

# BEAAP

BIENNALE OF ELECTRONIC ARTS PERTH

● IMMERSION

● BIOFEEL

● SCREEN

BEAP 2002 – The Biennale of Electronic Arts Perth  
<http://www.beap.org>

John Curtin Gallery, Curtin University of Technology, Western Australia

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The Biennale of Electronic Arts Perth, in partnership with the John Curtin Gallery and the Studio for Electronic Arts at Curtin University of Technology, features cutting edge work from international, national and regional contemporary arts practitioners. The inaugural thematic focus for BEAP was *LOCUS - the place where we believe consciousness exists*.

BEAP incorporates a series of international exhibitions, conferences, symposia and forums presenting the theoretical, cultural and philosophical basis of electronic arts practice, creating a platform for critical interrogations of concerns filtered through events including:

*CAiiA-STAR's Fourth International Research Conference  
- Consciousness Reframed 2002*

*The Aesthetics of Care? forum*

*CAiiA-STAR symposium*

*Innovations National Symposium Part 3 - Teaching in a Digital Domain*

*Coding the Spectacle forum*

**BEAP**

**BIENNALE OF ELECTRONIC ARTS PERTH**

**31 JULY □ 15 SEPTEMBER 2002**

**<http://www.beap.org>**

BEAP encouraged collaborations between individuals and groups to seek and promote interdisciplinary practice, both here in Australia and elsewhere. The exhibited works explore the boundaries of new technologies and present them to the public in a challenging and thought provoking way without advocating any one particular methodology or art practice.

BEAP shares an interest in the possibility of future exhibitions that explore aspects of electronic arts practice and in establishing research networks to communicate with other groups or individuals in Australia and overseas.

Paul Thomas  
Director, BEAP 2002 Biennale for Electronic Arts Perth  
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**BEAP – The Biennale of Electronic Arts Perth was developed in partnership with the John Curtin Gallery, Curtin University of Technology.**

I gratefully acknowledge the support of our sponsors with special mention to: The Australia Council for the Arts' New Media Arts Fund and Visual Arts and Craft Board, ArtsWA, Sharp Corporation and Technology Precinct.

BEAP 2002 would not have been possible without the assistance of the following people. I would particularly like to thank the exhibition curators and the conference organisers.

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**BioFeel Curator**  
**Screen Curator**

**Chris MALCOLM**  
**Oron CATTS**  
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JumboVision International

Paul Thomas  
Director, BEAP 2002 Biennale of Electronic Arts Perth  
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Curtin University of Technology, through the John Curtin Gallery, is proud to be involved in the development and presentation of the inaugural Biennale of Electronic Arts Perth (BEAP). As a university of technology it is appropriate that Curtin continue its leadership in this field by examining the impact of the new digital technologies on all aspects of contemporary life. BEAP brings together the arts and sciences at the point of intersection where they are shaping our future. Through projects such as this we have the opportunity to bridge the gaps between disciplines and to encourage the development of new hybrid forms of intellectual engagement that will open up new debates and new possibilities.

At Curtin, research is interpreted within the framework provided by the first Director of the Western Australian Institute of Technology, Dr Haydn Williams: “the application of creative thinking and ingenuity to the solution of definable and practical problems in all fields of human endeavour”, so the Arts and Humanities have always been central to our philosophy. BEAP demonstrates that commitment to pushing at the boundaries of art, science and technology.

I would like to particularly thank the Australia Council for the Arts, ArtsWA and the Technology Precinct the main sponsors, for their support in realising this project, and to also thank all the other corporate sponsors, universities and individuals who have ensured its success. I would also like to congratulate Mr. Paul Thomas from the School of Art who has brought together such an exciting and challenging program of exhibitions, seminars and events. Congratulations also to curators Mr. Chris Malcolm, Mr. Oron Catts and Ms Pauline Williams and to all those who have given their time and energy to this project.

## FOREWORD

**Professor Lance Twomey AM**

**Vice-Chancellor Curtin University of Technology**



## Why do my eyes hurt?

The Biennale of Electronic Arts Perth (BEAP) explores new spatial paradigms that have evolved from an interrogation of the social re-evaluation of space. BEAP will be the catalyst for critical interrogations of issues that are filtered through the particular theme of Locus. This inaugural event is conceived as a contextualising forum that renegotiates perceptual constraints and develops new forms of consciousness.

**Neo:** Why do my eyes hurt?

**Morpheus:** You've never used them before. Rest, Neo. The answers are coming....

**Morpheus:** This is the construct. It's our loading program. We can load anything from clothing, to equipment, weapons, training simulations, anything we need.

**Neo:** Right now we're inside a computer program?

**Morpheus:** Is it really so hard to believe? Your clothes are different. The plugs in your arms and head are gone. Your hair is changed. Your appearance now is what we call residual self-image. It is the mental projection of your digital self.

**Neo:** This...this isn't real?

**Morpheus:** What is real. How do you define real? If your talking about what you can feel, what you can smell, what you can taste and see, then real is simply electrical signals interpreted by your brain. This is the world that you know. The world as it was at the end of the twentieth century. It exists now only as part of a neural-interactive simulation that we call the matrix.

You've been living in a dream world, Neo. This is the world as it exists today.... Welcome to the Desert of the Real

(Extract from *The Matrix* by Larry & Andy Wachowski)

## DIRECTOR'S STATEMENT

**Paul Thomas**

**Director of the Biennale for Electronic Arts Perth**

The idea of place is now affected by computer generated and augmented virtual realities. Our skin has been replaced by digital devices and no longer maps the edge of consciousness. Formerly, consciousness was a product of our senses that converged around electrical impulses from the skin, the thin tissues of the cornea, the drum of the inner ear. The data on which consciousness is based is now being reorganised and reconstructed by way of input from peripheral devices.

Recently we migrated to a new universe, leaving the old world behind. However, bytes of information from the old reality persist. For example; one major influence on the way we still comprehend visual input data is via traditional perspectival constraints. One reason for this is that perspectival space is virtual in form. Though many artists have dealt with the reconfiguration of space to make us rethink the real, it is time to renegotiate inner and outer spatial constraints to allow us to perceive real space and cyberspace and more fully explore its potential.

Single-point perspective was the first virtual space. It prepared us for the new universe we are now entering by showing us that virtuality is a tangible liveable place. Brunelleschi (1460), with his peephole device, became one of the first to conceive of perspective. He developed a relationship with the mirror using it as a screen to create a defining process for manipulating space. The device consisted of a mirror and a painting made to represent the baptistery of San Giovanni. This small mixed media painting, said to be about 12 by 8cm, was not an ordinary work. The sky in the painting was made of polished silver. This was not done for an aesthetic reason, but for a purely practical one. There was a small hole the size of a lentil drilled in the back of the painting. The viewer turned their back on the baptistery of San Giovanni and looked through the hole into a mirror, placed at arms length. The viewer saw the baptistery seamlessly welded in to the background This device was one of the first perception defining virtual environments.<sup>1</sup>

However, the virtuality of perspective is crude and limiting.

In a sense, perspective transforms psychophysiological space into mathematical space. It negates the differences between front and back, between right and left, between bodies and intervening space ("empty" space), so that the sum of all the parts of space and all its contents are absorbed into a single "quantum continuum". It forgets that we see not with a single fixed eye but with two

constantly moving eyes, resulting in spheroidal field of vision. It takes no account of the enormous difference between the psychologically conditioned 'visual image' through which the visible world is brought to our consciousness, and the mechanically conditioned 'retinal image' which paints itself upon our physical eye.<sup>2</sup>

Perspective has had a commanding effect on the way we perceive the world. The importance placed on the subject/object relationship in systematic perspective not only alienates the viewer from the objects, but also the objects from one another. It freezes time to create the basis for the identification of space. The points in perspective, as Erwin Panofsky states, are devoid of all content and raise no questions of diversity. Nowhere in space can these points be realised; they demand we view the world only fictitiously or virtually.

Perspective has traditionally given the viewer the idea of being immersed in a depicted scene by creating the illusion of depth. The viewer can only enter a work conceptually, as one does in the case of a representational painting, with its metaphorical relationship to skin as the surface. In most cases this demands of the viewer some familiarity with a perspectival gaze. The viewer sees through a conditioned response towards a developed understanding, like looking through a window, or as though viewing a screen. The physical interface with what we call the real can be conceived of as `data_in_space` and becomes the consciousness factor. As new emerging means of display get closer to the retina, as the computer disappears, all that you will be left with is computer aided consciousness and computer vision.

It would probably be at least another generation or two before we have consensus on the shape of that space, but if we are to believe what art and science have been saying, it is probable that that space would exist in time, be an interactive process and organised horizontally with a geometry quite different from the Euclidean geometry of renaissance perspective.<sup>3</sup>

Computer generated consciousness can redefine spatiality and repackage the stuff of our memories. The cognitive processing of perspectival traditions that only allows for this single generated viewpoint limits our criticality in the exploration of space. This tradition, when juxtaposed with the potential of virtual reality, changes our mass subjectivity in the way we engage in the perception and representations of things. The `dataspatial`

relationship that is to become part of our mass subjectivity needs to be initially constructed through cultural, critical and artistic concerns. This spatiality can be seamless, imaginative, phenomenological or inclusive. The change can come from the liquid nature of this dataspace and stem from its capacity for immersion.

The problems explored in relationship to this technology arise through the loss of orientation, denial of alterity and then disassociation. What we have is a spatial transformation of infinite smallness; the moving of one form into another carried out a pixel at a time. The denial can be seen in computer generated morphing 'which attempts to erase binarisms into the homogeneous, seamless, and effortless movement of transformation and implied reversibility'.<sup>4</sup> Through this disassociation with spatial investigation to spatial assimilation a concern needs to develop, a new non-perspectival attitude to a spatiality that can re-explore the way we codify spatial experience.

Art is pro-active in the development of data-consciousness, which is of critical importance in reshaping the way we perceive. Its relevance is to social aspects of life; to create a bridge between the corporatised view of the developing computer generated consciousness and a social spatiality. The artists in the Biennale provide different views of spatiality that ask us to confront the perspectival effects on our consciousness. The work allows us to ask Neo question: "Why do my eyes hurt"?

There has been a significant spatial shift in recent years with artists and scientists reaching out beyond their own domains. This comes at a time when global economics, fuelled by new developments in science and digital technology, is providing increasing opportunities for artistic and technological interactivity. Artists have always been among the first to investigate the spatial effects of technological advances through their work, and using electronic and digital technologies for seeing and expressing ideas is becoming commonplace in the scientific arena. This mutual interest between artists and scientists can be seen in the use of the computer screen. This device has its own historical connections with the picture format that still suggests a way of looking at the world. Given all these factors there is now an exciting opportunity for developing collaborative partnerships for informing and inspiring society with the artist and scientist working together in the field of electronic arts.

Paul Thomas, Director of the Biennale for Electronic Arts Perth

1. Hubert Damisch. *The Origin of Perspective* (The MIT press Cambridge Massachusetts) 1994 trans John Goodman
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David CARSON

Donna COX

Char DAVIES

Nigel HELYER

Richie KUHAUPT + Geoffrey DRAKE - BROCKMAN

Robert NIDEPFER

Lynne SANDERSON

Ken RINALDO

STELARC

Victoria VESNA + Jim GIMZEWSKI

# IMMERSION

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● BIOFEEL

● SCREEN

## WINGS OF DESIRE

PEOPLE ARE DISTRACTED BY OBJECTS OF DESIRE,  
AND AFTERWARD REPENT OF THE LUST THEY'VE INDULGED,  
BECAUSE THEY HAVE INDULGED WITH A PHANTOM  
AND ARE LEFT EVEN FARTHER FROM REALITY THAN BEFORE.  
YOUR DESIRE FOR THE ILLUSORY COULD BE A WING,  
BY MEANS OF WHICH A SEEKER MIGHT ASCEND TO REALITY.  
WHEN YOU HAVE INDULGED A LUST, YOUR WINGS DROP OFF;  
YOU BECOME LAME, ABANDONED BY A FANTASY.  
PRESERVE THE WING AND DON'T INDULGE SUCH LUST,  
SO THAT THE WING OF DESIRE MAY BEAR YOU TO PARADISE.  
PEOPLE FANCY THEY ARE ENJOYING THEMSELVES,  
BUT THEY ARE REALLY TEARING OUT THEIR WINGS  
FOR THE SAKE OF AN ILLUSION. <sup>1</sup>  
MEVLANA JALALUDDIN RUMI

## Curator's FOREWORD Chris MALCOLM

As we move into our twenty first western century we are on the threshold of unlocking many of the fundamental secrets of life as we know it. A species poised, as always we have been, on the edge of the void – the void of our own unknowing.

We have forever existed in our own constructed sense of the real. Struggling to codify, to make sense of our surroundings, we have relied on our understanding of the world in order to comprehend our place within it. This driving combination of our biological

fascination with change, and cultural obsession with technology, has seen the ability to augment our physical being evolve to the point at which we now find ourselves able to replicate biological systems through genetic manipulative technologies. We have developed unprecedented powers to interfere with the fabric of life itself and control natural systems but what of ourselves individually. In what ways can the continuing developments in science and technology assist us in our development as human beings.

# IMMERSION

As a species we are hard-wired to detect the most subtle changes in the sensory datastream that informs our existence. We develop filters of perception to ignore much of this input – or at least to not respond to it – and yet it does not diminish the cumulative (subliminal) effect that these stimuli physically, and psychologically, have upon our being/consciousness. Our open eyes respond to movement but when we shut them, what then do we see of the flux that is our mind? Within all of us exists the potential “untarnished mirror” – a state of mind existing beyond the emotional noise of conscious thought, a quietude where emotions are not attached to the unending stream of thoughts that pass through our neural gates, the membranes of our sensory organs, the skin of our being. Our western history is one of discovery, focused on what is “out there” beyond, rather than within ourselves, of shaping reality to fit with in our existing scheme – our own consciousness.

As anthropologist Lyall Watson describes, we are a species obsessed with the “new”. Just as the invention of perspective in the fifteenth century allowed artists the unprecedented ability to induce sensations of immersion for viewers – through the illusion of depth beyond the painted membrane of the canvas or panel – we are witnessing the development of entirely new ways of constructing, presenting and experiencing alternative realities – Virtual Realities. With the explosion of interdisciplinary collaboration where art, science and technology converge, artists are more than ever poised to profoundly transform our lives in unprecedented ways providing potential for our collective consciousness to evolve and reinvent itself anew.

*Immersion* offers a glimpse of the range of possibilities for new modes of communicating, for momentarily controlling input and presenting without distraction the timeless ideas that these artists strive to share.

The technology used in immersive environments merely sets the stage for digital mediation in tangible space. At times the technology is itself on display as with the prosthetic and robotic devices of Stelarc that augment his own physical being during live performances. When dormant these objects are displayed for their own palpable cyber/techno-aesthetic qualities. It also can be much less visible as in Char Davies's groundbreaking works *Osmose* and *Ephémère*. These interactive fully immersive virtual environments are mediated by technology (computers, head mounted display unit, projection equipment) but rather than celebrate the technology itself, it only serves to facilitate the embodied experience of the participants. As the artist comments:

□ Rather than deny our embodied mortality and our material embeddedness in nature, I seek, somewhat paradoxically through a highly technologicalised art form, to return people to their bodies and to the earth by using VR to refresh their own

perceptions of an embodied being-in-the-world, to return them to a perceptual wonder at being there.□<sup>2</sup>

Ken Rinaldo is fascinated by the exploration of evolving technological systems that move toward intelligence and autonomy and looks to the intersection of living and technological systems in his immersive artificial life robotic installation *Autopoiesis*. Victoria Vesna in collaboration with leading nano-scientist Jim Gimzewski premieres a work *ZERO-WAVEFUNCTION nano dreams and nightmares* focusing on the implications of nanotechnology a little understood emerging technology that has unprecedented potential for social, technological and environmental change. Riche Huaupt and Geoffrey Drake-Brockman provide opportunity to interact with the virtual in counterpoint to the more familiar sculptural presence of an actual full body cast in their collaborative installation *Chromeskin*. With innovative use of 3-D scanning technology and customised rendering software posited alongside traditional sculptural techniques *Chromeskin*

bridges the virtual and the physical with the viewer as the protagonist in what the artists refer to as 'reversed immersion'. Utilising powerful digital animation techniques, Donna Cox creates visualisations of cosmological events that will never be seen by human eyes. They assist our own conceptual understanding of what eventually becomes a widely accepted view of cosmological reality.

Cultures supply and inform the spectrum of possibilities for how consciousness is organised. The production of artworks employing some of the feedback-driven, autopoietic capabilities that we embody offers some leads to the solution of the problem of a technologically determined culture. If this kind of work can become complex enough, or if enough connectivity can be developed among these works – say over the internet – then is it possible that the system that thus evolved might in fact be conscious? And if so, what then? <sup>3</sup> Stephen Jones

The artists in *Immersion* utilise a wide range of technologies – familiar, new and emerging. The investigation of the potential for our own immersion in alternative realities flows through much of the work. It brings together projects by artists who are redefining the possibilities through the development and subsequent application of technology – convergent disciplines that that can ultimately inform and inspire us all.

#### References:

- 1 Mevlana Jaluddin Rumi (1207 – 1273) *Mathnawi III*, 2133-2138 Shambhala, London 1999, p 17.
- 2 Char Davies excerpt from *Reverie, Osmose and Ephémère: Dr Carol Bighotti interviews Char Davies n.paradoxa*, international feminist art journal (Vol 9. (Eco)Logical, 2002)  
Carol Bighotti is Director of the Centre for Art and Technology Faculty, Emily Carr Institute for Art and Design, Vancouver, Canada.
- 3 Stephen Jones *Towards a Philosophy of Virtual Reality: Issues implicit in Consciousness Reframed* Leonardo (Vol 33, No.2, 2000)



David CARSON in collaboration with Brian McCLAVE + George MILLWARD

The *Skylab* 3-D stereoscopic video installation is the result of an exploration of relationships between astrophysics, art and mythology in regional Australia.

*Skylab* 2002 3-D stereoscopic video installation

This project investigates significant events from recent and archaic times that took place at two unique sites in Western Australia. Research for the project was conducted in relation to the specific sites, stories and museum artefacts from Esperance (the site of the crash landing of the NASA Skylab Space Station in 1979) and Wolfe Creek Crater (the world's second largest meteor impact site). These loci are the magnetic field attracting disparate stories and ideas, a matrix connecting the ancient with the modern, the poetic with the scientific and the real with the imagined.

*Skylab* is a partnership between David Carson and international video artist Brian McClave working with ex-NASA atmospheric physicist and electronic musician George Millward.

This will be the world premiere of *Skylab*.

David CARSON  
2002

CARSON + McCLAVE + MILLWARD  
*Skylab* 2002 [series of digital stills]







CARSON + McCLAVE + MILLWARD *Skylab 2002* (digital still)  
CARSON + McCLAVE + MILLWARD  
*Skylab 2002* (digital still)

# Donna COX

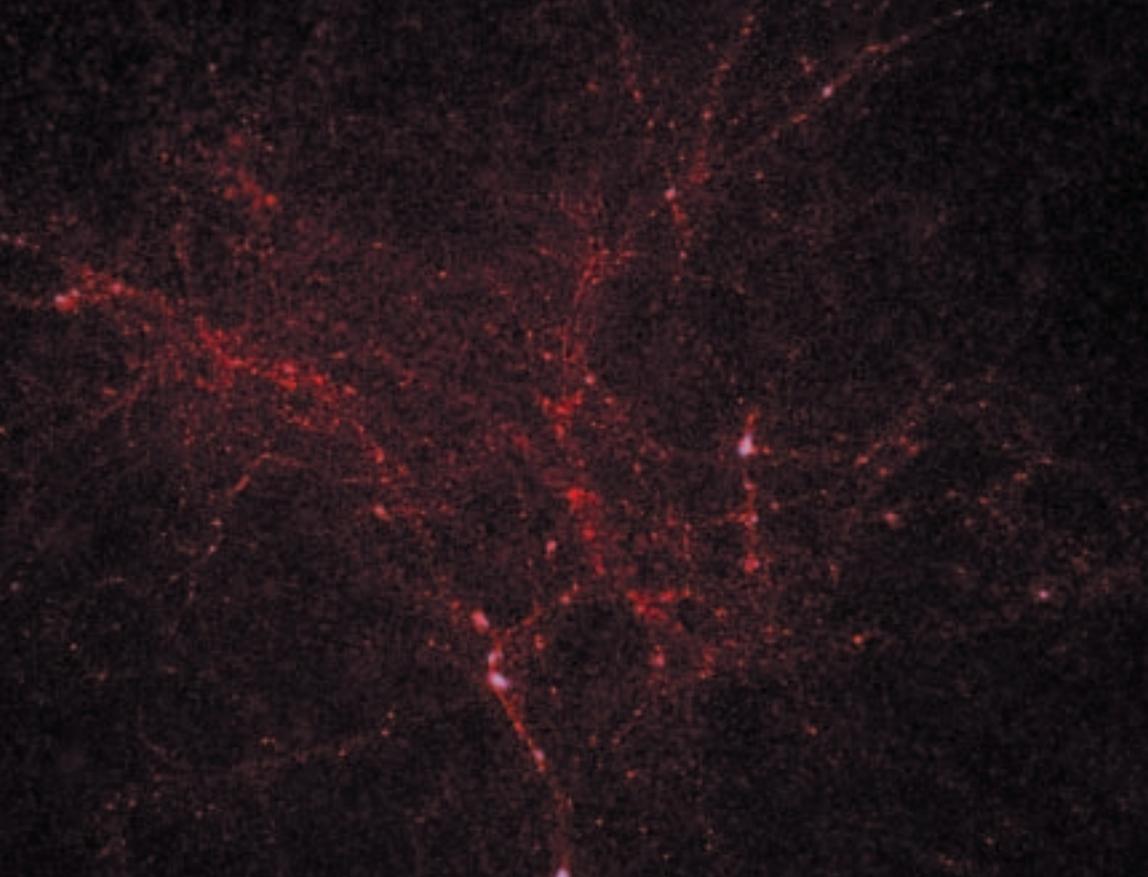
For many years, artist and educator Donna Cox has collaborated with scientists, artists, and technologists to visualise the cosmos. This collective work includes excerpts from the IMAX movie, *Cosmic Voyage* that was nominated for an Academy Award in 1997.

Cox sees the importance and impact of the artist's design of the scientific data. These images are often circulated to and viewed by millions of people: high technology visuals of the cosmos will provide a primary model of how people will understand and 'see' the universe for many years to come. In this sense, the artist plays a critical role in the editing and presentation of the data, and these visualisations become integrated into culture as reality. Yet, many of these visualisations represent abstractions and mathematical models that can never be seen by the human eye. Time and Space are warped in order to provide humans with a view of the unviewable. Through audience reinterpretation and cultural recycling, the visualizations evolve into a reality of their own.

Given the circulation of such imagery to millions of people at one showing and millions more through rebroadcast and replay of movies, one can see that these cosmological visualisations not only inform culture, but also formulate cultural creation beliefs of science. In particular, the Big Bang and other "evolution of the universe" imagery provide a new cosmic creation myth for cultural consumption. Here, the artist plays a role in the digital 'painting' of the cosmos: while Science and Entertainment have become the patrons of the new digital creation story.

Donna COX  
2002

*Converging Art and Science: A Collection of Collaborative Works by Donna Cox*  
2002 DVD video



*Supercluster* © Smithsonian Institute + Motorola Foundation, 1996. visualisation by: Donna Cox and Bob Patterson, NCSA. simulation: Frank Summers, Princeton.



*Milkyway* © National Centre for Supercomputing Applications and University of Illinois at Urbana-Champaign. visualisation by: Donna Cox, Bob Patterson and Stuart Levy, NCSA.





*Galaxies* © Smithsonian Institute + Motorola Foundation, 1996. visualisation by:  
Donna Cox and Bob Patterson, NCSA. simulation: Lars Hernquist and Chris Mihos UCSC.

# Char DAVIES

The immersive virtual environments of Char Davies are the fruit of more than 20 years of artistic practice dealing with perception, nature and non-Cartesian spatialities. Far from adhering to the techno-utopian view of cyberspace, Davies considers conventional approaches to virtual reality not only a reflection but a reinforcement of the dominant western worldview. In her work she proposes an alternative VR.

*Osmose* 1995 + *Ephémère* 1998 immersive virtual environment



*Forest + Grid*, digital frame captured in real-time through HMD (head-mounted display) during live performance of immersive virtual environment *Osmose* 1995.



The strategies developed by Davies and her team include emphasis on full-body immersion in 360 degree spherical, enveloping virtual space, through the use of a wide-field-of-view stereoscopic head mounted display. Immersion in Davies' environments depends on the body's most essential living act, that of breath. Through the wearing

of a motion tracking vest, participants are able to buoyantly float upward by breathing in, to descend by breathing out, and to change direction by subtly shifting their centre of balance. The immersive experience is hugely affected by the presence of sound, localized in three dimensions and responsive in real-time to the participant's position in space, speed, proximity, direction of gaze and so on.



left — *Winter Swamp*   above — *Summer Forest*   below — *Summer Seeds*  
All three images digital frames captured in real-time through HMD (head-mounted display) during live performance of immersive virtual environment *EphDmDre* 1998.

Experientially, there are two ways to engage with these works: firsthand, through visceral solitary immersion via the head mounted display, and as an audience member visiting the installation. In public exhibitions, the visual and aural explorations of each participant are projected in real-time so that an audience can follow the journey from the participant's subjective point-of-view. At the same time, the audience may also watch a shadow-silhouette of the participant's body in motion, a strategy intended to emphasize the relationship between the participating subject's body and the resulting visual / aural effects – drawing attention to the body's grounding role in virtual space.

The current exhibition of *Osmose* and *Ephemere* at BEAP is the world premiere of both works running on a PC.

Char DAVIES  
2002

*Tree Pond*, digital frame captured in real-time through HMD (head-mounted display) during live performance of immersive virtual environment *Osmose* 1995.







## Nigel HELYER

In English we speak of mines [sown] in fields or [laid] somewhat akin to an egg, or perhaps a cunningly [laid] trap. Mines are ontological devices: they lie in wait for the future! Such a concept is resonant with the old testament parable of the sowing of seed in which the [germs] of the future are broadcast, as if by chance, across a varied range of terrain, some fertile and fruitful, and some stony and barren, an ecology of destiny.

Whilst the physical geography of Islam acts as the historical context for the mytho-poetic spaces and narratives of the Old Testament so too, it acts as a repository for hundreds of thousands (perhaps millions) of landmines. *Seed* is a sonic installation that metaphorically collides our agricultural lexicon of the minefield, the narratives of the Old Testament and the contemporary disasters of military and ideological conflict by inviting the viewer / auditor to literally enter a [sonic-minefield].

*Seed* therefore proposes a place of complexity and ambiguity within which to contemplate the simplistic and unilateral position of current military and political events. It is after all sobering to consider that the death toll inflicted by landmines (principally in the developing world) is equivalent to the appalling destruction of the World Trade Centres - only repeated five times each year.

Nigel HELYER  
2002

*Seed* 2001 interactive sound sculpture installation

above: *Seed* 2001 installation details  
next page: *Seed* 2001 installation detail



*Chromeskin* includes two distinct elements – a full size chrome-plated man, and a new device, called the Quadrascope. The physical *Chromeskin* is a freestanding figure with a chromium plated, mirror-finished surface produced via electroforming a metallic coating over a firebreaglass bodycast. Another virtual *Chromeskin* exists inside the machine. This virtual *Chromeskin* was derived from a digital 3D model based on a laser surface scan of the same human body. Virtual *Chromeskin* is displayed on the Quadrascope, which is a sort of inverted immersion computer interface device.

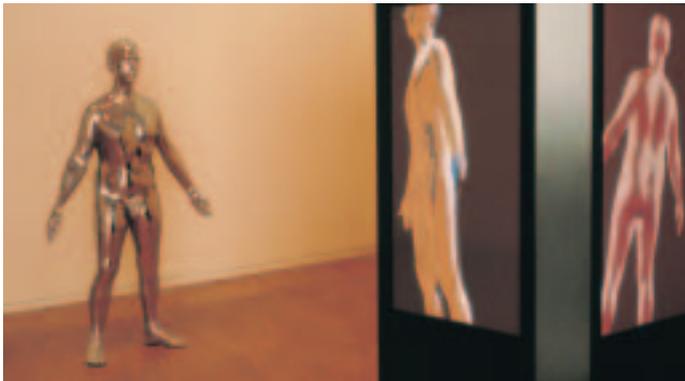
The two aspects of *Chromeskin* are installed in a staged encounter between two aspects of human agency - physical and virtual - arranged at counterpoise. *Chromeskin* addresses a bifurcated reality/virtuality identity space in which the

post-industrial machine acts as both prototypical self and a human referent. The split-being *Chromeskin* – auto-reflecting, interiorless and null-surfaced – dwells in this definitional borderland and explores the ramifications of the technological absorption of self.

By placing the virtual chrome-plated man inside the Quadrascope, and positioning it alongside the real chrome-plated man, we have set the scene for a kind of collision between virtual and actual agents, which is played out with the audience as participants. All viewers are implicated in this work, it cannot be experienced without a contribution into its feedback loops – both real and virtual. [www.chromeskin.net.au](http://www.chromeskin.net.au)

Richie KUHAUPT and Geoffrey DRAKE-BROCKMAN  
2002

## Richie KUHAUPT + Geoffrey DRAKE-BROCKMAN



*Chromeskin 2001* interactive digital sculpture installation

*Chromeskin 2001* installation view National Gallery of Australia, Canberra  
next page – *Chromeskin 2001* (detail)



# Robert NIDEFFER

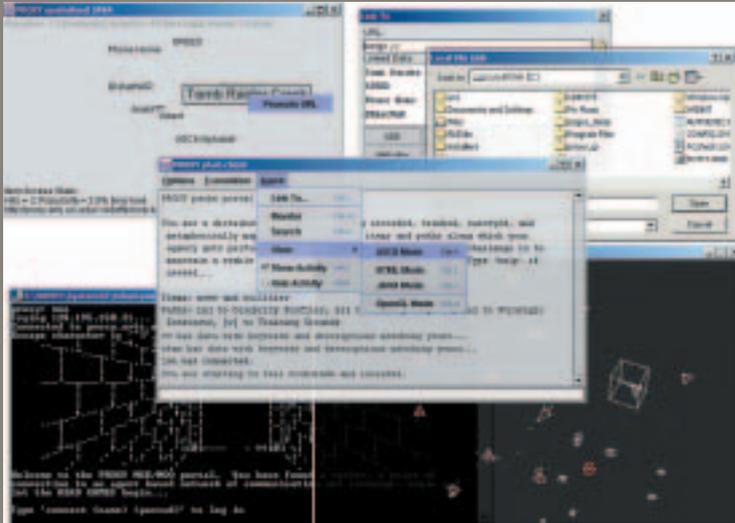
<http://proxy.arts.uci.edu/~nideffer>

The term "agent" is used to describe software that filters and customizes data, creates user profiles, and tracks user behaviours. PROXY is a head-game about agents and agency that revolves around what the artist calls "unorthodox methods of information discovery, file-sharing, data mismanagement and role-play." While most of today's software agents are developed as closed systems for commercial purposes, PROXY is an open-ended, multi-agent development environment that others may freely extend. Once the agent is set up and the system is installed, players can import personal data and begin exploring. By facilitating distributed, collective, and slightly out-of-control data processing, PROXY is a reminder of what software agents can be: a playful exploration of identity, community, and information exchange, but one that raises rather serious questions about who we are and how we behave in online public space.

*PROXY* 2001 software/website

*creepy-comics.com* 2002 software/website

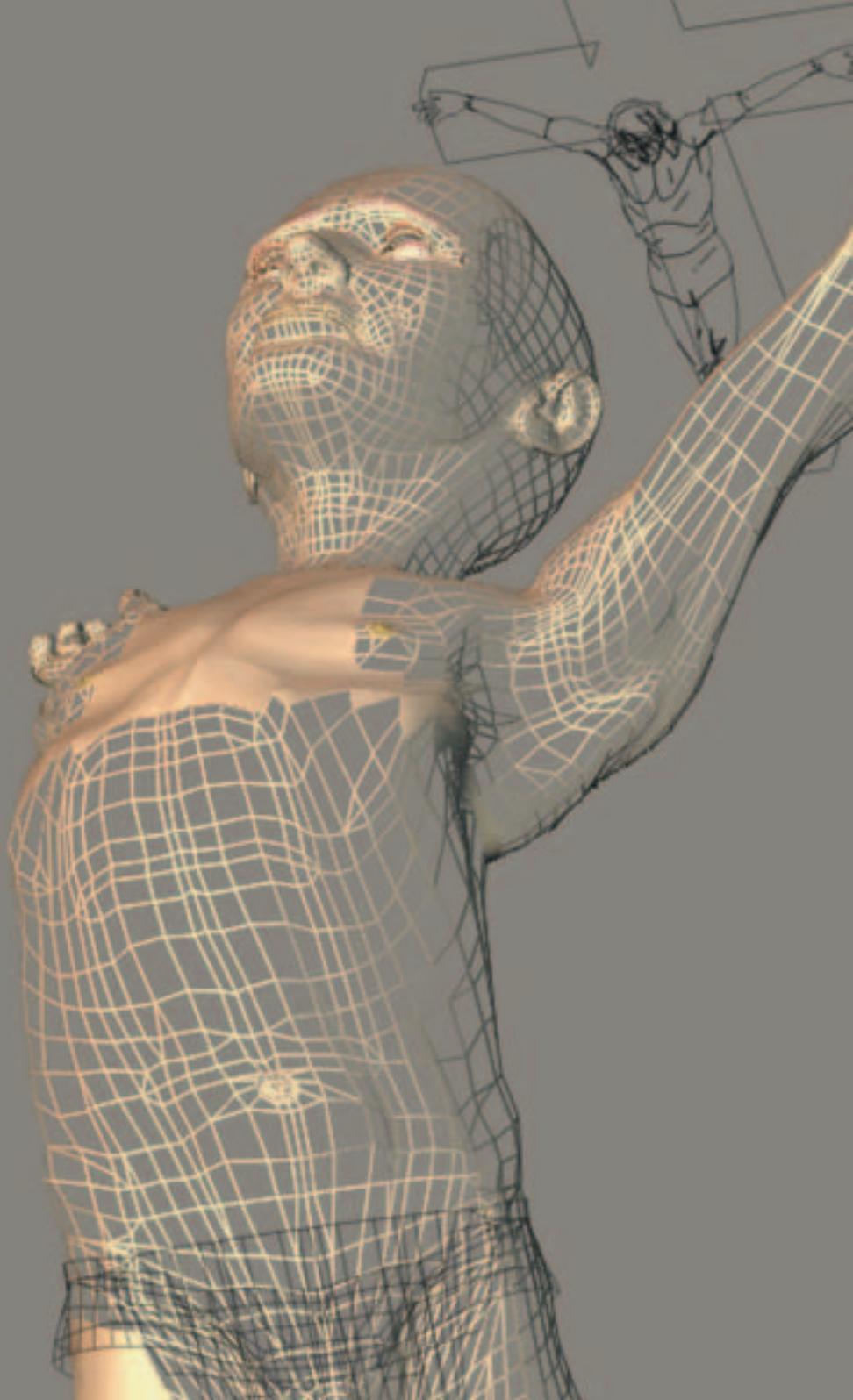




*creepy-comics.com* is the parent company for a soon to be released episodic role-playing adventure game designed as a cross-platform digital comic. *creepy-comics.com* deals with the trials and travails of two main characters – Pustule and Fester – as they navigate an unholy triumvirate of church, state and new media. *Episode I: State of Grace* represents the first known comics you can play.

Robert RIDGFFER  
2002

above: *PROXY* 2001 screen shot    right: *creepy-comics.com* 2002 screen shot

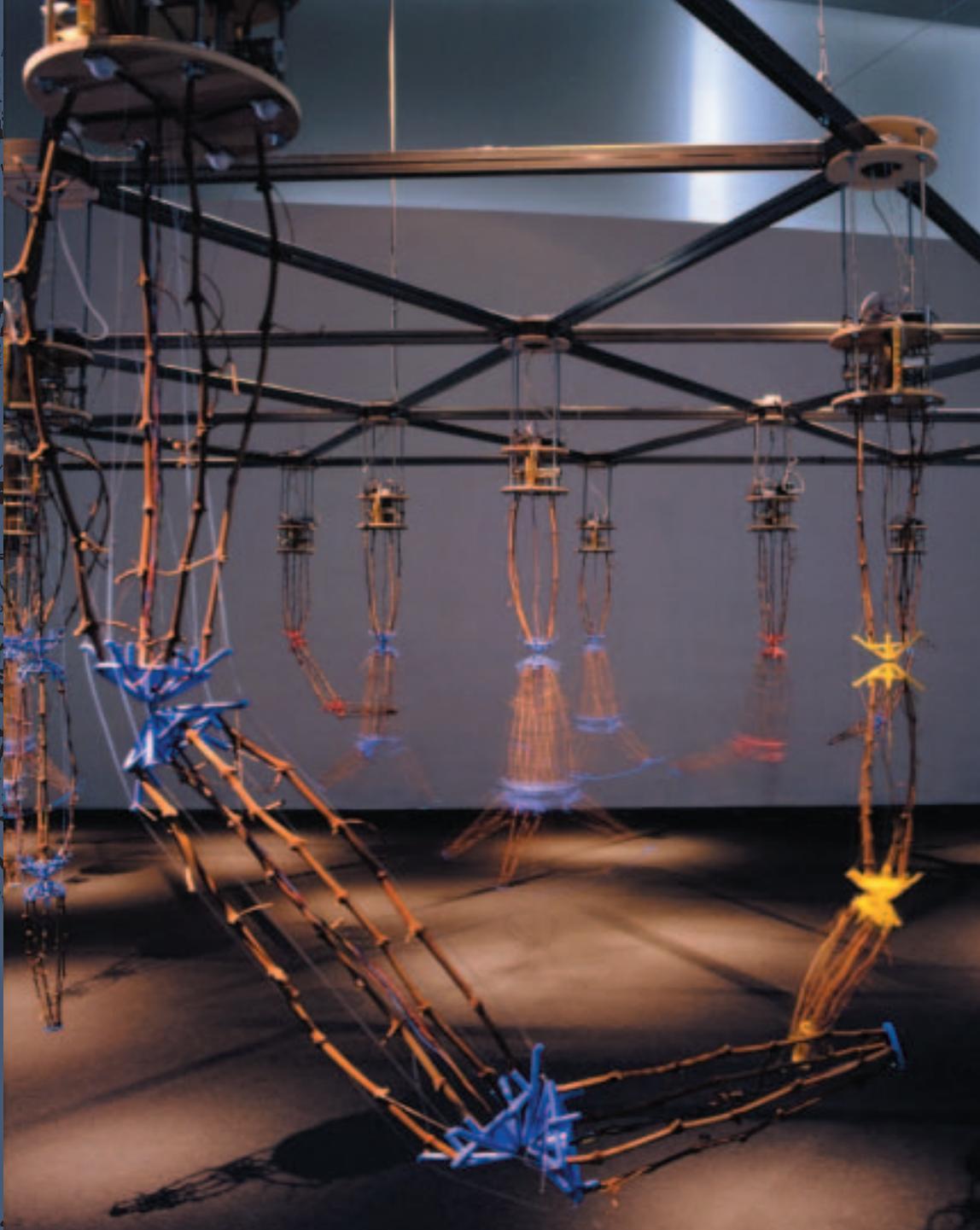


## Ken RINALDO

*Autopoiesis*, consists of ten musical and robotic sculptures that interact with the audience and modify their behaviours based on both the presence of the participants in the exhibition and the communication between each separate sculpture. It is "self making", a characteristic of all living systems. This series of robotic sculptures talk with each other through a hardwired network and audible telephone tones, which are a musical language for the group. *Autopoiesis* presents an interactive environment, which is immersive, detailed and able to evolve in real time by utilizing feedback and interaction from audience/participant members.

*Autopoiesis* 2000 artificial life robotic sculpture installation





*Autopoesis 2000* installation view, Hiasma Museum of Contemporary Art,  
Helsinki, Finland 2000 (photo: Veha Eweis)

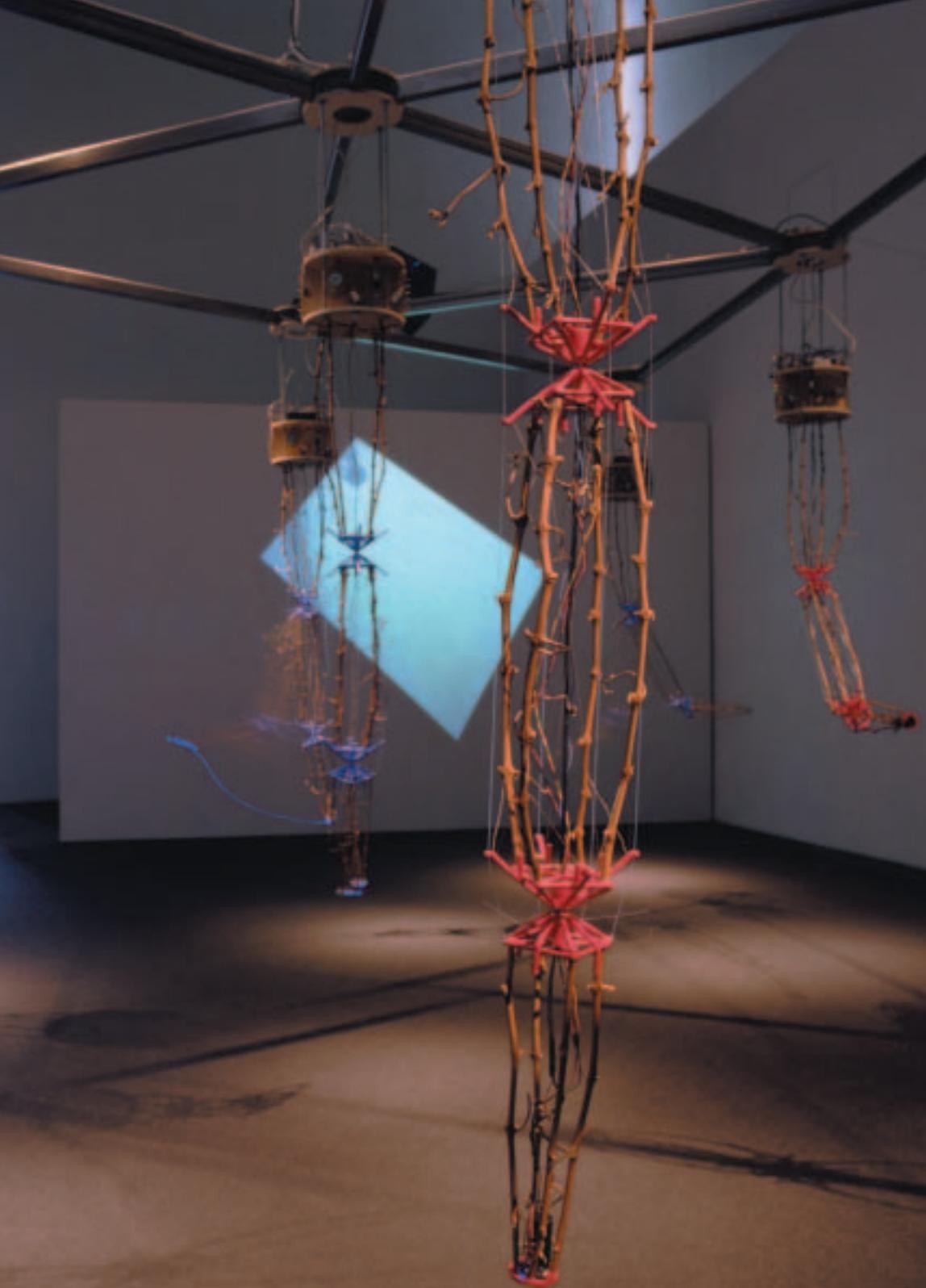


The interactivity engages the viewer / participant who in turn, effects the system's evolution and emergence. This creates a system evolution as well as an overall group sculptural aesthetic.

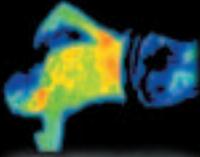
*Autopoiesis* continually evolves its own behaviours in response to the unique environment and viewer / participant inputs. This group consciousness of sculptural robots manifests a cybernetic ballet of experience, with the computer / machine and viewer / participant involved in a grand dance of one sensing and responding to the other.

Ken RINALDO  
2002

*Autopoiesis* 2000 installation view, Hiasma Museum of Contemporary Art, Helsinki, Finland 2000 (photo: Vehia Cuweis)



Stage Three



slow wave sleep

## Lynne SANDERSON

*Somnolent Fantasies - The Sleeper* is an interactive installation that takes the participant on a journey through the stages of sleep. The participant interacts with the sleeper by setting the time on a clock interface. This triggers the stage of sleep or the dream the sleeper is experiencing at that time. The sleeper controls image movement via data recorded at the Centre for Sleep Research.

Past and present are synthesised by dream experience. There are strong links between

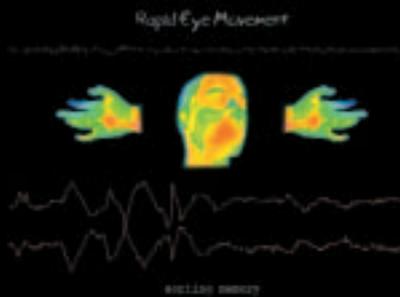
memory and emotion. Everyday we are reaching into the depths of our subconscious to let memory and imagination reveal our innermost secrets. The majority of sleepers have a lack of control over the content of their dreams. In dreams the experiences seem real to the sleeper, often leaving a profound impression on the person's waking life. This led me to the question - How can I remap the universal primal nature of the dreamstate so that others can experience it in the "real world"? Using medical data recorded in the sleep lab, I am attempting

*Somnolent Fantasies - The Sleeper 2001* interactive digital installation

above: *Somnolent Fantasies - The Sleeper 2001* (Stage 3) right: *Somnolent Fantasies - The Sleeper 2001* (REM Stage)

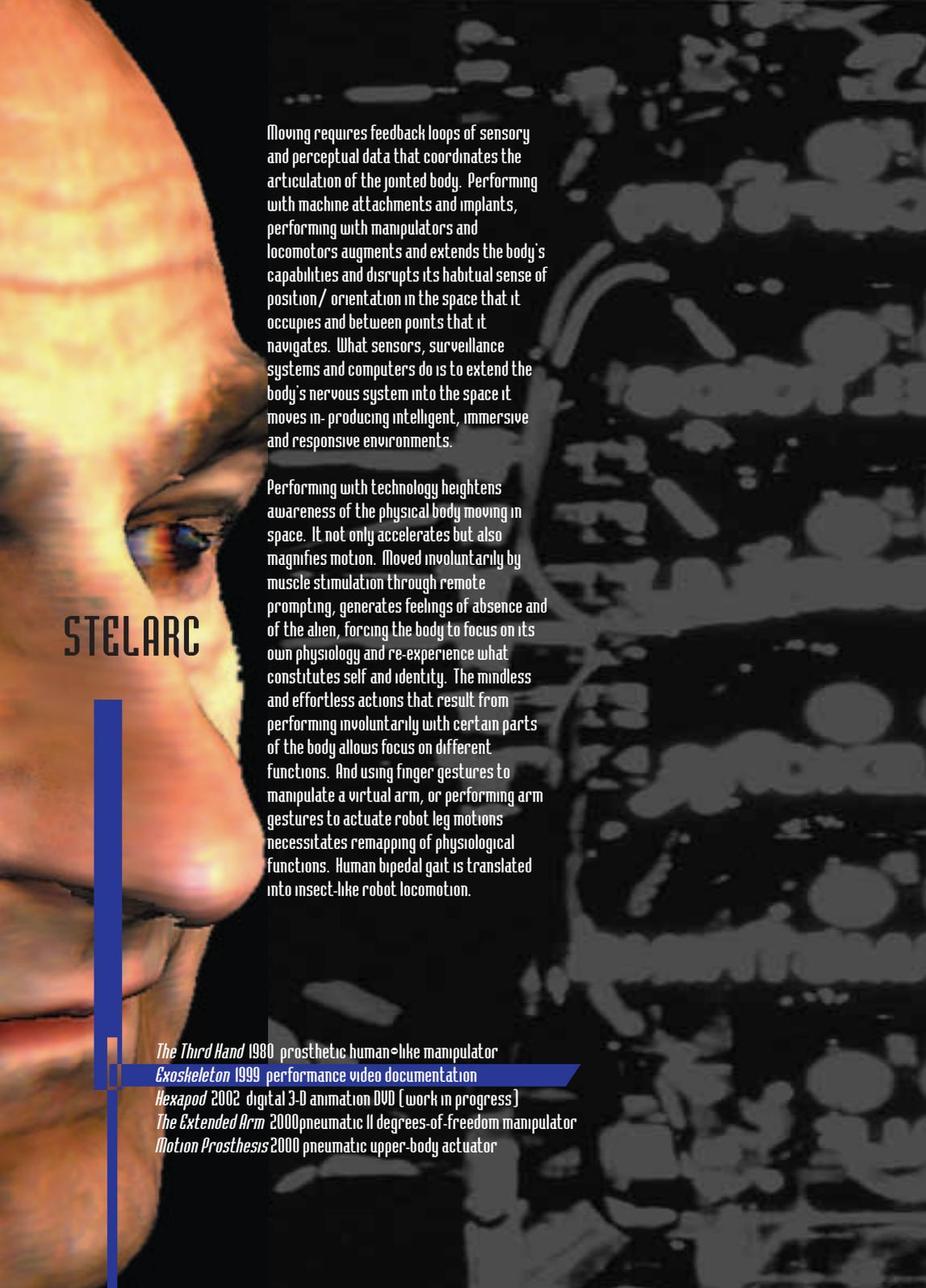


Sometimes I'll swim to the surface and struggle to wake up  
but I can't and I get sucked into another nightmare.



to remap elements to create a fluidity and motion that is born of the electrical energy of the human body.  
The meat has control - subconscious control. Mind control.  
*Somnolent Fantasies - The Sleeper* is an ongoing exploration into the sleeping mind and how data generated in sleep can control elements of the [real world]

Lynne SANDERSON  
2002



## STELARC

Moving requires feedback loops of sensory and perceptual data that coordinates the articulation of the jointed body. Performing with machine attachments and implants, performing with manipulators and locomotors augments and extends the body's capabilities and disrupts its habitual sense of position/ orientation in the space that it occupies and between points that it navigates. What sensors, surveillance systems and computers do is to extend the body's nervous system into the space it moves in- producing intelligent, immersive and responsive environments.

Performing with technology heightens awareness of the physical body moving in space. It not only accelerates but also magnifies motion. Moved involuntarily by muscle stimulation through remote prompting, generates feelings of absence and of the alien, forcing the body to focus on its own physiology and re-experience what constitutes self and identity. The mindless and effortless actions that result from performing involuntarily with certain parts of the body allows focus on different functions. And using finger gestures to manipulate a virtual arm, or performing arm gestures to actuate robot leg motions necessitates remapping of physiological functions. Human bipedal gait is translated into insect-like robot locomotion.

*The Third Hand* 1980 prosthetic human-like manipulator

*Exoskeleton* 1999 performance video documentation

*Hexapod* 2002 digital 3-D animation DVD (work in progress)

*The Extended Arm* 2000 pneumatic 11 degrees-of-freedom manipulator

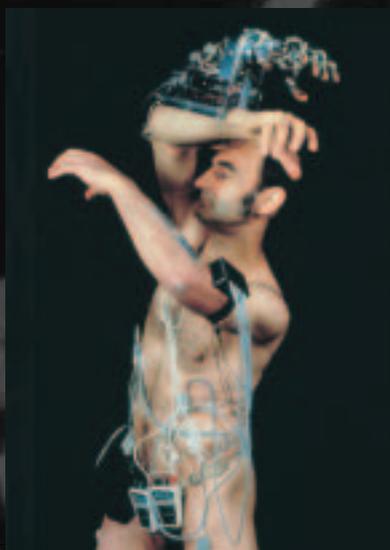
*Motion Prosthesis* 2000 pneumatic upper-body actuator



above: *Stimulation System* [photo: T.Figallo]

below: *The Third Hand* 1980 [photo: S.Hunter]

below right: *Motion Prosthesis 2000* [digital image: S.Middelton]







Actuated by machines or electrical stimulation, the experience is of a split body - a body with prosthetic bits and pieces. But when moved by an avatar in an inverse motion-capture system, the body itself becomes a prosthesis for manifesting the behaviour of an intelligent, artificial entity in the physical world. An intelligent agent needs to be both embodied and embedded in the real world. Confined, constrained, disrupted and dislocated, accelerated, automated and involuntary - the body's presence, position, proximity, velocity and trajectory become problematic.

STELARC  
2002

*Hexapod 2002* (work in progress, digital image: S.Middleton) detail

The impacts of societal transformations of Nanotechnology, which is not understood per se, are difficult to predict and essentially quite extreme in anticipated outcomes. Nanotechnology has no well articulated vision or direction and is generally not understood as a common human experience. The *ZERO@WAVEFUNCTION* project explores, as part of it evolution, dreams, nightmares and visions in a manner similar to quantum mechanics. The particle that penetrates the quantum wall has a probability to reflect to transmit through the barrier with a zillion possible outcomes in between.

To the artist and the scientist this becomes the magnetic realm worthy of exploration.

*ZERO@WAVEFUNCTION* is a set of wavefunctions of human existence and of technology and science woven together in a dynamically transforming landscape with probabilities of being and NonBeing of time and Notime. The project *ZERO@WAVEFUNCTION* represents an exploration of the unpredictable where both artist and scientist are willing to be conceptually changed in their vision, hopes and fears.

## Victoria VESNA + Jim GIMZEWSKI

Collaborators: Josh Nimoy, Pete Conolly and David Votava

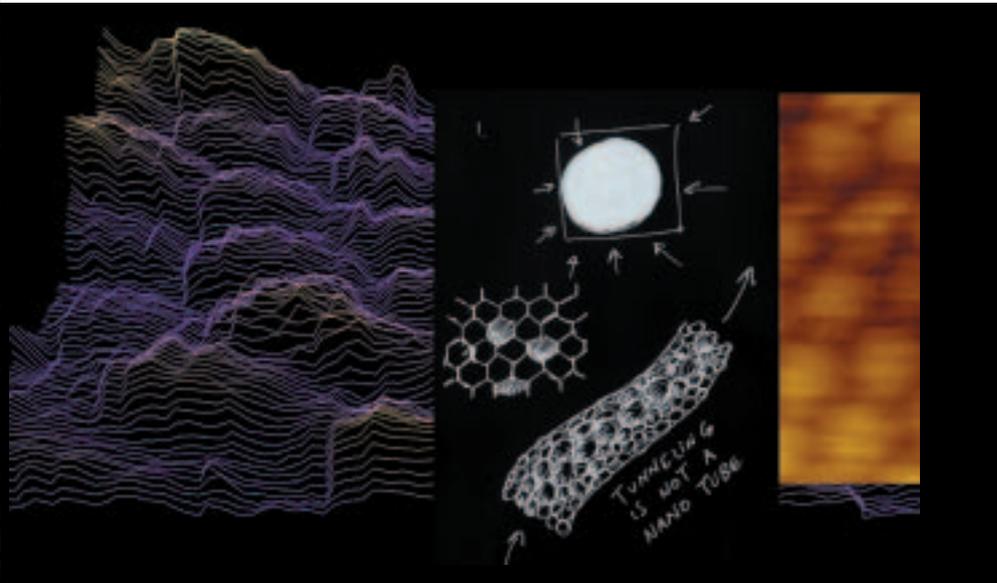
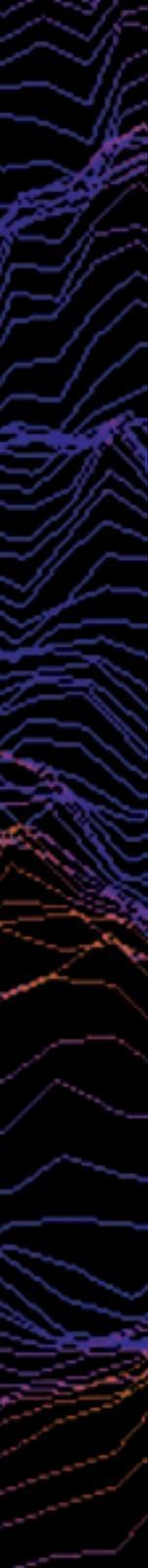


The project is an experiment with similarities to the quantum universe and the possibilities of the outcomes are numerous. In parallel, science fiction writers have been imagining the impact of working at a molecular level, from utopian to dystopian visions.

*ZERO@WAVEFUNCTION* explores these issues by playing with scale, sound, sensors and architecture.

Victoria VESNA  
2002

*ZERO@WAVEFUNCTION: nano dreams + nightmares 2002*



above: *Crowd* 2002 below: *ZERO@WAVEFUNCTION nano dreams and nightmares* 2002

## Curator's ACKNOWLEDGEMENTS:

I would like to thank all of my colleagues at the John Curtin Gallery for their support throughout the arduous development of BEAP. Professor Ted Snell, Patti Straker, Kate Hamersley, Suelyn Lockett, Michelle Siciliano and Nicole Reid. This exhibition could not have been realised without the dedication and tireless installation expertise of the John Curtin Gallery installation crew, and I take this opportunity to particularly thank Richie Huaupt, Philip Gamblen, Paul Caporn-Bennett, Bruce Slatter, Xavier Pardos and Adrian Reeve.

I am grateful for the advice and support from the Biennale Director, Paul Thomas, fellow curators Oron Catts and Pauline Williams and all of the artists in the exhibition.

**I would also like to acknowledge the support of the following people and organisations:**

The Commonwealth Government through the Australia Council its arts funding and advisory body; Professor Jeffrey Shaw from ZKM, Karlsruhe; Gerhard Himenkowski and staff from JumboVision International; Wayne Stanton from SHARP Corporation; Chad Brown, HTPC; Adam Arndell from Integrity Audio Visual; Jeffrey Teo from Optel AV Central; Martin Todd from Advanced Visual Design; Colin Griffiths; Ross Clendinning from the Art Gallery of NSW; John Barrett-Lennard and the Lawrence Wilson Art Gallery, Philip Burns and the Art Gallery of Western Australia; Domenico De Claro from Edith Cowan University; Melissa Lekias and the staff from Magenta, Milton Andrews from Square Peg Design + Illustration.

Chris MALCOLM

## IMMERSION

### List of WORKS:

**David CARSON** (collaborating with Brian McClAVE + George MILLWARD)  
*Skylab 2002*

3-D stereoscopic video installation  
sound design: George Millward  
3-D video: Brian McClave

**Donna COX**

*Converging Art and Science: A Collection of Collaborative Works by Donna Cox 2002*

DVD video  
visualisations: Donna Cox, Bob Patterson and Stuart Levy - National Centre for Supercomputing Applications, University of Illinois at Urbana-Champaign  
simulations, data, and reference imagery: Lars Hernquist, Chris Mihos, UCSC; Frank Summers,

Princeton; Michael Norman, NCSA; Brent Tully, University of Hawaii; David Malin, Anglo-Australian Observatory

**Char DAVIES**

*Osmose 1995*  
immersive virtual environment

*EphOre 1998*  
immersive virtual environment  
custom VR software: John Harrison  
computer graphics: Georges Mauro  
sonic architecture / programming: Dorota Blazszczak  
sound composition / programming: Rick Bidlack  
exhibition manager for the artist: Colin Griffiths  
assistant to the artist: Tanya Das Neves

**Nigel NELVER***Seed* 2001

interactive sound sculpture installation

**Riche KUHHAUPT + Geoffrey DRANE-BROCKMAN***Chromeskin* 2001

interactive digital / sculpture installation.

The artists would especially like to thank Jill Smith and Philip Dench at Headus Metamorphosis for the 3-D scanning / custom rendering software chrome plating: Premier Plating

**Robert NIDFFER***PROXY* 2001

software / website

*creepy-comics.com* 2002

software / website (cross platform digital comic: work in progress)

**Ken RINALDO***Autopoiesis* 2000

artificial life robotic sculpture installation

commissioned by the Hiasma Museum of Contemporary Art, Helsinki, Finland 2000

**Lynne SANDERSON***Somnolent Fantasies – The Sleeper* 2001

interactive digital installation

sound design, code: Peter Sansom

The artist wishes to acknowledge the assistance of the Centre for Sleep Research, University of South Australia.

**STELARC***The Third Hand* 1980

prosthetic human-like manipulator

based on a prototype by Prof. Ichiro Kato, Waseda University

assistance with construction- Imasen Denki, Nagoya

*Exoskeleton* 1999

performance video documentation

from Cyborg Frictions, Dampfzentrale, Bern edited by Anet Nyffeler

robot construction: Tom Diekmann, Stefan Doepner, Gwendoln Taube

technical assistant: Joy Wagner electronics and programming: Lars Vaupel

manipulator construction: Jan Cummerow

manipulator programming: Ulf Freyhoff

project coordinated by Eva Diegritz, Kampnagel and Hamburg City.

*The Extended Arm* 2000

pneumatic 11 degrees-of-freedom manipulator completed for Mutalogues, AvignonNUMERIQUE

construction: Jason Patterson

pneumatics design: Stefan Doepner, Gwendoln Taube, Jan Cummerow

electronics and programming: Lars Vaupel

*Motion Prosthesis* 2000

pneumatic upper-body actuator

construction: Stefan Doepner, Gwendoln Taube, Jan Cummerow

electronics and programming: Lars Vaupel

*Hexapod* 2002

digital 3-D animation DVD (work in progress).

This project is in collaboration with the Performance Arts Digital Research Unit at the Nottingham Trent University and the Evolutionary and Adaptive Systems Group, School of Cognitive and Computing Sciences at the University of Sussex, funded by The Wellcome Trust and the AHAB, UK.

robot design: Dr Inman Harvey

project team: Prof. Barry Smith, Dr Inman Harvey, Dr. Sophia Lycouris

engineers: John Luxton, William Bagge

3-D modelling / animation: Steve Middleton

**Victoria VESINA + Jim GIMZEWSKI***ZERO@WAVEFUNCTIONS: nano dreams and nightmares* 2002

interactive digital projection

Josh Nimoy: software artist

Pete Conolly: sensor artist

David Votava: architect

## Immersion BIOGRAPHIES:

### David CARSON

Based in Fremantle, Western Australia

David Carson is a 3-D video artist and is currently coordinating the 3-D video installation *Skylab* in collaboration with Brian McClave (3-D video artist) and George Millward (atmospheric physicist and experimental electronic musician) both based in the UK. Their last collaborative project *Geo-derma* has been exhibited widely since its premiere during the Festival of Perth at the Perth Institute of Contemporary Arts in 1998, including the Museum of the Future in Loughborough, UK in 1999.

<http://hosted.at.imago.com.au/geoderma/reviews.htm>

### Donna COX

Based in Urbana, Illinois, USA

Donna Cox is currently Assistant Director, Virtual Director Group, National Centre for Supercomputing Applications, and a full Professor in the School of Art + Design at the University of Illinois, Urbana-Champaign. Cox has exhibited computer images and animations in more than 100 invitational and juried exhibits in the last decade and her creative works have been exhibited at Digicom in Canada, Ilcograph in Japan, L'Objetfogho in Italy and Eurigraphics in France. Cox was Associate Producer for Scientific Visualization and NCSA Art Director of the IMAX film *Cosmic Voyage* that was nominated in 1997 for an Academy Award in documentary short subject.

<http://www.ncsa.uiuc.edu/~cox/>

### Char DAVIES

Based in Montreal, Canada

Char Davies has achieved international recognition for her work with immersive virtual environments, including most recently, an Honorary Doctorate of Fine Arts from the University of Victoria, British Columbia in 2002. She is currently a Visiting Scholar at the University of California – Berkeley and is a PhD Fellow at CMAA. She has lectured extensively around the world about her work, most recently at Cambridge University.

Following years as a painter and film-maker, Davies premiered the immersive environment *Osmose*, at the Musee d'Art contemporain de Montr al in 1995. She subsequently developed *EphOimDre* which premiered at the National Gallery of Canada in 1998.

Davies cares for 400 acres of land in rural Quebec, the Creal source of inspiration for much of her work.

<http://www.immersence.com>

### Geoffrey DRANE-BROCKMAN

Based in Perth, Western Australia

Geoffrey Drake-Brockman was born in Woomera, South Australia in 1964. In 1985 he obtained a BSc in Computer Science

from the University of Western Australia, and in 1994 an MA (Visual Arts) from the Curtin University School of Art. He has been exhibiting since 1986 with a major solo exhibition *The Identity Appliance* at Goddard de Fiddes in 1997. In 2001 he exhibited at *Sculpture by the Sea* in Sydney. He was awarded the Sir Charles Gardiner Annual Art Award in 1993, and the 1997 ANA Telstra AFR National Award for Excellence in Information Technology.

<http://www.chromeskin.net.au>

### Jim GIMZEWSKI

Based in Los Angeles, California, USA.

Jim Gimzewski is a Professor in the Dept. of Chemistry and Biochemistry at UCLA. Until February 2001, he was a group leader at the IBM Zurich Labs, where he was involved in Nanoscale science since 1983. He has pioneered research which allows the manipulation of single atoms and molecules using scanning tunnelling microscopes. Regarded as an international expert in the field of nanotechnology and with over 168 papers published Gimzewski has won numerous prizes including the prestigious Feynman Prize for Nanotechnology in 1997 and the Institute of Physics Duddell prize and medal for his work in Nanoscale science in 2001.

<http://www.chem.ucla.edu/dept/faculty/gimzewski/>

### Nigel HELYER

Based in Sydney, Australia

Nigel Helyer is an Australian Sculptor and Sound-Artist who received a BA HonDs in Sculpture from the Liverpool College of Art, UK in 1974, an MARCA in Environmental Media from the Royal College of Art, London, UK in 1979 and his Doctorate from the University of Technology, Sydney in 1997.

Over the past decade his practice has undergone a transformation in which discreet conceptual and methodological practices have converged to form a pluridiscipline – a practice which synthesises, sculpture with architectural + environmental sites, which combines performed soundscapes (textual, musical or electronic) with public radio broadcast and other new-media formats.

<http://www.somobjects.com>

### Riche RUHAUPT and Geoffrey DRANE-BROCKMAN

Ruhaupt and Drake-Brockman have been collaborating artistically since 1999. Joint exhibitions include Geoffrey at *The Verge*, Perth 2001 and *The National Sculpture Exhibition*, at The National Gallery of Australia, Canberra 2001. They received a Highly Commended award at the *National Sculpture Prize 2001* and their proposal for *Clownhead* has been commissioned for *Artrage 2002* in Perth. They are both based in Perth, Western Australia.

<http://www.chromeskin.net.au>

### **Riche KUHAUPT**

Based in Perth, Western Australia

Riche Kuhnaupt was born in Perth in 1960. He studied at the Curtin University School of Art, graduating in 1995 with an MA (Visual Arts). Kuhnaupt has had six solo shows in Western Australia, and his works have been selected for numerous group exhibitions including *Sculpture by the Sea*, Sydney in 1999 and 2000. *Shaky Ground*, Perth Institute of Contemporary Art, 1999 and *Added Dimension*, John Curtin Gallery, Perth, 2000. Kuhnaupt has received a number of awards including the Sydney Water Sculpture Prize in 2000, the City of Joondalup Invitation Art Award in 2000, and the Waverly Acquisitive Award, *Sculpture by the Sea* in 1999.

<http://chromeskin.net.au>

### **Robert NIDEFFER**

Based in Los Angeles, California, USA.

Robert Nideffer researches, teaches, and publishes in the areas of virtual environments and behaviour, interface theory and design, technology and culture, and contemporary social theory. He holds an MFA in Computer Arts, and a Ph.D. in Sociology, and is an Assistant Professor in Studio Art and Information and Computer Science at UC Irvine, where he also serves as an Associate Director of the Centre for Virtual Reality.

He has participated in a number of national and international online and offline exhibitions, speaking engagements and panels for a variety of professional conferences. Currently he is hard at play initiating an Interdisciplinary Gaming Studies Program (IGASP).

<http://proxy.arts.uci.edu/~nideffer>

### **Ken RINALDO**

Based in Columbus, Ohio, USA.

Ken Rinaldo currently teaches interactive robotic sculpture, digital imaging, multimedia and Directs the Art and Technology program in the Department of Art at The Ohio State University in Columbus, Ohio. He completed a Bachelor of Art in Communications in 1984 and a Masters of Fine Arts in Conceptual and Information Arts in 1996.

Rinaldo is an artist and theorist who creates interactive multimedia installations that blur the boundaries between the organic and inorganic. He has been working at the intersection of art and biology for over two decades working in the categories of interactive robotics, biological art, artificial life, interspecies communication, rapid prototyping and digital imaging.

<http://www.accad.ohio-state.edu/~rinaldo>

### **Lynne SANDERSON**

Based in Adelaide, South Australia.

Lynne Sanderson and Peter Sansom have collaborated on numerous projects in recent years through their company Sustenance Productions. *Need* and *Primal Bug* are two digital animation projects they have developed that have been widely exhibited including MTV Australia and as part of *An Eccentric Orbit* that opened at the Museum of Modern Art, NYC in 1994. Individually, Sanderson has also exhibited her work in clubs and theatre and Sansom has a prolific career spanning many years in the production of live and recorded music.

<http://sustenance.va.com.au>

### **STELARC**

Based in Melbourne, Australia.

Stelarc has used medical instruments, prosthetics, robotics, Virtual Reality systems and the Internet to explore alternate, intimate and involuntary interfaces with the body. He has performed with a *Third Hand*, a *Virtual Arm*, a *Stomach Sculpture* and *Exoskeleton*, a 6-Legged walking robot. He is presently attempting to surgically construct an *Extra Ear*. His *Prosthetic Head* project involves an avatar which speaks to the person who interrogates it – an embodied conversational agent. In 1997 he was appointed Honorary Professor of Art and Robotics at Carnegie Mellon University. He is Principal Research Fellow in the Performance Arts Digital Research Unit at The Nottingham Trent University. Currently he is artist-in-residence in the Faculty of Art and Design, Monash University, Caulfield. His art is represented by the Sherman Galleries in Sydney.

<http://www.stelarc.va.com.au>

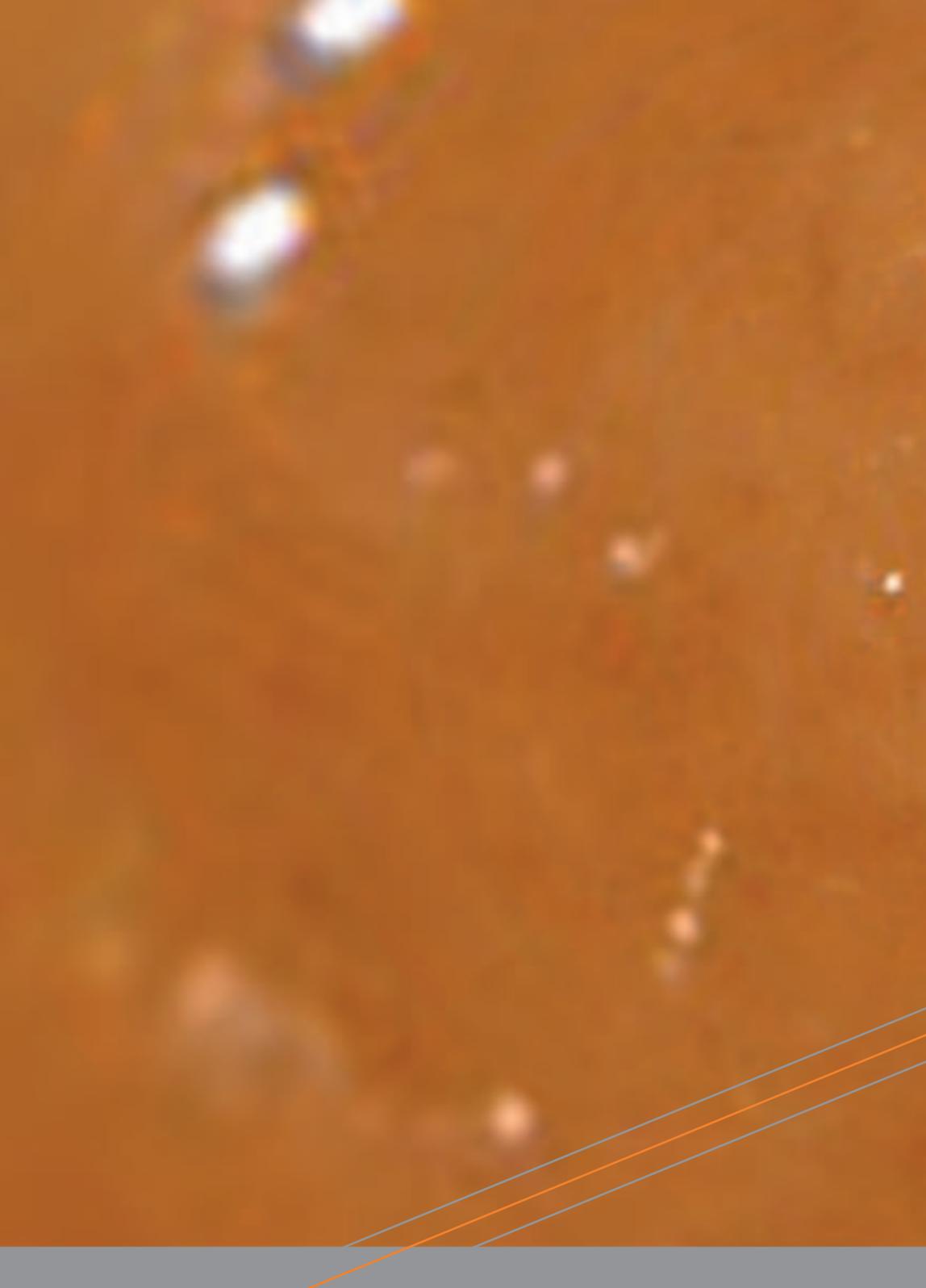
### **Victoria VESNA**

Based in Los Angeles, California, USA

Victoria Vesna is an artist, Professor and Chair of the Department of Design/Media Arts at the UCLA School of the Arts.

Vesna's work can be defined as experimental research that creatively connects networked environments to physical public spaces. She explores how communication technologies effect collective behaviour, and shift perceptions of identity in relation to scientific innovation. Vesna has initiated and produced a number of projects that address issues of art, science and technology such as the special issue of *Artificial Intelligence + Society Database Aesthetics: Issues of Organization and Category in Art* and the CD-ROM *Life in the Universe with Steven Hawking* (a UCSB/MetaTools co-production).

<http://vv.arts.ucla.edu>



> SYMBIOTICA RESEARCH GROUP

> MEART (AKA FISH & CHIPS)

> THE TISSUE CULTURE & ART PROJECT

> PIG WINGS

> TISSUE CULTURE & ART (FICIAL) WOMBS

> ADAM ZARETSKY

> MMMM

> AMY YOUNGS

> REARMING THE SPINELESS OPUNTIA

> MARTA DE MENEZES

> PROTEIC PORTRAIT

NUCLEART

> HEDKIKR

> INTEREXECTION

> ANDRÉ BRODYK

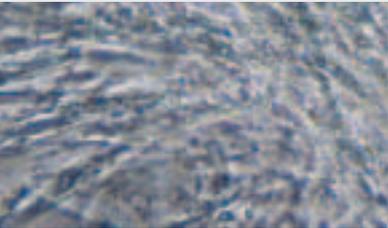
> DNART

# BIOFEEL

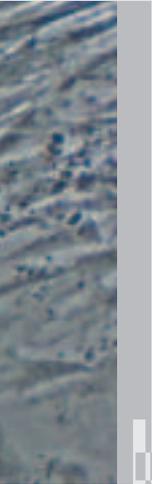
● IMMERSION

● BIOFEEL >>

● SCREEN



## Statement



The opening of new possibilities and alternative futures is at the core of the works presented in BioFeel. These are not merely representations about concepts. Rather they are tangible suggestions, employing new technologies yet to be subverted. This exhibition was originally conceived to present recent work created in SymbioticA by The Tissue Culture & Art Project and the SymbioticA Research Group. These works have been shown elsewhere, but never in Perth and never as a collection. In addition, BioFeel seemed an ideal vehicle to present the results of Adam Zaretsky's six-month residency in SymbioticA and to début his *MMMM* installation. Marta de Menezes' and Amy Youngs' works were chosen to be included in this show as they each raise issues concerning the practices that are being explored in SymbioticA. Marta is investigating the notion of the bio-medical lab as an artist's studio. Amy's *Rearming the Spineless Opuntia* deals with the responsibilities that might have to be exercised once living systems are deliberately manipulated.

SymbioticA was established in April 2000 with one of its main premises being that it would act as a porous membrane in which art and bio-medical sciences and technologies could mingle. This is an artist-run laboratory within a biological science department. Artists are encouraged to employ biological techniques as part of their practice.

The use of biological technologies is admittedly a contentious issue. These technologies are becoming a major part of our lives, and predictions claim that this will have a profound effect on our relationships with all living systems. The application of knowledge, acquired through directed research in life sciences, seems to be driven by forces that are interested in short term gains for the few, often neglecting long term risks. The utilisation of knowledge gained as part of both basic and profit driven research into living systems seems even more alarming in the light of the war clouds hovering

above. In addition to the obvious threat of biological warfare, the apparent decline in compassion to the Other makes our times perilous to make decisions about the manipulation and use of living systems. These decisions will determine the kinds of relationships we will form with the living world around us, be it a product of evolution or of human intervention.

Developments in technology are actualised possibilities, not necessarily the only ways knowledge can be utilised. As biological research departments in universities are encouraged by governments to partner with 'industry' and 'defence', the need for research into non-utilitarian purposes become urgent. The exploration of contestable possibilities is important to the understanding of the ways technology may develop. By fostering artistic critical engagements with biological research, SymbioticA provides a greenhouse for developing alternatives to the commercial mainstream. The art here goes beyond the fantasy of the surrealist project. The artists are dealing with the actual wet palette of possibilities of life manipulation offered by biotechnology.

The aesthetically driven and confronting treatment of these tools by the artists creates an uneasy feeling about the level of manipulation of fellow living beings humans have reached. This uneasiness seems to stem from a cultural and ethical ambiguity in regard to human engagement with life's processes. Our values and belief systems seem to be ill-prepared to deal with the consequences of applied knowledge in the life sciences.

The human-centric perception that guided our conduct towards other living beings since we started farming, did not diminish even after our origins were revealed as yet another branch of the evolutionary tree. The field of ethics still seems to be almost absolutely dominated by human-centric discourse, and things are not different in the relatively new area of bioethics. This self-obsessive trait might not be very useful as species barriers collapse and as new living entities appear. The level of manipulation of living systems that biotechnology is starting to provide is unprecedented in evolutionary terms. The ways in which humans choose to exercise their technologies on the world around them reflects on the ways they will use it on each other.

All work presented here deals in one way or another with the relationships we form with manipulated living systems. The resolution shifts from the protein through the chromosome, the cell and the tissue, to the whole organism. The accompanying symposium, *The Aesthetics of Care?*, will focus on these issues from academic, legal, ethical and artistic perspectives. It will provide a forum for deliberating on the artistic, social and scientific implications of the use of biological/medical technologies for artistic purposes. It will probe current models of practices and explore new roles and skills artists may acquire as they venture into this new realm of operation. This Symposium will deal with the relationships artists and audience form with works of art that consist of living biological systems.

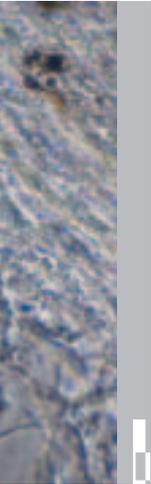
The Art and Science Collaborative Research Laboratory

School of Anatomy and Human Biology  
University of Western Australia

By Stuart Bunt and Oron Catts, founders and directors  
of SymbioticA

# SymbioticA

<http://www.symbiotica.uwa.edu.au>



## What is SymbioticA?

SymbioticA is a research laboratory dedicated to the exploration of scientific knowledge in general, and biological technologies in particular, from an artistic and humanistic perspective. It is located in The School of Anatomy & Human Biology at The University of Western Australia. SymbioticA is the first research laboratory of its kind, in that it enables artists to engage in wet biology practices in a biological science department. Developments in science and technology, in particular in the life sciences, are having a profound effect on society, its values, belief systems and treatment of individuals, groups and the environment. The interaction of art, science, industry and society is recognized internationally as an essential avenue for innovation and invention, and as a way to explore, envision and critique possible futures. Science and Art both attempt to explain the world around us in ways that are profoundly different but which can be complementary to each other.

Artists can act as important catalysts for creative and innovative processes and outcomes. They can also critically examine the various assumptions, and sometimes self delusions, built in to the 'scientific method'. There is a need for artists and other professionals in the humanities to actively participate in research into possible and contestable futures arising from these developments. While non-scientifically trained artists may have a limited ability to analyse the detailed veracity of scientific work, "outsiders" working in a different mental framework can bring both insights and distractions into the debates about the mechanisms, ethics and philosophy behind scientific work. This can only be effective if those same artists engage actively in the science and the debate so that they have enough understanding of the process and work to engage meaningfully with it.

SymbioticA sets out to provide a situation where this can happen, an opportunity in which interdisciplinary research and other knowledge and concept generating activities can take place. It provides an opportunity for researchers to pursue curiosity-based explorations free of the demands and constraints associated with the current culture of scientific

research. SymbioticA also offers a new means of artistic inquiry, one in which artists actively use the tools and technologies of science, not just to comment about them, but also to explore their possibilities.

SymbioticA welcomes undergraduate and postgraduate students from all disciplines, artists and scholars to work in interdisciplinary research teams exploring new directions for new technologies and the effects on society that they might have. It enables artists to access and explore a wide range of scientific materials and processes. SymbioticA is designed as an evolving place of artistic investigation that is accessible to people throughout Western Australia and beyond. SymbioticA aims to become a resource centre of investigation and research in the field of art and (mainly biological) science collaborations. It is a base for both short and long-term residencies. The first undergraduate course run by SymbioticA has been a very challenging and rewarding experience to all involved. Adam Zaretsky was the main driving force behind this course, drawing on his experiences teaching art and biology at Steven Wilson's Conceptual Information Arts Department at the San-Francisco State University. SymbioticA's Vivoarts course included lab visits and practices, field days to the zoo and breeding farms, and many ethical discussions. Documentation of work produced in this course will be presented as part of Biofeel.

#### **SymbioticA's Position in The University of Western Australia.**

The School of Anatomy and Human Biology is quite unique in the scope and variety of the research interests of its staff. The department has a long tradition of working with artists. The departmental corridors are

lined with art works. Hans Arkveld, a sculptor and painter, has been working with the department for the last three decades, other artists have come and gone on an ad hoc basis, but although many observed and gained inspiration there, none actually used the laboratories to produce their art work.

SymbioticA is now a research lab like any other in the department, or is it? The tension of the ambiguous position of SymbioticA in relation to the academic disciplines is generating collaborations that have no other place to evolve. With SymbioticA, artists can now work in the different laboratories in the department, such as the molecular biology, tissue culture, neuroscience, biomechanics laboratories and a biological imaging facility (IAAF). Artists will also have access to CTEC- the state of the art training facility for surgeons, including The Hill International Surgical & Medical Workshops, and a VR haptics room.

SymbioticA is a non-for profit organization, and as such, it is free to explore different modes of operation. However in order to survive in the harsh reality of the market economy environment it operates in, while maintaining its integrity and artistic freedom, it has to adapt some of the prevailing rhetoric and practices. This in spite of maintaining a critical outlook and insisting on a model of cooperation and collaboration rather than one of competition.

The West Australian Lotteries Commission and The University of Western Australia (UWA) jointly funded the set up for SymbioticA. SymbioticA provides a unique facility for Western Australia and enhances Western Australia's international positioning as a place that fosters innovations.

SymbioticA Research Group

Guy Ben-Ary Phil Gamblen Dr. Stuart Bunt Ian Sweetman

Oron Catts Ionat Zurr Gil Weinberg and Matt Richards in collaboration with Steve M Potter, Tom DeMarse and Alexander Shkolnik

The current status of the research into *Meart – the semi living artist*

(AKA Fish & Chips) – Stage 2.

SymbioticA Research Group in collaboration with Steve M Potter, Tom DeMarse and Alexander Shkolnik.

*Meart* is a bio-cybernetic research & development project exploring aspects of creativity and artistry in the age of new biological technologies. *Meart* is assembled from: Neurons from embryonic rat cortex – 'Wetware' – grown over Multi Electrode Array (MEA) , 'Software' – that interfaces between the wetware and the 'Hardware' – the robotic (drawing) arm. In this paper we will discuss our goals, vision and the current state of research (Stage 2) into the development of a 'semi-living artistic entity'.

The first public outcome of the project (Fish & Chips – Stage 1) was presented in the Ars Electronica Festival, *Takeover*, 2001<sup>2</sup> . In this case we used the real time electrical activity of fish neurons (some cultured over silicon and pyrex chips) to control a robotic arm that produced 'visual art' and a

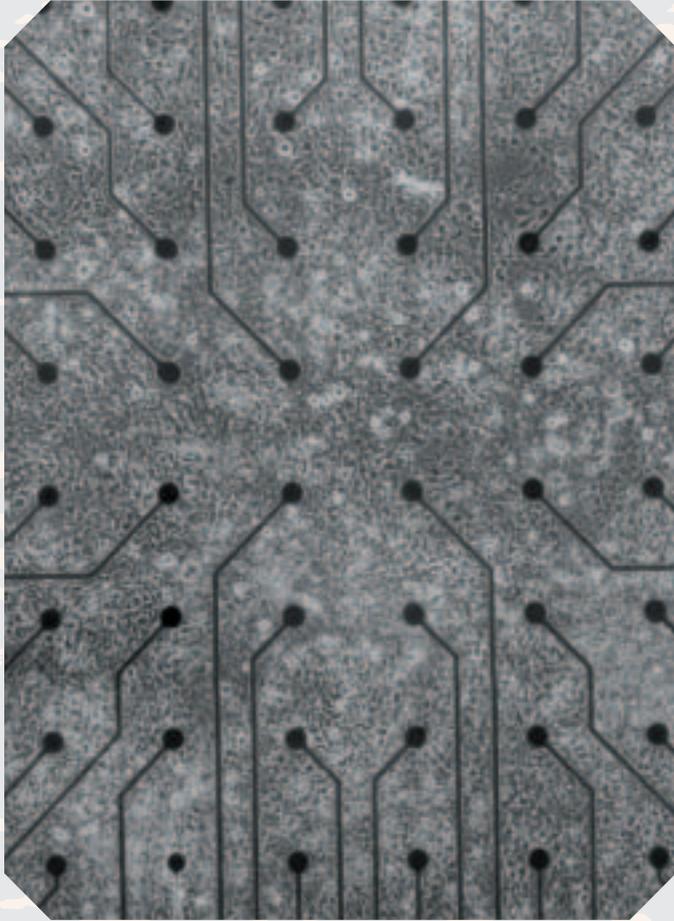
## MEART – the semi living artist (AKA Fish & Chips) Stage 2.

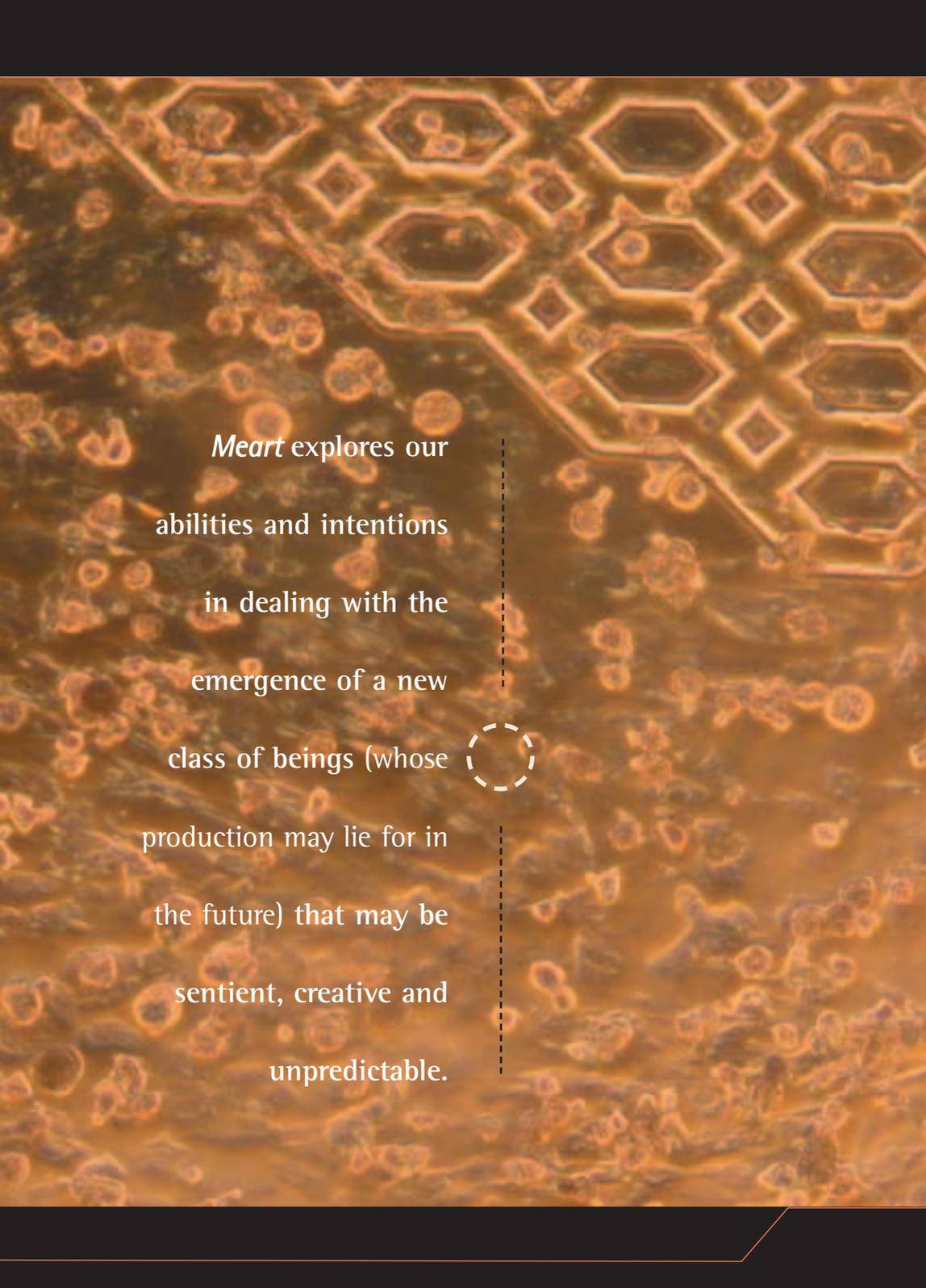
<http://www.fishandchips.uwa.edu.au>

sound piece. We closed the feedback loop by determining the frequency of stimulation of the neurons according to the music that was generated on the fly. The installation featured a laboratory/studio set-up, prototypes and documentation of the project, and was an example of the research being conducted in SymbioticA.

In *BioFeel* we will present the outcomes of the second stage of the project. We decided to change its name as we will not be using fish neurons and silicon chips rather neurons from embryonic rat cortex grown over a Multi Electrode Array (MEA). In this stage we are collaborating with Dr. Steve M Potter, a neuroscientist from the Laboratory for Neuroengineering, Georgia Institute of Technology. Steve and his group are developing a new paradigm for neurobiology research, that will bring together top-down

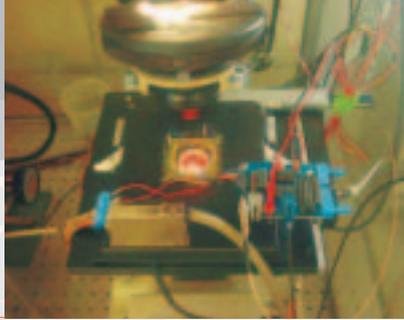




A microscopic image of plant cells, showing a network of hexagonal and diamond-shaped structures. The cells are stained in shades of orange and brown, with some cells appearing more prominent than others. The overall texture is intricate and organic.

*Meart* explores our  
abilities and intentions  
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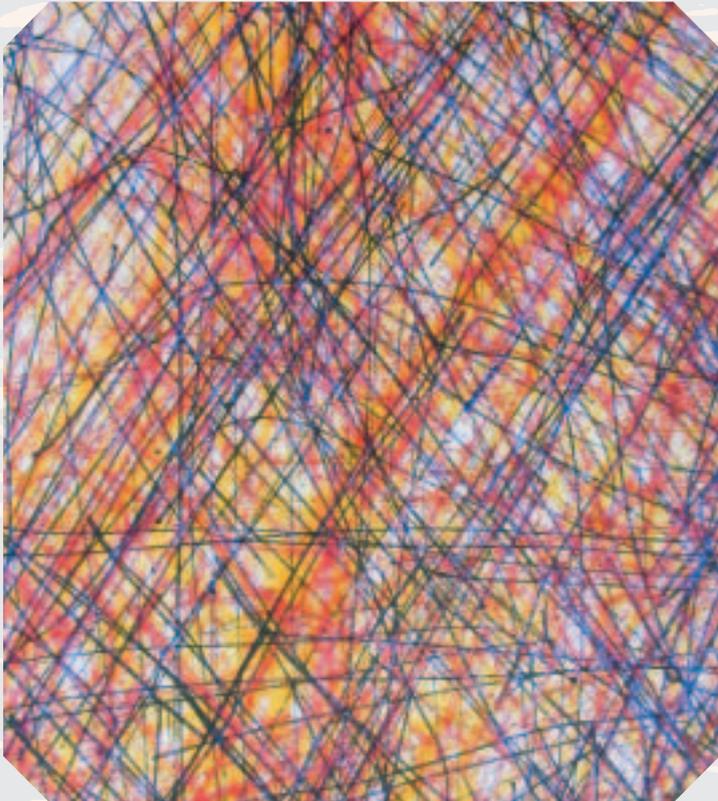




***Meart* takes the basic components of the brain (isolated neurons) attaches them to a mechanical body through the mediation of a digital processing engine to attempt and create an entity that will seemingly evolve, learn and become conditioned to express its growth experiences through 'art activity'.**

(cognitive, behavioral, ethological) and bottom-up (cellular, molecular) approaches to studying the brain. He is applying different technologies to study dissociated cultures of hundreds or thousands of mammalian neurons. Furthermore he is developing a real-time feedback system for 2-way communication between a computer and a cultured neural network. In this installation we will record the electric signals from a culture that will be set up for *Meart*, in Steve's lab. The data received from the neural activity will be processed both in Atlanta & Perth to control in real time the robotic (drawing) arm. We will close the feedback loop by stimulating the neurons (64 electrodes) when various events in the gallery space occur. As no one has ever done this before, we will treat this installation as an experiment – scientific as well as artistic. We will be interested to see if any emergent or 'creative' behavior occurs, or trace any change in the pattern of behavior of the neurons that occurs as a result of the stimulations.

*Meart* explores our abilities and intentions in dealing with the emergence of a new class of beings (whose production may lie far in the future) that may be sentient, creative and unpredictable. It is grown/constructed to evolve and create visual artistic outcome and by that means, to explore the notions of creativity and the nature of art. This hybrid is set to perform an open task, reveal its inner workings as drawings. The assimilation of 'wetware (neurons) / software (digital components) / hardware (robotic arm)', is intended to literally deconstruct creativity into its basic elements while stimulating and manipulating it through the different stages in order to observe and explore what and how the 'artist' will react and what it will do. *Meart* takes the basic components of the brain (isolated neurons) attaches them to a mechanical body



“... the MEA system (electro-physiological system) will record the electrical activity generated by the developing neuron and send sets of data indicating the locations of neuron activity over the MEA to the robotic arm. This will be converted into movement of the arm towards the corresponding areas of the canvas or the choice of how many and which out of the 3 pens will draw in a certain point of time. ”

through the mediation of a digital processing engine to attempt and create an entity that will seemingly evolve, learn and become conditioned to express its growth experiences through 'art activity'. The combined elements of unpredictability and 'temperament' with the ability to learn and adapt, create an artistic entity that is both dependent, and independent, from its creator and its creator's intentions.

### **Meart (AKA Fish & Chips) in BioFeel**

#### **What are we going to do?**

A series of experiments will be performed in order to explore the relationships between the input/stimulation to the neuronal culture and the output/drawings.

For example, a web cam (set up in the gallery space) will capture portraits of some of the viewers within the gallery space. This image will be then converted into a 64 pixels image. This pixel structure will correspond to the 64 electrode array on which the neurons are growing. This pixel map will be used to stimulate the neurons. Each turned on pixel will initiate a stimulation of the corresponding electrode of the multi electrode array. The initiation of this process will be the beginning of the drawing. The stimulation will be constant per one drawing session and will be sent to the cultures in a predefined iteration.

Then the MEA system (electro-physiological system) will record the electrical activity generated by the developing neuron and send sets of data indicating the locations of neuron activity over the MEA to the robotic arm. This will be converted into movement of the arm towards the corresponding areas of the canvas or the choice of how many and which out of the 3 pens will draw in a certain point of time.

#### **Multi Electrode Array and the feedback mechanism:**

The Potter lab at Georgia Tech<sup>3</sup> is developing tools to study learning, memory, and information processing in networks of cultured brain cells. These are obtained from the cortex of embryonic rats, and grown for months in Petri dishes that have a multi-electrode array (MEA) of 64 microelectrodes embedded in them (Made by Multi-channel Systems). Through these electrodes, they can send sensory inputs (electrical stimuli) and read out responses (action potentials) to and from the cultured neural networks. The neural signals are used to control an artificial body, whether simulated on the computer or built of mechanical actuators such as the robotic drawing arm of *Meart*. Sense data from the body's sensors are used to trigger stimulation of the network, via the electrodes. By closing the loop, from neural activity, to behavior, to sensing, to stimulation, it is hoped that it will learn something about itself and its environment. The fact that the cultured networks are growing flat on a glass substrate allows them to be observed in minute detail. The goals are both to learn more about how brains work, and to apply what is learned to designing fundamentally different types of artificial computing systems.

#### **Data Processing**

Discretely sampled information of the action potentials exhibited by the cultured neurons will be sent via direct TCP/IP link to the control interface of the drawing arm (an IBM clone PC). From this data a vector will be calculated that represents the relationship between the current position of the drawing arm and the position on the culture plate of the highest neural activity.

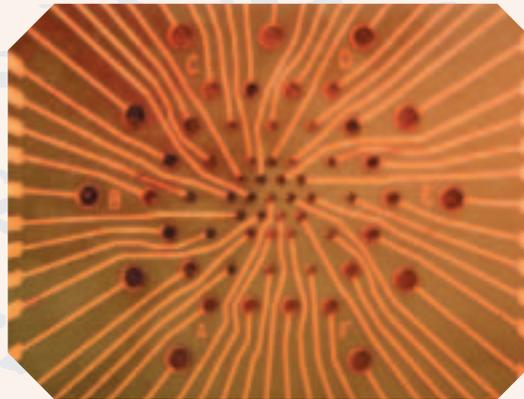
This vector will then be used to move the arm (via a parallel port interface controlling 16 pneumatic valves). Information on the movement of the arm (or any other visual environmental phenomenon) will be produced by recording a digital video frame on the host computer. The frame (a 320 by 240 32 bit JPEG image) will be reduced to an 8 by 8, 8 bit array which will be sent using a direct TCP/IP link to the laboratory at Georgia Tech and used to stimulate the cultured neurons. This mechanism differs greatly from that used in Fish and Chips phase 1 where multiple extra-cellular actions potentials were recorded with one electrode and this was continuously sampled at 44khz. The resulting sampled data was transferred into the frequency domain using the standard Fast Fourier Transform (FFT). The relative power of a number of frequency bands was then measured and, if higher than a predetermined threshold, were used to generate control signals to the arm interface.

#### Output module (Robotic Arm):

The robotic drawing device receives the processed data from the computer software and translates it into movement. The software processes the input data and controls an array of valves in a binary way signaling them to open or close. These valves allow compressed air to flow into the artificial muscles, which are pneumatic. As the muscles are inflated they contract with sufficient force to move three pens across

the surface of a paper. The muscles are made out of two major components – an internal air bladder which causes contractions in an outer casing.

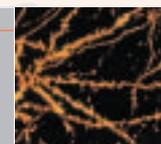
By creating a temporal 'artist' that will perform art-producing activities *Meart* explores questions concerning art and creativity, and the relationships we will form with constructed entities that express



creative and intuitive qualities. It sets out to explore these themes while referring to the ever-increasing pace of the evolution of biological technologies. How are we going to interact with such cybernetic entities considering the fact that their emergent behavior may be creative and unpredictable? How will society treat notions of artistry and creativity produced by semi-living entities?

#### Notes

1. A substrate fitted with an array of 8x8 electrodes on which neurons are cultured. The multielectrode arrays are transparent, therefore the neuronal morphology can be observed. The dish is connected to amplifiers and a computer that allows continuous stimulation of and recording from neurons lying on or near electrodes.
2. For more information about *Takeover* see <http://www.aec.at/takeover>
3. <http://www.neuro.gatech.edu/potter.php>
4. DeMarse et al., 2001



The Tissue Culture & Art Project  
Oron Cattts, Ionat Zurr and Guy Ben Ary

## WORRY DOLLS

<http://www.tca.uwa.edu.au>



In collaboration with SymbioticA (The Art and Science Collaborative Research Lab) at the School of Anatomy and Human Biology, University of Western Australia, and The Tissue Engineering and Organ Fabrication Laboratory, Massachusetts General Hospital/Harvard Medical School.

The Tissue Culture and Art Project (initiated in 1996), is an on-going artistic research and development project into the use of tissue culture and tissue engineering as a medium for artistic expression.

The Tissue Culture & Art project (TC&A) utilizes biologically related technologies (mainly tissue culture and tissue engineering) as a new form for artistic expression to focus attention and challenge perceptions regarding the fact that these technologies exist, are being utilized, and will have a major effect on the future.

What is Tissue Engineering:

Tissue engineering is the creation (fabrication) of human made tissues or organs, known as neo-organs<sup>(1)</sup>. It is about producing body spare parts. Tissue engineering usually involves the construction of artificial degradable biopolymer scaffolding in the desired shape, which is then seeded with the appropriate cells and immersed in a solution rich with nutrients and growth factors in conditions that try to emulate the body (37°C, 5% CO<sub>2</sub>). The system that provides these conditions is referred to as a bioreactor. With the advances in stem (embryonic) cell technology, it is in essence an artificial womb, which is being used to grow us new organs/extensions/additions.

Tissue engineering can offer an option of producing what we refer to as Semi-Living Objects. A tissue is a collection of cells of an individual organism that specialize in performing a specific task. When we combine this specialty with other tissue (not necessarily from the same organism) and artificially constructed support mechanisms, we will be able to 'grow' task specific or general use tools. The TC&A Project is interested in using tissue engineering and artificial wombs to grow sculptures.

These sculptures are still in the realm of a symbolic gesture representing a new class of object/being. These objects are partly artificially constructed and partly grown/born. They

TELL THE DOLLS  
YOUR WORRIES





Doll A



Doll B

Doll A = stands for the worry from Absolute truths, and of the people who think they hold them.

Doll B = represents the worry of Biotechnology, and the forces that drive it. (see doll C)

Doll C = stands for Capitalism, Corporations

Doll D = stands for Demagogy, and possible Destruction.

Doll E = stands for Eugenics and the people who think that they are superior enough to practice it.

Doll F = is the fear of Fear itself.

G= is not a doll as the Genes are present in all semi-living dolls.

Doll H = symbolizes our fear of Hope



Doll C

consist of both synthetic materials and living biological matter from complex organisms. These entities (sculptures) blur the boundaries between what is born/manufactured, animate/inanimate and further challenge our perceptions and our relations toward our bodies and constructed environment.

The concept of using Semi-Living Objects can be seen as a way to minimize the risks associated with new technologies as well as a way to eliminate some of the problems regarding the existing technologies and culture of consumerism. Changing the culture of production from manufacturing to growing could reduce the environmental problems associated with the process of manufacturing. The relationships that consumers will form with these semi-living objects will be different from the relationships they have with inanimate objects. Tissue engineering offers a possibility to change our own design as well as create a new breed of 'things': Presently, scientists are trying to mimic nature. However, how will we look when we decide to improve nature? Are we going to see fashion driven neo-organs? Are we going to completely objectify living matter?

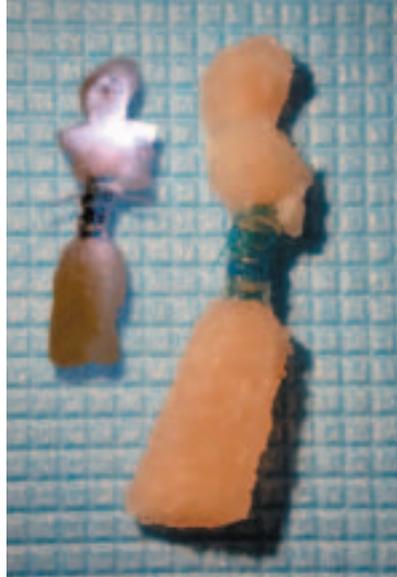
We feel that not enough attention is directed at proposing, examining and questioning the possible futures where this new technology can take us.

Doll D





Doll E



Doll F

## The Worry Dolls:

We chose to grow modern versions of the legendary Guatemalan Worry Dolls in the artificial womb.

"The Guatemalan Indians teach their children an old story. When you have worries you tell them to your dolls. At bedtime children are told to take one doll from the box for each worry & share their worry with that doll. Overnight, the doll will solve their worries. Remember, since there are only six dolls per box, you are only allowed six worries per day."<sup>(2)</sup>

We decided to give birth to seven dolls, as we are not kids anymore. We may not be allowed to have more than six worries but we surely have. The genderless child like dolls represent the current stage of cultural limbo: a stage, that is characterized by child like innocence, and a mixture of wonder and fear when we create the new sex – hence, a new era.

We gave them alphabetical names as we think that we can find a worry for each letter of the language that made us what we are now. While working on the Tissue Culture & Art Project, people expressed to us their anxieties. These dolls represent some of them. You are welcome to find new worries and new names... You will be able to whisper your worries (not just in terms of biotechnology) to these dolls and hope that they will take these worries away.



Doll H



- Doll A = stands for the worry from Absolute truths, and of the people who think they hold them.
- Doll B = represents the worry of Biotechnology, and the forces that drive it. (see doll C)
- Doll C = stands for Capitalism, Corporations
- Doll D = stands for Demagogy, and possible Destruction.
- Doll E = stands for Eugenics and the people who think that they are superior enough to practice it.
- Doll F = is the fear of Fear itself.
- G= is not a doll as the Genes are present in all semi-living dolls.
- Doll H = symbolizes our fear of Hope...

Our worry dolls were hand crafted out of degradable polymers (PGA and P4HB) and surgical sutures. The dolls were sterilized and seeded with endothelial, muscle and osteoblasts cells (skin, muscle and bone

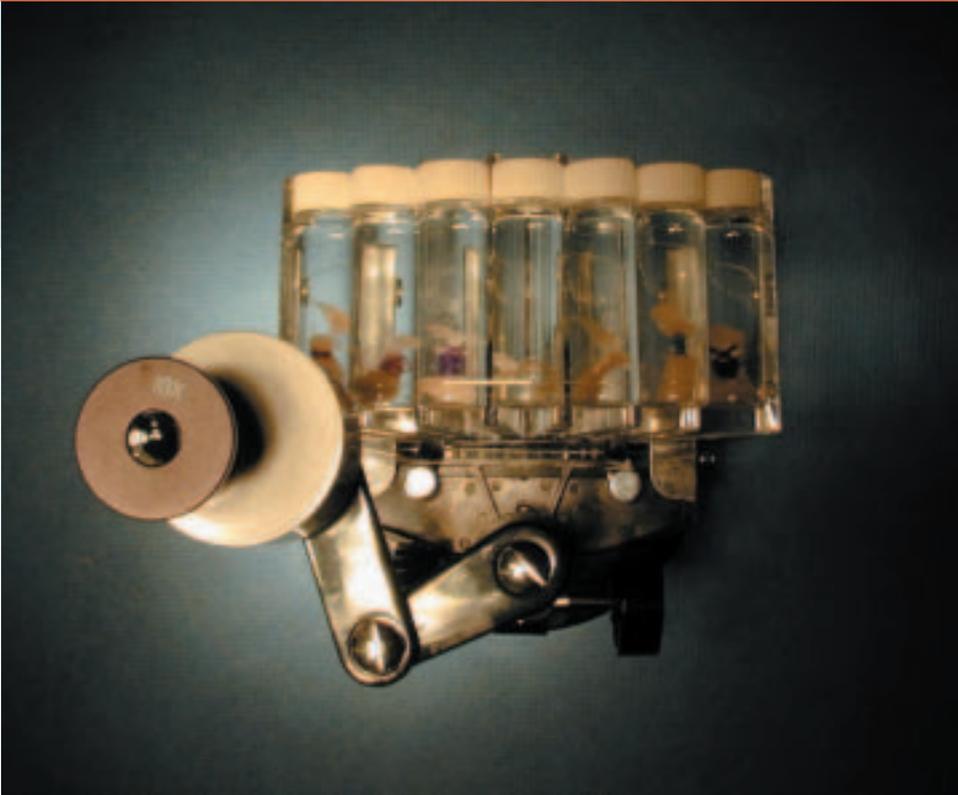
tissue) that are grown over/into the polymers. The polymers degrade as the tissue grows. As a result the dolls become partially alive!

Will they take our worries away?

The process, in which the natural (tissue) takes over the constructed (polymers), is not a "precise" one. New shapes and forms are created in each instance, depending on many variants such as the type of cells, the rhythm of the polymer degradation and the environment inside the artificial womb (bioreactor). It means that each doll transformation cannot be fully predicted and it is unique to itself. We are still in the realm of a dialogue with nature rather than a complete control over it. Our dolls are not clones but rather unique.

#### Notes:

1. *Tissue Engineering: The Challenges Ahead*, by Robert S. Langer and Joseph P. Vacanti, Scientific American, April 1999, pp. 62-65.
2. Taken from the written note attached to the Worry Doll package.  
Worry Dolls were purchased from a comic shop in Boston, USA.



Semi-Living Worry Dolls fixed in  
Formalin, 2000.

Oron Catts, Jonat Zurr and Guy Ben Ary

## PIG WINGS

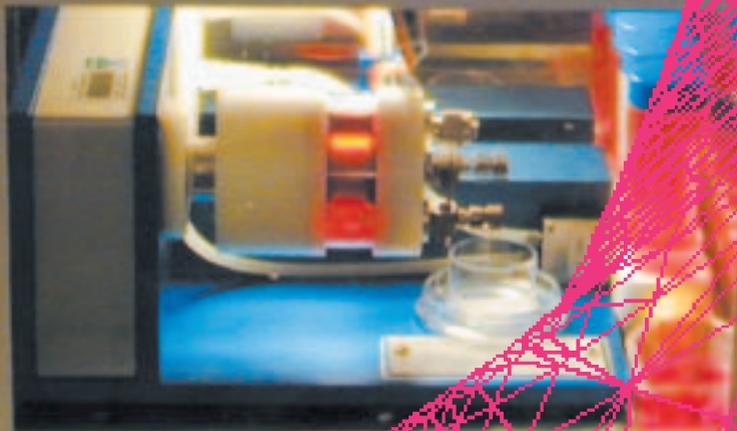
This project was developed as part of our residency at the Tissue Engineering and Organ Fabrication Laboratory, Massachusetts General Hospital, Harvard Medical School USA, and further developed in SymbioticA – The Art & Science Collaborative Research Laboratory, School of Anatomy & Human Biology, University of Western Australia.

Advances in bio-medical technologies such as tissue engineering, xenotransplantation, and genomics promise to render the living body as a malleable mass. The rhetoric used by private and public developers as well as the media have created public anticipation for less than realistic outcomes. The full effects of these powerful technologies on the body and society have, in most cases, only superficially discussed. Deciphering the human genetic code, and the creation of genetically modified pigs for the purpose of transplanting their organs into humans (xenotransplantation) opens up a space for the creation of ambiguous chimeras. The Pig Wings project was set to explore this space. Winged bodies (both animal and human) have been used in most cultures and throughout history. Usually, the kind of wings represented the creature (chimeras) as either good/angelic (bird-wing) or evil/satanic (bat-wing). There is yet another solution to flight in vertebrates which seems to be mostly free of cultural values – that of the Pterosaurs. We have used tissue engineering and stem cell technologies in order to grow pig bone tissue in the shape of these three sets of wings. The Pig Wings installation presents the first ever wing shaped objects grown using living pig tissue, alongside the environment in which such endeavour can take place. We will attempt to present living tissue engineered pig wings that will be animated using living muscles. This absurd work presents some serious ethical questions regarding a near future where semi-living objects (objects which are partly alive and partly constructed) exists and animal organs will be transplanted into humans. What kind of relationships will we form with such objects? How are we going to treat animals with human DNA? How will we treat humans with animal parts? What will happen when these technologies are used for purposes other than strictly saving life?





UNIEQUIP  
HYBRIDIZATION OVEN 6/13

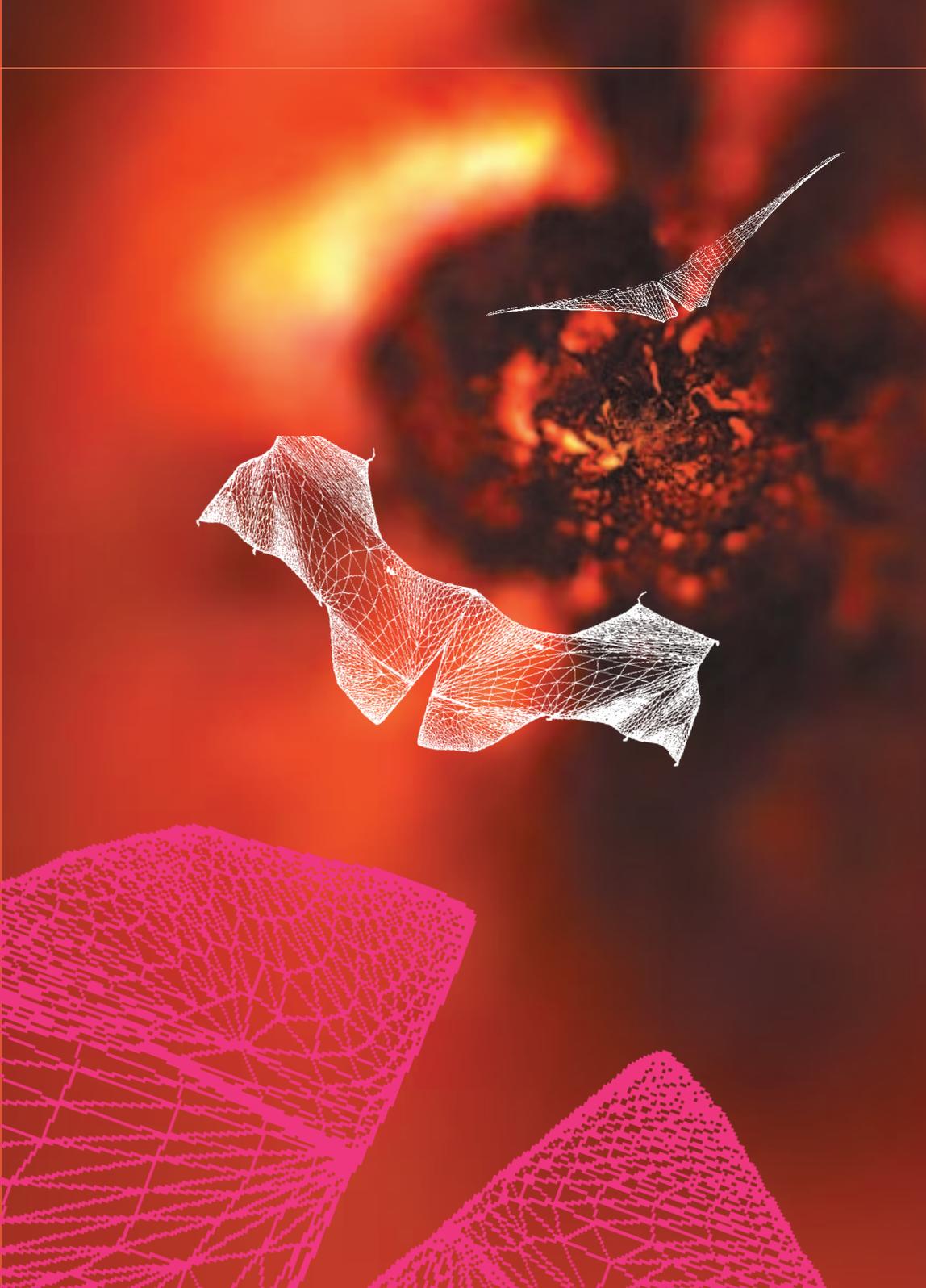


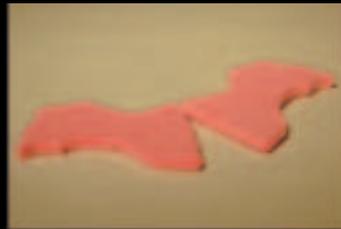
It was her 16th birthday and she knew that from today she would finally be able to get a legal implant (most of her friends had one already). She had been planning that for a while. A Few months ago she went to the Implants Farm and checked the catalogue and the displays. She knew immediately what she wanted: a pair of decorative wings. Just like those of hamster-bat she got for Christmas when she was ten. The farm's practitioner took a biopsy from her inner-thigh and then showed the scaffold design. "Would I fly?" she asked. He laughed, "Ho no, that will require a complete redesign of your body and even then you will only be able to glide. These wings are designed to go with the current fashion of backless dresses." "What about these feathered wings?" she inquired. "I don't think your parents have the budget" he replied " and, beside, they will not grow with you, they are for adults only." It was a regular procedure and the risk of contamination was reduced to less than 3%. The farmer took her behind the office, to the implants growth factory. She looked through the glass window to the sterile farm, where pigs with different body parts seamlessly attached to them lay in pools of clear liquids. He showed her to "her pig". She immediately liked "her pig". It was smooth and its skin colour was just like hers. The farmer explained that the pig carried human genes to increase human-pig compatibility. She trusted the pig to carry and grow her wings till they would be grafted back to her  
(A story of an upper class girl, 2028).

## The Aesthetics of Parts

By Ionat Zurr & Oron Catts







Deleuze and Guattari metaphor of 'becoming animal' till there is no longer man or animal' is becoming real with the advance in xenotransplantation, genetics, tissue technologies and stem cells research. Artists dealing with hands on wet biology art practice are exploring the tangibility of such abstraction. As artists working for the last six years with living tissues, we have come to realize the reality of a fragmented body and 'self'. We have grown and sustained alive for long periods (up to six months) communities of cells independently from their original host. We have grown them externally to a body as part of our ongoing research into growing semi-living sculptures . The above biological technologies open up an array of body treatment, enhancement and modification. It



suggests contestable futures of cross-species and mergers that will profoundly question current held moral and belief systems. Organ transplantation is now a common procedure practiced in the biomedical field. Organs are being harvested from either living or dead donors in order to extend lives. This practice of 'extended bodies', like any other practice, operates within the socio-economic fabric, enabling the well off to receive more and better-conditioned organs, such as young healthy livers for affluent alcoholics. Organ trade and organ theft are widely practiced around the world. Organs become commodities that can extend life as well as be used for body enhancement and modifications. The first case of a hand transplant demonstrated the use of organ transplant techniques for proposes beyond strictly saving life. The media reported that the recipient requested that the 'new' hand be removed from him as 'He said it was like a dead man's hand with no feeling in it'



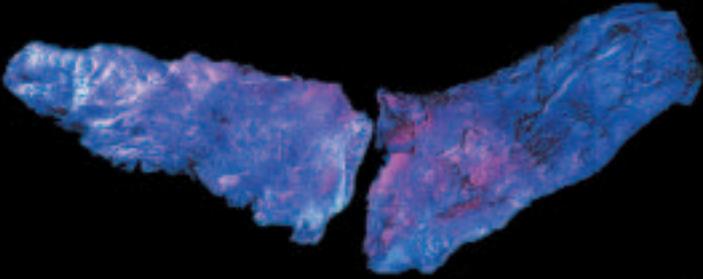


and 'he felt "mentally detached" from it , focused attention to the complex relations between the self and the introduced extension. Different aspects of art expression have been dealing with the mix/fusion of identities, genders and classes between the "selves" of the donor's organ and its recipient: A murderer's heart implanted in its victim's body and so forth. One human is becoming a hybrid of two humans. The shortage in human organs has encouraged a research into xenotransplantation. Xenotransplantation is the transplantation of cells, tissues or organs from non-humans. This procedure crosses a species barrier that has evolved over millions of years. Furthermore, the procedure involves genetic manipulation and insertion of human genes into the animal (mainly pig) genome

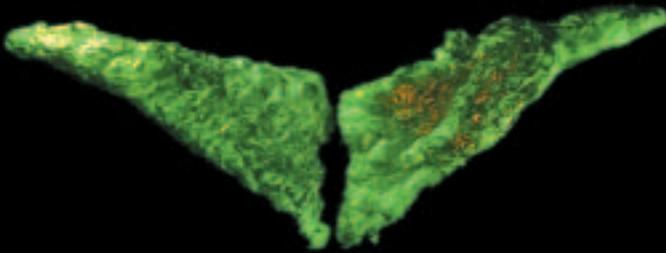


for better compatibility. The human-animal cross, from a biomedical perspective, presents new procedures and new risks that can only be assessed in a perspective of a time scale of more than one-generation. 'Tricking' the evolutionary mechanism by surgical and chemical means to suppress the immune system in the organ recipient and introducing pathogens and viruses from another species may result in unrecognized and new virus infections and other clinical syndromes. Also, the cross infections among humans (and their offspring) is unknown. Bach (1998) in his call for a moratorium on all human xenotransplantations, titles his commentary as "individual benefit versus collective risk". Nevertheless, insertion of pig cells into humans is being done, such as insertion of pig's Porcine cells into brains of patients with neurological diseases. The human-animal physical cross is still facing biological and ethical hurdles. Though its potential in terms of 'the becoming animal' offers

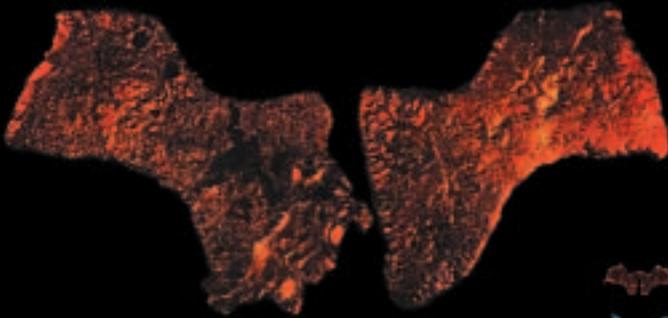




*Pig Wings*  
- the Aves Version  
2001-2002



*Pig Wings*  
- the Pterosaurs Version  
2001-2002



*Pig Wings*  
- the Chiropteran Version  
2001-2002



a new dimension; a physical human-animal hybrid. Tissue engineering technologies have been offered as another solution to deal with the shortage in body parts. Tissue engineering is a technique that offers the construction and growths of an organ in-vitro (outside of the body) using the patient's own cells, and the re-implementation of the organ back to the recipient. It is intriguing that the image of the subject/object who brought tissue engineering into the public psyche was the mouse with the ear on its back. A nude mouse (a mouse with suppressed immune system) was used as a bioreactor, hence as a 'vessel' for the growth of an organ. The scaffold of the ear was constructed out of special biodegradable polymers and seeded, in vitro, with cartilage and skin cells from the earless patient. As the cells grew over/into the scaffold it degraded. In an early stage during this process the construct was attached to the mouse, which acted as a nutrient supplier and temperature regulator. The walking sniffing chimera 'scarred' each human who were exposed to it. One may suggest, that it has become one of the most important icons of the late 20th century. A living icon of our unlimited sculpting and designing abilities to create the creatures/monsters of our imaginations and the possibility to sculpt and design ourselves in these shapes. Stem cells are the current 'holy grail' in the biomedical field. Embryonic stem cells are cells before differentiation. Hence, these cells have the ability to divide to any type of tissue, when they are given the right conditions and appropriate growth factors. The general idea behind this promise is the ability to clone an identical twin with identical DNA. This twin should not necessarily develop into a whole human being. It can become A 'Bag of organs' with no central nervous system that will be there in case you need or desire an organ. "My twin is a liver" can become not only a figure

of speech. The combination of stem cells and tissue engineering technologies can be appropriated not only for saving/extending life and/or the growth and construction of organs in the 'original design'. These technologies open up a gate to the treatment of a living body as a malleable entity. One will be able to attach a tail, a horn or any fashion driven shape of tissue to 'its' own limited and less than perfect body. In the socio-economic climate in which these technologies operate, we can speculate on the large divide between the well off and the less advantaged, as well as between the human species and the rest of the animal kingdom. We can also speak about the playfulness and decision making based purely on aesthetics and/or fashion driven taste. As all of these technologies will become more available in different forms and different prices, the idea of Organ Farms (for replacement, modification and enhancement) might become a reality. Body parts made out of different animals tissues might become objects of desire. The traditional view of a body as one autonomous unchangeable self will go through a radical change. Body parts are designed, exchanged, replaced and sustained in a semi-living state as part of the environment. Animals are being used as a bioreactor for the growth of other parts. Naturally, as we suffer from speciesism, non-humans animals such as pigs will become the "vessels" for the growth of ears, noses and other body decorations. Stem cells technologies for the rich, pig farms for the poor and the adventurous. Actualizing Deleuze and Guattari's 'becoming an animal' to physical actuality will severely challenge current belief systems, which are unable to account for developments in biological technologies. Are you willing to take this day trip to the farm?



Adam Zaretsky in collaboration with  
the Tissue Culture & Art Project

Between 1999–2001, Adam Zaretsky was exploring the effects of music on bacterial fermentation as an Artist and Research Affiliate in Arnold Demain's Laboratory for Microbiology and Industrial Fermentation at Massachusetts Institute of Technology. During that time, Oron Catts and Ionat Zurr were also in Boston. They were in the process of growing their Pig Wings as as Research Fellows in Dr. Vacanti's Tissue Engineering and Organ Fabrication Laboratory at Massachusetts General Hospital's Harvard Medical School. That we were in the same town living with similar day-to-day tactics was pure happenstance. As some of the few artists who use biological laboratories as their studios, we decided to collaborate by playing Pig Music to Pig Wings.

To this end, we downloaded all the pig related MP3s from the soon to be illegal Napster. By typing in PIG as the keyword, our search

## DYNAMIC SEEDING MUSICAL BIOREACTOR

<http://www.emutagen.com>

revealed a cross section of the etymological nuance symbolically connected to this family of animal. A few examples: *War Pigs* by Black Sabbath, *Fascist Pig* by Suicidal Tendencies, *Da Killing of Da Pigs* by Da Yoopers, *Chokin this Pig* by Eminem, *Squeal Like a Pig* by The Reverend Horton Heat, *Filth Pig* by Ministry, *American Pigs* by The Angry Samoans, *British Pigs- The Price of Royalty* by One Life Choir, *PigInCheez* By Aphex Twin, *Blue Christmas* by Porky Pig and of course, *Pigs on the Wing* by Pink Floyd.

Once a week, over the next three weeks, we played Pig Music to Pig Wings at Mass General Hospital. This allowed us time during the week to relax and listen to music with the steadily differentiating bone precursor cells. We started with what we referred to as a Dynamic Seeding Musical Bioreactor. Getting cells deep into constructs is common quest for many in the tissue engineering field. The constructs are very porous and it was hypothesized that the irregular vibrations of the music might assist in the distribution and physical embedding of the cells into the construct. The Vibro Transducers, generously donated by Acouve Laboratories, were intalled in a 37 degree Celsius incubator. The Synthecon Bioreactor vessels were then stuck to these vibrating plate speakers. Inside the vessels were the wing shaped polymer constructs (about 4mm thick) and a rich sample of Mesenchenal stem cells (each cell ~ 15 thousandths of a millimeter in diameter.) Pirate MP3s were played. Scientists, artists and stem cells took moments of repose together. Alteration of Sculptural Morphology was noticed early on as the wing shaped biopolymers curled up like fried corn chips after the first few songs. Not surprisingly, the wings visibly 'danced' to the music both during the early seeding of the biopolymers and on their following weekly exercise regiments.

Bouncing and twisting, stretching and jumping, the Pig Wings took flight. After the incubation period had finished, some of the Musically Entertained Pig Wings were sent to histology to be compared to the Pig Wings whom had been Musically Deprived. Considerable differences in cells count, tissue morphology and distribution throughout the construct were ascertained. Although our application of music to growing tissue cultures was informal and non-repeatable, our observations and the results of the histological comparison lead us to postulate that Pig Music may have a curious effect when applied to Pig Tissue in Vitro.

### Scientific Perspective

By Kylie M Sandy

In the Pig Wings project, mesenchymal cells (bone marrow cells) from pigs are grown over bioabsorbable poylmers. The scientific aspect of the project is engaging an artisitic medium, to investigate both the movement of bone cells within the 3D scaffold of the polymer, and the occurrence of calcification within the polymer. Future research will include quantitative and qualitative accounts of the amount of calcification in the polymers, when they are subjected to sound waves. Findings have a potential application to orthopaedic science and tissue engineering.





## MMMM... Adam Zaretsky

In MMMM...(Macro/Micro Music Massage), we, the public, are invited to join in the process of sonic performance for cells in culture. Please engage your living unfamiliar relatives. Here is your chance to massage various living tissues or organisms without getting your hands dirty. We, as fleshy flasks of living culture, are also invited to become part of the experiment by vocally vibrating each other's rear ends at the same time.

Two ButtVibe lounge recliners are placed facing each other on opposite sides of the room. The chairs massage according to sound output miked from the vocalizations of the person in the opposite chair. This can include voice and instruments/noisemakers. The same signals are sent to neighboring vibrating plate speakers applied to various lifeforms. The organisms will bounce, splash, stretch, bear down and/or jump to attention in response to the audio source. Please Feel Free to Sit Down and Talk to the Living Specimens!

Video of reclining volunteers and their life-world mirrors dancing on biopolymers is projected above and behind the volunteers. This functions as a closed circuit and very local vibro-videophone for talking to various kinds of strangers. We have here a real time, multimedia, multi-species erotic continuum of sonic jostling. We also have the ability to record a certifiable non-repeatable effect through bioassay of public play. Please record any data you might have amassed during your research in the communal lab books provided.

Public Knowledge Purpose: My personal favorite artistic offering to public experience is the reinsertion of fun for fun's sake into the social. I know that sounds simple and naïve. It is. Vibrating chairs are titillating. The idea of helping strangers in public liveen each other's bodily experience shamelessly in a temporary suspension of moral standards is my call to duty. It's something to do while waiting for the AIDS vaccine. At the same time, the conjoining of the microcosm and the human body, so often forgotten in the workaday world, is emphasized. Simple assays could show alterity of cells due to vibration, which can be an effective comparative aid in analyzing human facial response patterns to mechanical tickling and vibro-erotism in general. This sensual experience could abstract our importance as self-centered entities by focusing on bounce as a form of transient existence. In other words this is art and tech lite, public hedonism and unashamedly so. Sit Down and Extrapolate!



## Philosophy of Science Purpose:

If our research into the effects of sonic spectrum vibrations are progressing so neatly, why then is the next stage of this project an interactive public event? MMMM... is an artistic experiment. No hard data is expected to arise. This in no way limits potential insights into the natural world that might stem from MMMM... Most artistic products, if shaken well, exude scientific data as a by-product. Unfortunately, there are often strong and contentious reactions to cross-disciplinary activities. It is almost as if breadth itself were a kind of blight on the stability of taxonomy. If labels and classifications are more than mythic, faith based logics of the day, then they shouldn't have such a phobic reaction the birth of hybrid concepts and complex admixtures. With a little grant money, this too can be reduced to its fundamentals. Tame All Anomalies!

Artistic Purpose: I am a rather insular little maniac. I know how important it is that interactivity be interactive and not some uni-dimensional point/click act of avoidance. Dialogical artworks are important diffusers of the unsporting voyeurism of which both scientific objectivity and artistic appreciation are prone to. This bodily bi-directional communication is both remote and deeply interpersonal. It should remind us of our corporeal fleshiness and, by proxy, our relation to all the squiggly things that squiggle upon the earth. As a libertine in the days of deadly STDs, this is perhaps a reflection of the traumas of libidinal economizing for personal survival. The vibratory arts are highly underrated due to fears of lost productivity.

Viva Tactility!



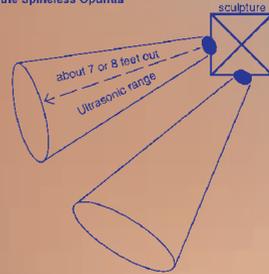




## AMY YOUNGS

<http://www.accad.ohio-state.edu/~ayoungs>

Rearming the Spineless Opuntia



The plant inside this device is both interactive with people and protected from them. Its metal armor closes up when approached and opens when people move away from it. Through cloning and micropropagation technologies, humankind has engineered creations such as the Spineless Opuntia, a cactus that lacks its original defense mechanism against those who eat them. This sculpture embodies my impulse to protect this vulnerable, human-engineered creation. But it also reveals the folly of protection in its heavy reliance on technology.

*Rearming the Spineless Opuntia* – 1999 (60"x30"x30") Live Spineless Opuntia cactus, electronic components – including ultrasonic sensors and microprocessor – motor, copper, steel, aluminum and rubber.



During the last thousands of years humankind has tried to manipulate Nature. Today's dogs, cats, horses, and crops are evidence of what has been achieved by artificial selection. It is remarkable that the understanding of heredity and evolution is so recent, when our ancestors were using it empirically for so long. In 1953 the molecular basis of heredity was disclosed as the structure of DNA was revealed by Watson and Crick. In the last 50 years significant scientific advances have been made, allowing the modification of life in an extremely controlled way. Biotechnology was born to explore these new tools for the benefit of humankind.

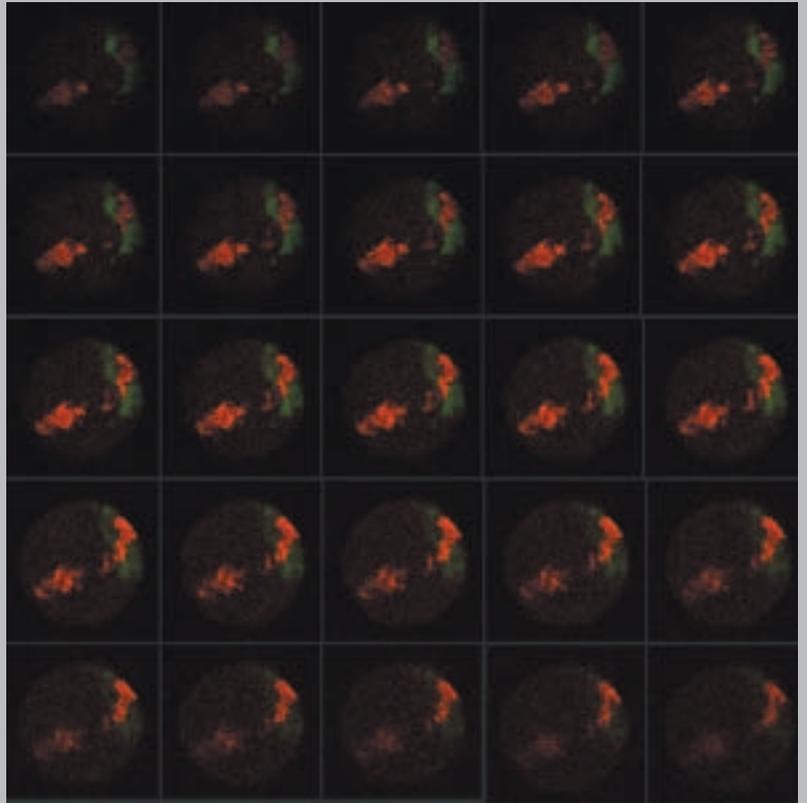
However, the remarkable tools of modern biology are seen with hope and fear, simultaneously. It is becoming possible to develop new therapies for incurable diseases, but at the same time the public fears the misuse of this powerful technology. As a consequence, words like *transgenic*, *genome*, *clone* and *stem-cells* have spread from scientific publications into the mass media. As society becomes aware of biotechnology, with all its hopes and fears, artists have started to include references to biotechnology in their works.

## MARTA DE MENEZES

Furthermore, biotechnology offers the opportunity to create art using biology as new media. We are witnessing the birth of a new form of art: art created in test-tubes, inside laboratories.

My work has been focused on the possibilities that modern biology and genetic research offer to artists. I have been trying not only to portrait the recent advances of biological sciences, but to incorporate biological material as new media: DNA, proteins and cells offer an opportunity to explore novel ways of representation and communication. Consequently, my recent artistic activity has been conducted in research laboratories.

Being an artist, with no formal training in biological sciences, I always have to start by learning the jargon and techniques in use in the laboratory. With time I learn the possibilities and limitations of the experimental systems available. At that point I can start producing biological artwork.

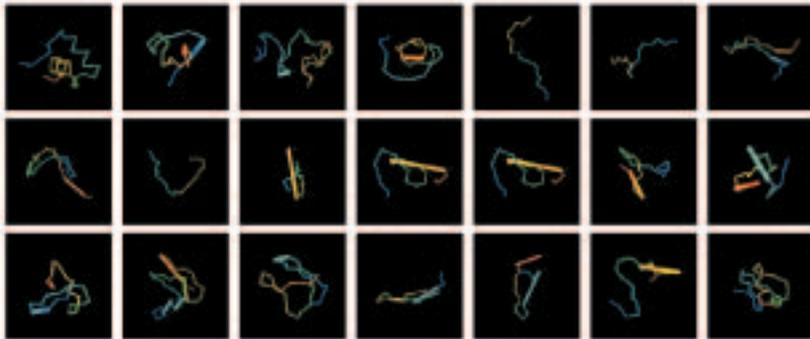


NucleArt Two chromosomes inside a human cell. Stack of images.

proteic portrait:

## MARTA DE MENEZES

### MARTAI S AVELRIVEIRDE MENESES DASILVAGRACA



Proteic Portrait Study showing similarities between marta and claw8a, as well as predicted structures of marta.

## **NucleArt**

In NucleArt I am using DNA labelled with fluorochromes to paint the nuclei of live human cells. I want to explore the relationship between the object and the observer. The artworks are live human cells painted with DNA. However, in order to be adequately observed they have to be killed. Like in many scientific subjects, from the Eisenberg's principles to anthropological studies, frequently the observation disrupts what is being observed.

Chromosomes are made of DNA, a complementary double helix, and are localised in the nucleus of cells. Normal human cells have 46 chromosomes; females have 23 represented twice, including two X chromosomes, and males have 22 represented twice plus an X and a Y chromosome. The position of chromosomes in the cell nucleus is determined in part by certain rules. For example, some chromosomes tend to stay closer to the periphery of the nucleus while others are more commonly found towards the centre. With this information, it is already possible to predict, to a certain extent, where chromosomes should appear, and to paint them accordingly. However, there are still many uncertainties concerning the position of chromosomes in the cell nucleus. In fact, one of the topics being researched in Ana Pombo's laboratory, where the project is being developed, is how different human chromosomes interact with each other.

In the NucleArt project I explore new possibilities by adapting cell biology techniques to the production of art. I combine the knowledge of the relative position of the chromosomes with the capacity to use DNA to paint each one of

the chromosomes specifically. The technique is known as Fluorescence In-Situ Hybridisation (or FISH) and can also be used to visualise segments of chromosomes or even single genes. Groups of chromosomes can equally be stained with the same colour. In this way, it is possible to create relatively controlled images where some or only one chromosome is painted with or without portions of it in other colours. The resulting artwork requires the use of a confocal laser scanning microscope in order to be visualised.

All the images I have been creating are analysed by scientists as they might provide clues for a better understanding of how the human nucleus is organised. In fact, one of the objectives of all my projects is the demonstration that artists can work in research laboratories alongside scientists in collaborations leading to advances in both art and science.

The artworks are exhibited using computer projections in order to convey the three-dimensional structure of the human nucleus.

## **Functional Portraits**

For years artists have been attempting to portrait not only someone's appearance, but also how the person is. The personality of the model can be conveyed by elements of the pose, the setting and even the technique used by the artist.

Science has developed powerful tools to image the interior of the body. Since Roentgen's discovery of X-rays, one can easily see what is hidden behind the skin. Today, new imaging technology allows better visualisation of both biological morphology and function.

Functional Magnetic Resonance Imaging (fMRI) of the brain permits direct visualisation of the brain regions that are active in real time, while the subject is performing a given task.

In this project I have been attempting to create *Functional Portraits* by imaging the brain function of the model, while performing a task that characterises herself or himself. I have been using fMRI equipment more powerful than the ones used for medical diagnosis in order to achieve better images. The first portraits I have been producing are 'Patricia' with her brain activity while playing the piano and a self-portrait with my own brain function while drawing.

I am now planning, as a development of *Functional Portraits*, to paint the brain by manipulating its activity. With the knowledge of the brain regions that are activated by certain tasks or stimuli, it is possible to design a number of simultaneous tasks and stimuli that will achieve a complex brain activity pattern. In other words, by planning a defined set of tasks it is possible to "paint" a defined pattern of brain activity. Although the artwork has a short lifespan – as long as the subject is performing the tasks – it is possible to document it by means of fMRI. It is a case where it becomes possible to create art by simple thought.

### **Proteic Portrait**

Proteins are frequently as beautiful as contemporary sculptures. To explore a computer database of protein structures using software and hardware allowing three-dimensional visualisation is like exploring an art gallery.

I decided to take advantage of the visual opportunities offered by structural biology in order to create a self-portrait using proteins as art medium.

Proteins are made of 20 different aminoacids, each one can be represented by letter (one-letter code). As a consequence, it is possible to use that convention to design a protein whose aminoacid sequence corresponds to a name. However, interesting three-dimensional conformations are only seen when the protein is over a given length: very short peptides adopt linear structures relatively uninteresting. As a consequence, my professional name – Marta de Menezes – would be too short for an interesting conformation. However, as portuguese people tend to have very long family names I could design a protein with my full name, the *marta* protein:

### **MARTAISAVELRIVEIRDEMENESESDASILVA GRACA**

Using computer databases it is possible to confirm that there is no known protein in Nature with such aminoacid sequence. In fact, it is even possible to identify the natural proteins most similar proteins to *marta*. Computer modelling also creates several possible conformations for *marta*, based on the structure of similar aminoacid sequences in known proteins. However, the exact conformation of *marta*, can only be determined experimentally by solving its structure using nuclear magnetic resonance (NMR) or crystallography.

The proteic portrait will only be finished when the true structure of *marta* will be uncovered.

### **Acknowledgements**

NucleArt is a collaboration with scientist A. Pombo, and helpful advise from S. Xie and S. Martin at the MRC – Clinical Sciences Centre, Imperial College, London. Chip-Art has insights from C. Goodman and T. Magalhães at the University of California in Berkeley. Functional Portraits have been created with assistance from P. Figueiredo at the University of Oxford.

We live in our heads too much – or at least we think we do. Post-Everything society asks us to disconnect with increasing frequency and we listen, obediently 'losing' ourselves in leisure, consumer and worker fantasies. At the fringes, radical movements like cyberpunk take up same call, transmuting it into a notion of identity as a kind of software and envisioning the society's literal disembodiment. New Age spirituality – seemingly an entirely opposed worldview – strongly continues the Gnostic desire to jettison the decay and inertia of material reality.

HEDKIKR is a free improvising duo. We make sound from an interaction that is heavily weighted toward the physical and the subconscious. It comes from the body, from under the mind – from outside. We like it out there.

Our work at SymbioticA has been literally to put the physicality of our performance under the microscope. The closer technology permits us to look at the world, the harder it is to escape the idea that the time scale of the human universe is too slow. Built on systems that are built on more systems – human perception is at the blunt end of the scale. From the scale's pointy other end, our most minute actions proliferate into a tidal wave of consequences. Our unification of experience is a fabrication constructed out of a vertiginous array of micro-universes.

Bacteria and viruses are where the action is.

We have developed a series of performances analogous to a laboratory culture – with certain environmental conditions and a prescribed duration. Each new performance retains some form of audio or visual residue from the last, creating its own micro-history.

It's Experimental music – we hope to justify the capital E.



Darren Moore Drums and Lindsay Vickery Saxes

BIOFEEL > HEDKIKR  
> INTERSECTION

HEDKIKR:

This project is a joint project between SymbioticA and the School of Architecture and Fine Arts, UWA. Adam Zaretsky & Oron Catts,

In first semester 2002 SymbioticA offered for the first time a hand on course in Art and Biology. Adam Zaretsky, a visiting research fellow in Symbiotic was the driving force behind this course, drawing on his experience in running art and biology courses and workshops in San- Francisco State University and The School of The Art Institute of Chicago. Dubbed VivoArt, this course was delivered by Adam Zaretsky and Oron Catts and involved both practical and theoretical sessions. Students received hands on experience in Molecular Biology (inserting a gene from a jellyfish (GFP) into bacteria), Tissue Culture, Developmental Biology, and more. The course also extensively covered issues related to the ethics of using living systems for human centric ends with invited speakers from the zoo, animal research ethics, scientists and artists. Some of the students' works is presented as part of BioFeel. SymbioticA ,University of Western Australia

## VIVOARTS



VivoArts student composition

Students: Donna Glasson, Margaret Heenan, Anisa Hirte, Barbara Kletnieks, Emily Green, Matt Marchment, Ruth Jeffery, Gill Phillips, Zoe Saleeba. Kelly Scurr, Kelli Sharp, Catherine Traicos, Lauw Sauw Ting, Cynthia Verspaget, Carla Webster  
Unaffiliated Synchronous Collaborators: Poppy van Oorde-Grainger, Tanja Visosevic

# DNART

André Brodyk

BIOFEEL > ANDRE · BRODYK  
> DNA ART

The installation "DeoxyriboNucleicArt" is a work in progress. This work engages with the processes used in Recombinant DNA technologies as new art marking processes and the use of living material as new art media. Creative interpretations and applications of recombinant DNA processes enable the encryption of extra biological material derived from inanimate and aesthetic sources for use as synthetic DNA. The inanimate sources used in this installation are fragments derived from biotech industry company warehouses, laboratories and research facilities. When synthetic DNA is vectored into the genomes of living organisms such as *Escherichia coli* bacteria, it is incorporated into the genetic makeup of the organism. The loci of such genetic transformation can be seen as sites of permeable aesthetic exchange, between innate and living material. Living entities comprised of encrypted extra biological material embody a new medium of "in vivo" art expression. Appreciation as well as apprehension of such permeable interrelationships between all things at a genetic level is made fecund by the experiences provided by such new art media and processes.

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Cornelius Nienaber  
Greg Cole -Scientific Glass  
Blower from the Department  
of Chemistry, UWA.

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Sohan Hayes for designing  
and constructing *PC2*  
(SymbioticA Central  
Laboratory).  
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& Human Biology, University  
of Western Australia;  
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All of the good people in the  
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Hodgetts, School of Anatomy  
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Dr. David P. Martin, TEPHA  
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Massachusetts;

Dr. Hidetomi Terai, Dr. Didier  
Hannouche, Dr. Julie Fuchs  
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Engineering & Organ  
Fabrication Laboratory,  
Massachusetts General  
Hospital, Harvard Medical  
School; Dr Frederic Gimenez,  
MIT Bioengineering  
Department;

Bec Dean, PICA

Julia Reodica, Artist &  
Laboratory Technician -  
Exploratorium San Francisco.

Peter Macintosh

**Guy Ben Ary:**

Born in USA (1967), lived in Israel and Australia. Currently living and working in WA. Manager of the Image Analysis and Acquisition Facility (IAAF), School of Anatomy and Human Biology, UWA. Specialising in light microscopy, biological and digital imaging. Member of the Tissue Culture & Art Project (joined in 1999). Joined SymbioticA – The Art & Science Collaborative Lab in April 2000. Trained in programming, web development & Law (LLB).

**André Brodyk:**

Bio artist born in Adelaide Australia. Currently PhD candidate at the College of Fine Arts University of New South Wales MFA from COFA UNSW. Research interests centred on recombinant DNA technologies and processes and the use of living material as new art processes and new art media. Currently investigating the use of synthetic

## BIOFEEL-BIOS

DNA via art based encryptions. Artist in residence at SymbioticA research laboratory UWA. Undertaken research in microbiology laboratory at University of Newcastle. Australia.

**Dr. Stuart Bunt:**

Co-founder of SymbioticA, the first art and biology lab situated in a science department. Have consulted and lectured on the nexus between Art/Science and Technology, exhibited in Ars Electronica and collaborated or helped produce a number of biotech art pieces revolving around emergent technologies in the biosciences. Background in science (developmental neuroscience lab, D Phil in Natural Philosophy, Oxford), and the arts (Director/co-founder SymbioticA). Senator at the University of Western Australia, chief executive biomedical software spin off company, Paradigm Diagnostics, and founder of the Image Acquisition and Analysis Facility, UWA.

**Marcus Canning:**

Marcus works and collaborates with many different people in many different ways. Most recently he has been busy bee as a designer for the 'Shishka-Car' spectacle at the Adelaide Festival 2002, and as creator of the video work and inflatable set used in Buzz Dance Theatre's 'Cave' production, which has just toured to Korea. He curated the 'Now You See It' window installation exhibition in Midland which is still running, and started in April as the Director of the Artrage Festival – which kicks off in October. Previously he was Creative Director of the Awesome Festival's regional programme. The first pneumatic soft sculptural work he undertook was a balloon snake created in collaboration with all the kids in Kalumburu – the most remote community in the Kimberley. He has an incessant and never-ending video opus which will one day crawl gasping into the light of day. It is called 'Dough-Boy'. It features a cosmic chef deity who floats through space and has a small white rat living in his mouth.

**Oron Catt:**

Tissue engineering artist. Born in Finland, lived in Israel and Australia. Co-Founder and Artistic Director of SymbioticA – The Art & Science Collaborative Research Laboratory at The School of Anatomy & Human Biology, University of Western Australia. Founder of the Tissue Culture and Art Project (1996). Research fellow at The Tissue Engineering & Organ Fabrication Laboratory, Massachusetts General Hospital, Harvard Medical School (2000–2001). Trained in product design, and specialized in the future interaction of design and biological derived technologies.

**Phil Gamblen**

Born in the UK in 1964. Migrated to Canada in 1966. Trained and worked as a gem cutter in the 1980's. Re-settled in WA in 1991 after two years of travel. Graduated from Claremont School of Art in 1996 and Curtin

University of Technology in 1998 with an Honours Degree in Fine Art, majoring in sculpture. Current artworks utilize motion and light to investigate technological aspects of today's culture, the overlap of art and science and the re-use of obsolete and discarded materials.

**Sohan Hayes:**

Sohan completed a degree in Fine Art at UWA, graduating 1997. His art practice spans a diverse array of mediums, some of them being kinetic sculptures, performance work, video, installation, sound and CG character animation for CD-ROM games. In recent years with the Awesome Children's Festival regional program Sohan has travelled to various communities around Western Australia, working with young people to create special events and artworks.

**Tom DeMarse**

Tom DeMarse is a postdoctoral researcher in the Biomedical Engineering Department at Georgia Tech. His primary research interests include the study learning and memory *invitro* and *invivo*. He has worked with Steve Potter for over two years on the Animat Project whose goal is to create a hybrid animal using multi-electrode array technology in which a biological brain that is cultured *invitro* is interfaced and controls a computer/robotic body.

**Marta de Menezes**

Marta de Menezes is a Portuguese artist (b. Lisbon, 1975) with a degree in Fine Arts by the University in Lisbon, and a MSt in History of Art and Visual Culture by the University of Oxford. In recent years, she has been exploring the interaction between Art and Biology, working in research laboratories demonstrating that new biological technologies can be used as new art medium, and proving that laboratories can be art studios. Besides researching into new ways to create art, Marta de Menezes is also an accomplished artist using

traditional media, with paintings frequently representing insights from scientific research.

#### **Darren Moore**

Percussionist and a composer, born in the UK in 1974. From 1981 lived in Perth after a family immigration. He studied music at the WA conservatorium graduating in 1997 with Bachelor of Music. Between 1998 - 2001, Darren lived & worked professionally as a musician in London. Currently Darren leads local avant guard jazz group - 'Open Source Project' as well as performing in Hedkiker with Lindsey Vickery.

#### **Steve M. Potter**

Steve M. Potter is the product of an artistic mother and a scientific father, who fostered both creativity and curiosity. As a result, he is perhaps more interested in the aesthetics and presentation of scientific data than most scientists, eager to make it interesting for the general public. He got his undergraduate degree in biochemistry at the Univ. of California, San Diego, and his PhD in neurobiology at the Univ. of California, Irvine. He worked as a postdoctoral scientist 8 years at the California Institute of Technology, developing tools to study living neuronal networks. He is now a professor of Biomedical Engineering at Georgia Institute of Technology in Atlanta. More info, <http://www.neuro.gatech.edu/potter.php>

#### **Alexander C. Shkolnik**

Alexander C. Shkolnik is an undergraduate at Emory University, Atlanta, GA, graduating with a B.S in neuroscience and behavioral biology and a joint B.S / M.S in computer science and mathematics. He is currently working on his masters thesis as a research fellow in Steve Potter's lab. Interested in merging the fields of neuroscience and computer science, Alexander hopes to continue his academic career in Artificial Intelligence.

#### **Ian Sweetman**

Through an eclectic and undistinguished career Ian Sweetman is uniquely unqualified in, but has at one time or another earned a living from; photography, bacteriology, pulmonary physiology, bass playing, record production, sound engineering, neurobiology, forensic anthropology, maths, applied computer science, network administration, artificial intelligence, strange art projects involving fish and robots and, tentatively, haptics. He still does not know what he wants to do with his life, but if he ever gets paid what he thinks the world owes him, travelling around the world with a bicycle, a tent and a credit card is a strong possibility.

#### **Lindsay Vickery**

Composer/performer Lindsay Vickery's music includes works for acoustic and electronic instruments in interactive, improvised or fully notated settings, ranging from solo pieces to opera and interactive video. He has been commissioned by numerous groups and performed in Holland, Poland, Norway, Germany, England, the Phillipines, the USA and across Australia. Lindsay has been artist-in-residence at STEIM (NLD), HarvestWorks (NYC), LACMA (LA), the University of Illinois and the MATA festival (NY). Vickery is a lecturer at the WAAPA@ECU in Perth. He was a founder member of Magnetic Pig, GRIT, HEDKIKR and LA-based multimedia group Squint. [www.magneticpig.iinet.net.au/lv/lv.html](http://www.magneticpig.iinet.net.au/lv/lv.html)

#### **Amy Youngs**

Amy M. Youngs exhibits mixed-media interactive sculptures nationally and internationally. Reviews of her work appear in the Chicago Reader and Artweek and her articles have been published in Leonardo and Nouvel Objet. She has lectured nationally, including, California State University, Long Beach and the Massachusetts Institute of Technology. She was awarded an Individual Artist

Fellowship Grant from the Ohio Arts Council in 2002. She received a full Merit Scholarship to study at The School of the Art Institute of Chicago, where she completed her MFA in 1999. Youngs is currently an Assistant Professor of Art at The Ohio State University.

#### **Adam Zaretsky**

One of the world's foremost Microinjection Food Science Researchers, Zaretsky practices garage embryology, parasitology and glossolalia as a perpetually rotating academic at the International University of Pataphysics. In 2002-2004 he will be teaching VivoArts in Neil Rolnick's Electronic Media, Arts, and Communication department at Rensselaer Polytechnic Institute. The class focuses on all of the living arts, including but not limited to: Environmental Art Installation, Radical Food Preparation, Performative Pet/Domestic Animal Relations, Science Fiction Enactment, Art and Science Co-Laboratory and Licentious Body Manipulation Arts. Rumor has it that Zaretsky met with the illegitimate brother of US President George W. Bush, Osama bin Laden at a cultural summit in the Cayman Islands, whereupon Osama stated: "the axis of benevolence \*is\* soft parasitology." Contact: [injector@emutagen.com](mailto:injector@emutagen.com)

#### **Ionat Zurr:**

Wet Biology art practitioner. Born in England, lived in Israel and Australia. Artist in residence in SymbioticA - The Art & Science Collaborative Research Laboratory at The School of Anatomy & Human Biology, University of Western Australia. Co-Founder of the Tissue Culture and Art Project. Research fellow at The Tissue Engineering & Organ Fabrication Laboratory, Massachusetts General Hospital, Harvard Medical School(2000-2001) Studied photography and media studies, specializing in biological and digital imaging, as well as video production.



MAR

# SCREEN

● IMMERSION

● BUDFEEL

● SCREEN



# SCREEN

## Eye:

As I sat on the church pew this morning waiting for the Christening service to begin, I found myself in the midst of an in-depth ocular exploration of the church's interior architecture. This was quite a pleasant experience after being somewhat bemused by the massive construction site banner assaulting the external skin of the building. As my gaze wandered from window to window, painting to painting, buttress to buttress, an excerpt from a quote came to mind; "The eye seduces the imagination".

While pondering this little snippet I continued my visual exploration seeking out *the wooden or stone partition in the church*. I smiled when Father Ted requested that we, as a group, denounce Satan; I couldn't help it. My cat's alias is Spawn of Satan and I had a mental image of a Garfield influenced crucifixion on the back fly-wire screen. It may have been my backlog of Catholic induced guilt (it resurfaces whenever I enter a church) but I had a terrible fear of being struck down by a bolt of lightning. I had hoped that a piece of mesh would shield me from the scrutinous gaze of the clergy; it didn't happen. However, the rather tall man sitting on the pew in front appeared to do the trick. (cont...)

## Screen:

Device to shelter from heat, light, draught, observation;  
mesh over doors to keep out insects;  
wooden or stone partition in church;  
shelter, protect from detection;  
scrutinise, examine for potential motives;  
examine for presence of disease, weapons, etc;  
white silvered surface on which photographic images are projected.

(Collins Pocket Reference English Dictionary, 1988; p: 430)

pauline williams



**midland/myer**  
david brazier  
merrilyn fairskye  
pilar mata  
tarryn gill

**kurb**  
tania doropoulos

**central tafe**  
**/arcane bookshop**  
rebecca dagnall  
christian de vietri  
heather webb  
kai faigénbaum  
cavity

**cbd**  
david christian  
mark christian

**spectrum**  
vikki wilson

**john curtin gallery**  
amanda alderson  
paul caporn  
bec dean  
david fussell  
donna ettrick  
michelle glaser  
mia lalanne  
marie-louise xavier  
chris wells  
trish kent  
brogan bunt

john curtin gallery

← **SCREEN**

play ...



**...loading...**

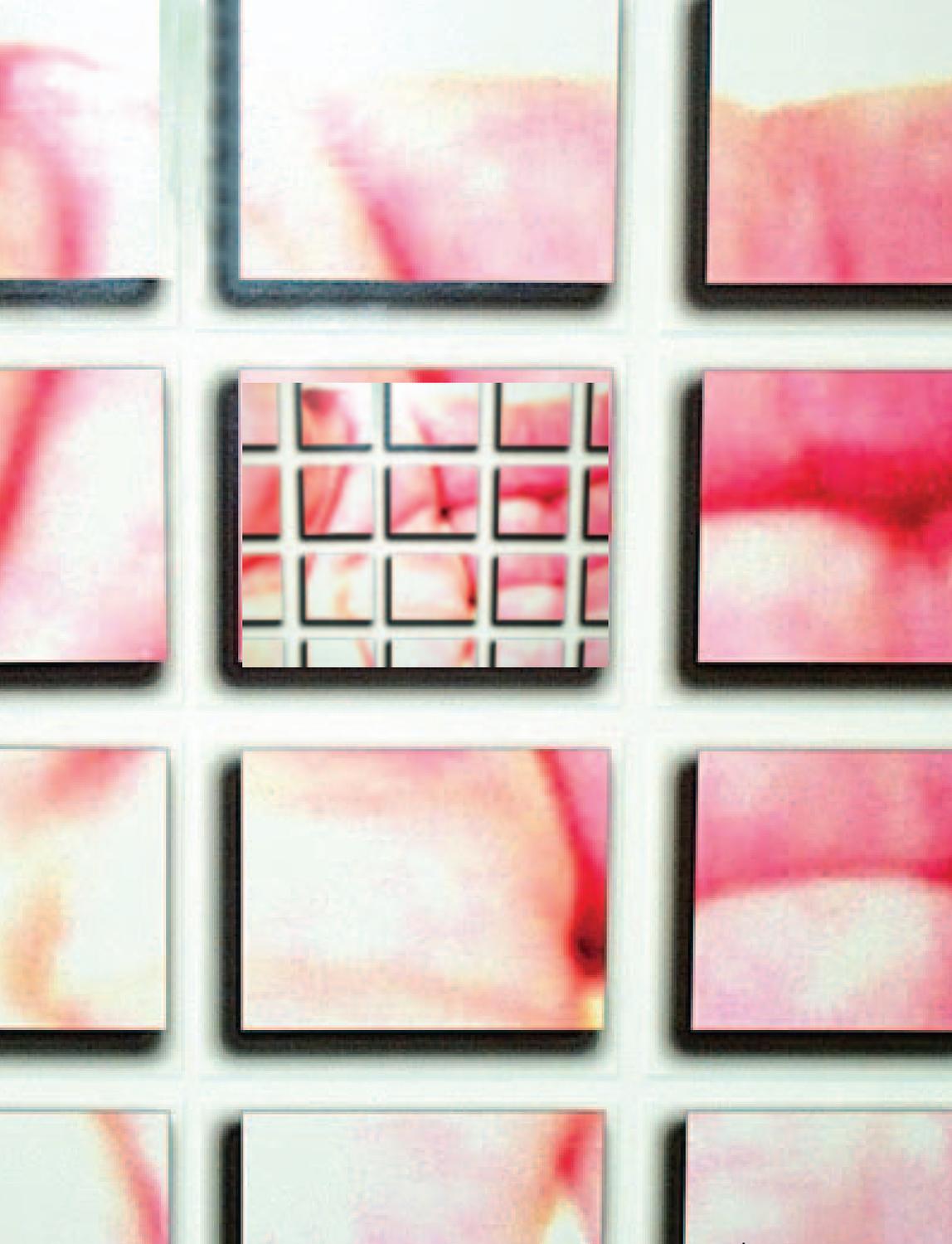




paul caporn, bec dean and david fussell  
*blue lagoon* video, installation, performance, text, 2002

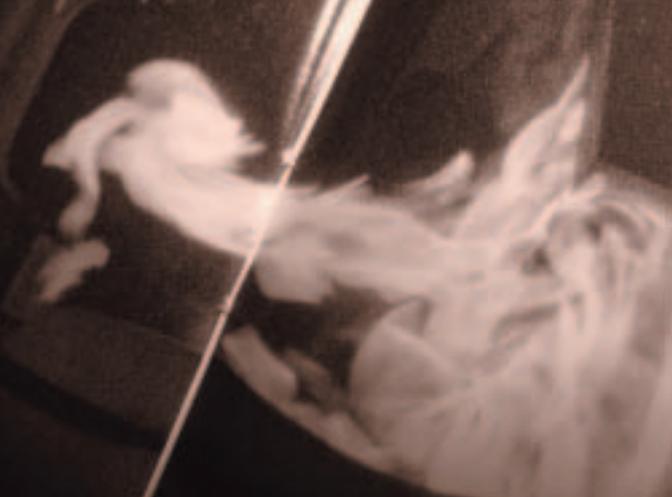
every time i look into his/her eyes  
it's like i'm looking into a mirror  
i'm so glad it's over  
i've never felt this way before  
you don't understand me the  
way he/she does  
i know what you're thinking  
we have a spiritual connection  
i never want to leave here  
why does it hurt so bad?  
it's just like a fairytale







stills from the interactive work, *doctor pancoast's cabinet de curiosités*.  
created by michelle glaser, mia lalanne, marie-louise xavier and chris wells.



trish kent  
*confessional* detail from digital print

brogan bunt  
*hotel* still from interactive work



*In formulating the curatorial premise for Screen I had considered the eye as the receptor of lived and cinematic experiences. The ocular nature of image gathering is the focal point of the bodily process and is representative of the 20 media based works shown at the various exhibition sites in and beyond Perth.*

*As I contemplate these notions I am again drawn to the eye as seducer of the imagination. Sight and mind, or rather the processes of sight and recognition, seem virtually impossible to isolate from each other. I feel that it is the eye via recognition that seduces the imagination. Considering the infinite number of images that pass through the body's processes of recognition, one may question; how does the eye, operating as receptor, decipher the images that make the journey along the numerous optic pathways to the brain for coding, decoding or storage? According to the Hitchhikers Guide to the Galaxy, we may have brains the size of a planet, even so, is that big enough to contain the massive process of our continuous ocular dialogues?*

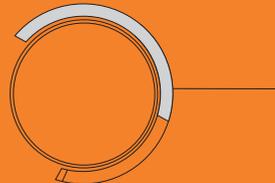
*My thought process has been interrupted by the melodic buzz of a moth bouncing against the light globe. It must have happened across the demonic slash in the fly wire, the remains of Spawn of Satan's latest possession. If it were not for the mosquitoes siphoning a steady flow of blood from my ankles it would have been quite an ambient moment.*

#### IMAGE:

In his essay *The Image Matrix* "Analog is having a burial and digital is dancing on its grave", Arthur Kroker states,

"...sliced through and diced, combined and recombined the body is an image matrix...the image maintains the pretence that it has something to do with the history of the eye precisely because its real electro-optical history focuses on the shutting down of the eye of the flesh and the opening up of the residual eye of the dead code...the image archive is reduced to the steady flicker of the cybernetic code...perfectly preserved, perfectly coded, always retrievable..."

Welcome to the mainframe!



curators statement





The demonic slash seems to have also allowed easy access to a rather cool breeze. It has caused a distinct change in the moth's melody via the now pendulous wind-chime. The cacophony of moth and chime is developing a sound not dissimilar to the ping of the ultra sound as it isolates a section of body to image. Definitely an intriguing ocular exploration of fleshy interior architecture but I think that is possibly the making of another exhibition beyond Screen and perhaps not a flashback that I wish to spend too much time on.

Within the film *Matrix* (1999), Morpheus introduces Neo to his 'true reality'.

"This is the construct. This is our loading programme...what you see is your residual self-image, a mental projection of yourself, of your digital self. The twentieth [twenty-first] century exists now as a neuro interactive simulation, that which we call the matrix" (Matrix, Wachowski, 1999).

For the viewer the matrix, the main frame, exists as a binary code as seen from the mother ship (the vehicle of desolate reality). Within the mainframe the motion of metallic green digits continue on their vertical voyage with no apparent destination. As with the *Matrix* the boundaries between technology and lived experience blur to the point where the bodily construction of our self-image move beyond the 'residual self-image' to the real. This notion forms the basis of my premise for Screen and pre-empted the participating artists' ocular investigation into the blurring of these boundaries. The result is a diverse critique of the cinematic and lived experiences that permeate our 'paramount realities', our sense of the world.

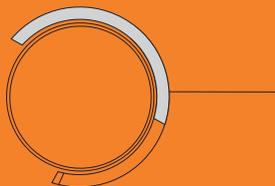
Kroker goes on to state:

"It is our future to disappear into images, not only into those external image screenings cinema, T.V, video, digital, photography, but also into those image matrixes that harvest human flesh, MRI & CT Scans, and thermology".

The screen as a permeable membrane, has in a sense transcended its physicality, it has been stretched to almost transparent, no longer simply the *white silvered surface on which photographic images are projected*.

The participating artists and I have endeavoured to undertake an investigation into these issues in relation to cinematic and lived experiences. What you experience at the various exhibition sites are independent interpretations of the eye, image and screen.

curators statement





spectrum

is it the desire to be somebody?



Remember all your secrets,  
I won't tell anyone.



he'll have an active fantasy life  
coupled with emotional flattening  
she said



a throw of the dice  
will never abolish chance



vikki wilson

*serial killer permutation engine: a throw of the dice will never abolish chance stills*

When I grow up I want to  
Be an armysolger.  
I wiff belim war.  
When I'm not working  
I'll sleep in.



midland/myer



pilar mata & tarryn gill  
army soldier



merrilyn fainskye  
*eye contact* film stills

david brazier  
*carpet* animation film stills



central tafe  
/arcane bookshop



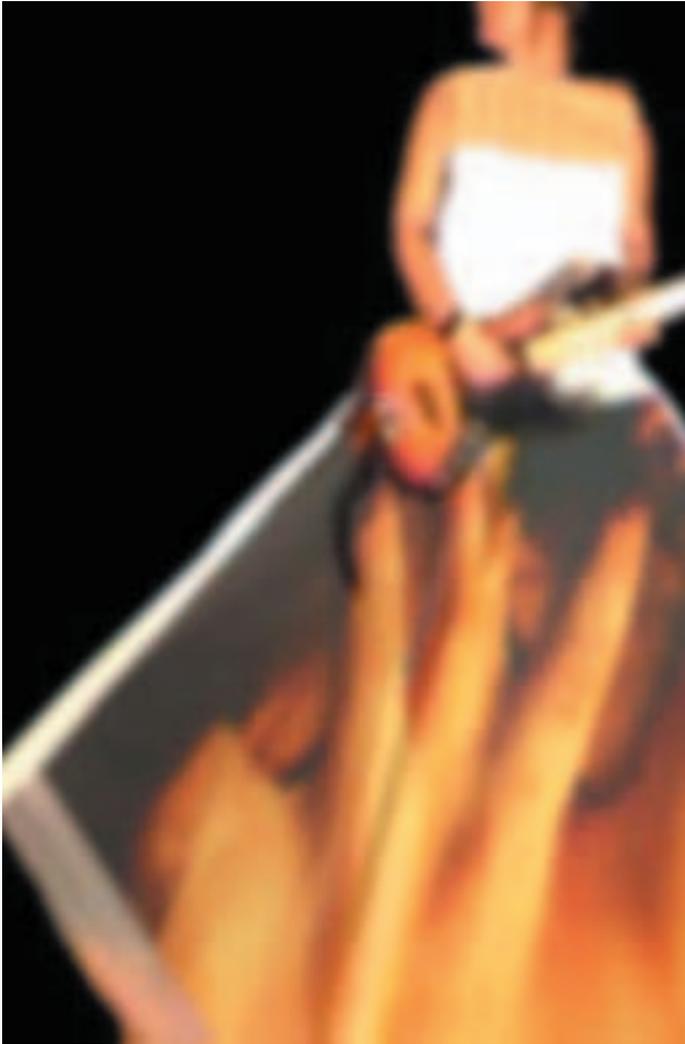
They're in the shed,  
On the top shelf  
next to the car  
polish.

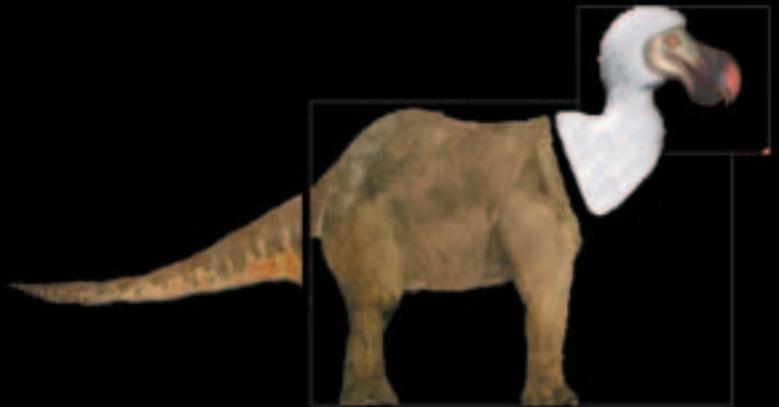
Maybe Rob an  
that wanna come.

I'll give em a call ay

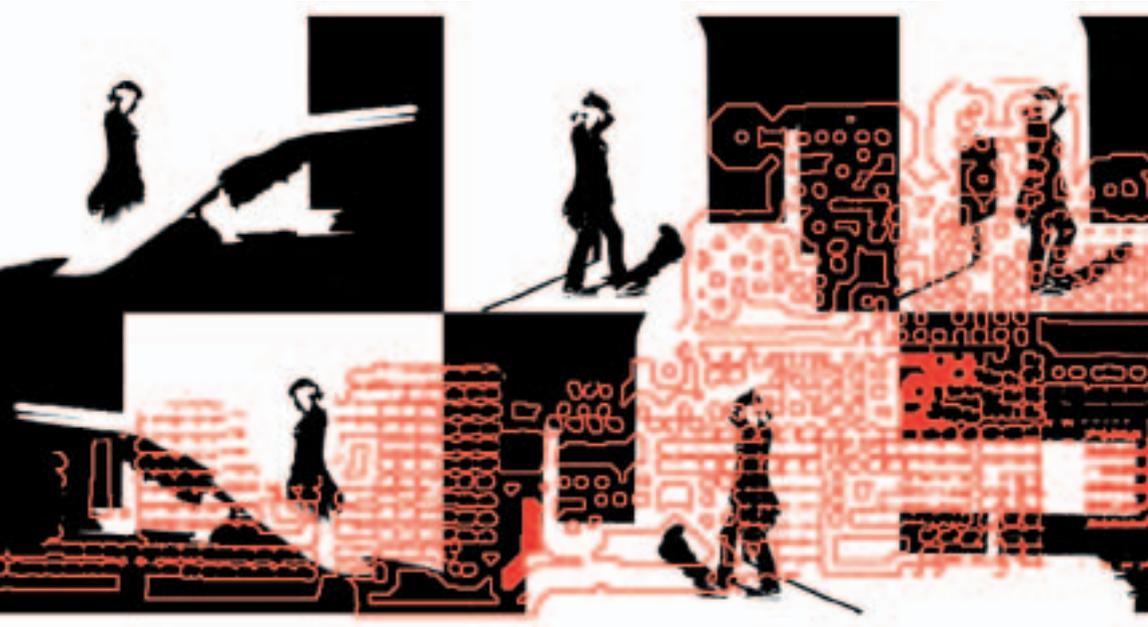
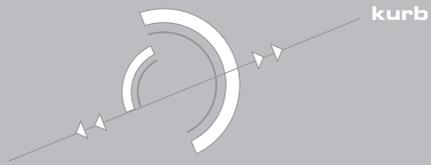
On you get the esky  
while you're out  
there love?



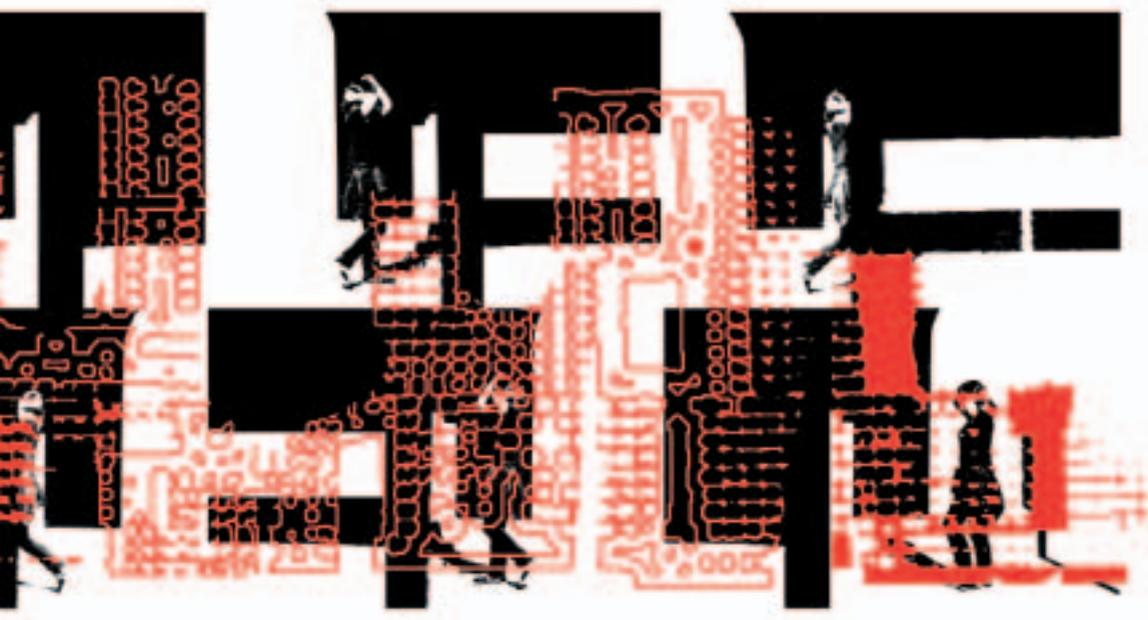


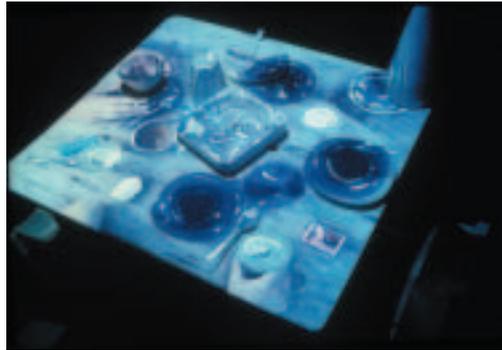
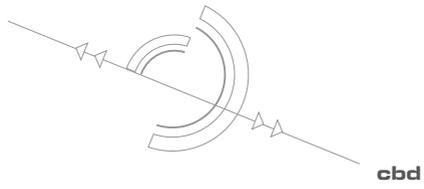


kai faigénbaum  
*conjectural hybrids* 2002 captured digital iframe



tania doropoulos / mustaka  
*threepointtwoseconds* video slide and audio





mark christian  
*pile* installation

david christian *tabula rasa*  
detail video installation

*Screen* has been developed with the kind support of the City of Perth, Humanities Division, School of Art, Curtin University of Technology, John Curtin Gallery, John Curtin Centre, MYER Forrest Chase, School of Media, Communication and Culture, Murdoch University, Central TAFE, spECtrUm Gallery and BEAP.

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Artist Biographies are available via the BEAP website: [www.beap.org](http://www.beap.org)

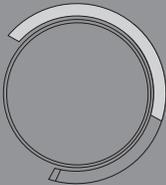
The good Dr. Pancoast would like to acknowledge the grand closet sound by Trevor Hilton and illustrations by Helen Smith, Gina Moore and Richard Giblett. The many facets of the Doctor's Closet were photographed by Robert Frith.

From an idea developed with Nic Beames. With performers Neal Lucanus and Fiona Cornelisse

David Brazier would like to thank Andrew Hill, Tim Burns, Ryan and Ben for their assistance in the construction of *Carpet Animation*.

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acknowledgements



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THE UNIVERSITY OF WESTERN AUSTRALIA

With Kind assistance from The Lawrence Wilson Art Gallery



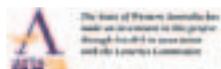
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**SCREEN** would like to thank for their support:



SHAP - The Academy of Electronic Arts, Perth was developed in collaboration with the John Curtin Gallery, Curtin University of Technology



TOWN OF VINCENT

