocks, and to analyze how
these assumptions are repeatedly reinforced within computing.
Approximately ten women with backgrounds in computing took part
in the workshop. All participants found it important that issues
of race and computing be discussed. At least half the group
stated that they had prior experience with race theory or were
part of anti-racist political projects.

In the first part of the workshop, we wrote on the board the
words "science", "technology" and "computing", added expressions
we associated with these words and analyzed how these were
gendered. The participants were well-versed and actively
attributed the expressions to gendered categories. In the second
part of the workshop, we read excerpts from texts on race and
gender. When we started discussing the texts, two things
happened. First, the participants were disturbed by the use of
the word "race." Second, the language of our discussions
switched from a colloquial to a theoretical one.

The German word for race, "rasse", has a very specific use and
connotation in Germany. I therefore asked the participants to
propose another word or, otherwise, to use the English word
"race." The participants consequently shifted the discussion on
"race and gender" to a discussion on the use of language. My
attempts to come back to the topics of race were resisted. I
asked the participants why they found - in comparison to the use
of a gendered vocabulary - that the vocabulary around race was
so difficult to adopt? Some of the participants suggested that
their positions in the hierarchical structures played a role in
their reactions. As "women," being the object of sexism, it was
easier to talk about issues around sexism, domination and gender
construction. As "white" persons, it was uncomfortable to use a
language that questioned their positions as such. Consequently,
the participants flipped the discomfort of being questioned by
the language and questioned the language that caused the

discomfort.

In the last part of the workshop, we read a short text typical of feminist critique of computing. It is a text critical of the politics of "no-difference" in the public discourse in Finland when it comes to the adoption of new technologies. The author successfully analyzes the strategic use of no-difference in the politics of new technologies. At the same time, she reduces the question of "difference" to that of gender and location. Issues of race and class are excluded.

The participants found the content of the paper illustrative of the gendered structures in the representation and use of computers. When we started questioning the absence of race and class, the tone of the discussion was once again that of irritation. One of the participants suggested that "race and class did not belong to the scope of this research." Another participant said that a footnote mentioning the absence of race and class at this point would have been useful. Then, yet another participant asked, how were these suggestions different from the practices of many academics who write longer texts with a footnote referencing "feminism"? After a short silence, we brought the workshop to a closure. We concluded that bringing issues of race, class and gender together into the computing would require a completely new form of critical thinking, which we still had to discover.

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2. The title can be translated as "standard:deviant," or "standard:difference."

3. I thank Grada Ferreira, Diana McCarty, Esra Erdem and Rutvica Andrijasevic for their help and support in preparing this workshop.

4. By computing, I mean the science of computing, as is practiced in universities and research institutions.

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AUTHOR BIOGRAPHY

Seda Gyrses is studying computing at the Humboldt University,
Berlin. Her fields of interest are in feminist critiques of
computing, open source, educational software, multilateral
security and immigrant politics.

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FEATURED ARTISTS
[Works by the following artists, which accompany this issue,
can be seen online at http://lea.mit.edu.]

Mendi + Keith Obadike, 204 Mill Rock Rd., Hamden, CT 06517,
U.S.A.
Mendi Obadike e-mail: mendi@blacknetart.com
http://www.blacknetart.com

Mendi + Keith Obadike are interdisciplinary artists whose
music, live art and conceptual Internet artworks have been
exhibited internationally. their writing and art projects have
been featured in the film *Take These Chains*, in periodicals
(including *Art Journal*, *Artthrob*, *Indiana Review*, *Black
Arts Quarterly* and *Tema Celeste*), and in the upcoming
anthology, *Sound Unbound: Writings on Contemporary Multi-Media
and Music Culture (edited by Paul D. Miller). Their work
generated much discussion online and offline when Keith offered
his blackness for sale on ebay in 2001. In 2002, Mendi + Keith
premiered their Internet opera, *The Sour Thunder*, which was
the first new media work commissioned by the Yale Cabaret, and
they launched the *Interaction of Coloreds* (commissioned by the
Whitney Museum of American Art). In 2003, *The Sour Thunder* was
broadcast internationally from 104.1 in Berlin. Most recently,
Mendi's manuscript *Armor and Flesh* (forthcoming on Lotus
Press) won the Namoi Long Madgett award.

THE INTERACTION OF COLOREDS
Mendi + Keith Obadike
http://artport.whitney.org/gatepages/august02.shtml
http://www.blacknetart.com/IOCccs.html

This work is part of Whitney Museum's net-art portal,
"Artport." It was commissioned as a gate project and was
featured during the month of August 2002. It is an on-line skin
color verification system, part of the current pool of products
in image recognition and manipulation, that was developed "after
years of detailed Diasporic research." As its producers claim,
it is just necessary to "follow our strict jpeg guidelines and
answer a few detailed questions about family history", and this
color verification system will identify your true color.

KEEPING UP APPEARANCES
Mendi Obadike
http://www.blacknetart.com/keepingupappearances.html
http://www.blacknetwart.com/keepup.html

In *Keeping up Appearances*, a "hypertextimonial," Mendi
Obadike's aim is to "investigate the power of using forms which
often signify lack of power by using them in concert with each
other." In this hypertextual work, she explores what she calls
"disclosures" of autobiographical writing, in particular
inspired by the works and lives of Faith Ringgold and Audre
Lorde.

BLACKNESS FOR SALE
Keith Obadike
http://Obadike.tripod.com/ebay.html

In 2001, "Keith Obadike's Blackness" was auctioned at E-Bay, in
the category Fine Art. The description, among many other
benefits for a buyer of Keith Obadike's Blackness, lists the use
as being for "writing critical essays or scholarship about other
blacks" and for using it as a "spare" Blackness, in case "your
original Blackness is whupped off you." Instead of the planned
10 days, the work was auctioned for four days, after which E-Bay
management removed it, citing it as "inappropriate."

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RENAMING THE FUTURE

by Michael Punt, Editor-in-Chief, Leonardo Reviews

[Ed. note - The following article is being published as an
editorial in *Leonardo*, Vol. 37, no. 1 (Feb. 2004).]

In August 2003, the Leonardo/ISAST Governing Board approved the
name change of Leonardo Digital Reviews to Leonardo Reviews. The

removal of the adjective "digital" may seem a trivial reduction, but it was the consequence of some extended reflection by the editorial team and others on the history and future of the project. What had begun as a relatively small project for *Leonardo* has developed in recent years and currently draws on the insights of a panel of around 80 artists, scientists and academics in the humanities, distributed over five continents. In the past two years, this panel has been generating between 10 and 20 reviews a month, all of which are published on our web site. Some are also featured in *Leonardo Electronic Almanac*, and others are published in *Leonardo*. Whatever the destiny of the reviews, the intellectual diversity of the reviews panel has become consolidated over the years into a significant source of commentary and discussion that reaches out to a wide range of topics. Clearly, while the name change is intended to reflect this realignment, it is also a response to a more universal shift in the way that we understand the cultural and intellectual relationships among art, science and technology in the light of current research.

Two decades ago, the advent of relatively accessible personal-computer technology and developing communications networks promised such radical realignments in our intellectual interaction that some of us launched into the prediction business without much regard to that other future - the one where our promises come back to haunt us. Now, 20 years on, much that once seemed obvious has turned out curiously otherwise. Expectations of the paperless office and the demise of print have proved as unfounded as the gloomy predictions that television would bury Hollywood, or that tape recorders would silence Tin Pan Alley. Never has the cinema been more profitable, the music industry more healthy or the paper merchants so happy. For at least four centuries, it has been clear that when technologies of reproduction amplify the possibilities for collaboration and distribution, they become "anti-parasites," stimulating new appetites for the very aesthetic forms that they threatened to destroy. Somehow, in our roles as historians and futurologists, we should have known that.

One reason we forgot was due to digitization's radical confrontation with all that was certain and philosophically secure, which seemed to suggest that the familiar patterns of the history of technology were no longer sustainable. For one thing, never before had technology been able (or so it seemed) to rewrite its contract with reality. Not only was digital information no longer chained to a referent, it was indifferent to the very idea of signification. Information flowed

autonomously, interacted with itself and was transmuted, regardless of a human interpreter. Machines seemed happy to assimilate any input into their reality of pulses, while the sadly limited receptors of embodied human intelligence merely inconvenienced the coherence of the system by demanding printouts, visual displays and vibrations. Not surprisingly, many of us saw a brand new world opening before us, in which the dominance of history was dissolved. The narrated past was swept away as the decaying body ceased to be the primary custodian of knowledge. However, just as the impact of computers, with all that logic and ordering, has been to make philosophy more organic and messy, so digitization stimulated a revival of both a popular and academic fascination with overlapping worldviews that included the metaphysical, spiritualism and the supernatural.

The apparent discontinuity between the digital and the analog appeared to reiterate the unsustainable rupture in reality that strained classical science a century ago. The enormous energies expended on the denial of immaterial dimensions during the closing decades of the nineteenth century all but derailed the scientific project and almost certainly stunted the development of art as it prioritized the material and the concrete over the fugitive and transcendental. The legacy of this confrontation with spirit, which lies at the core of our current technologies has, if nothing else, exposed the history of dubious assumptions, strains and asymmetries that lay behind the insistence upon any single reality. Such critical revisionism has shown that digital reality itself is not immune to such scrutiny, and its privileged position in the forefront of cultural theory has collapsed as a consequence of its own intellectual gift to its host.

The ecstatic dream that we may one day "jack in" to technology and "mainline" information in a seamless act of union is now better understood as a future prospect in biochemistry and nanotechnology rather than electronics, and the "digital" is becoming recognized as continuous with what was formerly bracketed as the analogical - nothing more or less than another phase in the infinite spectrum of reality(ies). This intellectual revision and the ensuing concept of the postdigital analog as a description of this enriched reality underlie the future direction we envisage for Leonardo Reviews. Thus, while continuing to review artworks, scientific commentaries, interventions in the humanities and technological topics that are manifest in what may turn out to be predominantly digital modes of production and distribution, we are better described as

Leonardo Reviews as we try to synthesize and respond to what seems relevant to the ISAST community, unconstrained by our history.

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LEONARDO REVIEWS - NEW URL

Leonardo Reviews is pleased to announce the new postings for November 2003 at: http://leonardoreviews.mit.edu. This is our new (user-friendly) URL, although there is no need to change your bookmark, since it is simply a forwarding service. We hope that with this easily memorized URL, we are easier to access. This month, we have sixteen reviews dealing with symposia, expositions and festivals as well as the usual coverage of material published in our field. Of especial interest is Yvonne Spielmann's extended discussion of the Biennale di Venezia fiftieth International Art Exhibition and Sean Cubitt's review of Roy Ascott's *Telematic Embrace*. Along with Robert Pepperell's support in recovering Husserl's *Phenomenology*, we also have a review of his own book and many other reflections and interventions from our panel of reviewers at the website.

All these and the Leonardo Reviews Archive can be accessed at: http//:leonardoreviews.mit.edu.

Michael Punt
Editor-in-Chief
Leonardo Reviews

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LEONARDO REVIEWS
NOVEMBER 2003

Arranging Things: A Rhetoric of Object Placement, by Leonard Kohen
Reviewed by Margaret Dolinsky

Ars Electronica 2003: "CODE - The Language of our Time," Linz, Austria, 6-11 September
Reviewed by Maia Engeli

Bill Viola: The Passions, by Peter Sellars and John Walsh
Reviewed by Chris Cobb

Black Mountain College: Experiment in Art, edited by Vincent
Katz
Reviewed by Chris Cobb

Digital Dragon, High-Technology Enterprises in China, by Adam
Segal
Reviewed by Stefaan van Ryssen

Fagus: Industrial Culture from Werkbund to Bauhaus, by
Annemarie Jaeggi
Reviewed by Roy R. Behrens

Foul Perfection, Edited by John C. Welchman
Reviewed by Michael R. (Mike) Mosher

Husserl's Phenomenology, by Dan Zahavi
Reviewed by Robert Pepperell

Innovations in Education: The Art and Science Partnership, by
the Qatar Foundation, Education City, Doha
Reviewed by Michael Punt

Lester Beall: Space, Time and Content, By R. Roger Remington
Reviewed by Roy R. Behrens

The Posthuman Condition: Consciousness Beyond the Brain, by
Robert Pepperell
Reviewed by Rob Harle

Prefiguring Cyberculture: An Intellectual History, Darren
Tofts, et. al. eds.
Reviewed by Rob Harle

Silent Players: A Biographical and Autobiographical Study of
100 Silent Film Actors and Actresses, by Anthony Slide
Reviewed by Michael Punt

Solitary Sex: A Cultural History of Masturbation, Thomas W.
Laquer Zone Books, New York, 2003
Reviewed by Michael R. (Mike) Mosher

Step Across the Border, by Fred Frith
Reviewed by Stefaan Van Ryssen

Telematic Embrace: Visionary Theories of Art, Technology, and
Consciousness, by Roy Ascott
Reviewed by Sean Cubitt

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TELEMATIC EMBRACE: VISIONARY THEORIES OF ART, TECHNOLOGY, AND
CONSCIOUSNESS

by Roy Ascott, edited and with an essay by Edward A Shanken.
University of California Press, Berkeley, CA, 2003. 427 pp.,
illus. ISBN: 0-520-21803-5.

Reviewed by Sean Cubitt, Screen and Media Studies, University
of Waikato, Private Bag 3105, Hamilton, New Zealand
seanc@waikato.ac.nz

"Networking invites personal disclosure" (p. 186) - and there
can be few more networked artists than Roy Ascott, whose 40-year
career as teacher, theorist and pioneer of networked art is here
celebrated in a handsome volume of his essays. Two modes of
writing meet in this one book. Edward Shanken contributes a
characteristically authoritative historical and analytical
account of Ascott's life and work, an addition to the editor's
welcome and growing historical project to recover the earlier
critical discourse of cybernetic and technologically mediated
art. Shanken makes you want to read on, to dig out your dusty
copies of Jack Burnham and *Radical Software*. Ascott's essays
are quite different in tone - they make you want to stop reading
and respond.

As my own department goes through a modestly radical
reorientation, I find myself dropping the book to make notes on
institutional redesign (response to Ascott's mercurial and
inventive program for the Ontario College of Art) and
communication between disciplines. Or I drop the pen and e-mail
a colleague with annotations for a joint essay on media
education in the twenty-first century, fired by Ascott's student
projects at Ealing and Ipswich. Or I contact a friend in
Scotland about our project to rebuild the reputations of the
1960s generation of conceptual, performance and media artists
disowned by the UK's hyper-conservative curatorial establishment
(who thought Francis Bacon was somehow contemporary in the
1990s, and still prefer Lucien Freud). Or, as now, I compose
myself enough to write a cogent and scholarly review for
Leonardo, many of whose readers already know Roy Ascott, have
collaborated with him, studied with him, or met him at
exhibitions, conferences and colloquia or online.

The single most important thing to remember about Ascott is
that he is an artist. We cannot ask of him the same kind of
rigor we would ask of a Ph.D. student. There are ellipses and
leaps of imagination here, and lapses of taste, appeals to
mutually contradictory authorities, strange admixtures of
shamanic visions and cybernetic logic. But that is precisely the
point. Ascott was never so much a prophet as someone who already
lived in the future. To that extent, his work as a teacher, an
artist and an essayist, is held together by utopianism. It isn't
as if he does not know this, or ignores the accusatory tone with
which the word can be pronounced. In one of his most significant
essays, "Is There Love in the Telematic Embrace?," he responds,
perhaps slightly disingenuously, that his "cultural prospectus
implies a telematic politics, embodying the features of
feedback, self-determination, interaction, and collaborative
creativity, not unlike the 'science of government' for which,
over 150 years ago, AndrŽ-Marie Ampre coined the term
'cybernetics'" (p. 242). Published in 1990, this passage betrays
the loneliness of the intellectual path Ascott elected to
follow. On the one hand, the fashionable judgements of the art
establishment largely continued to ignore the visionary and
technopoetic discourse of the technological arts. On the other,
Ascott had held aloof from the discourse of semiotics, Marxism
and psychoanalysis which, though perhaps exhausted by the 1990s,
had provided a serious oppositional discourse for photography
and film, for example in the work of Victor Burgin, Laura Mulvey
and Peter Wollen. Nor is there much sign of a brush with post-
coloniality.

There is a sense in which Ascott has been proven right. Neither
the World Wide Web as a mass medium, nor e-mail as the killer
application that has brought the Internet into common use,
respond well to the traditions of critical modernism. And the
semiotic tradition has been all the weaker for following
Saussure instead of Chomsky, and Derrida instead of Maturana and
Varela. The lack of information theory in artistic discourse has
been something of a weakness all round, though whether it is a
symptom or cause of the wagon-circling of the current phase of
"post-conceptual" vacuity is hard to fathom.

Everything Fried feared when he wrote of the theatricalization
of art has come to pass, as witnessed by the passionless and, in
every sense, thoughtless practice of the now aging yBa's (young
British artists). These hyper-objectified objects tempt no one
to interact with them, their inertness ostensibly a comment on
the culture, but functionally a continuation of it. Ascott's
pedagogy, extending into his art, is of a quite different order,

messy and, in the best sense of the word, amateurish, made for
the love of it and of the unforeseeable possibilities that can
be realized when you set up a system with the capacity to
attract and enhance the visitors' interactions between
themselves as much as with the art.

At the same time, it is also true that Ascott rarely
demonstrates an awareness that art and teaching carry
responsibilities as well as rights. Responsibility is, in his
thinking, not personal but systemic. A well-designed system will
automatically evolve protocols for its use. Sadly, that has not
proved the case in the evolution of the Web. If the medium is
the massage, profiling is the pimp that runs the parlor.
Marketing, data-mining and the ubiquitous "cookie" have stolen
the innocence of the Web as a self-governing system and
punctured the belief we might have had that it was capable of a
kind of self-enclosure. The Internet could never be a closed
system, and since its nearest neighbor is the capitalist
corporation in the age of globalization, every step towards
global connectivity has been shadowed by a step towards global
exploitation. Even Ascott's plunges into visionary consciousness
with the aid of shamanic rituals and drugs can seem touristic,
the expropriation of indigenous knowledge for a privileged
Northern Žlite.

At the heart of Ascott's practice is the question posed by
Niklas Luhmann: How is it possible to know - and to communicate -
when we know how what we know is constructed by its
communication? Ascott's response is to focus not on the what but
the how, not on content but on the communicative. Oddly,
however, for such a passionate man, his response involves the
disembodiment of humanity, a move towards pure consciousness. It
is this abandonment of the corporeal that allows him to argue
for the significance of the virtual in another key essay,
"Telenoia," in which he argues that play in "the world as net .
. . empowers us to de-authorize meaning just as it enables us to
reconstruct the world. The reconstruction is a model, to be
sure, creating a virtual world, from which other worlds can
emerge" (pp. 258-9). De-authorization, stripping meaning of its
authority, is a product of a parallel process in which
networking strips meaning of its authors.

While this might suggest a source in Barthes, there is a
significant difference between the two thinkers. For Barthes,
the death of the author is the necessary precondition for the
birth of the reader, who now must take responsibility for the
work. For Ascott, on the other hand, the birth of the network

abolishes both readers and writers, instead instigating a regime
of connectivity and global consciousness. The utopianism of this
is startling, and indeed beautiful. But it leaves responsibility
for the production, if not of meaning, then of communicability
and connection, in the hands of an emergent consciousness
presumed to be benign, presumed to be autonomous. Quite rightly,
in the same essay, Ascott describes the private galleries of the
1960s as Sherman tanks: "We failed to see the connection between
the supreme individualism of art and the supreme individualism
of business and speculation" (p. 258). What is missing here is a
sense of the supreme anonymity of telematic art and the supreme
anonymity of global corporations. The individual and the
anonymous are as closely interwoven as the rational and the
irrational. Seizing on one at the expense of the other does not
heal the gap: it preserves and deepens it.

All the same, I have to admit that I feel these comments are
graceless, for a reason mentioned above. Ascott's fundamental
inspiration is artistic. It is not his job to give a cure for
cancer or for world debt. His task is vision, on a scale that
mere futurology cannot undertake. His work is certainly not
selfish, quite the contrary. He has the most generous attitude
towards his fellow humans it is possible to imagine. And though
a critic can carp at this as willful and dangerous na"vetŽ,
well, that is the job of a critic. The work of an artist, in the
early twenty-first century, is no longer negative. Adorno, for
my money the most important philosopher of the twentieth
century, can no longer convince us that Beckett and Berg are the
last word, not when nihilism has become coffee-table theory and
"No Future" has moved from punk situationism to become a staple
of the Top 40.

As essayist, Ascott does not pretend to coherence: he wants to
inspire. As you look over his career, you see that he has indeed
achieved that, and then I realize that even this critique has
its own tribute to pay. If I want to anchor Ascott, he now wants
to anchor himself, "flying with our feet on the ground," as he
says in the "Moist Media Manifesto" that concludes the
collection. The body, after all, is a system and the globe a
braided web of systems interacting with systems. Conceptualizing
art as the production of systems that will nudge and adjust all
abutting systems and be nudged and adjusted in turn is indeed a
visionary statement of the potential for humanity to proceed,
but now in partnership with the green world and the
technological. The challenge Ascott lays down is not so much to
disprove him, as to find better ways to include more actors in
the network, to democratize more radically and to ground more

substantially. The reader will find much to disagree with in
this book, and much to learn in the disagreeing.

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HUSSERL'S PHENOMENOLOGY

by Dan Zahavi, Stanford University Press, Stanford, CA, 2003.
178 pp.,
ISBN: 0-8047-4546-3.

Reviewed by Robert Pepperell
pepperell@ntlword.com

There can be few philosophers whose work is more important in
the ongoing debates about consciousness than Edmund Husserl, and
there is perhaps no more perplexing question than that of the
relationship between mind and world, a relationship he has
helped to clarify perhaps more than any other recent Western
thinker. In this concise book, Dan Zahavi, a widely acknowledged
authority on Husserl, offers a clear exposition of Husserlian
phenomenology - a hugely influential philosophical method that
seeks to grasp the central core of inner thought through a
rigorous process of analysis. In doing so, the book describes
various strategies Husserl employed to manage the dialectic
between the subjective realm of the conscious mind and the
objective realm of external objects (including other conscious
minds).

Husserl's phenomenological method attempts to isolate those
irreducible aspects of mentality by stripping away or suspending
na·ve appearances, what Husserl calls the "natural attitude."
This "pretheoretical" attitude, he argues, is prejudiced and
prone to erroneous assumptions, particularly the assumption that
there is some kind of "real" world that exists independently of
our own thinking existence. Instead we suspend all metaphysical
speculation and concentrate on the "giveness" of reality in
direct experience, what we really see rather than what we think
we see. In an analogous way (although it is not an analogy
suggested by either Husserl or Zahavi), it is easy to get
untrained people to improve their drawing skills simply by
pointing out to them how they tend to draw what they think they
see rather than what is actually there. Hence, "we should . . .
not let preconceived theories form our experience, but let our
experience determine our theories." (p. 45).

Because of Husserl's emphasis on the giveness of mental
experience, and the objects perceived therein, he has been

regarded by later critics as essentially an idealist thinker -
one who believes that "subjectivity can persist without the
world" (p. 71). It is a reading of Husserl that Zahavi works
hard to correct, marshalling evidence from previously
unpublished material in the manuscripts smuggled out of Germany
prior to the Second World War. This is important, since
Husserl's Jewishness was grounds for his condemnation by the
Nazis, with the consequence that he was invisible to a whole pre-
war generation of German philosophy students who were instead
led towards Husserls' former student, Heidegger, with
repercussions that persist today. In his earlier work, Husserl
adopted a metaphysically neutral position vis-ˆ-vis the
existence of a mind-independent reality. Therefore, the question
of whether objects presented to the mind are "real" or
"imaginary" (e.g. hallucinatory) is irrelevant as far as
phenomenological analysis is concerned, being instead
"methodologically suspended" (p. 40). But this stress on the
giveness of the object in our direct experience of it, on its
appearance, does not equate, as Zahavi argues, with a dual world
composed of separate subjective appearances and objective
realities. This would lead to the kind of idealistic,
introspective and eventually solipsistic position that is being
avoided. Rather, "phenomenology is not a theory about the merely
appearing, or to put it differently, appearances are not mere
appearances. For how things appear is an integral part of what
they really are . . .   The reality of the object is not hidden
behind the phenomenon, but unfolds itself in the phenomenon" (p.
55).

Indeed, In the later Husserl, the very idea of a distinction
between subject and object (which might give rise to the
suggestion of a mind-independent reality) is, so to speak,
transcended. It makes no sense, it is argued, to imagine a
worldly reality not constituted by a subject, just as it makes
no sense to imagine a subject unconstituted by worldly reality.
Furthermore, it makes no sense to talk about a subject not
constituted by other subjects through a relation of so-called
"intersubjectivity." Thus, as Zahavi points out, Husserl
effectively anticipates later phenomenologists such as
Heidegger, Sartre and Merleau-Ponty by positing a triad of
subjectivity-intersubjectivity-worldly reality, none of which
exists as an independent condition but takes form only in its
relation to the others.

The second half of the book summarizes some key ideas in
Husserl's latter research; his conception of time and the flow
of consciousness, the necessity of embodied kinaesthetic

experience in the perception of objects, the intersubjective
nature of self-awareness, his critique of the assumption of
objectivity in the scientific method and its estrangement from
our experience of ordinary reality. In many ways, this latter
work foreshadows more recent trends in philosophy of mind, such
as the "enactive" approach adopted by current researchers who
stress the "sensorimotor contingencies" of perceptual action
(see the review of British Psychological Society conference in
the August 2003 issue of Leonardo Reviews). This latter work of
Husserl, much of it still unpublished or untranslated, is
revealed by Zahavi's careful research to be an intricate weave
of subtle insights into the nature of being and experience. Just
as in the very best literature, one gets the sense here of a
mind in the throes of a kind of "metaconsciousness," or
consciousness of consciousness itself - where the very bounds of
self-knowledge are being articulated.

Hence Zahavi's claim that the widespread interpretations of
Husserl's work as idealistic and solipsistic are inaccurate,
partial and outdated. Instead, Husserl emerges as a figure who
still has much to offer and whose influence is set to grow
rather than recede. Given the nature of the subject matter and
the shear breadth of Husserl's output, the author has managed to
construct a short volume that rings with clarity, abounds with
illuminating examples and provokes profound thought. Zahavi
expresses the wish that this book will turn the reader towards
Husserl's own writings, and one could not imagine a more
authoritative and helpful introduction to them than this.

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LEONARDO 37:1 - ABSTRACTS

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EXPANDING THE CONCEPT OF WRITING: NOTES ON NET ART, DIGITAL NARRATIVE AND VIRAL ETHICS

by Mark Amerika, University of Colorado, Department of Art and Art History, UCB 318, Boulder, CO 80309-0318, U.S.A. Mark.Amerika@Colorado.edu

In these experimental notes, the artist reflects on his Net art trilogy, composed of *GRAMMATRON*, *PHON:E:ME* and his most recent art project, *FILMTEXT*, a digital narrative for cross-media platforms. Investigating issues such as digital screenwriting, Net art, digital "thoughtography" and an emergent artificial intelligentsia, the artist theorizes an expanded concept of writing to better explain his project as an evolving, practice-based research initiative, focused primarily on the interface of art, technology and storytelling.

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PLANET EARTH IN CONTEMPORARY ELECTRONIC ARTWORKS

by Julien Knebusch, Ecole des Hautes Etudes en Sciences Sociales/Paris, 22, rue Caulaincourt; 75018 Paris, France. julien_knebusch@yahoo.fr

This article presents an overall view of contemporary electronic artworks related to planet Earth as a topic of artistic inquiry. The author presents and interprets philosophically the different ways in which artists have approached planet Earth and tried to re-appropriate this object of modernity. In order to do so, he outlines a phenomenological reading of these artworks and confronts them with the well-established phenomenological discourse about humans' relationship to Earth.

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THE EARTH MUSIC OF THAMKRABOK MONASTERY

by Phra Hans Ulrich Kaempfer, Thamkrabok Monastery,
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and Sheila Pinkel, 210 North Avenue 66,
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Since 1981, Luang Paw Charoen Panchard, Abbot of Thamkrabok
Monastery in the Lopburi province of Thailand, has created music
based on shapes found in nature. Cracks in walls, stones or the
soil are traced onto transparent plastic sheets and transformed
into musical notes. Luang Paw believes that the process of
making this earth music results in spiritual healing and growth.

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SPECIAL SECTION: THE ART AND SCIENCE OF INTERSTELLAR MESSAGE
COMPOSITION

Guest editor: Douglas A. Vakoch, Interstellar Message Group
Leader, SETI Institute, 2035 Landings Drive, Mountain View, CA
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Framing interstellar messages as art projects is a recent
development. The Search for Extraterrestrial Intelligence, or
SETI, has largely been conducted by scientists and engineers,
with minimal input from the artistic community. The SETI
Institute and Leonardo have initiated a series of workshops to
encourage discussion among artists, scientists and technologists
about interstellar message composition. This special section of
Leonardo features extended abstracts of six of the 18
presentations given at the first workshop devoted specifically
to the interface of art, science and technology in interstellar
message design, held in Paris on 18 March 2002.

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HEART RATE SONIFICATION: A NEW APPROACH TO MEDICAL DIAGNOSIS

by Mark Ballora, School of Music, Pennsylvania State
University, 233 Music Building, University Park, PA 16802-1901,
U.S.A.
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Ever since 1819, when Theophile La'nnec first put a block of wood to a patient's chest in order to listen to her heartbeat, physicians have used auscultation to help diagnose cardiopulmonary disorders. Here the authors describe a novel diagnostic method based in music technology. Digital music-synthesis software is used to transform the sequence of time intervals between consecutive heartbeats into an electroacoustic soundtrack. The results show promise as a diagnostic tool and also provide the basis of an interesting musical soundscape.

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THE DIGITAL ART OF MARBLED PAPER

by B. Tevfik Akgun, Communication Design Department, Faculty of Art and Design, Yildiz Technical University, Istanbul, Turkey. akgunbt@yildiz.edu.tr

The author describes his development of a computer-based paper-marbling tool, based on a traditional Turkish artform in which marbled-paper figures and patterns are created on the surface of a liquid bath. Similar works can be obtained by simulating fluid flows on a computer, using the Navier-Stokes equations as the physical model of the fluid flows. The author has created an application program that includes marbling tools. Such a program must run in real time, so that hand-eye coordination is required of the user. Real-time simulation of fluid flows requires much processor power. The author has attempted to adapt this technique for use with a personal computer. To decrease the processing power required, the image size may be decreased, but the results may not be as satisfactory.

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MULTIFRACTAL FINGERPRINTS IN THE VISUAL ARTS

by J. R. Mureika, G. C. Cupchik and C. C. Dyer

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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 conclusion suggests that such dimensions cannot be used as a "fingerprint" for identifying the work of a single artist. To overcome this limitation, the authors have adopted the

multifractal spectrum 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.

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A SYMPHONY OF SENSATIONS IN THE SPECTATOR: LE CORBUSIER'S *POéME ƒLECTRONIQUE* AND THE HISTORICIZATION OF NEW MEDIA ARTS

by Katie Mondloch, Department of Art History, University of California at Los Angeles, 100 Dodd Hall, Los Angeles, CA 90095-1417, U.S.A.
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This essay seeks to historicize the technological production of artistic virtual space, which is often misconstrued as having originated with contemporary new media art production. The author critically investigates Le Corbusier's *Pome Žlectronique*, a 1958 automated multimedia performance commissioned by the Philips Corporation for its pavilion at the World's Fair in Belgium, as a paradigmatic example of much earlier attempts to create a spatialized, virtual experience in the spectator. The author argues that the highly disciplined spectatorship conditions of the *Pome Žlectronique* have many suggestive parallels with those of contemporary artistic production in new media, thus offering a theoretical and historical foundation for art-historical discourse regarding the proliferation of immersive multimedia artworks in contemporary practice.

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A UNIVERSAL GRAMMAR FOR VISUAL COMPOSITION?

by Peter D. Stebbing (teacher), Hochschule fŸr Gestaltung, D-73525 SchwŠbisch GmŸnd, Germany.
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The author has identified four fundamental organizational principles common to both organic form and the creation of visual composition. The author proposes that our perceptual

system has evolved to respond to these principles (perceptual primitives) due to the necessity of recognizing the diversity of organic forms on which our survival depended during our earlier evolution. The evidence shows that these four principles occur widely throughout humankind's aesthetic expression in different cultures, epochs, art forms and media. Applying von Humboldt's principle, the author proposes that these limited means provide unlimited possibilities for developing student creativity if it were taught as a coherent grammar.

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AUTHOR
Mike Leggett
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LANGUAGES FAMILIAR TO THE AUTHOR
English (some of the European languages)

THESIS TITLE
Burning the Interface - Artists' Interactive Multimedia, 1992 - 1998.

ABSTRACT
Part One: Preface and Part Two: Introduction provide a personal context for the research degree and brings the reader to the juncture at which the core of this report in Part Three was initiated, the point at which, with both trepidation and encouragement from my first supervisor, the media artist Bill Seaman, and with the endorsement of the Head of School,

Professor Liz Ashburn, I commenced on the research that led to the exhibition at the Museum of Contemporary Art, Sydney in early 1996, "Burning the Interface" (international artists' CD-ROM).

Part Four examines in some detail four published artists' work on CD-ROM, three of which are more recent than the curatorial research for the exhibition, which was completed by the beginning of 1995. Part Five surveys the range of practice by artists working with digital media and the opportunities for exhibition in the public spaces of museums, galleries and the street, and advances scenarios for correcting the laxity of response by the exhibiting institutions to the vigor with which Australian artists have represented their work and ideas in international forums.

Part Six has the dual function of, on the one hand, closing the written thesis with some conclusions about "interactive multimedia" and its current usefulness as an art medium to the artist and, on the other, as an introduction to the studio practice component of this MFA submission. This takes the form of a prototype "experimental" version, *Strangers on the Land*, an interactive multimedia CD-ROM.

KEYWORDS
interactive, multimedia, media arts, structuralist film, video art, new
media art, new media exhibition

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THE ART OF BURNING MAN - FEATURED IN LEONARDO VOL. 36, NO. 5

The journal *Leonardo* has collaborated with The Burning Man
Project to publish a special section featuring the art of
Burning Man. In the October 2003 issue of *Leonardo*, 20 artists
discuss the creative aspects of designing and building art for
Burning Man. Among the many art mediums discussed are fire,

water, lasers, LED light, metal, telestereo optics and fractal
audio. Each essay is illustrated with a photo of the artwork.

The Burning Man Special Section includes an introduction by
guest editor Louis M. Brill: "Desert Weirdness Introduces a New
Era of Art;" and a feature article by Burning Man art curator
Christine Kristen (a.k.a. LadyBee): "The Outsider Art of Burning
Man."

Artists' essays are divided into four themes as follows:

SCULPTURE -
Michael Christian: *Flock*.

LIGHT SCULPTURE -
Radiant Atmospheres: *The Afterlife*
Tim Black: *L2K Ring* and *Ship to Ship*
Jeremy Lutes: *The Lily Pond*
Christopher Schardt: *Spin*
Russell Wilcox: *Beaming Man*

INTERACTIVE INSTALLATIONS -
Cassidy Curtis and Chris Whitney: *The Telestereoscope*
Deidre DeFranceaux and Jann Nunn: *The Cradle*
Hendrik Hackl: *The Ammonite Project*
Cynthia "Kiki" Pettit: *Firefall*
Kal Spelletich: *The Myth of Sisyphus*
Jenne Giles and Philip Bonham: *The Ribcage*
Dan Das Mann: *The One Tree*
Susan Robb: *The Golden Tower Project*
Finley Fryer: *The Plastic Chapel*

MOBILE INSTALLATIONS - Dana Albany: *The Bone Tree*
Aaron Wolf Baum: *The Voice of the Nebulous Entity*
Lisa Nigro: *Draka, The Flaming Metal Dragon*
Steven Raspa: *The Futura Deluxe Bubble Fountain and Porta
Temple*
Austin Richards: *Dr. Megavolt*

This issue of LEONARDO is available now and may be purchased at
the Burning Man Marketplace at:
http://marketplace.burningman.com/. To find out more about
LEONARDO subscriptions from The MIT Press, visit
http://www.leonardo.info .

The Leonardo Burning Man project is also accessible on-line at:
http://mitpress.mit.edu/Leonardo/gallery/burningman/ .

Contact: Louis M. Brill, Guest Editor
lmbrill@earthlink.net or (415) 664-0694

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MIT PRESS AND LEONARDO/ISAST ANNOUNCE PUBLICATION OF *WOMEN,
ART AND TECHNOLOGY*, EDITED BY JUDY MALLOY

Although women have been at the forefront of art and technology
creation, no source has adequately documented their core
contributions to the field. *Women, Art and Technology*, which
originated in a *Leonardo* project of the same name, is a
compendium of the work of women artists who have played a
central role in the development of new media practice.

The book features overviews of the history and foundations of
the field by critic/curator Patric Prince; critic Margaret
Morse; artist/educator Sheila Pinkel; artist/networker Anna
Couey; and Kathy Brew, artist and former director of the new
media initiative ThunderGulch. The foreword was written by
Patricia Bentson, managing editor of the Leonardo Music Journal.

Artist contributors include computer graphics artists Rebecca
Allen, Donna Cox and Diane Fenster; video artists Dara Birnbaum,
Joan Jonas, Valerie Soe and Steina Vasulka; composers CŽcile Le
Prado, Pauline Oliveros and Pamela Z; interactive artists
Jennifer Hall and Blyth Hazen, Agnes HegedŸs, Lynn Hershman,
Nancy Paterson and Sonya Rapoport; virtual reality artists Char
Davies and Brenda Laurel; Net artists Monika Fleischmann and
Wolfgang Strauss and Sandy Stone; and choreographer Dawn
Stoppiello. Critics include Jaishree Odin, Simone Osthoff and
Zo' Sofia.

Editor Judy Malloy is an electronic fiction and Internet
pioneer and editor of the electronic publication NYFA Current
(formerly Arts Wire Current).

Follow this link to order Women, Art and Technology from
Amazon:
http://www.amazon.com/exec/obidos/ASIN/0262134241/leonardoonlin-
20.

The complete table of contents, articles not included in the
book and links to new works in the field are available on the
book's website at http://www.judymalloy.net/newmedia.

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IN LEA DECEMBER ISSUE - WOMEN, ART AND TECHNOLOGY

In the December issue of LEA, guest-edited by Judy Malloy, we introduce the newly released book *Women, Art, and Technology* (MIT Press, 2003, Leonardo Series; see above news item). This issue of LEA will include two complete articles from the book - "Fleshmotor" by Dawn Stoppiello and Mark Coniglio and "Video Art Povera: Lo-Fi Rules!" by Valerie Soe. Also included is part of the article "Face Settings: An International Co-Cooking and Communication Project by Eva Wohlgemuth and Kathy Rae Huffman," by Kathy Rae Huffman, and short articles by artists Nancy Paterson, Jen Hall and Blyth Hazenabout their current work, which is documented in longer articles in the book.

These articles serve as an introduction to *Women, Art and Technology*, a comprehensive book edited by Judy Malloy, which includes 36 chapters and documents the work of over 100 artists, including Lynn Hershman, Nancy Paterson, Sonya Rapoport, Char Davies, Brenda Laurel, Sandy Stone, Donna Cox, Dara Birnbaum, Joan Jonas, Steina Vasulka, Cecile Le Prado, Pauline Oliveros, Pamela Z and Agnes Hegedus.

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LEONARDO-@RT OUTSIDERS 2003 NEW HORIZONS PRIZE AWARDED

Leonardo/ISAST and OLATS (L'Observatoire Leonardo des arts et des technosciences), along with the Paris-based @rt Outsiders Festival, are pleased to announce that the Leonardo-@rt Outsiders 2003 New Horizons Prize (Prix Leonardo-@rt Outsiders/Nouveaux Horizons 2003) has been awarded to Ewen Chardronnet and associated artists for the work *Open Sky*. The jury particularly noted the innovation of the work of the Acoustic Space Lab network and the artists involved in the *Open Sky* project: Rasa Smite, Martins Ratniks, Raitis Smits, Radioqualia and Makrolab, coordinated by Marko Peljhan.

Open Sky is an installation by Ewen Chardronnet, based on the conversion of the Soviet-era radio-telescope RT32 of Irbene in Latvia in the context of the ongoing research projects of the Acoustic Space Lab collective. The RT32 is a 32-meter former espionage antenna that has been converted for use in radio-astronomy and fundamental science. Since 2001, artists, radio amateurs and scientists have worked together to explore the tactical and artistic possibilities of the dish. For more

information, go to http://acoustic.space.re-lab.net/ or contact
Mr. Chardronnet at ewen@tiscali.fr.

The jury also awarded a special mention to the installation
"FILE /AIR: The Ambiguity of Limits," by Kitsou Dubois and Eric
Duranteau. The artwork translates documentation of the work of
Kitsou Dubois in zero-gravity parabolic flight into an
installation with powerful poetic and sensory impact. Additional
information on the work of Kitsou Dubois, who is also a previous
Leonardo New Horizons award winner, can be found at
http://www.spacearts.info.

The Leonardo-@rt Outsiders 2003 New Horizons Prize Jury
consisted of: Roger Malina (astronomer and president of the
Paris-based Association Leonardo), Frank Popper (Professeur
Emeritus - UniversitŽ de Paris 8), Alex Adriaansens (Directeur
of V2 in Rotterdam), Isabelle Rieusset LemariŽ (Ma"tre de
ConfŽrences in Information Sciences and Communication Science at
IUFM Versailles), Franois Michaud (Conservateur at the MusŽe
d'Art Moderne de la Ville de Paris) and Michel Jaffrennou
(author).

The purpose of the Leonardo New Horizons prize is to recognize
new types of work emerging at the intersection of the arts,
sciences and technology and to make this work known to a broader
audience. This year's New Horizons Prize was designed to be
awarded to one of the artworks exhibited at the European Museum
of Photography, Paris, in the context of the @rt Outsiders
Festival, dedicated this year to the topic of space art. Roger
Malina, Henry Chapier (PrŽsident of @rt Outsiders Festival),
Annick Bureaud (Director of Leonardo OLATS) and Jean-Luc Soret
(Artistic Director of the @rt Outsiders Festival) devised this
year's special award, which includes a 1000 Euro prize. In
addition, the winner has been invited to publish his work in
Leonardo and to present his work publicly to the Leonardo
networks.

The Leonardo Prizes and this Leonardo-@rt Outsiders 2003 New
Horizons Prize are sponsored by the Program in Technocultural
Studies at University of California at Davis, U.S.A. Leonardo
Prizes are awarded by the Leonardo Prizes and Awards Committee,
chaired by Professor Lynn Hershman of the University of
California, Davis.

Press Contacts:

@rtOutsiders Festival: Yannick le Guillanton - 01 44 78 75 20 or

le.guillanton@art-outsiders.com

Leonardo/OLATS: Annick Bureaud - annick@nunc.com

Leonardo/ISAST: Melinda Klayman - (1) 415-405-3335 or
isast@well.com

Further information on the Leonardo Prizes and Awards program
can be found at http://www.leonardo.info

Further information on the @rt Outsiders Space Art exhibition
and conference can be found at http://www.olats.org and at
http://www.art-outsiders.com

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LEONARDO CALL FOR PAPERS - ARTSCIENCE: THE ESSENTIAL CONNECTION

What is the value of artistic practices, techniques,
inventions, aesthetics and knowledge for the working scientist?
What is the value of scientific practices, techniques,
inventions, aesthetics and knowledge for the artist? When does
art become science and science, art? Or are these categories
useless at their boundaries and intersections?

Can an individual excel at both science and art, or is even a
passing familiarity with one sufficient to influence the other
significantly? Do the arts ever contribute significantly to
scientific progress? Where will current scientific innovations
lead the arts in the next few decades?

Leonardo will publish a series of special sections over the
next 3 years devoted to exploring these questions. Submissions
can be from artistic scientists who find their art avocation
valuable; from scientist-artist collaborators who can
demonstrate a scientific or artistic innovation; from
scientifically literate artists who draw problems, materials,
techniques or processes from the sciences; or from historians of
art or science looking at past examples of such interactions.

Interested authors are invited to send proposals, queries
and/or manuscripts to Guest Editor Robert Root-Bernstein, 2201
Biomedical Physical Sciences Building, Michigan State
University, East Lansing, MI 48824-3320, U.S.A. E-mail:
rootbern@msu.edu.

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LEONARDO/ISAST ELECTS NEW MEMBERS TO ITS GOVERNING BOARD

Leonardo/The International Society for the Arts, Sciences and
Technology is pleased to announce the election of two new
members to its governing board, a group that consists of
prominent figures in the fields of art, science and technology.
Darlene Tong and Greg Niemeyer, along with the rest of the ISAST
Governing Board members, will participate actively in fulfilling
the mission of Leonardo/ISAST.

Darlene Tong joins the ISAST Governing Board as a librarian at
San Francisco State University, where she has been employed for
nearly 30 years. Her responsibilities at SFSU have included
coordinating a new library building project and collection
development for all art and design subject areas within the
library holdings. A prolific writer and speaker, Tong has
presented material on archiving new media and on
multiculturalism in the arts. Tong is compiling the bibliography
and chronology for the California Asian American Artists
Biographical survey project. In addition to serving on the
Leonardo/ISAST board, Tong also serves on the advisory board of
the Poetry Center and American Poetry Archives and on the board
of directors of La Mamelle/Art Com, a non-profit artist
organization that supports and disseminates works incorporating
new ideas and technologies, including performance, on-line and
electronic formats.

Also joining the governing board, Greg Niemeyer studied
classics and photography in Switzerland before he came to the
United States in 1992. As an MFA graduate student at Stanford
University, he founded the Stanford University Digital Art
Center (SUDAC). Currently Niemeyer is a professor of New Media
Art at the University of California at Berkeley, where he is a
founding member of the UC Berkeley Center for New Media.
Supported by the prestigious Intel Art and Technology Research
Grant and, recently, the F. Warren Hellman Grant, he completed
several digital media installations that explore novel
experiences with computing. His latest installation, in
collaboration with Chris Chafe, is *Organum*, a movie about the
resilience of human motives in the face of biological and
technological change.

Tong and Niemeyer join Roger Malina, Chair; Martin Anderson,
Treasurer; Mark Resch, Secretary; Penelope Finnie; Michael
Joaquin Grey; Lynn Hershman; Ed Payne; Anne Brooks Pfister;
Sonya Rapoport; Beverly Reiser; Piero Scaruffi; Joel Slayton;

and Stephen Wilson on the Leonardo/ISAST governing board.

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

LEA is accessible using the following URL: http://lea.mit.edu

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