



Leonardo Electronic Almanac volume 11, number 11 November 2003

ISSN #1071-4391

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EDITORIAL

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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TECHNOLOGY AND DIFFERENCE: ESSAYS AND PROJECT REPORTS

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

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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 Leibniz) 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, transgendering 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-[^]-vis others, and its diachronic continuity vis-[^]-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 metropolises 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 Ekalavya'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 transiencies, 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."

REFERENCES

1. The following discussion on the enigma of identity is indebted to our reading of "The Identity Puzzle" in **A Princely Imposter** (Permanent Black, Delhi 2002) by Partha Chatterjee.
2. For a detailed discussion of the history of anthropometric photography in the Andaman Islands and in India in general, see "Stern Fidelity" and "Penetrating Certainty" by Christopher Pinney in his book, **Camera Indica** (Reaktion Press, London, 1997). See also "Science Visualized: E. H. Man in the Andaman Islands" by Elizabeth Edwards and "The Parallel Histories of Anthropology and Photography" by Christopher Pinney in **Anthropology and Photography 1860 - 1920**, edited by Elizabeth Edwards, Yale University Press, New Haven and London, in association with the Royal Anthropological Institute, London, 1992.
3. For a history of fingerprinting in India, see **Imprint of the Raj** by Chandak Sengoopta (Macmillan, London, 2003).

AUTHOR BIOGRAPHIES

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 Artificial, Sao Paulo, Generali Foundation Gallery, Vienna and the Walker Art Center, Minneapolis.

< 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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2. "Software Writing Cities," address given by Nigel Thrift at the "Information and the Urban Future" conference, Taub Urban Research Center, New York University, 26 February, 2001.
3. Amitava Kumar, "Temporary Access: The Indian H-1B Worker in the United States," in Alondra Nelson, Thuy Link H. Tu, and Alicia Headlam Hines, eds., *Technicolor: Race, Technology, and Everyday Life* (New York, NY: New York University Press, 2001) pp. 76-87.
4. See Gajjala and Mamidipudi [1] and R. Gajjala and A. Mamidipudi, "' Analoging' the Digital, Digitizing the Analogue: Contemplations on Communities of Production and Virtuality," in Maria Fernandez and Faith Wilding, eds., *Domain Error! Cyberfeminist Practices* (Autonomea, 2002).

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

REFERENCES

1. <http://finut2003.leipzigerinnen.de/>
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.

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.

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."

LEONARDO REVIEWS 2003.11

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.

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

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

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
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"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, Andr -Marie Amp re 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 message, 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 elite.

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"vet□, 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.

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

Reviewed by Robert Pepperell
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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 naïve 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 "givenness" 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 givenness 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 Husserl's former student, Heidegger, with repercussions that persist today. In his earlier work, Husserl adopted a metaphysically neutral position vis-à-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 givenness 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 sheer 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.

LEONARDO JOURNAL

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LEONARDO 37:1 - ABSTRACTS

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.
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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.

PLANET EARTH IN CONTEMPORARY ELECTRONIC ARTWORKS

by Julien Knebusch, Ecole des Hautes Etudes en Sciences
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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.

THE EARTH MUSIC OF THAMKRABOK MONASTERY

by Phra Hans Ulrich Kaempfer, Thamkrabok Monastery,
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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.

SPECIAL SECTION: THE ART AND SCIENCE OF INTERSTELLAR MESSAGE COMPOSITION

Guest editor: Douglas A. Vakoch, Interstellar Message Group
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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.

HEART RATE SONIFICATION: A NEW APPROACH TO MEDICAL DIAGNOSIS

by Mark Ballora, School of Music, Pennsylvania State

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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.

THE DIGITAL ART OF MARBLED PAPER

by B. Tevfik Akgun, Communication Design Department, Faculty of Art and Design, Yildiz Technical University, Istanbul, Turkey.
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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.

MULTIFRACTAL FINGERPRINTS IN THE VISUAL ARTS

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

contact: J.R. Mureika, W.M. Keck Science Center, The Claremont Colleges, 925 N. Mills Avenue, Claremont, CA 91711-5916, U.S.A.
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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.

A SYMPHONY OF SENSATIONS IN THE SPECTATOR: LE CORBUSIER'S
POÉME fLECTRONIQUE 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 *Poème électronique*, 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 *Poème électronique* 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.

A UNIVERSAL GRAMMAR FOR VISUAL COMPOSITION?

by Peter D. Stebbing (teacher), Hochschule für Gestaltung, D-73525 Schwäbisch Gmünd, 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.

LEONARDO ABSTRACTS SERVICE

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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

YEAR PUBLISHED/EXAMINED
November 1999

ORIGINAL LANGUAGE OF THESIS
English

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Author

THESIS SUPERVISOR
Bonita Ely, University of New South Wales, Sydney, Australia - College of Fine Arts

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ANNOUNCEMENTS

POSITION AVAILABLE: TIME AND INTERACTIVITY ASSISTANT PROFESSOR

College of Liberal Arts, University of Minnesota, Twin Cities
Campus

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The University of Minnesota is an equal opportunity employer and educator.

ISAST NEWS

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
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<http://www.leonardo.info> .

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

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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 Cécile Le
Prado, Pauline Oliveros and Pamela Z; interactive artists
Jennifer Hall and Blyth Hazen, Agnes Hegedŷs, 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>.

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.

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-Art Outsiders 2003 New Horizons Prize Jury consisted of: Roger Malina (astronomer and president of the Paris-based Association Leonardo), Frank Popper (Professeur Emeritus - Universit  de Paris 8), Alex Adriaansens (Directeur of V2 in Rotterdam), Isabelle Rieusset Lemari  (Ma tre de Conf rences in Information Sciences and Communication Science at IUFM Versailles), Fran ois Michaud (Conservateur at the Mus e 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 Art Outsiders Festival, dedicated this year to the topic of space art. Roger Malina, Henry Chapier (Pr sident of Art Outsiders Festival), Annick Bureau (Director of Leonardo OLATS) and Jean-Luc Soret (Artistic Director of the Art 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-Art 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.

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Leonardo/OLATS: Annick Bureau - 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 Art Outsiders Space Art exhibition and conference can be found at <http://www.olats.org> and at <http://www.art-outsiders.com>

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.

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 Mabelle/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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LEA WORLD WIDE WEB ACCESS

For over a decade, Leonardo Electronic Almanac (LEA) has thrived as an international peer-reviewed electronic journal and web archive, covering the interaction of the arts, sciences and technology. LEA emphasizes rapid publication of recent work and critical discussion on topics of current excitement. Many contributors are younger scholars and artists, and there is a slant towards shorter, less academic texts.

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

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

LEA
PUBLISHING
INFORMATION

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1204 Geneva, Switzerland

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Leonardo Electronic Almanac is published by:

The MIT Press Journals, Five Cambridge Center, Cambridge, MA
02142
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ACKNOWLEDGEMENTS

LEA acknowledges with thanks the Rockefeller and Ford Foundations for their support to Leonardo/ISAST and its projects.

< End of Leonardo Electronic Almanac 11 (11) >
