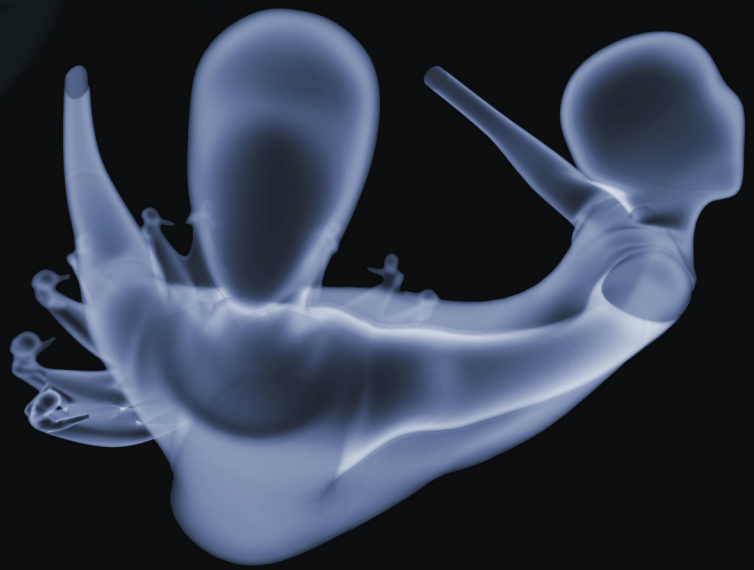
INTIMATE TRANSACTIONS

Art, Exhibition and Interaction within Distributed Network Environments



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INTIMATE TRANSACTIONS

Art, Exhibition and Interaction within Distributed Network Environments

Edited by Jillian Hamilton

ACID
Australasian CRC for Interaction Design
Brisbane, Australia

Foreword

In many respects, the *Intimate Transactions* project is a product of ten years of effort to build critical mass and capacity for Australia's creative industries. Keith Armstrong and his core project team have undertaken this research journey with many others: fellow artists, students and staff from several universities and industry partners, all drawn from the aggregate of brilliant researchers that emerged as a result of establishing the Australasian CRC for Interaction Design (ACID). ACID was crystallised from the networks that had been established between Queensland University of Technology's Communication Design discipline and other, technology-related initiatives across Australia and New Zealand: the Australian Centre for the Moving Image in Melbourne, the Spatial Information Architecture Laboratory at Royal Melbourne Institute of Technology, HitLabNZ, the Interactive Television Research Institute at Murdoch University in Western Australia, Information Environments at the University of Queensland, and the Creativity and Cognition Studios at the University of Technology, Sydney. The formalisation of these connections by ACID has allowed specialist researchers, supported by those working in the background, to collectively contribute to the multi-disciplinary skills and relationships that are needed to ensure that large, internationally recognised projects like *Intimate Transactions* can flourish. We can now point to many similar projects that owe much of their success in the education—research—commercialisation value chain to this exciting human infrastructure of collaborators and associated capability.

Intimate Transactions is an outcome of one of ACID's primary research agendas: exploring the potential of interaction within multi-user environments. It was developed within one of our key foundation projects: the Australasian Creative Industries Network. The importance of this project is in its commitment to understanding 'embodied presence'. That is, it has provided new insights into how a person can be 'present' in a location while physically located thousands of kilometres away.

In an age of globalisation and the democratisation of information, we have an increasing need to facilitate what we can normally only achieve from face-to-face communication — that is, a more intimate knowledge and understanding of each other and our individual idiosyncrasies. *Intimate Transactions* takes some important steps in helping to achieve these intangible qualities in communication across the network. This has important, broader implications because, in personal or professional situations, we read each other, and what we

read determines whether we trust and what we believe. Of course, such outcomes have profound significance for a country like Australia, which is strongly collaborative but happens to be plagued by the tyranny of distance and a relatively small population. We need to be connected, and innovations like *Intimate Transactions* may lead to us being connected more often.

The outcomes of this project have been achieved through the tenacity and intuitiveness of an artistic collaboration that has maintained a focus on the people and the experience rather than on the technology and the infrastructure. The world of design is increasingly focused on Experience Design, which involves the formation of multi-disciplinary teams to examine the human dimensions of new products, services and management processes and structures. While it might seem odd to mention these areas in the context of this project, it is important to be aware of the way that our mainstream creatives are working with others and drawing more on artistic sensibilities to provide us with the things we actually want and desire rather than what single disciplines like engineering or business might decide for us when working in isolation.

People are also becoming philosophically driven by the same social and cultural values that clearly underpin the ultimate aspirations of this project. While I wouldn't presume to call *Intimate Transactions* mainstream, I do commend this project for the hope it brings to the way we might integrate economic, social and environmental values.

Collaborations such as the one formed around *Intimate Transactions* are really hard, but fun and worth doing. Although the words here are serious, I'd like to end with a simpler and more profound message — have fun, be the best and don't ever play down the giggle-factor. As you read through this book, I believe that you'll come to understand what I mean.

Professor Jeff Jones
CEO
Australasian CRC For Interaction Design

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Introduction

Jillian Hamilton and Peter Lavery

Dr Jillian Hamilton is the editor of this publication and Professor Peter Lavery is the Director of the Australasian Creative Industries Network, the project area of the Australasian Cooperative Research Centre for Interaction Design that supported the Intimate Transactions project.
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What contributes to the design, production and curation of successful new media art? How are experimental, interactive installations approached by artists, curators and participant audiences? Is it possible to create a sense of embodied communication or an intimate transaction between people who are separated by vast distances but joined by interfaces and distributed networks? This publication considers these questions from the perspectives of many different disciplines. It provides insights into the design and development of a new media work entitled *Intimate Transactions* from the visual, sound and performance artists and the furniture, spatial and technology systems designers who collaborated in its production. They discuss their design philosophies, working processes, resolution and exhibition of this major new media artwork. These essays on production are accompanied by analytical texts by writers from the fields of art history, performance and Human Computer Interaction. Their interpretive essays consider how new media artworks like *Intimate Transactions* challenge traditional understandings of art, curatorial installation and exhibition experience because of the need to take into account interaction, performativity, inter-site collaboration, co-presence and the reconfiguration of space. They also anticipate how the innovations of this project might be incorporated into other fields such as Computer Supported Cooperative Work, virtual environments and networked communication.

The *Intimate Transactions* project arose out of a convergence of interest in the potential of the high-speed distributed network. In 2004, the Australasian Creative Industries Network (ACIN), a project area of the Australasian Cooperative Research Centre for Interaction Design (ACID), established a research agenda around testing and extending the interaction and communication potential of the new, low latency network, GrangeNet (Internet 2). Artists, technology specialists and curators who identified an interest in this research field were brought together under the umbrella of ACIN to explore a range of related design, process and technical questions. Their investigations focused on the production and exhibition of an experimental artwork, which provided a site to develop and integrate their proposed solutions and test their efficacy.

The key constituent group involved in the project was the Transmute Collective, led by new media artist and Queensland University of Technology (QUT) Postdoctoral Fellow, Keith Armstrong. Together with choreographer Lisa O'Neill and sound artist Guy Webster, he had been developing an artwork entitled *Intimate Transactions* since 2001. Having already received research funding from the Creative Industries Faculty at QUT, Arts Queensland and the Australia Council, it had progressed through two iterations as an immersive image and sound environment. It had an intuitive interface design and an innovative input device — the Bodyshelf, designed in collaboration with Canberra artist Zeljko Markov. The work had been shown as a single-site prototype at Performance Space in Sydney in 2004.

Intimate Transactions became a focus of the ACIN project for the third phase of its development. This involved extending the work into a dual-site, networked installation. During this development phase, ACIN consciously linked the Transmute Collective with researchers and industry partners from other Australian cities. Along with innovation in interaction design, part of ACID's wider agenda is to bring researchers from different disciplines and partner universities together into teams in order to develop interdisciplinary capacity among research staff and students. It also seemed appropriate for a program investigating communication in a distributed environment to encourage collaboration across geographical distance. Therefore, while the Transmute Collective at QUT remained at the heart of the collaboration and Keith Armstrong was of singular importance in the project's management and in maintaining continuity in its vision over time, the creative team was extended. It came to include researchers Pia Ednie-Brown and Inger Mewburn who were working on haptic devices in the Spatial Information Architecture Laboratory at Royal Melbourne Institute of Technology (RMIT). The technical team was also expanded to include staff at ACID, The Block in the Creative Industries Precinct at QUT in Brisbane, and the Australian Centre for the Moving Image (ACMI) in Melbourne. The collaboration so became a distributed one, separated by 1,500 kilometres.

Through this collaborative research process, *Intimate Transactions* has evolved into a complex, dual-site, interactive installation that operates within the context of the distributed network. Some of the aspects of the earlier, single-site prototype were developed and refined. The Bodyshelf, for example, underwent modification to incorporate additional feedback sensors to relay the participants' movements across the network. Other aspects, including the conceptual structure of the

system design and the logic of the interface design, were completely reconfigured to support an interaction between participants at distant sites. Additional components, such as haptic devices, were developed to add tactile feedback and to relay the movements of the second participant across the network.

Because of these developments, *Intimate Transactions* now allows two people in separate museum locations to explore a shared virtual environment. Standing on the touch-sensitive Bodyshelves, they use a series of body movements to navigate a representational avatar through a landscape and interact with its abstract, animated creatures. They experience rich, multi-sensory feedback: evolving images and colour flares, modulations in the surrounding sound-scape, and textured vibrations that ripple through their stomachs and backs. When their avatars conjoin, they feel each other's physical push and pull through the Bodyshelf. This experience of a remote, embodied interaction is made possible through the fast-speed data transfer of the distributed network.

In 2005, the completed work was piloted with audiences in adjacent, networked rooms at the National Review of Live Art in Glasgow, Scotland and the B'Tween Festival of Future Entertainment in Doncaster, England. Its first long-distance dual-site installation occurred later in the same year at The Block in Brisbane and ACMI in Melbourne, Australia. Following its subsequent, successful exhibition at the Ars Electronica Festival in Linz, Austria, and major international museums including Artspace in Sydney, the Institute of Contemporary Arts in London and Bios in Athens, *Intimate Transactions* has been acknowledged internationally as a major, pioneering work in the fields of virtual environments, distributed network communication and new media art.

Interdisciplinary Collaboration in Practice-led Research

One of the main factors that has contributed to the success of this project has been the collaborative, interdisciplinary approach to its research, design and production. The development of an interdisciplinary and geographically distant yet highly productive collaboration has been the hallmark of this project. The Transmute Collective is itself a multidisciplinary team with members skilled in interactive digital media and visual, sound and performance specialisations. They initiated collaboration with system designers, programmers and a furniture designer in the early prototype development. The contributors from RMIT broadened the interdisciplinary scope of the project, bringing the expertise of architecture/wearables to the work, while staff at ACID and both testing museum venues provided invaluable technical and curatorial expertise.

Collaboration is not always easy or seamless. Indeed, it has been argued that the process of collaboration involves a certain loss of self because it requires a merging of interests with those of the group. Individual egos and notions of the creative individual (artistic myths of the isolated genius) must be set aside in the forging of a common purpose and approach.[1] This negotiation is undoubtedly compounded when the collaboration is interdisciplinary. As Carol Gray noted in her early definition of practice-led research, creative practitioners pursue research questions from their own disciplinary perspectives using methodologies and specific methods that predominate within, and may be unique to, their own discipline.[2] This means that when a project crosses disciplinary boundaries, questions may arise out of the situated disciplinary knowledges[3] of individual collaborators and may be resolved through disciplinary methodologies and practices that are not necessarily shared by other team members. In this project, while the collaborators expressed a common interest in exploring and extending the interaction and communication potential of the distributed network, perhaps unsurprisingly, each viewed the problem from their own, particular perspective and so envisaged this potential differently. The broad research questions of the project raised a number of contingent, disciplinary-specific research questions that the individual collaborators needed to solve through their own, specific methods of practice. The disciplinary diversity of the team therefore stretched the communication comfort zones of team members as they encountered the unfamiliar ways of working, value assumptions and cultural nuances that are woven into the methods and practices of different disciplines. No doubt the geographical distance between the collaborators and limited face-to-face contact exacerbated these differences. Yet, as a group, the collaborators faced the challenge of producing a work with a shared aesthetic and the goal of creating diverse (image, sound and vibration) feedback that would work in concert to generate a unified experience.

Out of these challenges, *Intimate Transactions* has come to demonstrate what can be achieved through interdisciplinary collaboration, even when it occurs over vast distances. The benefits of collaboration come about when contributors from different disciplines bring new perspectives to a project and, unfettered by assumptions about what is possible within the field, throw up questions that challenge disciplinary norms or propose solutions that push the project to unexpected and surprising places. In this project, for example, it was Lisa O'Neill, a dancer and choreographer rather than a specialist in digital technology, who proposed the

whole-body movements that are integral to the work's innovations in interaction design. For a dancer, it seemed natural to challenge the confinement of movement to the wrists. Yet, in the world of interactive technology, this is as radical a move as placing the body on a shelf in the gallery. It is precisely because such challenges were made to established assumptions, and because the project team was willing to step out of disciplinary comfort zones to embrace them, that the innovations of this project have occurred.

Members of the *Intimate Transactions* project team have discovered ways of explaining, understanding and negotiating across the borders, and they will now carry these communication skills into their next projects. In this way, ACIN has supported the development of a critical mass of artists and researchers who are committed to, and experienced in, working in multidisciplinary teams on digital media. This is an important capacity if, as *Intimate Transactions* demonstrates, it is in the border-zones between disciplines that the opportunities for innovation are the greatest.

The first section of this publication brings together essays by the key collaborators who contributed to the development of *Intimate Transactions*. These essays reflect upon the research problems, design decisions and research processes that have unfolded in the project's development.

Keith Armstrong writes from his position as director of the Transmute Collective and creative director of *Intimate Transactions* to provide an overview of the development of the project through its iterative design process. He also describes the ecosophical philosophy that underpins the conceptual framework of *Intimate Transactions* and explains how its principles came to be incorporated into the work's system design, interaction design and participatory feedback.

Lisa O'Neill explains how her professional background in live performance and choreography helped to solve the challenges of creating a sense of embodiment and dual participation in the work. She describes her approach to choreographing the body movements of the participants, producing the dramaturgy of the creatures and designing the rhythms of the vibrations produced by the haptic feedback devices.

Furniture designer and visual artist Zeljko Markov provides insights into how his approach to the input device emerged out of his art practice. He aligns his design of the Bodyshelf with Lisa O'Neill's vision for an approach to interaction that facilitates the free

movement of the body. He also describes the refinement of the Bodyshelf over several iterations to increase its sensitivity to input and to introduce feedback from the participant at a second site.

In an interview with Jillian Hamilton and Jeremy Yuille, sound artist Guy Webster discusses his approach to developing a sound-scape for the work. He explains how he developed a multi-channel soundtrack that is not only sympathetic to the ecological concerns of the project, but also creates a differentiated experience of public and private spaces, identifies the characteristics and rhythms of each of the creatures in the work, and represents the 'tensions' created through various types of interaction with *Intimate Transactions*. He also describes working closely with other members of the project team to integrate the sound with other sensory feedback to maximise immersion in the work.

Marcos Càceres, the lead programmer of *Intimate Transactions*, describes his development of the principle of computational layers within the work's system design. He describes the relational model of the programming, which is built upon the notion of 'transactions' between parties that lead to changes in the environment as a whole, and how this works in sympathy with the ecological ethos of the project.

Pia Ednie-Brown and Inger Mewburn of RMIT's Spatial Information Architecture Laboratory emphasise their urge to introduce a sense of embodiment and 'touch' into the work through the haptic feedback devices they designed for the Bodyshelf and a pendant worn on the participants' chests. They discuss the development of a sense of tactility in the work through the modulation of the frequency, intensity, rhythm and texture of the vibrations produced by these haptic devices. They also explain how they developed a directional 'push' in the Bodyshelf to signify the directional movements of the other participant.

While they are inevitably intertwined and interdependent, these essays do not always present a uniform story. Each is written from a unique perspective and places a different disciplinary emphasis upon the project's potential, goals and outcomes. Moreover, each describes the experiences of the project differently. The collaborators were not always in agreement as they worked through the process of producing this work. Their differences, as well as inconsistencies in styles and disciplinary languages, have not been smoothed over but remain in the texts that follow. This is because, as a collection that deliberately retains the inflections of its authors, this publication is richer for the multi-faceted insights it presents. As a heteroglossia,[4] it provides a

more complete picture of the project's development because it considers it from many different points of view. And, together, the resonances and differences within these texts demonstrate how the interdisciplinary push and pull on the research process can contribute to innovation and a greatly enriched project outcome.

Extending Exhibitionary Practices

These essays on the collaborative, interdisciplinary practice-led research process are complemented by insights from the technical staff and curators who worked with the creative team to exhibit the work. It is important to acknowledge that the challenges presented in exhibiting an inherently complex work like *Intimate Transactions* are increased exponentially by extending it into a dual-site operation, utilising new infrastructure and the logistics of connecting two sites in different cities in real time over the network.

ACID's Research Technology Manager, Gavin Winter, explains how The Block at QUT in Brisbane and ACMI in Melbourne supported the project technically. Both active partners in the ACID research programme, these newly opened museum facilities piloted the project in order to build their capacity to support their exhibition of digital media and high-speed distributed installations into the future. At the time, GrangeNet had been established as a university network but had not yet been incorporated into key cultural centres. Winter explains how the work was connected between sites using GrangeNet and portable Access Grid units that were designed to support remote conferencing.

Mike Stubbs, senior curator at ACMI, describes the staging of *Intimate Transactions* within a museum context for the first time. He discusses the challenges that cutting-edge, interactive new media art like *Intimate Transactions* present to audiences and makes a case for resourcing the support that is needed to ensure that experimental artworks are transferred successfully from the research context of laboratory prototype into fully functioning, interactive installations in the public realm.

Identifying Innovation

The final section of this volume brings together analytical essays by authors from multiple fields. Together, they identify the innovations produced by *Intimate Transactions* in the areas of interaction design, systems design, immersive environments, gallery installation, and network technology, and they point to the significance of these advances for the fields of art, performance, interaction design and networked communication.

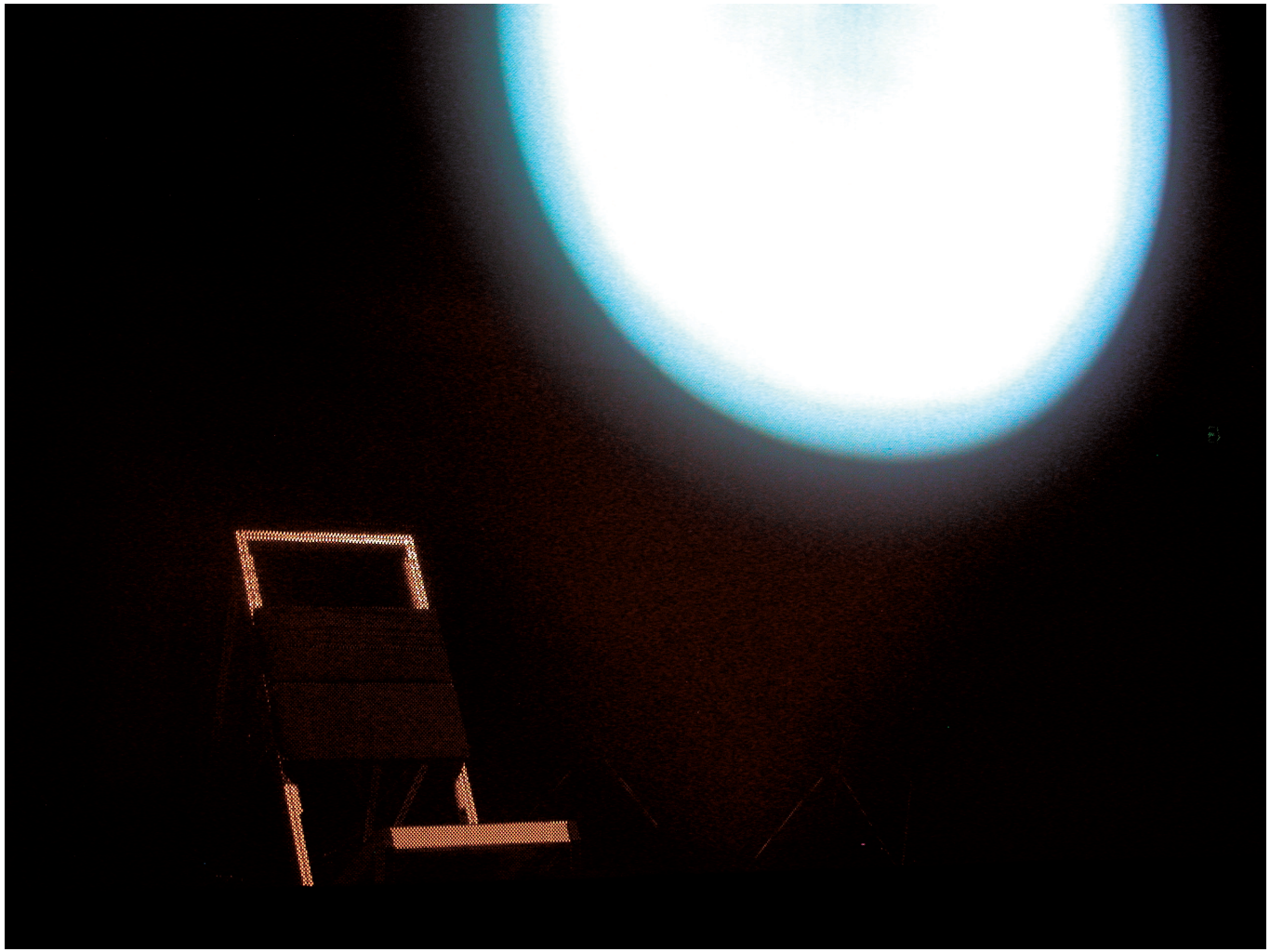
Stephen Viller and Jamie Madden write from the perspective of Human Computer Interaction and report on the study they conducted into user experience of *Intimate Transactions*. They discuss the potential that this project has for increasing a sense of presence and awareness in ubiquitous technologies within the domain of Computer Supported Cooperative Work.

Johannes Birringer reviews *Intimate Transactions* from the perspective of a new media and performance art critic. He describes his own experience of the work at Ars Electronica and writes about its kinaesthetic effects. Contextualising the work within site-specific and performance art, he argues that it sits within a new category of interactive environments and coins the term 'transactive environment' to describe it.

Jillian Hamilton contextualises *Intimate Transactions* within the fields of art history and networked communication. She considers how this work facilitates immersion through embodied interaction and multi-sensory feedback and how it establishes a dialogic and tactile relationship between distantly-located participants. Focusing on the challenges that these innovations present to our perceptions of space, she proposes that this artwork provides a model for enhanced communication across the network.

Along with its accompanying DVD, this publication on the design, production, exhibition, experience and evaluation of *Intimate Transactions* provides a tangible record of the collaborative research process and the project's research outcomes. It also provides an enduring presence for the work itself. As is the case with much new media artwork, *Intimate Transactions* would otherwise be transient because it is subject to the inherent temporality of installation, performance and interaction.

This publication is also a testament to the investment that has been made in *Intimate Transactions*. Besides the key collaborators who are represented through their essays here, many other contributors — from design students to experienced artists — were involved in this project during its three-phase development over the past four years. The project was built upon pilot projects, which drew upon prior collaborations forged by Keith Armstrong within the Creative Industries Faculty at QUT. Technical staff at QUT and the exhibition venues worked behind the scenes to support the work. And, importantly, the iterative development process was supported by the documented feedback provided by many participants at the end of each phase. The project received substantial support from the Australian and international arts sector through grants and venue support, and the university



sector through research funds, residencies and the use of infrastructure. Primarily, it was made possible by the financial, material and staff support of the cooperative research centre, ACID. The success of this project has depended upon each of these contributions.

If sophisticated and technically demanding new media artworks are to be successfully developed, then these contexts of sustained support, interdisciplinary collaboration and the iterative development of the work over time are essential. The *Intimate Transactions* project provides a model for these processes and demonstrates the benefits that are derived from them. It has laid a strong foundation for further, sustained investigation of the area of networked communication and its potential for embodied interaction. For ACIN, this project has set a precedent for the way we want to work and the things we want to go on to achieve.

left: The Bodyshelf from behind a screen before the commencement of *Intimate Transactions*, Cairns Centre for Contemporary Arts, Australia, 2006
photograph: Peter Cullin

1 Smith, Hazel and Dean, Roger, 'Posthuman Collaboration: Multimedia, Improvisation, and Computer Mediation', *M/C Journal*, 9.2.2006, *http://journal.media-culture.org.au/0605/14-smithdean.php* (accessed 24th June, 2006).

2 Gray, Carol, 'Inquiry Through Practice: Developing Appropriate Research Strategies', in *No Guru, No Method? Discussions on Art and Design Research*, University of Art and Design, UIAH, Helsinki, Finland, 1996: p. 3.

3 The term 'situated knowledge' is taken from Donna Haraway. Against the notion of a common perspective which gives rise to a universal or generalised understanding, Haraway argues that an individual point of view is necessarily determined by each subject's unique aspect and is always "embodied, critical, and partial". The term also accords with Mikhail Bakhtin's dialogic theory, which argues for a "differently orientated accent" of each subject which gives rise to the anticipation of a multiplicity of responses and approaches. While for Haraway, situated knowledges are produced by social contingencies such as ethnicity, religion, gender and sexuality and for Bakhtin they are configured by social class, here we are proposing that the disciplinary base of the producer is a determining factor in interpretation, the setting of priorities, approaches and creative responses in practice-led research. Haraway, Donna, 'The Science Question in Feminism and the Privilege of Partial Perspective', *Feminist Studies*, Vol. 14, No. 3, Fall, 1988, p. 581-589; Bakhtin, Mikhail M., *The Dialogic Imagination; Four Essays*, Emerson, C. and Holquist, M. (trans.), Holquist M. (ed.), University of Texas Press, Austin, Texas, 1981.

4 This term was used by Mikhail Bakhtin to refer to a hybrid form of the novel, which is constructed through an interplay of narrators' and characters' voices. Translated from the Russian term 'raznorechie,' it literally means 'different-speech-ness'. Morris, Pam, *The Bakhtin Reader: Selected Writings of Bakhtin, Medvedev, Voloshinov*, Edward Arnold, London, 1994, p. 248.

Towards a Connective and Ecosophical New Media Art Practice

Keith Armstrong

Dr Keith Armstrong is the director of the Transmute Collective and artistic director of Intimate Transactions. *Formerly an electronic engineer and information technology specialist, he is trained in visual and new media arts. During the development of* Intimate Transactions, *he was a Postdoctoral Fellow at the Creative Industries Research and Applications Centre (CIRAC) at Queensland University of Technology, and a lead researcher in the Australasian CRC for Interaction Design (ACID), the project's primary sponsor in its final development phases. He is currently an Australia Council New Media Arts Fellow. As artistic director of* Intimate Transactions, *he was responsible for shaping and directing the project in collaboration with the interdisciplinary team of sound artists, performers, programmers, industrial designers and ecological scientists who contributed to its design and production.*
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www.embodiedmedia.com
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> I believe that what we will see in the next few years is a new paradigm based upon the notion of participation, in which art will begin to redefine itself in terms of social relatedness and ecological healing ... artists will gravitate towards different activities and roles [compared to] those that operated under the aesthetics of modernism.
>
> Suzi Gablik, *The Re-enchantment of Art*, 1991[1]

The design of *Intimate Transactions* was inspired by a range of discourses and practices drawn from the fields of critical ecologies, new media and innovative performance practices. At its core is what I refer to as an *ecosophical praxis*. Underpinned by an engagement with aspects of critical ecology, such a praxis sits within a social and political agenda that emphasises the integral place of social relationships within ecological systems. Because of its emphasis on relationships, an ecosophical praxis involves a socially driven approach to art practice. Collaboration and interactivity guide both the production of art and the design of how it will be experienced. Within the development of *Intimate Transactions*, I have therefore taken on the role of interdisciplinary collaborator and I have resituated audiences as performers who engage with ecological issues through their interactions with both the artwork and other participants. While this approach of combining ecological concerns with collaboration in production and experience is subtle and non-didactic, it ultimately governs every aspect of the work.

In this essay, I will elaborate upon the ecosophical principles that have influenced the design of *Intimate Transactions*. I will also reflect upon the iterative design process and the progress of *Intimate Transactions* towards its current iteration as a participatory, embodied,

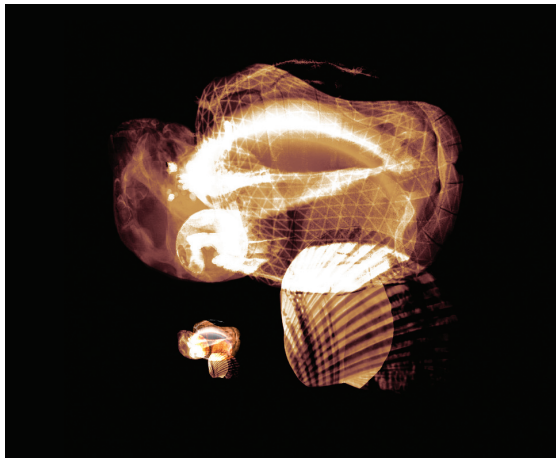
networked and collaborative new media artwork. By charting the gradual refinement of its design, I will show how this project has come to fulfil Gablik's prediction of art that facilitates an understanding of complex ecological concerns and social participation.

An Ecosophical Foundation

My approach to the design and production of new media art has developed through a long-term study of the principles of ecosophical philosophy.[2] While ecology and ecosophy share a common derivation in the Greek terms 'oikos' and 'sophia' (which together translate as 'wisdom of the house or dwelling'),[3] it is important to distinguish their meaning. Ecology is a scientific field; its key concern is with the integrity, homeostasis and diversity of natural systems. Ecosophy, on the other hand, is a philosophical approach. It developed out of critical ecology (which emerged from critical theory typified by the Frankfurt School)[4] and debates surrounding the ethical issues raised by scientific ecology as it struggled to deal with the implications of humanity's adverse impact upon global ecosystems.[5] As a field of dynamic cultural debate, critical ecology is concerned with issues such as environmental degradation and sustainability.[6] Focusing upon the root causes of these human-created conditions, it is concerned with the broader study of dynamic relationships. In particular, it is concerned with human behavior — the way that we act towards each other and the natural systems of which we are a part.

One of the key arguments of critical ecologist such as Tony Fry, Carolyn Merchant, Arne Naess, George Sessions and Elizabeth Baker is that we have developed (in the West at least) a deeply ingrained belief in humanity's hegemony over the non-human world.[7] Fry goes further, suggesting that this belief has led to our perceptual separation from the environment. He argues that we have developed, "[an] absolute blindness to the fact of our connectedness to both material and immaterial ecologies".[8] Yet, as Fry goes on to conclude, "No matter what we have come to believe ... 'we' are not individuated entities but relational beings."[9] That is, while a perceptual separation has become deeply ingrained within our psyches, it contradicts one of the basic facts of our existence: we are, necessarily, an integral part of life's interlocking cultural and biophysical ecologies.[10]

Theorists such as Fry, as well as Felix Guattari and Verena Conley, have gone on to argue that this homocentricity is reflected in our complex social ecologies and the ecologies of the inorganic



far left: *Force of Permanence, Landscape of Imagery*
image: Benedict Foley

left: *Force of Conflict, Landscape of Imagery*
image: Benedict Foley

environments that we produce. These, in turn, have an enormous impact upon the natural environment.[11] We might conclude from this that the current ecological crisis stems from the way in which we conceive of ourselves in relation to the non-human world.[12] As Fry argues, the possibility of ecological sustainability requires us to move towards an understanding that our relationships with the non-human world, and with each other, are necessarily symbiotic.[13]

Ecosophy provides a set of guiding principles that we might follow. Noting that the definition of ecosophy must remain open and fluid because it is contextual and personal, Norwegian philosopher Arne Naess (the founder who coined the term 'ecosophy' in 1995) describes his own, personal ecosophy (which he calls *Ecosophy-T*).[14] This includes: respecting the intrinsic right of others to be and become, fighting against pollution and resource depletion, working towards population reduction, respecting complexity and depth, promoting autonomy and decentralization, negotiating voices for the voiceless, developing measures of life quality not tied to material goods, and acting individually and collectively to begin making change around these principles. Naess argues for,"a rejection of the person IN an environment in favour of 'a relational total field image".[15] It is important to note that this 'relational total field image' includes not only an ethical engagement with

the environment, but also an attendant consideration of our relationships with each other. An ecosophical position therefore re-images our relational engagements within both the ecological and social systems of which we are a part.

There is a place for art and design within such an ecosophical framework. Suggesting that art and design might provide a panacea for the current ecological and social crisis on their own would clearly be absurd. However, as Guattari has argued, aesthetic activities (such as music, visual art and cinema) should be deployed as tools because of their undeniable power to affect change within the realm of subjectivity.[16] Fry similarly seeks to assure cultural practitioners of the importance of our role. He reminds us that design has real power within society because its task is to convert ideas, concepts or intentions into realisable forms. Design impacts upon, and configures, almost all of our living environments and so defines many of our interactions with the world. He argues that while design has been deeply rooted within histories of anthropocentricism, and therefore has tended to establish and maintain social functionality and 'restraint',[17] changing the way that we approach design can have an enormous impact upon the way that we interact with the world. It can therefore potentially change the way that we approach, and therefore understand, ecology.[18]

The Emergence of an Ecosophical Praxis

Ten years ago I began to consider what role I might play in engaging with the problems of ecology through the production of new media art. Ecological art movements of the 1980s and 1990s had emerged in response to a greater understanding of the unfolding environmental crisis and our ethical responsibility. We might think, for example, of Dominique Mazeud's *The Great Cleaning of the Rio Grande* (1987-2002), Andy Goldsworthy's numerous photo essays (1980 - 2002), or Joan Brassill's *Where Yesterday May Be Tomorrow* (1997). However, while such artists were identifying human responsibility for our ecological woes, few were dealing with why the crisis had come about and how it was being perpetuated.[19] New media art, in particular, largely tended to operate without acknowledging the homo-ecological implications of its practices.[20] I wanted to explore processes for conceptualising and developing new media art works that would operate within an ecosophical framework.

I resolved to apply the principles of eco-political and eco-social engagement through a process of 'practice-led' research.[21] I decided that the new media works I

produced would be inspired by, and focus upon, the possibility of a paradigm shift in our understanding of our place and role within dynamic, interlocking ecological and social systems. Rather than creating directive, didactic forms, these artworks would provide contextual frameworks within which audiences might be encouraged to reflect upon the 'problem of ecology' and the problems of human subjectivity that have been identified by Fry, Guattari and others.

Emerging from the concept of a 'relational total field image', collaboration and collective action are key facets of an ecosophical praxis. I therefore adopted a number of approaches to providing audiences with the opportunity for shared experience, social interaction and discussion around pressing ecological issues. I re-interpreted the traditional role of audiences and harnessed the interactive, connective aspects of networked new media art practice, as well as conversational communication strategies, in order to foster social engagement through the work. I wanted to encourage participants to reflect upon the implications of both individual action and group collaboration within computational, aesthetic systems. In motivating and empowering audiences to play a key role in creating and shaping their environments within the artwork, it was my hope that they would reflect upon the experience and be inspired to act in new ways within their own social contexts.

In line with ecosophical principles, and because solutions to the 'problem of ecology' inevitably must incorporate strategies from multiple perspectives, I decided to draw together a collaborative, interdisciplinary team of creative practitioners. According to Fry, an interdisciplinary group that is bound and activated by a related set of ecosophical beliefs provides support mechanisms through which complex ideas, practices and attitudes can find support and so be nurtured, enacted and extended. It therefore potentially constitutes what Fry refers to as a structural 'community of change',[22] or what David Bohm refers to as a 'microculture of change'.[23]

The Transmute Collective, with myself as artistic director, Lisa O'Neill as performance director, and Guy Webster as sound director, was formed in 1998 around a sympathy with these ideas and a desire to make interdisciplinary, performative installation work. Over time we have extended this core creative team to include programmers, electronic engineers and ecological scientists.

Stage One: Two Pilot Projects

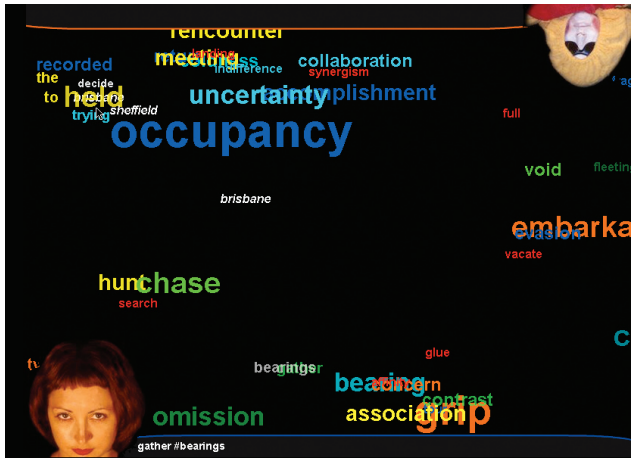
In 2001, after producing a number of major works, the Transmute Collective began to develop *Intimate Transactions*. Two initial pilot projects which set the

groundwork: *Liquid Gold* (2001) and *Transact (Flesh/Skin/Bone)* (2002). We decided that the core of their interactive, computational design would be inspired by the energetic flows within scientifically described ecologies (for example the flows of energy that originate from the sun/photosynthesis and are subsequently exchanged via consumption and decomposition). The intention was not to mimic the sophisticated (and mostly mysterious) operations of biophysical or social ecologies. Rather, it was to produce simple energetic transmission and reception path metaphors, and so to refer to the connection-making and communicative features of these life-sustaining systems.

These ideas of energy transfer have a synergy with the practice of the Transmute Collective's performance director Lisa O'Neill, who performs in the Japanese tradition of Suzuki Theatre. Suzuki Theatre is an actor-training method that focuses upon the energetic centre of each actor and explores the subsequent energy-based relationships between the actor and other actors, as well as with their audience.[24] This model of relational exchange, transfer and resonance not only influenced the development of the energetic flow metaphors of the work's computational interaction design, it also led us to conceive of *Intimate Transactions* as a durational, performative experience.

The first pilot project, *Liquid Gold*, consisted of simultaneous performances in Brisbane, Australia, and Sheffield, England, which were accurately coordinated across time zones.[25] To connect these venues, and an online audience, the work employed a custom-built chat server (called the 'idea animator') that ran in both physical venues and on the remote audience's Internet browsers. The performance was led by Lisa O'Neill in Brisbane and remixed by me as it was presented live in Sheffield. This stream was then returned and reworked in Australia in a continual interplay between sites.

The work's content was based upon a woman's journey: physically through the revamped industrial interior of the Brisbane venue (a converted industrial-era powerhouse) and on-screen through a number of fantastic, brightly coloured virtual worlds. It was a journey that allowed her to reconcile the ghosts of her chequered past and journey towards her newly imagined future.[26] Two writers (one in Australia and one in England) translated what they were witnessing locally in their performance venues into text. Their words were animated and projected live in both venues and on the remote audience's browsers. Players were able to click on particular words, causing the online avatars to gravitate towards them, thus allowing a constantly circulating flow of ideas and emotions.



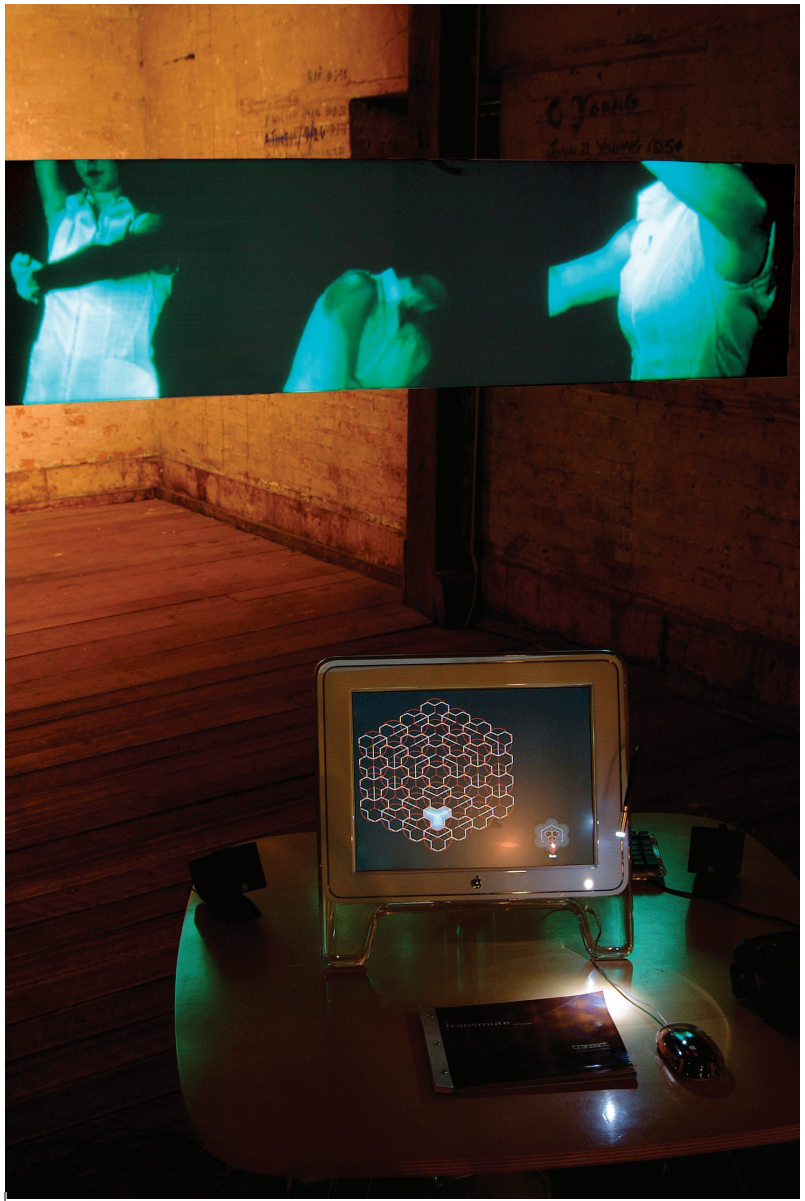
Idea Animator (screenshot)
Liquid Gold Online, 2001
graphics: Gavin Sade/Deni Stoner

The connective, distributed structure of *Liquid Gold* demonstrated the potential for networked performance installations that both stream images and connect online audiences through playful, hybrid experiences.

The second pilot, *Transact (Flesh/Skin/Bone)*, was shown at the Tasmanian State Art Gallery in Hobart, Australia in 2002.[27] It alluded to the relationship between the body's internal 'weather' environment and the ever-changing atmospheric conditions that it depends upon. It was influenced by the practices of the Japanese performance form 'Body Weather', which refers to the dynamic interactions between the 'atmospheric conditions' of a performer and their site.[28] It was also informed by the Suzuki actor training method's understanding of dynamic balances between 'skin' (a performer's outward appearances), 'flesh' (the result of a breadth of disciplined training) and 'bone' (a performer's inherited bodily characteristics).

Again the work incorporated the performance of Lisa O'Neill. It was configured as a two-screen installation with spatialised sound — an evocative, nonlinear sound work created by Guy Webster that was characterised by a deepening sense of uncertainty. This artwork involved an interactive scripting methodology (designed by Gavin Sade) and was inspired by the tessellated, interlocking honeycomb structures that are prevalent within many ecological forms. This structure allowed the work's dynamic, performative imagery to be arranged into cells, which were recombined and juxtaposed in real time. The user could indirectly control the work through a deceptively simple interface that allowed them to set the parameters for bodily flesh, skin and bone characteristics.

These two works were early experiments with ecologically inspired content and structures as well as performativity within networked, dual-site installations. In both works, participating audiences who brought a willingness to collaborate became increasingly



Stills from the installation
Transact (Flesh/Skin/Bone), Tasmnia
State Gallery, Hobart, Australia, 2002
photograph: Keith Armstrong

embedded within the work's content, form and modality and slowly began to understand their role and place within the work's fluid relationships.

Stage Two: Eco-conceptual Development

As we observed participants' interaction with *Liquid Gold* and *Transact (Flesh/Skin/Bone)*, we increasingly came to realise the potential of performance within interaction design and the power of choreography in the design of interactive systems, interfaces and virtual characterisation. We decided to further emphasise the role of performativity by moving the participants towards a more active role. From this point on, our work would require participants' active engagement through whole-body movements. The effects triggered by a sustained, physical interaction would ripple through to all other computational and experiential aspects of the work.

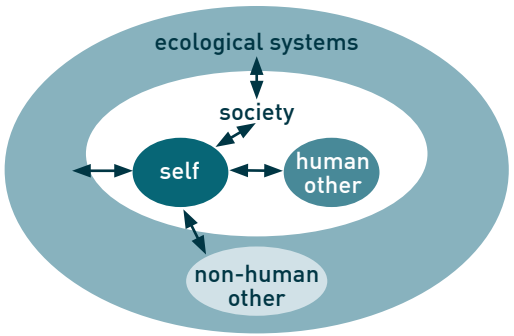
Because of this emerging emphasis on physical movement to trigger interaction, the project's input devices and their supporting physical structures became an important aspect of development. It became apparent

that they should have a strong physical presence, but not detract from the experience of participants once they were engaged with the work. This led us to design what we called a Bodyshelf, in collaboration with furniture designer and visual artist Zeljko Markov. Underpinned by a networked, computational system, this unique hybrid of furniture and interaction device demands a particularly active physical engagement. It requires participants to make full body contact with its footrests and backboard, and to be in continual motion.[29]

Our intention was to produce an *embodied* experience of interaction. Like Paul Dourish's definition of embodiment, which incorporates 'a participative status' that includes conversations and actions as they unfold in the world,[30] the term 'embodied' is used here to both describe the foregrounding of the participants' bodies in their interaction with the work and the engaged, inter-relational sensibility that we were striving for. We wanted participants to become immersed within *Intimate Transactions*' systemic operations physically and, at the same time, be engaged with multiple processes of dialogue, exchange and transfer. In this, we set out to conform to Naess's ecosophical principle of moving beyond a simple understanding of 'a person IN an, environment' towards a 'relational total field image'; that is, a complex, participative engagement.

At the same time, we decided to increase the ecological, relational experience of the work. We developed a new conceptual approach to the logic of the interaction around what project mentor and sustainability scientist Liz Baker terms 'ecological subjectivity'.[31] With Liz, we conceived of three interlocking concepts: *Me, Us* and *Other*. She described them as follows:

> Me is ... that bit the participant identifies as themselves ... Us is (for most people) other people like me ... a more inclusive term ... Other ... is that stuff which is not like me ... that I have no connection to.



Ecological Self Relationships, 2001
diagram: Liz Baker

We adopted this trio of concepts as a core organisational principle for the work. Through adaptations within the scripting methodology, interaction design and media, we transformed the work to involve an experience or journey through three distinct movements: between states designated as Me, Us, and Other.

The conceptual logic of this trio of Me, Us, Other states was incorporated into the range of media to be activated in response to the participants' bodily movements. Each collaborating artist was asked to interpret each of the Me, Us, Other states within their own medium: performance, sound, visual image, vibration or interface design. We wanted to reward participants through this sensory feedback when they brought a willingness to collaborate, based upon their emergent understanding of their own place and role within a series of complex, shifting relationships.

Zeljko Markov designed the Bodyshelf to facilitate a choreography of gentle body movements through the three states. In its first iteration, it allowed a range of body movements for continual transitions between containment and openness. The Me state required both hands and feet to be pressed backwards into the device. A transition towards the Us state required increasing physical extension of upper body and arms. This led to a fully extended pose — the Other state — that required the participant to reach into the darkness and towards the large screen-space slanted in front of them. In this way, the participant's movements transitioned from a private, contained stance towards a state of extended reach. An overhead, camera-controlled, gesture recognition system allowed the quality of arm movements through Us and Other physical states to be registered and relayed to the system, which then triggered feedback to the user through various media that was mixed and effected in real time.

The interactive sound-scape created by Guy Webster progressed through sounds that could be perceived as personal and close (Me state); through spatially familiar (Us state); towards distant, unfamiliar, and spatially abstract (Other state). A speaker was built into the Bodyshelf which produced sonic vibration on the participant's back.

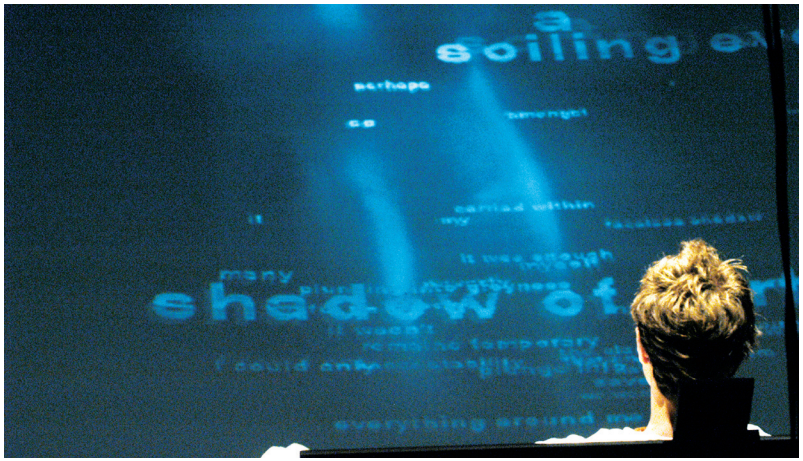
The visual media included representations of ghostly bodies and multiple shards of floating texts that were drawn from Italo Calvino's short story 'Smog', which tracks a man's obsessive preoccupation with a physical and psychological pollution that is enveloping his increasingly fraught relationships.[32] The body forms and texts were organised into databases and were tagged with characteristics that related to the Me, Us and

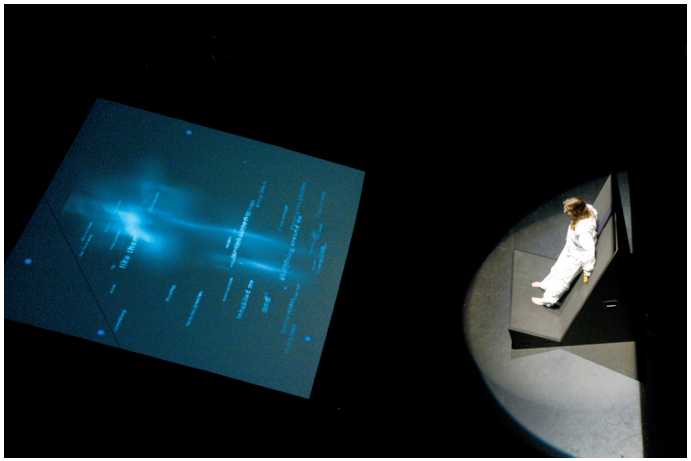
Tess de Quincey operating the first generation Bodyshelf in 'Us' Mode
photograph: Keith Armstrong

Other concepts. This meant that words and phrases, which were animated in concept groupings, emerged out of a background mass of words and hovered in the foreground of a large, slanted screen. Multiple readings could be made from the same text as the words emerged and recombined through the progression of Me, Us and Other states. Combinations of bodily images also appeared, with their physical forms aligned to the various states: Me (tight, rhythmical, familiar); Us (smooth, flowing, open, welcoming); and Other (strange, juddering, improbable).

An array of media thus combined to provide sensory feedback that reflected the participant's bodily expression. Bodily gesture so became a means for invoking and exploring mediated relationships that were at times comforting and personal, but could quickly shift to moments of great intensity and agitation.

In 2003 we exhibited this stage two, single-site version of *Intimate Transactions* to an invited peer group at the Brisbane Powerhouse Centre for the Live Arts in





Participant navigates the fluid text environments of *Intimate Transactions*, Stage 2, 2003 photographs: Sonja De Sterke

order to capture feedback. Participants acknowledged a strong, integrated relationship between their interaction and the sensual feedback of sound, vision and vibrations. Our incorporation of the ecosophical principle of re-situating the 'Self' in relation to the ecological 'Other' was also clearly understood by some participants. For example, Liz Baker wrote that,

> The installation, I came to realise, is a way of exploring otherness, strangeness, and unknowability in a safe way: a physical/aural/visual analogy to storytelling. Because it is safe, the individual is more likely to explore just that little bit further, to take themselves into unfamiliar territory ... its objectives are met through the experience of exploration. It helps us learn to push the boundaries of the familiar in ways that accept unknowability. In that, it is a small lesson in developing an ecological consciousness.[33]

However, from the feedback we received, we also became aware of a design problem. Some participants reported feeling unable to easily locate themselves within the work. They had difficulty relating their body's actions to the changes in the work's imagery and sound-scapes. This led to a perceived lack of agency. Feedback suggested that a direct, controllable representation of the participant through an on-screen avatar would make navigating through the visual interface much easier. Until

this point we had avoided making a literal representation of the participant. Instead, we had conceived of the participant as one key force affecting the environment and saw their representational presence as being constituted by the observable effects of their actions: changes in colour, speed, mixing, replication, processing and so on.

Despite our own satisfaction with the design, we had to acknowledge that our perceptions of the work might have been skewed by our knowledge of the work's intentions and by the many hours we had spent becoming intimately aware of its subtleties and effects. Our own experience was quite different to the experience of an audience member who was limited to 30 minutes or less interacting with the work.[34] Ultimately, we decided to make fundamental changes to our design. This involved reworking the entire interaction and visual design methodology.

Stage Three: *Intimate Transactions* as a Dual-Site, Networked Installation

In the subsequent, final iteration of *Intimate Transactions*, we retained the work's emphasis on performativity and embodiment, but decided to extend the participants' agency by introducing orientation markers and modifying the interaction and interface design to become more intuitive. A representational avatar was developed to reflect the participant's navigational movements through the work and to make the relationship of the user to the worlds within *Intimate Transactions* appear more concrete.

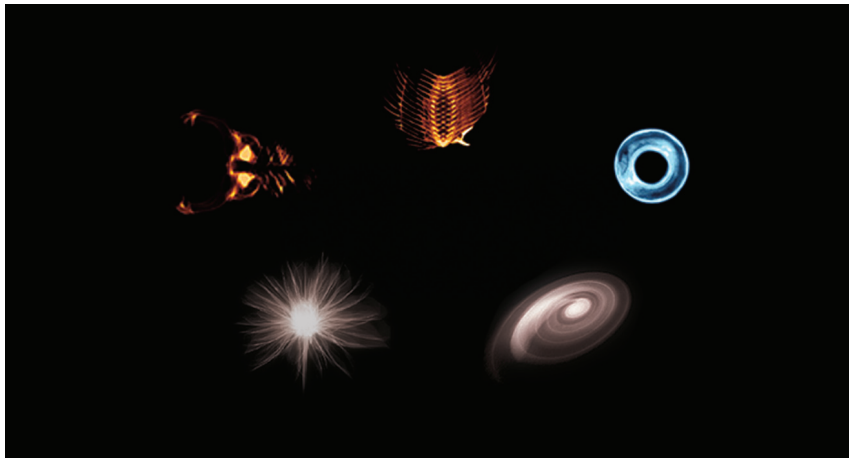
The incorporation of an avatar suggested the possibility of a new structure in line with multi-player game engines, which typically use avatars to represent a participant's positions and activities. Within the model of multi-player game design, the avatar usually interacts with, and has dialogue with, other characters. This model therefore suggested the prospect of evolving the work into a multi-user application. This, in turn, provided the impetus to develop a dual-site, networked application — a version of *Intimate Transactions* comprised of two sites, each with a Bodyshelf, connected by a server within a distributed network.

Such a major extension of the project required significant design changes. These were begun in the first year of my two-year Postdoctoral Fellowship at Queensland University of Technology (QUT) Creative Industries Research and Applications Centre, and were assisted by Federal and State Government arts funding. During the first year of my fellowship we developed a working, networked software prototype and two

second-generation wooden Bodyshelves that included important new innovations — a moving footboard and a back pressure sensing mechanism. They were tested and refined through public showings and evaluations during a three week residency at the Performance Space, Sydney. In the second year of my QUT fellowship we began to work with the Australasian CRC for Interaction Design (ACID) as part of their Australian Creative Industries Network (ACIN) research project, which revolved around investigating the potential of communication in distributed network environments. Their support included a major funding commitment and new collaborations with their research partners — the Royal Melbourne Institute of Technology (RMIT) Spatial Information Architecture Lab (SIAL), the Australian Centre for the Moving Image (ACMI), and the University of Queensland. We welcomed the opportunity that this extension of the project provided to refine our approach to ecosophical design and collaborative interaction and to develop a final dual-site, multi-user version of the work.

The decision to extend the project to a multi-user, dual-site installation meant that significant design changes were required. We decided that while the project could continue to operate around the idea of energetic transfer that we had established, the introduction of a networked dimension necessarily required a reinterpretation of the Me/Us/Other paradigm. This was because interaction would no longer simply be with the online environment and the symbolic inhabitants we had created. We would now have to facilitate interactions between participants. Because of the ecosophical underpinning of the work, it was important to promote a sense of intimacy, collaboration and reciprocation between them. Given that participants would be interacting with the work from geographically separate locations, developing this sense of intimacy and shared experience presented a challenge.

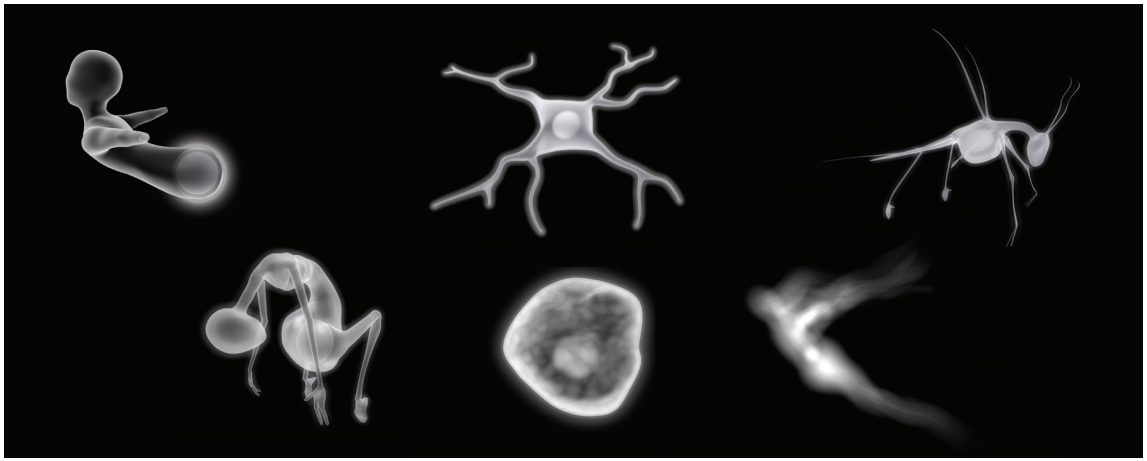
We approached this challenge in two ways. The first was through systems design changes. I extended the interdisciplinary team working with the Transmute Collective to include computational designers Marcos Càceres and Cameron Owen. Their brief was to build a systems model that would accommodate a networked application. Because of his experience as an interaction designer, Marcos was able to augment the design structurally and conceptually. He created an underlying relational model for the work that incorporated a principle of computational layers. He proposed that such layers could inherently encompass the core principles of ecological systems that we had envisaged, such as evolution and exchange, but they could also facilitate the transfer of objects (or icons) between two parties. This insight led us to imagine an entirely new computational model based upon the notion of *transactions* —



The internal objects of creatures, 2005
image: Benedict Foley

exchanges between parties that would lead to change for all.[35] While the work's navigational structure retained the exploration of the Me → Us → Other (familiar → unfamiliar) progression, adopting this approach impacted upon the way that we envisaged the interaction through the Me, Us and Other states.

In the final design of *Intimate Transactions* each participant now controls a body-shaped avatar. Their movement on the Bodyshelf dictates the avatar's movement across a large, vertically orientated screen-space. This space is populated by a group of other inhabitants, which take the form of abstracted creatures designed in collaboration with 3D modeler Stuart Lawson and graphic designer Benedict Foley. While each participant interacts within an apparently individual world, both worlds are connected via the network. This relationship is implied by the 'shadow' of the other person's avatar, which appears in real time on the screen. Navigating within the participant's own world, without the intention of transacting with any of the creatures or the other participant, implies an operation within the Me state. Interactions between a participant and the other inhabitants of the virtual world occur within the Us and Other realms. A progression therefore occurs from a place of relative familiarity/empathy towards the unknown.

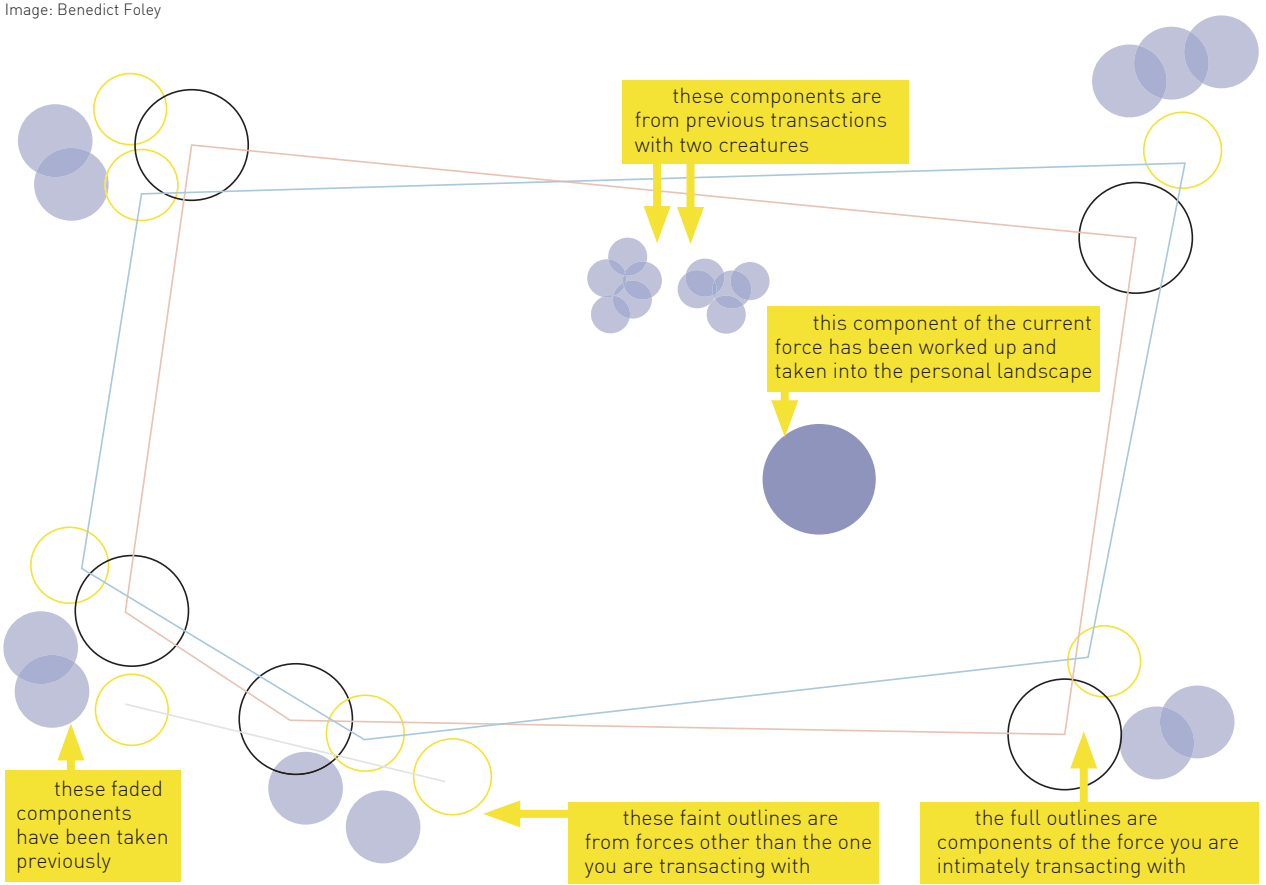


Avatars and creatures, 2005
Clockwise: participant avatar,
(Force of) Torment, Conflict, Change
Permanence and Insatiability
image: Stuart Lawson

Participants are encouraged to explore the relational realms of Us and Other through a process of transactions. The first involves taking objects from the creatures (which appear as internal icons or image layers within them). The participant incorporates these objects into their own avatar. This strategy of collecting is a familiar game play strategy — commonly adopted to 'win' in computer games. Within *Intimate Transactions* however, the adoption of a strategy of collection implies consumption. As this consumption continues, it gradually impacts upon the world. The creatures are gradually depleted and their constituent environment progressively degrades. The pace of the world slows down. This effect is manifested through an increased sluggishness in the response of the computational system and the dimming of the screen.

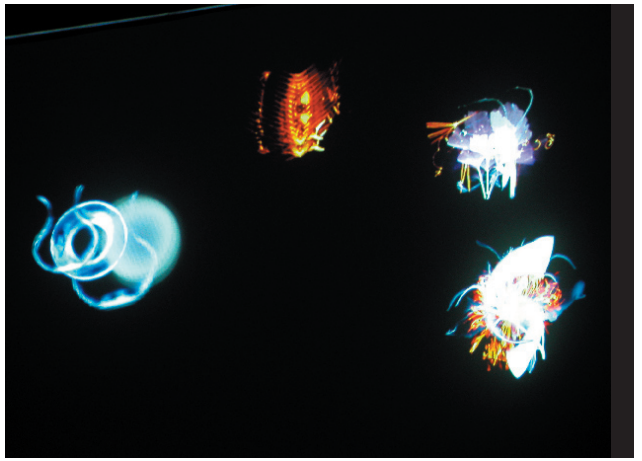
At this stage, each participant operates within their own separate world, and their individual actions trigger local image and sound experiences. They are aware of the parallel user's environment only through the shadow of the other person's avatar which suggests their presence. However, the two worlds are conjoined and interdependent. This means that local acts of consumption flow through the system and every action also has ramifications upon the other person's world. As their actions cause the depletion of their creatures and the slowing down of both worlds, participants are able to 'meet up' in a shared space and, at that point, they

Design document describing an example of an internal state of a creature
Image: Benedict Foley



right: (screenshot) Two participants transacting with each other across the network to return creature objects, 2005
photograph: Cameron Owen

far right: (screenshot) A collection of internal objects taken from creatures and collected by a participant, 2005
photograph: Cameron Owen



see a representation of the other participant's 'world state'. Here we are evoking ideas of 'overshoot' that are caused by ecological foot printing and 'entanglement' as a means of sensitising participants to the way that their actions can ripple through and affect distant, unknown others.[36]

As participants gradually become aware of the ramifications of their consumption (and that of the other participant), they may use this knowledge to guide their subsequent actions. The only way to restore the health of the system is to enter into a transaction with the other participant and work collaboratively with them to systematically return the objects to the creatures. This raises the overall energy of the worlds again.

While these transactive exchanges developed around a simple game logic of collecting and returning objects, we have been careful to avoid direct competition between participants through outcomes that might be understood as wins or losses, or an experience that has a beginning, middle and end. Instead, our intention is that the distinctions between Me, Us and Other begin to dissolve as participants interact and transact — as they integrate component elements of the creatures and exchange them with the other participant then cooperate to restore the creatures and the energy of their own/shared environment.

This flow of local actions through the system was achieved through the unusual design approach of

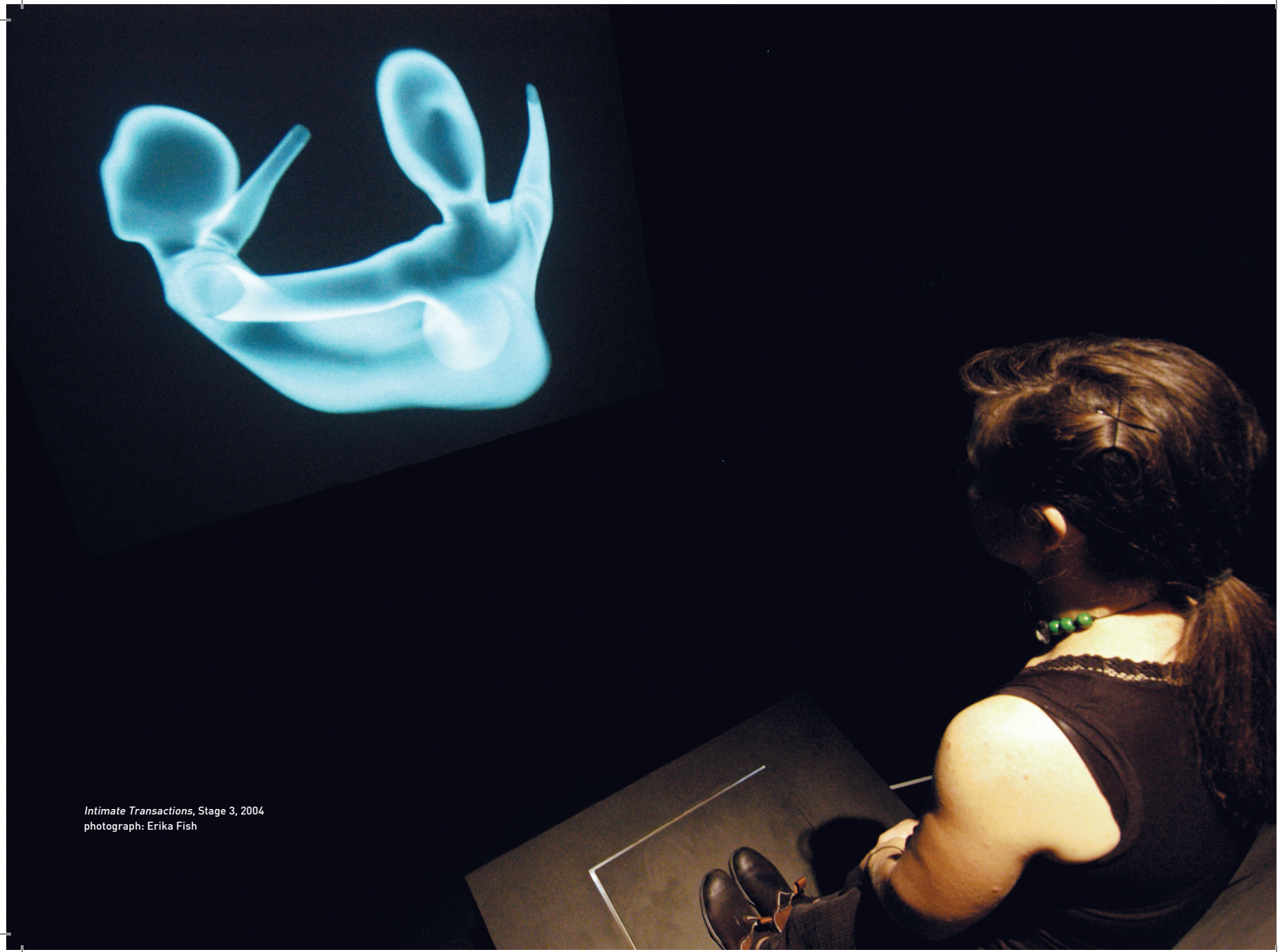
Intimate Transactions Stage 3 Prototype, Performance Space, Sydney, 2004
photograph: Heidrun Lohr, Keith Armstrong

creating two separate, parallel universes that are joined through the computational layering and combined with networked and cross-affective processes.

Within this final (stage three) iteration of *Intimate Transactions* we also worked to increase the participants' sense of embodied experience by increasing the sensitivity of the input device and introducing both individual and shared participatory feedback. We retained the basic form of the Bodyshelf because of its success in establishing embodied energetic flows between the participant and the screen interface and thus the occupants of the virtual world. We refined it however, by incorporating a tilting floor, driven by body balance and weight. This has increased its sensitivity to the movement of the feet. We also introduced a pressure-sensitive backboard, driven by weight and the positioning of the upper back. These more subtle modes of body action have dramatically increased the sense of performative engagement and embodiment, as well as perceptions of energy flow.

We have also increased the sense of shared experience and energy flow by incorporating a wearable haptic device. It was designed in collaboration with Pia Ednie-Brown and Inger Mewburn who are based at RMIT's Spatial Information Architecture Lab. The device generates vibrations through a pendant that is worn by each participant on their stomach. It produces vibrations that are created by a custom soundtrack and vary in intensity according to the proximity and character of the individual creatures that the participant is interacting with. A second haptic device has been incorporated into the Bodyshelf. Through vibrations in the lower back/ buttocks, it relays feedback from the other, remotely situated person's movements on their Bodyshelf. Sensate pulses thus provide feedback to the participant from interactions with the creatures within the local environment and from the participant in the adjoining environment.

Collaborating in an electronically mediated work remotely via a distributed network has the potential to be an alienating experience yet, through this mechanism, a sense of bodily responsiveness and touch is generated between participants. At the conclusion of the experience, a bi-directional video stream allows each participant to see the person they have been collaborating with, but a sense of bodily intimacy has been established long before.



Intimate Transactions, Stage 3, 2004
photograph: Erika Fish

On Reflection

Over the past four years, *Intimate Transactions* has evolved from a single site, non-networked artwork to a multi-site, server-driven experience for two or more networked participants. At the same time, its audience interactivity, ecological engagement and collaboration have been extended to produce a complex, relational experience. While participants may choose to disappear into their own local worlds and never transact with each other, this will limit their experiences. If they instead choose to transact with each other, they capitalise upon the interaction and the subsequent increase in sensory experience that accompanies it. As action and reaction produce different states of balance and flow, a cascade of audio-visual and tactile feedback ripples back and forth through the server. This results in continual changes in the fluidity and movement qualities of the avatars; continual evolution of the visual icons; dramatic shifts in the source, timbre, quality and granularisation of the enveloping sound-scape; and variations in the tactile vibrations. The sensitivity of the system as a whole causes an interconnection of actions, events and consequential outcomes across multiple fields or environments.

Intimate Transactions has also evolved to extend the understanding of a 'relational total field image' within an ecosophical framework. On one level, it celebrates and encourages the possibility of the individual participant's exploration and agency. However it also bestows upon them a status that ecologists refer to as *keystone*, that is, "those species having a large, disproportionate effect, with respect to their biomass or abundance, on their community".[37] It is important to note that, while participants are able to trigger an extensive array of image, sound and haptic outcomes, they can never exert absolute control over the system as a whole, either individually or collectively. Nonetheless, the effects of their apparently private actions flow through the system to increase deceleration and atrophy or to restore and re-establish both worlds.

Intimate Transactions therefore helps to facilitate the understanding that cooperative collaboration is required to maintain the integrity, diversity and efficacy of the environments we occupy. It has been designed, in all of the interdisciplinary levels of its complexity, to create an experience in which participants can slowly begin to sense their shared roles within a complex web of energetic relations that connects them with other inhabitants within the work and, through metaphorical

association, with the ecologically and socially connected world beyond. Through event feedback, participants are encouraged to reflect upon their actions over time in order to gradually understand the range of local and networked factors shaping their experiences and their influence upon the environment. In these regards, it has embraced the goals of an ecosophical practice. It has become a realisation of Gablik's forecast of an art that is concerned with participation and social relatedness and has the potential to promote ecological healing.

1 Gablik, Suzi, *The Re-enchantment of Art*, Thames and Hudson, New York, 1991.

2 Armstrong, Keith, *Towards an Ecosophical Praxis of New Media Space Design*, PhD diss., Creative Industries Research and Applications Centre, Queensland University of Technology, 2002; Armstrong, Keith, 'Investigating Ecological Subjectivity: Intimate Transactions (Shifting Dusts)', in *PixelRaiders 2004*, Sheffield Hallam University Press, Sheffield, 2004

3 Heim, Micheal, *Virtual Reality and the Tea Ceremony*, Princeton Architectural Press, Princeton, 1998.

4 Merchant, Carolyn, *Reinventing Eden: The Fate of Nature in Western Culture*, Routledge, New York, 2004.

5 Botkin, D. and Keller, E., *Environmental Science: Earth as a Living Planet*, Wiley, Brisbane, 1997; Recher, H. D. Lunney and Dunn, I., *A Natural Legacy: Ecology in Australia*, 2nd edn. Macmillan, Botany, 1986.

6 Tony Fry, who suggests that the prospects for ecological sustainability are currently bleak, argues that, "we need to restore [nature] to a state of health, stop damaging it and start repairing what we can." Fry, T., 'Know Your Enemy: Defining the Problem of Unsustainability', in *Shaping the Sustainable Millennium – Conference Proceedings*, 2000 www.teamdes.com.au/pdf_files/Know%20Enemy.pdf (accessed January 20, 2006)

7 Merchant, Carolyn, *The Search for a Livable World*, Routledge, New York, 1992; Merchant, Carolyn, *Ecology: Key Concepts in Critical Theory*, Humanities Press, Princeton, 1994; Naess, Arne, 'The Deep Ecology "Eight Points" Revisited', in Sessions, G. (ed.), *Deep Ecology for the 21st Century*, Shambhala, Boston, 1995; Baker, Elizabeth, *Ecological Being/Being Ecological: Self, Morality and the Environmental Exigency*, PhD diss, Faculty of Science, Griffith University, 1997.

8 Fry, Tony and Willis, Anne-Marie, *Openings Into the Ecology of Information Technology: Impacts of Information Technology Briefing Paper*, The Ecodesign Foundation, 2001, p. 3. http://www.changedesign.org/Pathfinding/Archived/IIT/BriefPart1.htm (accessed January 20, 2006)

9 Ibid.

10 Also see Metzner, Robin, 'The Place and the Story: Where Ecopsychology and Bioregionalism Meet', *Trumpeter*, Vol. 12.3, 1995.

11 Fry, Tony, *A New Design Philosophy: An Introduction to Defuturing*, UNSW Press, Sydney, 1999; Fry, Tony, *Know Your Enemy: Defining the Problem of Unsustainability*, p. 2; Guattari, Felix, *Chaosmosis: An Ethico-Aesthetic Paradigm*, Indiana University Press, Bloomington, 1995; Conley, Verena, *Ecopolitics: The Environment in Poststructuralist Thought*, Routledge, New York, 1997.

12 In my 2004 paper, 'Investigating Ecological Subjectivity', I have expanded upon these issues and summarised this position thus: "We now live under the enduring mantle of a global crisis, a self-imposed act of unparalleled and seemingly irrational self-destruction, which we misname as ecological — WE are the crisis. This 'problem of ecology' indicates a crisis of human subjectivity and agency linked to a fundamental problem in how we image ourselves within the world".

13 Fry, Tony and Willis, Anne-Marie, *Openings into the Ecology of Information Technology*, p. 3; Fry, Tony, *Know Your Enemy*, p. 2.

14 The McGraw Hill Online Learning Center defines Deep Ecology as, "A philosophy that calls for a profound shift in our attitudes and behaviour based on voluntary simplicity, rejection of anthropocentric attitudes, intimate contact with nature, decentralization of power, support for cultural and biological diversity, a belief in the sacredness of nature, and direct personal action to protect nature, improve the environment, and bring about fundamental societal change." http://www.mhhe.com/biosci/pae/glossaryd.html (accessed January 20, 2006).

15 Naess, Arne. *'Eight Points' to a Deep Ecology*, http://www.haven.net/deep/council/eight.htm (accessed January 20, 2006).

16 Guattari, F., *Chaosmosis, An Ethico-Aesthetic Paradigm*, p. 120.

17 Fry, Tony, *Know Your Enemy*, p. 2.

18 According to Fry, the task of rethinking design cannot simply involve developing projects in new ways within an existing design framework. Rather, it involves envisaging a new relational environment: what he refers to as a 'lifeworld'. This is not a neo-deterministic, overarching utopian project but is, instead, a series of emergent, contextually determined practices. Fry writes about considered, circumstantially appropriate actions, rather than a stock solution. Fry, Tony and Willis, Anne-Marie, *Openings into the Ecology of Information Technology*.

19 A notable exception is Joseph Beuys.

20 One exception is the Canadian artist Char Davies. See *Osmose* and *Ephémére* at http://www.immersence.com (accessed January 20, 2006).

21 Carol Gray describes 'practice-led' research as a mode of research that is, "initiated in practice, where the questions, problems and challenges are identified and formed by the needs of practice and practitioners." I use the term practice-led to accord with this approach while emphasising an iterative, creative research practice where theory and practice are inseparable. See Gray, Carol, *Inquiry Through Practice: Developing Appropriate Research Strategies, 1996*, cited in *Media International Australia Incorporating Culture and Policy*, 1996, http://eprints.qut.edu.au/archive/00003999/01/3999.pdf (accessed 30th September, 2006)

22 Fry, Tony, *Know Your Enemy*.

23 Bohm, D. and Peat D., *Science, Order and Creativity*, Bantam, New York, 1987

24 This approach will be discussed in more depth by Lisa O'Neill in her essay within this volume.

25 Transmute Collective, *Liquid Gold: The New Adventures of Ling Change*, dual-site media performance with streamed and online components, Powerhouse Centre for the Live Arts Brisbane, Australia and Site Gallery, Sheffield, England, 2001.

26 This content borrowed heavily from our earlier work, *Transit Lounge*, 1998.

27 Transmute Collective, *Transact (Flesh/Skin/Bone)*, Interactive Installation, State Art Galley, Hobart, Tasmania, 2002.

28 This practice was pioneered in Australia by Tess de Quincey, with whom I collaborated on a project called *Golden Circle* as part of 'Triple Alice' in Alice Springs, 2001.

29 The development of the Bodyshelf will be discussed in more depth by Zeljko Markov in his essay within this volume.

30 Dourish, Paul, 'Seeking a Foundation for Context-Aware Computing', *Human Computer Interaction*, 2001, pp 229-241.

31 Baker, E., *Ecological Being/Being Ecological*.

32 Calvino, Italo, *Smog, The Watcher & Other Stories*, Harcourt Brace Jovanovich, New York, 1971.

33 Baker, E., *Ecological Being/Being Ecological*.

34 We decided to limit the experience to this length of time because our research indicated that any longer would make the work logistically difficult in terms of the project's curation.

35 This will be expanded upon by Marcos Cáceres in his essay in this volume.

36 For explanation of these terms see Buchanan, Mary, 'Mind Games: Quantum Tricks That Read Your Thoughts?' *New Scientist*, Vol. 184, 2004, p 32.

37 Piraino, Stefano and Fanelli, Giovanni, 'Keystone Species: What Are We Talking About?' *Conservation Ecology*, Vol. 3.1, Iss. 4, 1999.

Placing the Participant in the Performing Role

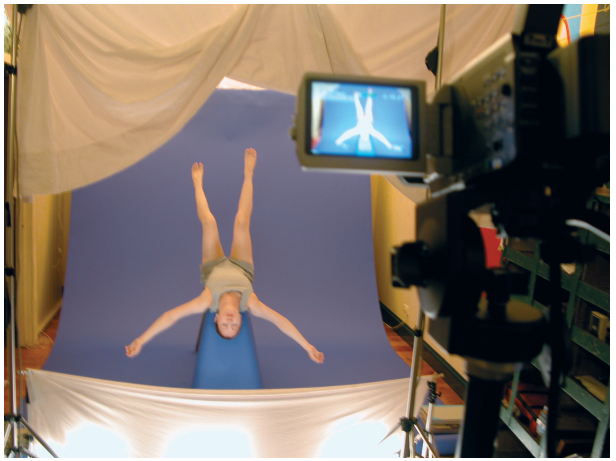
Lisa O'Neill

Lisa O'Neill is a freelance performer, choreographer, teacher and performance director. She has received numerous commissions to tour her original and collaborative dance and theatre works nationally and internationally. For the past twelve years, she has also worked as an actor with Frank Theatre, touring and training extensively in the Suzuki Actor Training Method. As the performance director of the Transmute Collective, she was a key collaborator on the design and production of Intimate Transactions *as part of ACID's ACIN project. www.lisaoneill.com*

It was always our intention to create a dual-site installation. From very early on, the Transmute Collective's design of *Intimate Transactions* was based on the premise that two geographically distant people would use their bodies to connect and interact with each other. This meant that we were primarily concerned with participants experiencing a sense of physical embodiment in the work because, crucially, we wanted them to use their bodies to feel the presence of each other across space. Where previous Transmute projects had used live or pre-recorded video footage of the performing body (my body) as visual content, this shift in our conceptual approach to the body in *Intimate Transactions* meant that my usual role in the Transmute Collective changed. We decided that I would relinquish my role as performer and hand this responsibility on to the participant. I would now focus upon the position and role of *their* physical body within the work.

This approach posed a number of challenges. We had to consider, for example, how someone with perhaps no physical training or little body awareness might experience some kind of physical transformation through the engagement of their body in relation to the virtual world and the space around them. The design of the structural components of the work, and the participants' physical interaction with them, had to address this problem. In addition, the interface would have to support an experience of connected interaction

Stills from the installation, *Transact (Flesh/Skin/Bone)*, 2002
photographs: Keith Armstrong



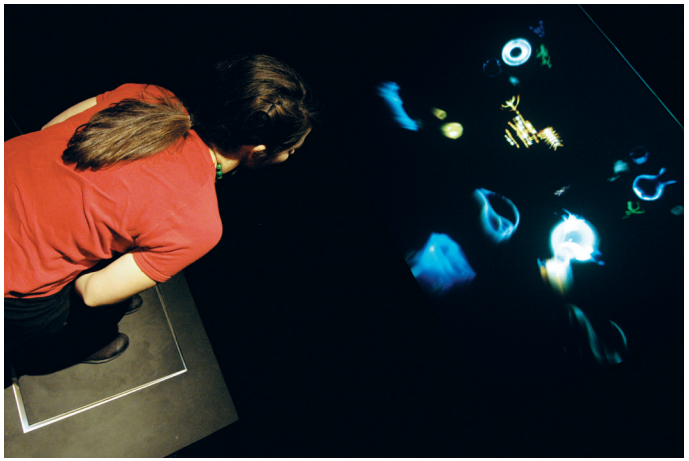
right: Blue screen video shoot of Lisa O'Neill to produce the body visuals for *Intimate Transactions*, Stage 2 (research and development stage) photograph: Keith Armstrong

far right: Participant navigating body imagery within *Intimate Transactions 2* photograph: Sonja De Sterk

between geographically distant bodies. My experience in the areas of live performance and choreography was crucial in solving these challenges of creating a sense of embodiment and dual participation. It informed the design of the world's physical interaction as well as the visual content of the work.

Before explaining how particular ideas of performance informed the concepts and design of *Intimate Transactions*, I will briefly describe my theatre practice. I work as a freelance performer, choreographer and director in the areas of dance, theatre and performance. As a member of Frank Theatre, I train in the Japanese Suzuki Actor Training Method. Devised by Japan's foremost theatre director, Tadashi Suzuki, this method is primarily concerned with the relationships between the performer's body and space and between the performer and the spectator. These connections are realised through body focus, energy and tension. The performer orientates and navigates his/her body through the performance space by initiating movements from the centre of the body, which is located under the belly button. The body's centre acts like a control room: all movements of the body are directed, initiated and controlled from there.[1]

Many of the ideas behind *Intimate Transactions* were derived from this performance philosophy. Its understanding of the movement of the body through space influenced the design and structure of the



far left: Lisa O'Neill testing the interaction on the Bodyshelf
photograph: Keith Armstrong

left: *Intimate Transactions*, Stage 3: navigating the Force of Instability's internal objects at the Block, QUT, Brisbane, Australia, 2005
photograph: Erika Fish

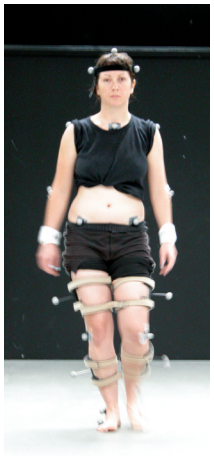
main interaction device, the Bodyshelf, upon which the participant stands. This L-shaped shelf, which is the height of a human body, is slanted so that the participant's weight is taken off the feet and redistributed across their entire body. Placing the participant in a slightly unusual position and adjusting their centre of gravity makes them consider their body in a slightly unfamiliar context. The surface of the backboard of the Bodyshelf requires the participant to roll and press their back into it to activate the interaction. This helps to focus their attention on their middle body, and removes the usual inclination to control with the hands. The footpad of the Bodyshelf, which also drives the navigation, is designed to be mobile so that the participant has to continually re-adjust and transfer their body weight. Because two modes of navigation (foot and back) have been incorporated into the Bodyshelf, the participant has to spend a small amount of time learning to coordinate their movements. This forces them to focus thought on the body's actions then, as these movements become more intuitive, they are rewarded with the feeling that the body is in total play, moving in concert with the surrounding sounds and visual landscape.

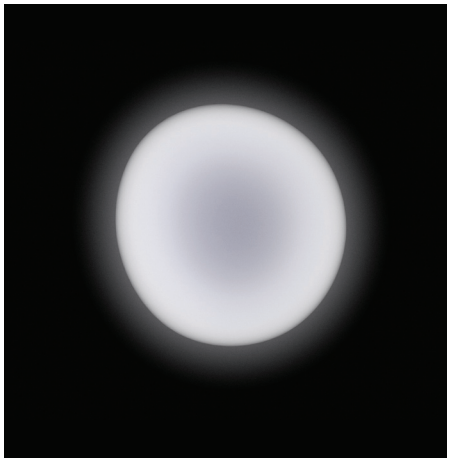
To consolidate this physical interaction with the work, I focused on the transfer of the participant's energy from the Bodyshelf to the activity on the screen. I realised that the person moving on the Bodyshelf needs some sort of visual representation to reflect the movement of their

right: Lisa O'Neill in motion capture experiments, QUT School of Human Movement photograph: Keith Armstrong

centre right: Energy ball, 2005 image: Stuart Lawson

far right: Avatar showing circular ball, 2005 image: Stuart Lawson

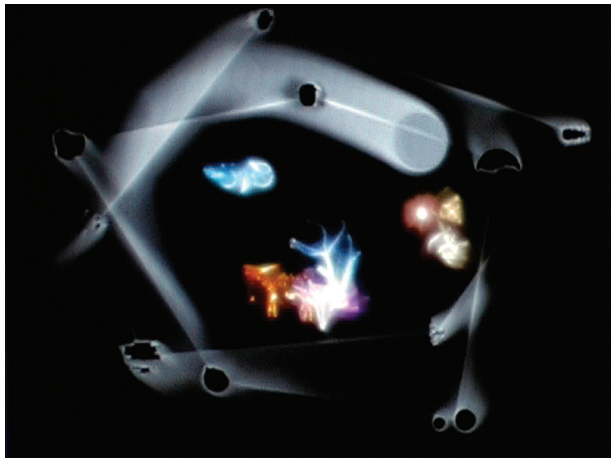


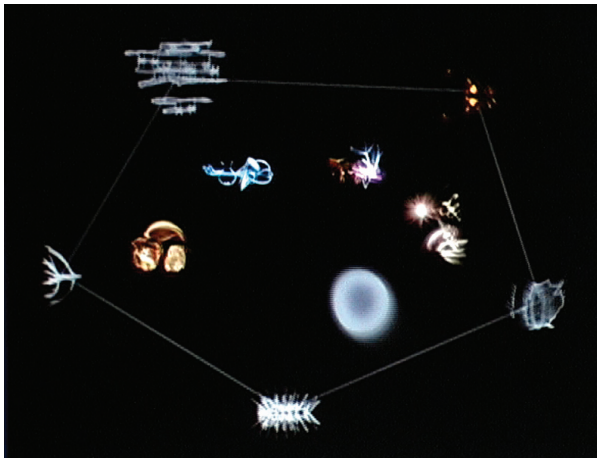


body and arrived at the idea of relating the participant's body to a cursor. That is, the movement of a circular ball on the screen is determined by the direction and pressure of the participant's back movements. Poetically, it is as if the ball on the screen is an extension of one's own body re-centre. When the participant physically connects with the cursor, the space between the body on the shelf and the ball on the screen becomes active on an energetic level. Energy is transferred across the space as the participant physically drives the image around the screen.

This idea of creating a visual representation that connects the participant's body movements to the screen continued into the design of an avatar to represent the participant, as well as a series of creatures that populate the virtual world. I worked closely with a 3D animator, Stuart Lawson, to choreograph the movement of the avatars and computational creatures. We filmed my body as I demonstrated how the avatars and creatures would each move from their centres as the participant does on the Bodyshelf. The footage became a reference for the animation of the avatars' and creatures' motions. The participant's avatar, as well as each creature, holds the circular ball deep in their centres.

I also worked closely with the computer programmers to map out the virtual space and to design the structure and interactivity of the work. Together we decided how the participant would interact with





far left: Participant transacting with the Force of Change, 2005 photograph: Cameron Owen

left: Participant interacting with the Force of Conflict, 2005 photograph: Cameron Owen

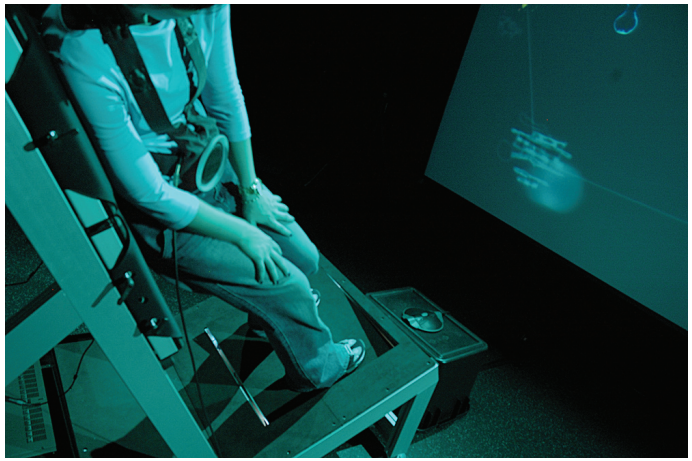
the creatures, how the creatures would interact with the participant, and what movements on the Bodyshelf would drive these events. I sketched diagrams to depict how all the elements could fit together and when and how the interactivity should take place. In particular, we focused on how the participant might register that a physical connection and relationship is occurring with the creatures. As the participant drives their body's avatar over a creature's avatar their centres lock, giving the participant dual control over the movement of their avatar and the creature.

The participant's connection and interactivity with other entities in the virtual world is amplified through vibrations that are produced by haptic devices built into the backboard of the Bodyshelf and a stomach pendant that the participant wears. Designed by Pia Ednie-Brown and Inger Mewburn, these haptic devices produce vibrations that are felt in the back and stomach. The vibrations have been triggered by the participant's proximity to the creatures and interactions with them. To add to the richness of the vibrations, I took on a sort of dramaturgical role. I created character profiles for each creature (what they like, what they don't like, etc.). Each creature was assigned a quite different personality which determines how it co-exists with the other creatures and what happens when the participant intervenes. Changes in the qualities of the vibrations have been calibrated

to occur when the participant moves near each of the creatures. Because the creatures' characteristics and behaviours have been carefully scripted into the work, the intricate shifts in the dynamic flow of energy are relayed to the participant as they navigate through the space.

Guy Webster, a sound artist and co-member of the Transmute Collective, produced sounds that are also sympathetic to the creatures' personalities and the events of the work. Because Guy has a background in performance, our communications have always been very clear and well understood. We worked on these concepts together, and so established a symbiotic relationship between sound, movement and interaction from the early stages of the project's design. The sound that is produced through the work is responsive to the movements of the participant and to their interaction with individual creatures. This means that the participant experiences the feeling that he or she is creating the soundtrack with their body and, indeed, that is exactly what they are doing.

Besides creating a situation in which the participant has to consider and continually readjust their body's movements as they navigate through a virtual landscape and establish relationships with the inhabitants of the

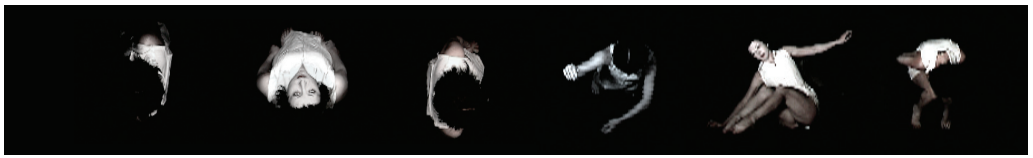


Participant wearing haptic pendant at the Australian Centre for the Moving Image, Melbourne, 2005
photograph: David McLeod

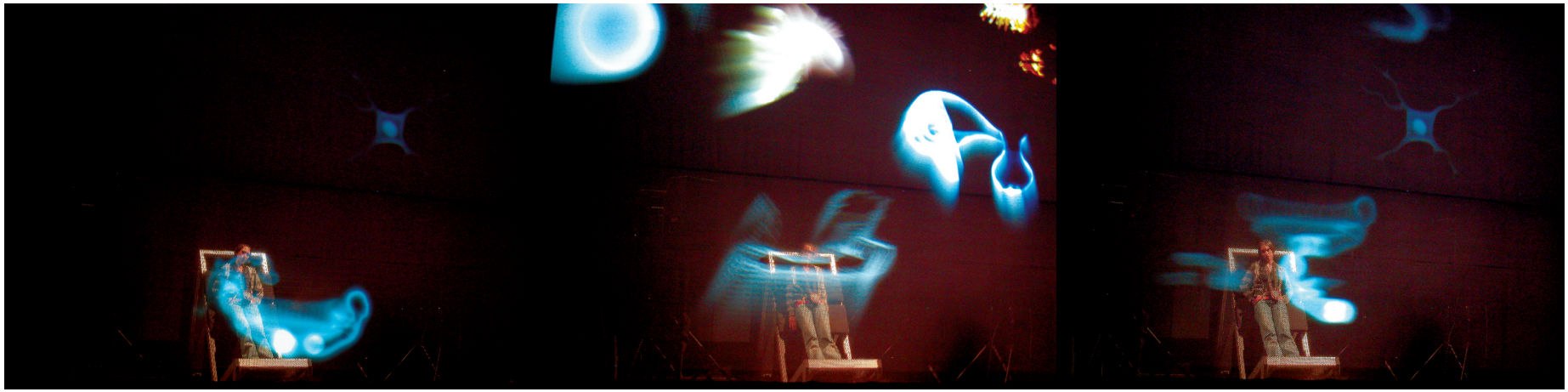
world, we also had to consider how the participant would experience their body engaging with the other participant across the network. This level of interaction occurs when the participants have collected numerous objects (represented by icons) from the creatures and the virtual world has therefore reached a state of imbalance. The two participants must cooperate to return the objects in order to correct the imbalance and restore vitality to the virtual world. The only way to do this is by connecting their avatars together so that they are conjoined. This idea was deliberately built into the narrative of the work so that the only way to progress through the different stages or levels of the work is to find and work with the other person.

To support the understanding of this principle, we extended the idea of interlocking centres (circular balls). With their centres interlocked, the participants must push and pull against each other as they move around the space. We also transferred the idea of responsive vibrations from the haptic device to this interaction. The movements of the other participant are relayed by pushes and pulls that are felt through the backboard of the Bodyshelf. This combination of visual and haptic feedback helps to convey the exchange of energy and bodily tension between participants.

Like creating a theatre work, the design and development of *Intimate Transactions* has been a collaborative process. Theatre involves continually fusing elements together and overlaying ideas over ideas to create what you think will be a complex and layered experience. The same can be said of *Intimate Transactions*. From working closely with Keith Armstrong to create an initial concept document to collaborations with a larger creative team, we have woven together sound, visuals, physical movement and vibrations. My challenge has been to engage with many collaborators, the majority being computer based, in a process that would push these collaborators into new areas of thought and experimentation. For my own part, I was forced to deal with aspects of technology that were unfamiliar to me. Outside of my work with the Transmute Collective I don't normally incorporate technology into my practice and I am not familiar with interaction design theories. I therefore had no preconceived ideas about what was technically possible. Perhaps it is for this reason that I suggested and formulated approaches from an unusual and new perspective, from my knowledge of performance and the philosophies of Suzuki Theatre.



Stills from the installation *Transact (Flesh/Skin/Bone)*, 2002
photograph: Keith Armstrong



The responsibility of the Suzuki performer is to absorb space, energy and sound into their body and then exchange this information with the spectator in the theatre. You manipulate time and space to create a certain atmosphere that will ultimately present the spectator with the experience you intend for them. *Intimate Transactions* takes up some of these ideas in the production of body, visual, sound and design tensions to create a space that is immersive. However, *Intimate Transactions* places the participants in the performative role. The participants are the creators and the recipients of the work. Like a performer on stage in their own spotlight, they are situated at the centre of the action.

above: *Intimate Transactions*, Cairns Centre for Contemporary Arts, Australia, 2006
photograph: Peter Cullin

1 This idea that the body's centre is strong and energised also appears in martial art practices. Suzuki, Tadashi, 'The Way of Acting', *The Theatre Writings of Tadashi Suzuki*. Rimer, J.T. (trans.), Theatre Communications Group, New York, 1986; Nobbs, John, 'Frankly Acting', *An Autobiography of the Frank Suzuki Performance Aesthetics*, Frank Theatre Press, Brisbane, 2006.

A Shelf for the Body

Zeljko Markov

Zeljko Markov is an artist, craftsman and designer. He has exhibited widely in solo and group exhibitions and has contributed to numerous collaborative projects. He designed the Bodyshelf that houses the interaction and haptic devices for Intimate Transactions.
zeljko_markov@bigpond.com

In 2002, the Transmute Collective approached me with a brief to develop an input device for an embodied, immersive installation, *Intimate Transactions*. The Transmute Collective wanted to depart from traditional modes of interaction that rely upon hand–eye coordinated controls. In this work, participants would need to commit their whole body to the operation of the input device in order to engage with the installation. Pressure sensors embedded in the device's contact surfaces would be carefully calibrated to detect shifts in body weight. Consistent with the Suzuki Theatre practice[1] of Transmute's performance director Lisa O'Neill, the device would also need to impart a strong sense of grounding and focus the participant's physical energy in their stomach area.

I am trained as a visual artist, designer and a craftsman. Since establishing an independent studio practice in 1997, I have developed an interest in one specific category of furniture: shelves. This interest has taken me beyond the usual peripheries of engagement for a designer/maker. As critic John Neylon noted in a review of my 'Shelf + Self 4' exhibition in Adelaide in 2003,

> Markov has taken to the gallery as a space and responded by placing within it devices he calls shelves which both define the space as well as interrogate viewer expectations about design-mediated experience ... The attraction of the shelf for him is that it is one unit of interior design which has neutral character (unlike a chair or table).[2]

I had been aware of the practice of the Transmute Collective's director, Keith Armstrong, for over a decade and was also familiar with the Transmute Collective's recent work. While our respective practices appear quite different, we had often talked about the possibility of collaborating. We share an interest in the creation and manipulation of space for and with bodies, based upon a critical investigation of mediated experience. We decided to explore and develop these ideas together through *Intimate Transactions*.

During an initial meeting I was given schematic drawings of an envisaged installation that incorporated a tilted projection screen, an overhead projector, an

image-recognition camera and a footboard. These elements revolved around a chair occupied by the figure of a participant. I remember thinking how passive and distinctly disengaged the seated figure appeared in the drawings.

The second problem was the chair which, for me, carries too much cultural baggage. A key part of contemporary human history, it harbours a plethora of associations that are both collective and individual. From the sublime to the most prosaic — the throne to the toilet, the astronaut's control seat to the electric chair — such associations are endless. A seated position is also too familiar. A chair, however re-styled or disguised, would always be betrayed by its ergonomic constraints and the seating position that has so shaped the contemporary human body. I decided that *Intimate Transactions* would benefit from something much more neutral — an object without so many connotations. I began to develop the idea of a shelf for the body.

Even at this early stage of the project, I was conscious of how ambitious *Intimate Transactions* was shaping up to be. The initial concepts were complex and, even with considerable distillation and subsequent development and refinement, a lot was going to be thrown at a participant during a relatively short period

Zeljko Markov, *For Suzie's Robert*, 2005,
wood (+ book), 65cm x 52cm x 14cm
photograph: Zeljko Markov

of time. It would therefore make sense for the shelf to appear uncomplicated and undemanding on approach: something you could just walk straight on to.

My immediate challenge was to find a way of supporting a human body in a neutral position that is not too familiar and yet not threatening. Sitting or lying seemed too loaded — and could potentially induce a sense of forced commitment or passive resignation, which seemed inappropriate. I began to experiment widely as I produced numerous prototypes. The sheet material rack in my studio was emptied and refilled with plywood and fibreboard, which were deployed as angled surfaces to push my body against. Every available

surface became tilted and accumulated additional parts. There were ropes and harnesses hanging from the rafters and I spent many hours contorting and twisting as I experimented with the pressure sensors.

Because my studio in Canberra and Transmute's studio at Queensland University of Technology in Brisbane are over 1,000 kilometres apart, we had to communicate frequently during this period by telephone and email. They often needed to improvise prototype jigs using office furniture and other substitutes in order to physically experience a dilemma or potential solution that I needed feedback on. These improvised jigs would, of course, behave quite differently and give different readings, but we continued to solve problems through sustained conversations. Given the very different specificities of our practices, we sometimes struggled to find a common but very specific language. During this design phase there was also a lot of media development occurring in Brisbane, which I simply couldn't keep up with. This raised the danger of tangential fragmentation in the project. I relied heavily upon Keith's directorial capacity and brokering skills during this phase of the project.

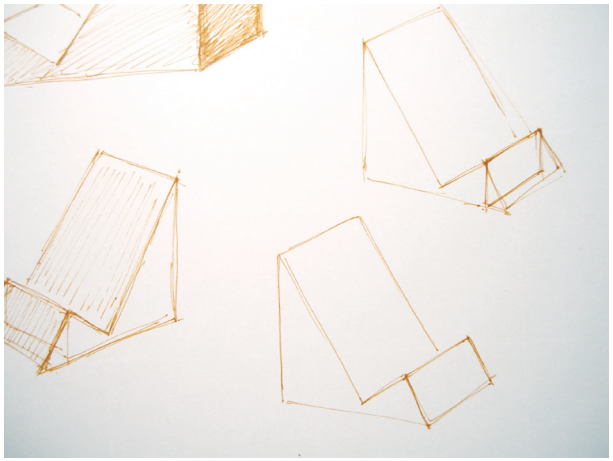
In time I came up with a deceptively simple solution for positioning and supporting the participant's body. Imagine standing in front of a wall, with your back facing the wall but not touching. Your feet are shoulder distance apart, your heels about twenty centimetres away from the wall. Now imagine the wall and the floor tilting back in unison, slowly, until your bodyweight starts to shift from your feet to your back, which comes to rest against the wall. This is the position you would have found yourself in on the first working prototype.

The next critical decision concerned the physical presence of the structure — how it would look as you walked up to it. Keith reminded me that the participants would approach it in semi-darkness, as it would only be softly lit from above. To me, it was very important that it had integrity as a form, and I wanted to eliminate anything that wasn't essential. I wanted it to look solid and grounded (like the participant's body should feel). To touch, it would be soft but firm, neither warm nor cool.

The realised shape was reminiscent of a toothed cog section. It was made from a timber frame, clad with fibreboard and painted matt black. The footboard and backboard surfaces were lined with pressure sensors and covered with a six-millimetre layer of black neoprene, like the inside of a wetsuit. It was solid, big and heavy. Somewhere along the way, I workshopped its name to Bodyshelf.

right: Early sketch designs
for the Bodyshelf, 2002
drawing: Zeljko Markov

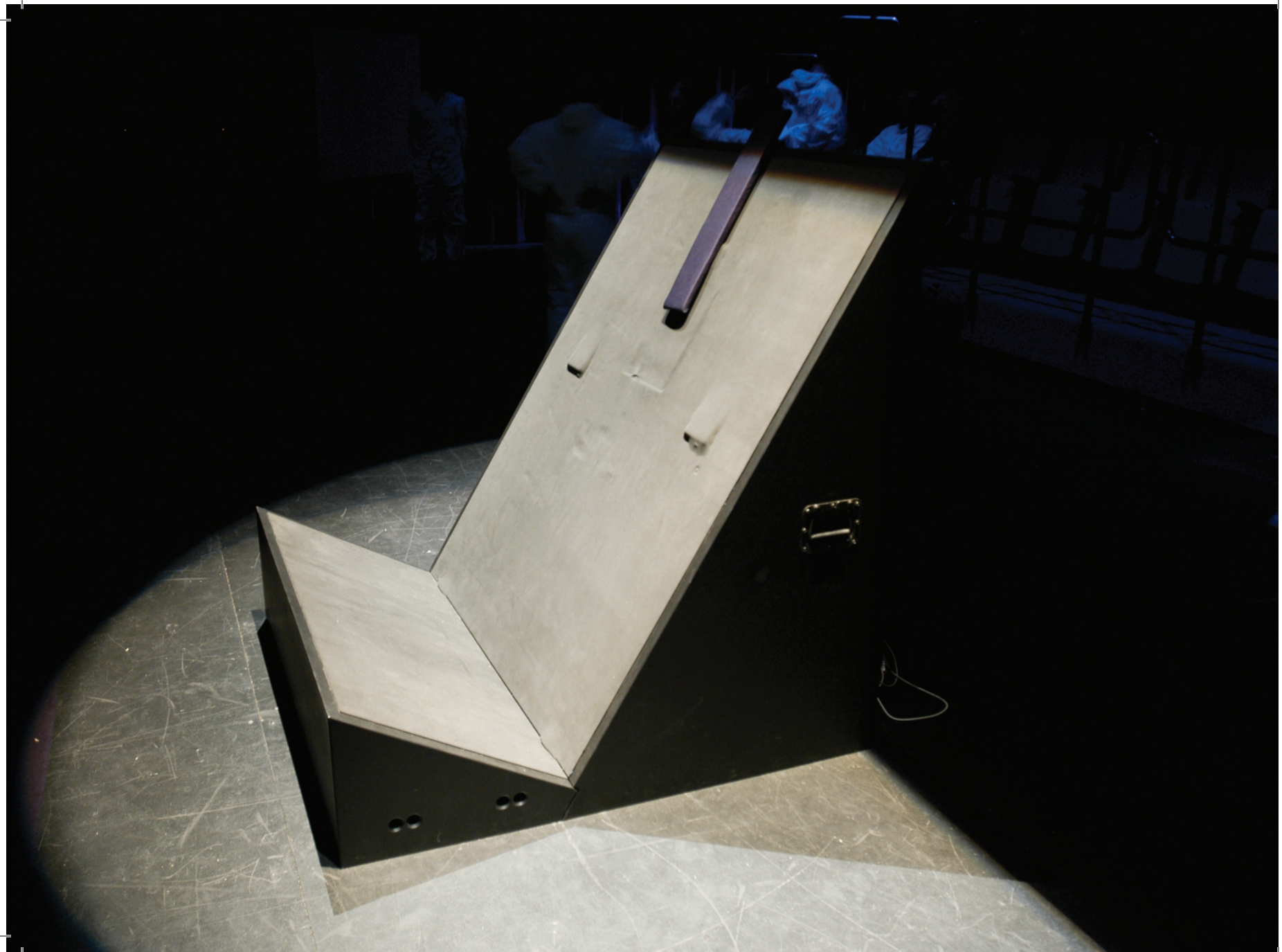
far right: Early design prototype
of the Bodyshelf, 2002
photograph: Keith Armstrong

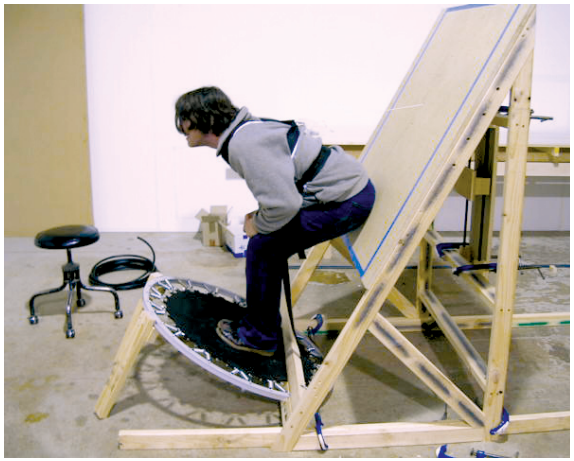


Intimate Transactions was first shown as a proof of concept, single-site installation at the Brisbane Powerhouse in 2003. This provided us with valuable feedback on all aspects of the project. The Mark I Bodyshelf performed well. The strengths that were identified were the position it held the body in and its overall physical presence.

The subsequent stage of the project involved developing a dual-site version of *Intimate Transactions*. During this phase of the project I had to attend to other projects (a solo exhibition in Melbourne and several commissioned pieces). Meanwhile, Transmute radically changed approach. Firstly, they decided to accommodate a second 'player' in the interaction. Secondly, while the original navigational approach was more akin to drifting through an abstract space, navigating by changes in gesture and body weight, the new iteration would be more 'game-based' and would require the participants to accurately steer on-screen avatars. It was built upon a new software design proposal by systems designer Marcos Càceres. This change of approach suggested major additions and alterations to the interaction, and so to the Bodyshelf.

By the time I rejoined the project, Transmute were making rapid changes to the Bodyshelf structure as they worked through a range of new possibilities. While





left: First working prototype of the Bodyshelf, 2003 photograph: Sonja De Sterke

right: Unresolved Bodyshelf pulley system using a jacket, wires and springs, 2003 photograph: Zeljko Markov

far right: Components for an unresolved Bodyshelf, 2003 photograph: Guy Webster

retaining the 'tilted shelf' concept, they prototyped a new, mechanical means of interacting with the work's computation and interface. It involved an upper body harness, connected to the Bodyshelf by springs and cables, an air or gel-filled cushion on the backboard, and a small trampoline to stand on. Guy visited my studio and demonstrated this new approach. I watched him as he pulled his torso away from the backboard, heaving on the sprung cables, as the harness cut into the shape of his jumper.

Despite my reservations, I worked on the idea for several weeks leading up to a developmental residency at the Sydney Performance Space in July 2004. The more I worked on the new approach, the more I disliked it. It seemed clumsy, and it rendered the strengths of the first Bodyshelf obsolete. But I kept working. And then, at the apparent point of no return (the Sydney showing was already too close), I called Keith and started my (now in-house famous) speech by saying, "I'm not in love with it ..."

Keith's response was incredibly brave. It led to the decision to rethink and rework the Bodyshelf, even though he knew that we would probably not have the time and resources to complete the pair of Bodyshelves required for the dual-site installation at the (already booked and promoted) Sydney show. It was one of

left: Bodyshelf Stage 2 prototype, 2004
photograph: Zeljko Markov

bottom left: Modelling upper back movements for positioning the sensors on the Bodyshelf, 2004
photograph: Keith Armstrong

those critical times in a project when enormous risks are taken. In the end, we did complete the new pair of Bodyshelves and they worked well in Sydney. This is my favourite memory of the *Intimate Transactions* project. I loved the idea of working with a team of people who were prepared to take that chance so late in the project.

During that final, intensive design period, I developed an articulated floor section for the footboard, supported by a very effective version of a universal joint. With the pressure sensors under this floor panel, participants could easily steer the work by shifting their body weight through their feet. Transmute also decided to incorporate navigation driven by the back, using pressure sensor strips mounted on the backboard. I developed a sliding panel on which the sensors could sit, to accommodate a variety of body sizes. I was again able to maintain the visual integrity of the backboard by disappearing the sliding panel and sensor array under a layer of neoprene.

After the Sydney residency, Transmute began to work with the Australasian CRC for Interaction Design (ACID). *Intimate Transactions* was becoming well known and a number of national and international showings were booked. The funding boost that ACID provided, and the immediate need to tour the work, easily led to the decision to appoint an industrial designer to refabricate

right: Early CAD image
of the Bodyshelf redesign, 2005
image: Steve Curran,
Upside Solutions

far right: Final Bodyshelf
redesign, 2005
photograph: Keith Armstrong

the Bodyshelves from robust and lightweight materials to make them suitable for long-term touring. Steve Curran of Upside Solutions (Brisbane) was engaged to take on the task of redesigning the Bodyshelves in standard aluminium extrusions. This allows them to be broken down into sections for easy transportation in touring cases. I am very grateful to Steve for the trouble he took to retain as much of the original Bodyshelf presence as possible under his brief, which was dictated largely by logistics.

1 See Suzuki, Tadashi, 'The Way of Acting', *The Theatre Writings of Tadashi Suzuki*, Rimer, J.T. (trans.), Theatre Communications Group, New York, 1986.

2 Neylon, John, 'SHELF + SELF 4: What Kind of Agenda?', *The Adelaide Review*, June 2003.

Avatars, Creatures and Environments

Benedict Foley and Stuart Lawson

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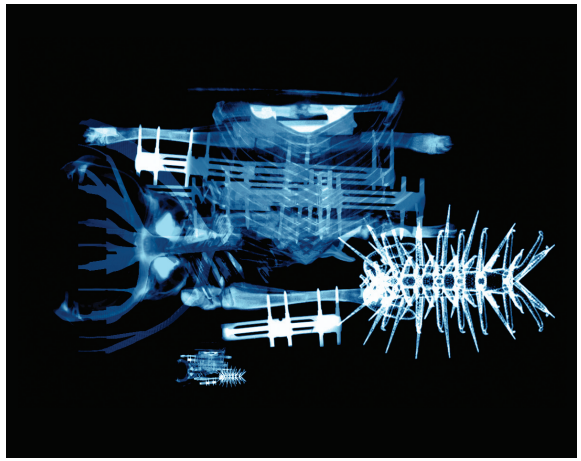
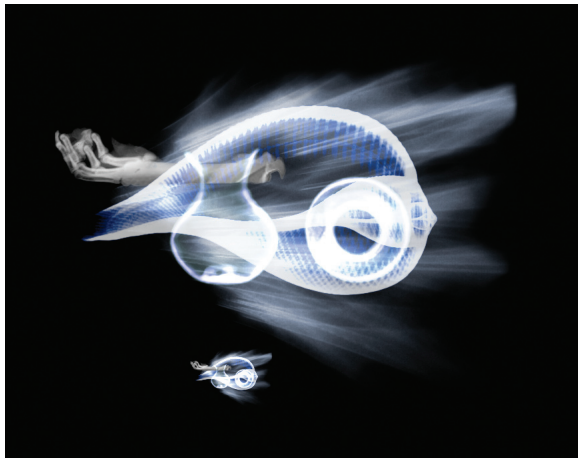
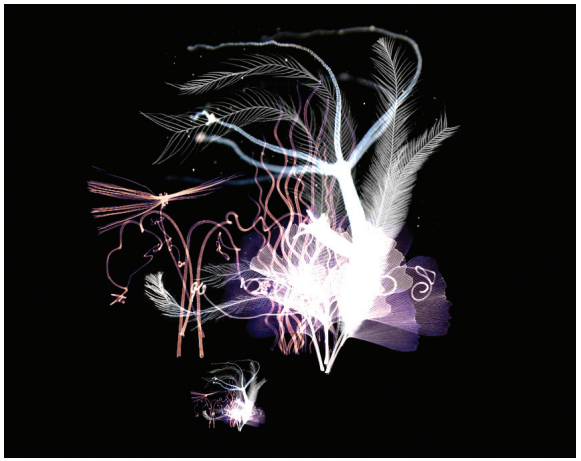




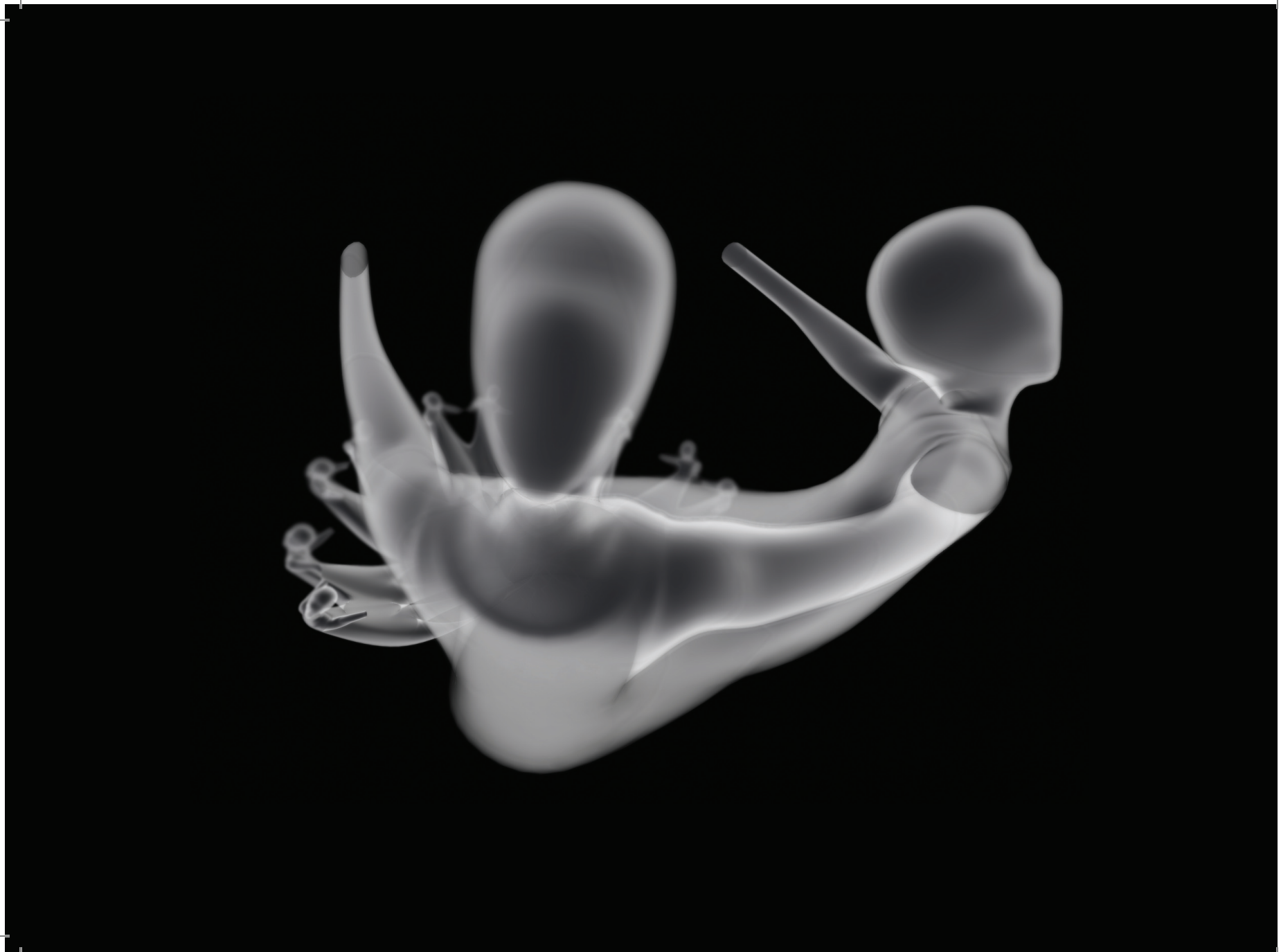


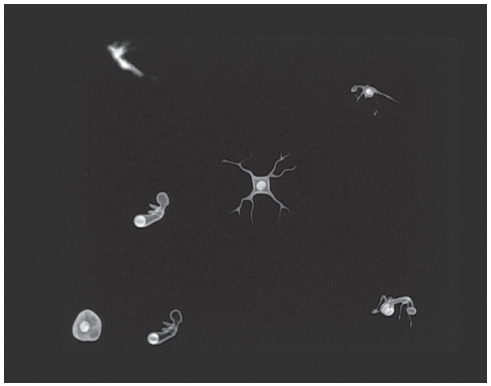
above far left: *Force of Conflict*,
Landscape of Imagery, 2005
image: Benedict Foley

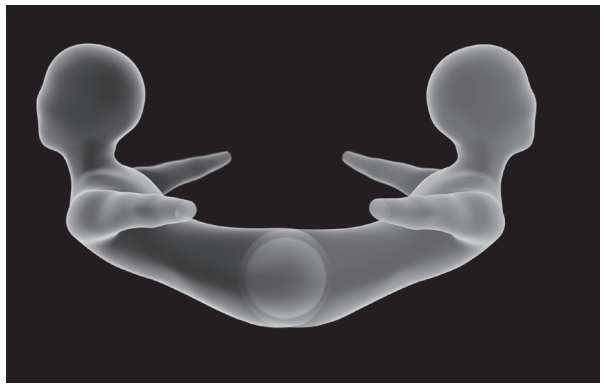
above left: *Force of Insatiability*,
Landscape of Imagery, 2005
image: Benedict Foley

above: *Force of Change*,
Landscape of Imagery, 2005
image: Benedict Foley

above right: *Force of Torment*,
Landscape of Imagery, 2005
image: Benedict Foley



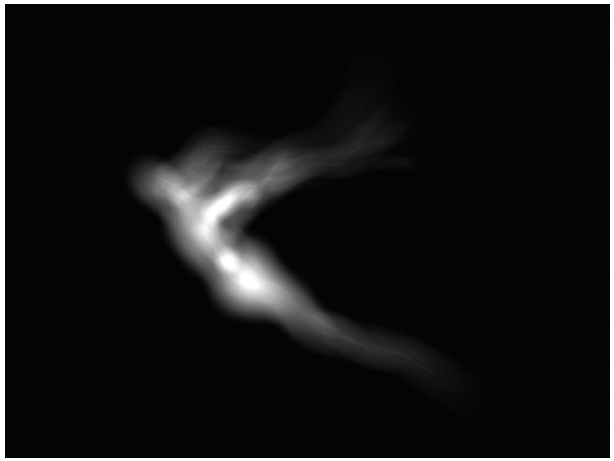


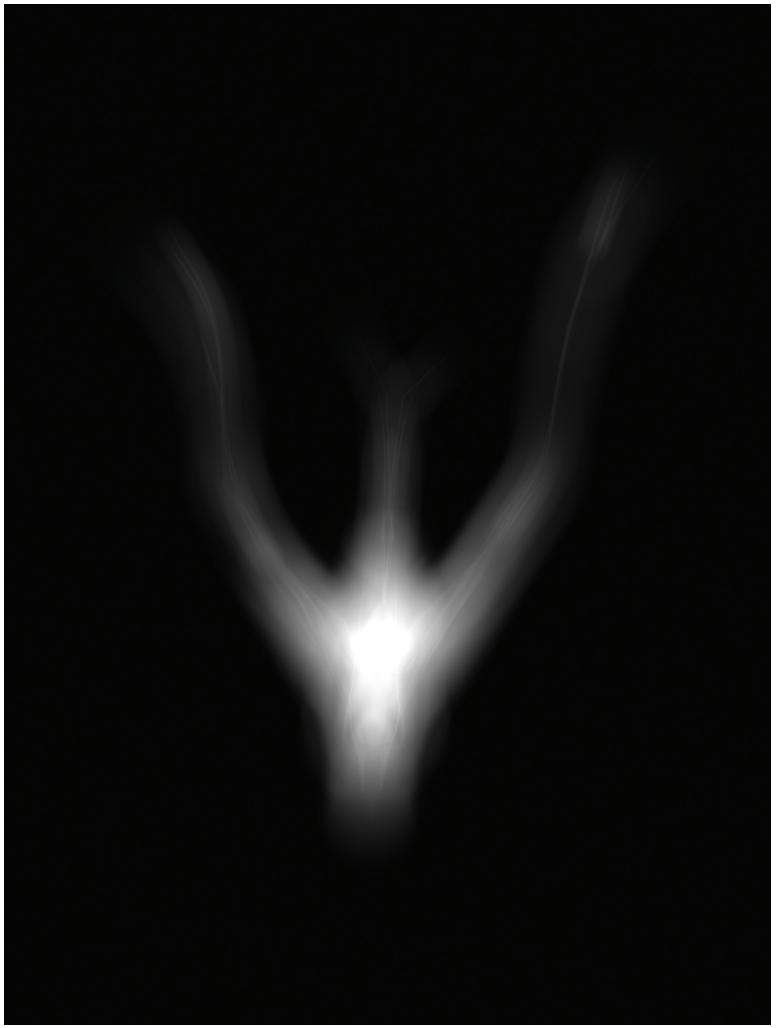


left: Two participants conjoined, 2005
image: Stuart Lawson

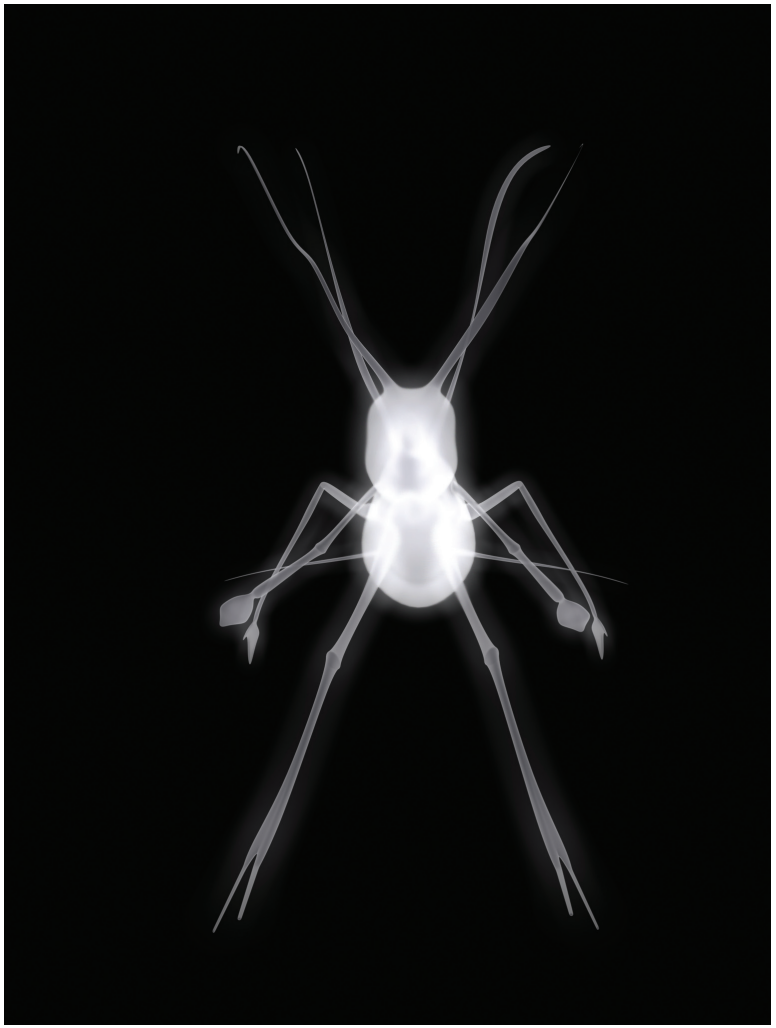
above: Main space populated
by creatures and two participant
avatars, 2005
photograph: Stuart Lawson

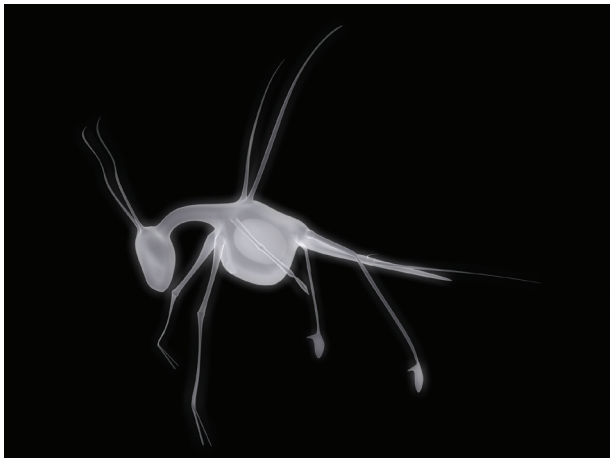
above right: Two participants' body
avatars joining, 2005
image: Stuart Lawson





Force of Change, 2005
images: Stuart Lawson



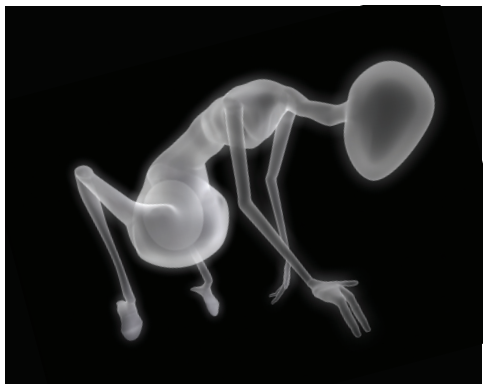


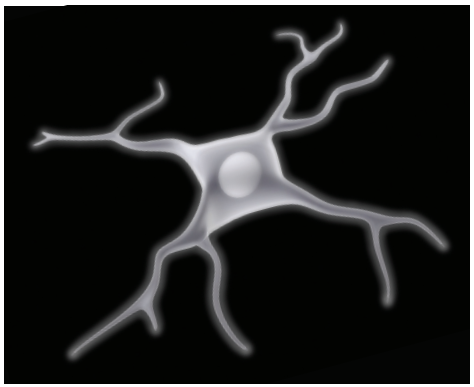
Force of Conflict, 2005
images: Stuart Lawson

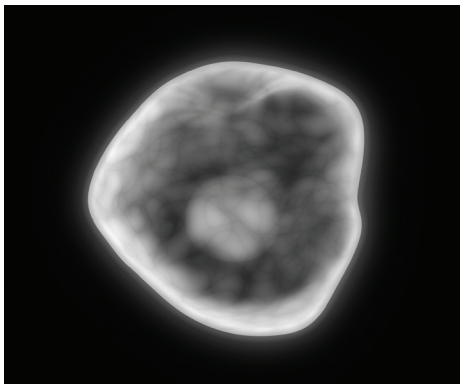
below left: *Force of Insatiability*, 2005
image: Stuart Lawson

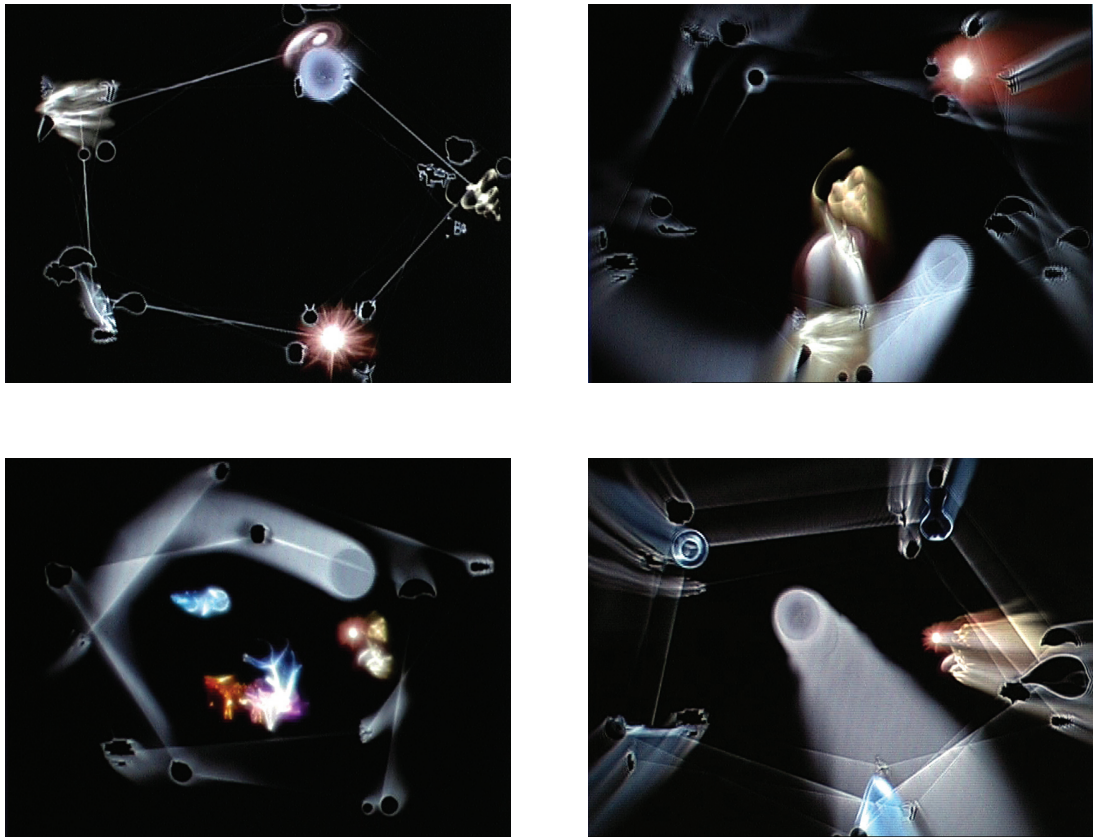
below middle: *Force of Torment*, 2005
image: Stuart Lawson

below right: *Force of Permanence*, 2005
image: Stuart Lawson









Participants collecting creatures' internal objects, 2005
image: Cameron Owen

An Interview with Sound Artist Guy Webster by Jillian Hamilton and Jeremy Yuille

Edited by Jacqueline Adair Jones

Guy Webster is a sound designer and former dancer and choreographer. His major works in sound design and interactive composition have featured in numerous festivals, galleries, conferences and theatres in Australia, Japan, UK and Europe. As part of the Transmute Collective, he worked in close collaboration with Keith Armstrong and Lisa O'Neill, as well as with the systems designers, to develop the immersive sound-scape of Intimate Transactions.
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On 2nd November, 2005 Guy Webster met with Jillian Hamilton and Jeremy Yuille to discuss the design and development of the sound aspects of *Intimate Transactions*. Below are excerpts from their conversation.

On Collaboration

Jeremy: Guy, you have been involved in numerous sound-based projects. Just how did you come to be involved with this project?

Guy: The project was initiated through discussions with Keith Armstrong and Lisa O'Neill, about four years ago. Essentially, the project is about the engagement of the body and how that is related to the performance of an audio-visual spectrum. A lot of the philosophy that's built into it is based on performance techniques that I'm familiar with because I used to be a dancer. As a matter of fact, Lisa [O'Neill] and I worked professionally together early in our careers, so I understand the sort of performance philosophy that she talks about, and I have incorporated it into my sound design for this project. A main part of this philosophy is that a performer can engage with the audience by dominating the space — by filling the entire space with their physical presence. In the case of a theatre, you would fill the theatre so that the audience feels the action close, making you a huge presence on stage.

With *Intimate Transactions*, we have involved audience members as performers so that they are forced to engage with each other in a virtual space. Their physicality extends into and fills the entire space. Part of it is illusion, part of it is entertainment and part of it is a game, but all of it is physical. From this perspective I have created a sound structure that immerses the person and totally surrounds them, so that they feel like they are at the centre of the space. That was very important to me. It's very easy to stand in front of a screen and not feel part of a work but if you're surrounded by it you can't help but feel a part of it. That's very difficult to do with a screen. But you can do it with sound.

Jeremy: Who else was involved in designing the sound?

Guy: Initially I worked with a young (Opcode) Max programmer named Ben Woods. This was very early in the process. I also worked closely with two (Macromedia) Director programmers, Cameron Owen and Glen Wetherall. Cameron built the engine that animates all the creatures and controls all the imagery. I worked very closely with him because it was important to me that there was a direct correlation between the imagery and the sound. This includes the changes that occur (so that they are simultaneous), the characteristics and rhythms of the creatures and, finally, the structure of the 'tension' levels and how they are related. So I worked very closely with Cameron to understand all of that and basically worked alongside him. As he was developing how the imagery acted and operated, I was developing the structure and the sound. In order to make the process potentially seamless, Glen worked with Cameron and me to re-route the many layers of detail from the animation to the audio engine.

Most of the decisions about the interface design were made early on in the process, but they were structured in such a way that they were quite easy to change. Overall, it was very much a studio process, where we would literally sit down and discuss ideas, put them in place and test them out.

Jillian: Can you explain more about working with the other members of the Transmute Collective? How did you work with Keith and Lisa regarding the sound?

Guy: To design the sound, I took ideas from our discussions on philosophy and ecological design. Once the sounds were in place, I would meet with Keith and Lisa (usually separately because I wanted them to approach what I had done spontaneously and just give me their immediate responses). We would have long listening sessions and discuss what was going on with the sound, how they thought it related to the interaction and the performance elements. I would explain my reasons for the decisions and the interpretations I'd made. They would explain to me how they had interpreted it and what they thought worked.

There were so many different aspects that each of us had to become involved with the visual structure, the architecture of the visual world and how it relates to the architecture of the sound and the programming. But before any of that could even begin, we had to define what the interface was. And that took about two years to get right.

Jillian: Was the interface developed first or concurrently with the sound design?

Guy: Concurrently. Since I'm very interested in sound

as pure vibration, at really low frequencies, that was something we started to build into the work early on. The vibrations in the Bodyshelf, and in the pendant that you wear, are all controlled by sound. That's part of the sound design where sounds can actually reach out and touch you, and it's also a physical connection to the creatures in the space — the elements that you change.

Jillian: Were you involved in the development of the Bodyshelf and the haptic devices and did their design influence your approach?

Guy: The Bodyshelf is something that we developed because of Lisa and her performance philosophies and through a desire to engage the body. Lisa works in the sort of practice in which the engagement of the body begins with the centre of the body. We set out to create a device that engages the person through that region of their body. The first Bodyshelf design had a lot of limitations in its physical manifestations and the different actions you had to learn in order to operate it. An extensive physical vocabulary was required, so it was something that you couldn't really grasp or understand right away. We set about using the same shape and the same physical orientation, but changed our approach to interactivity. We wanted to have participants surrender to the space, so they weren't just standing and totally in control, but had to sort of settle back.

In the next part of the design process we had to make some big calls. Like demanding from the engineer that we use plywood rather than three millimetre steel for the haptic devices in the shelf. Steve Curran did an amazing job in the design of the shelf itself. For safety reasons, he preferred a steel version, but haptic actuators attached to a rigid surface do almost nothing, so I had to redesign it. It needed to be much more like the skin of a drum, so that it flexes a little bit when you were on it — but not too much — and then, when there are vibrations within it, it flexes a little bit as well — right to the edge of the shelf rather than in a localised place. That was a process I needed to include in the design.

Jillian: I'm assuming the design and development of the haptic devices also required quite a lot of cross-collaboration.

Guy: Yes. In the design of the haptic interfaces, there were discussions about how they would look; how they would fit into the device; how they would fit into the pendant; what the pendant would be. Once we had the physical devices, we could actually start to define the sounds. We talked a lot about sound, but it wasn't until the devices were actually in place in the Bodyshelf, and there was a person involved in the experience, that we could start to define what the sounds would be.

Jeremy: Do you have an example of how you would implement a change after comments from your collaborators?

Guy: A good example has to do with the creature *Conflict*.

Jillian: I understand that these creatures each have unique properties and identities, as well as interesting names.

Guy: (Laughs). Yes, they do — names like *Permanence*, *Torment* and *Conflict*. With *Conflict*, there was a particular sound that I was using, but Lisa and Keith just didn't understand why it was there. They felt that it didn't suit what they imagined. So then I said, "Well, okay, describe to me the sound you would replace it with. Where would you go with this?" They gave me some images; some rhythms that they imagined suited *Conflict* better. I took the original sound and developed it so that it started to lean towards what they had described.

Throughout the project, there was constant feedback in the way that we worked. Sometimes it was complicated, where we engaged other people to come and be involved in sessions that might last for several days, after which we would do interviews with each person as a part of our research feedback. At other times the process was more informal.

On Sound and Technology

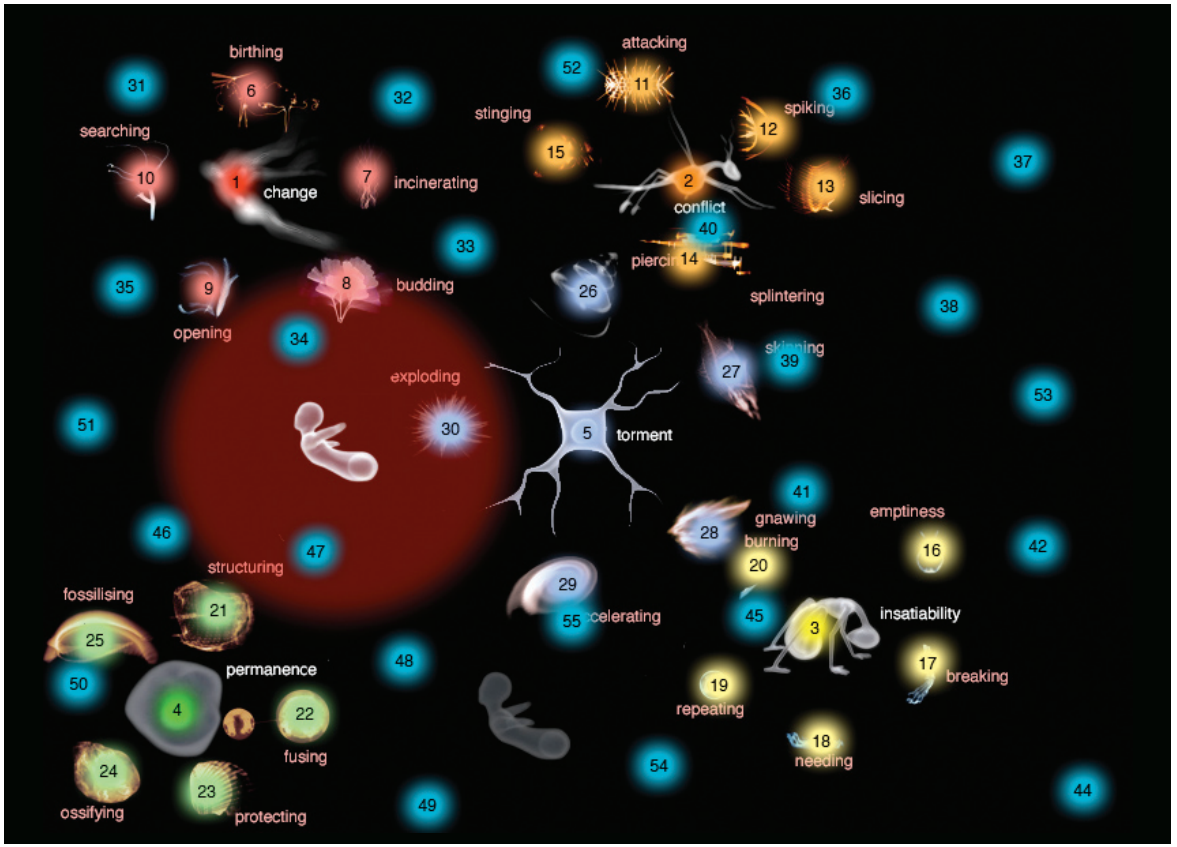
Jeremy: How did you come to decide on the kind of sounds you would make for this work? What kind of palette do you use?

Guy: All of the sounds initially come from sound recordings. Then I've taken them through a process of manipulation. There was a period of time where I just sat in the studio and created an enormous palette of sounds, and then I filtered them.

Jeremy: What were you looking for in field recordings and what process did you use to create a palette of sounds?

Guy: I was looking for 'particles' of sounds for this work because they have values that can grow and engage with other particles. In the first and second stage of the processing of sounds, I'd initially look for sounds that had a broad spectrum, and then I'd stretch and elongate them. By doing this, I could get very deep within the sound waves. I used a series of other processes, sometimes spectral, sometimes simple things like delays within sounds.

Jeremy: You spoke earlier about creating a feeling in the participants of being part of a space through the use of sound. Could you explain how that's done?



Map of sound locations and relationships to creatures, 2005
image: Guy Webster

Guy: Over time I went from working with the Bodyshelf (the physical structure) to the interface. I set specific measurements and heights that the speakers sit at so that the sound creates a plane — a flat plane that revolves around the participants' heads. The speakers are arranged in a set-up where there are two to the rear, two to the sides and three arranged at the front, plus a sub-woofer behind.

Jeremy: Could you explain the architecture of the sound design to us?

Guy: There are several layers at work within *Intimate Transactions*. You begin in what we often refer to as the public space, where you're able to see the avatar and the five creatures and the other participant's avatar. There's a whole selection of sounds that are relative to just that space. Then, within and around each of the five creatures is another layer of sound. And those sounds are particular to each of those creatures. In fact, there's a particular spectrum of sounds that are unique to each creature and to the areas of the public space that they inhabit. And then, within each of the creatures, those sounds are represented again but in a sparser arrangement. You're able to change the images within each of the creatures and as you do, the sounds that they are represented by, and the sounds that are configured within them, change as well.

Intimate Transactions including sound system at Artspace, Sydney, Australia, 2006 photograph: Artspace

So there are one, two, three, four separate layers of sounds, and each of those is represented by levels of what, in the development stage, we came to call 'tension'. It is the thing that controls how the whole network operates. It's that tiny little thing that changes when you engage with a creature and change one of its properties. By altering the image, you adjust the tension in the creature, which in turn changes the public tension and ultimately alters the whole network tension.

Jillian: When you talk about 'tension', are you referring to a tension in action, a tension associated with things that are happening?

Guy: Yes.

Jillian: How does that activate the different layers?

Guy: Whatever change you make within each of these layers, even if it's partial, constantly affects what happens on both sides of the network. It's the connection between sites that averages to create change across the whole network. They are separate sites, but they're two separate places that affect each other. It's based on the idea of subjective ecology where something is initiated that creates some sort of by-product, and that by-product starts to engage or affect someone else in a totally different site. That's what these tensions are about: changes you make can affect someone else. For example, let's say I change one of the creatures, drawing heavily on its force. The images start to darken perhaps and become slower, a bit lethargic. As the effect moves across the whole spectrum, all the imagery starts to become lethargic and that's directly represented in the sound also.

Jillian: Are two people in the dual sites experiencing the same or different sounds? And if they're different, are they aware of the sounds of the other site?

Guy: When the two avatars and the two participants align, they have a connected experience, which means they experience the same things. Otherwise they are experiencing different images and sounds. But there are certain times where, for instance, if you're not doing very much at all and the other person is doing a lot, the space will become imbalanced. And the only way to rebalance it is to interact with the other person. By participating with the other person in a transaction, you share the interface. You are joined by a physical connection of vibrations. And by using those vibrations, you can actually sense which direction the person is moving.

Jillian: These are the vibrations that are coming through the haptic device?

Guy: Yes — the haptic device you wear on the belly, as well as the two haptic devices built into the Bodyshelf, which you lean against. There is a sensation you feel only when the two avatars come close to each other. And when the avatars align, they are represented by two circles that are joined. If the two participants are working in direct opposition with each other, they'll feel it in the haptic devices. You can literally feel the direction the other participant is going in. These built-in cues assist people in reading what's happening on the other side of the network. Some of the cues are visual, some are audio-based and some are vibration-based. I was interested in the idea of vibration beginning sonically and ending physically.

On Aesthetics

Jillian: Earlier we spoke about the Bodyshelf and how you developed it collaboratively. I'm curious to know if it has an important meaning in terms of the sound.

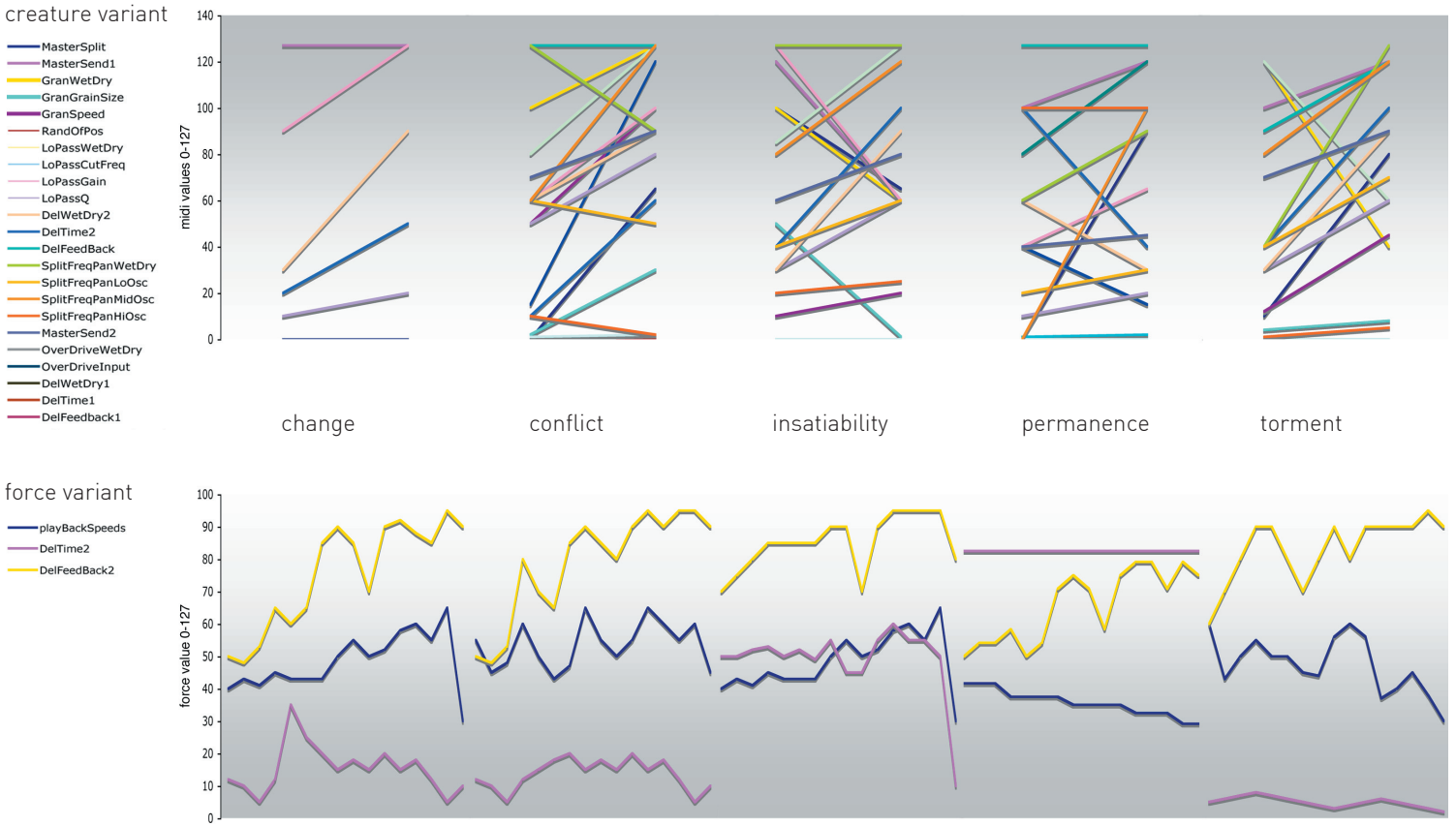
Guy: Something that I'm very interested in is the idea of motion as balance rather than stillness as balance. So that's why, in my research as a sound designer, I am inspired by the idea of motion and want to explore it physically. There may be other practitioners who have developed similar practices around motion, balance and sound, but this is something that I've been interested in on my own. It comes from an idea I've developed as a dancer. I want people to consider that the only true balance happens when there is movement. When we manage to stay on our feet we are actually moving very slightly. A pendulum is in balance when it's in motion because it swings equally in both directions. To me, the only place you can find true balance is in motion. This idea of motion in a space to create a sense of balance is something that I've embedded very heavily into *Intimate Transactions*.

This project has been well suited to that kind of exploration because, through the Bodyshelf, you are connected to, and situated within, the centre of the space. And through it, you are able to control and experience motion around you. Yet you are also moving within that space. It is therefore your balance and your sense of motion in balance that controls the entire space. Without your own sense of balance in motion, you will find it very difficult to operate. But, in the control of balance, the Bodyshelf becomes an extension of the body.

Jillian: I'm wondering to what extent motion triggers the sound and affects the feedback that's coming to the user through sound?

Guy: When you stand on the Bodyshelf, the board that you put your feet on isn't solid, it moves underneath you, so you are in constant motion and your motion on the Bodyshelf creates feedback in the sound spectrum. So, yes, physicality and motion in space generate the feedback of the sound.

There have been a lot of things done with surround sound that put you right in the centre of the action, by moving the action around you, but not in very exceptional ways. In *Intimate Transactions*, you can experience your whole world sometimes spinning around you.



Diagrammatic score of real time variation within each creature, 2005
diagram: Guy Webster

Jeremy: And this relates to a visual cause and effect, as the participants make visible changes to the creatures?

Guy: Yes, it does.

Jeremy: What about the aesthetics of the creatures? How did you make the decisions for the features of each of the creatures?

Guy: We wrote character profiles for each of the creatures, and they are pretty will defined. We spent time developing what each character is like and how it reacts to a participant's presence. For example, does it like the presence of the participant and respond very favourably or does it ignore it, or does it react badly to it? Each of those reactions relates directly to the choices I've made in the sounds.

Jillian: Can you describe, the sound characteristics of a creature — say, *Permanence*?

Guy: *Permanence* is based on the idea of a rock, and it responds minimally to your presence. The sounds for *Permanence* are based on a deep, meditative series of sounds. There are minimal sound and motion changes, but *Permanence* responds by vibrating.

Torment, on the other hand, is based on the personality of a voracious insect. And it doesn't like your presence. It moves a lot, so it is very difficult to engage with. The sounds for *Torment* are breathy. Rhythmically, it is very fast and shaky. It doesn't necessarily have very big leaps in its frequencies, but it has a jagged, breathy sort of quality and that also comes across in the vibrations. Each creature has its own designated series of vibrations that change as you interact with them. For instance, *Conflict* starts pretty harshly and it becomes harsher, until it starts to shake you. Since you're right in the middle of that space, your whole world becomes intense.

Jeremy: How do the sounds for other creatures differ from the sounds for *Permanence*, *Torment and Conflict*?

Guy: The sounds for the other creatures are similarly linked to the nature of the characters they represent. For example, *Insatiability* is based on a character called the Hungry Ghost, which is a Buddhist mythological character that has a distended belly and a tiny, tiny throat. It's constantly hungry and cannot get enough, so it just ravages everywhere it goes. The types of sounds that are associated with this creature are ravenous sounds, like swooping, and they take up a bunch of space

and then disappear again. The sounds accentuate the nature of the creature. They give it more depth.

The sounds are either directly connected to each creature in the public space or connected to each one of the forces that are within it. Then there is a series of sounds that forms a deeper layer, related to the collective forces. Then those sounds appear again in the network experience with the other user.

Jeremy: Is it a composition?

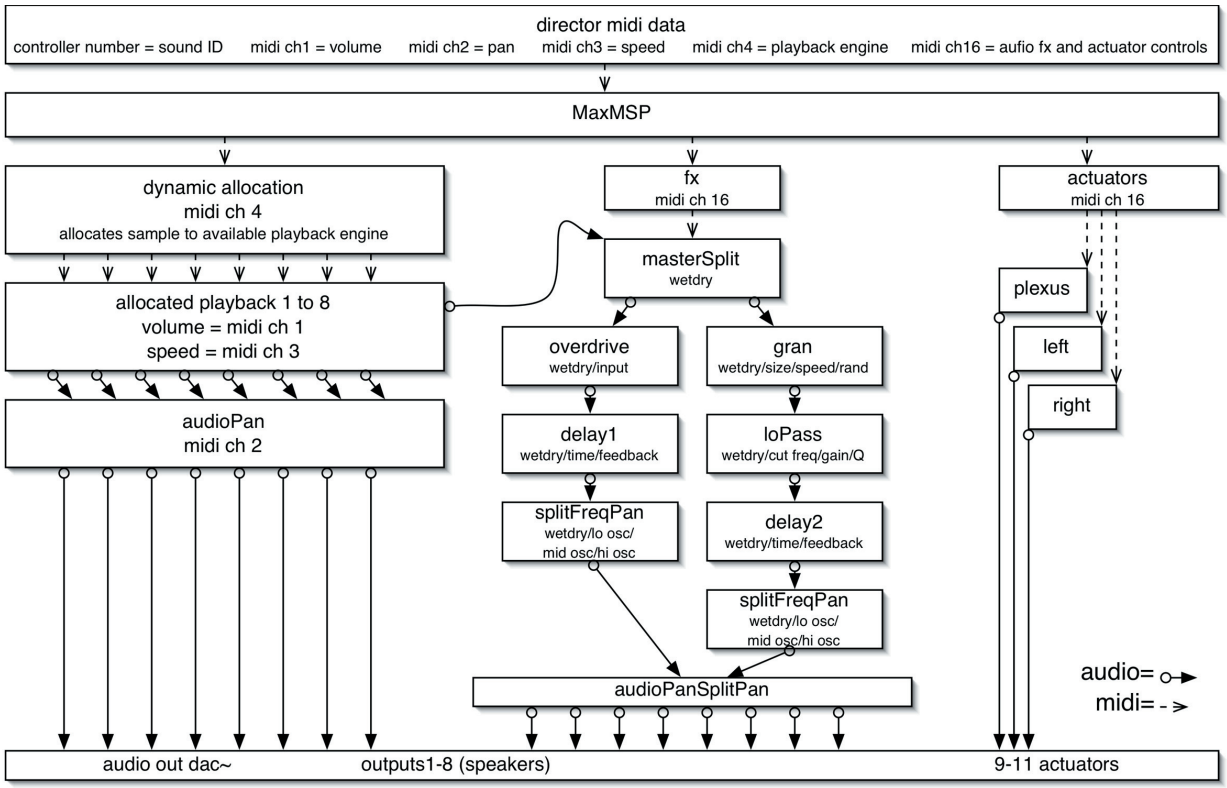
Guy: I think there are compositional elements to it. There are certain elements to it that have been designed as if they were compositional elements: chord structures in particular sensations through groupings of frequencies, for example. Other elements are built into the designs within the samples themselves. You've got the base structure of the musicality built into the samples in the designed characteristics of the creatures.

Jeremy: Is this experience of evolving sound designed only for the person in the middle of the space, or is it designed to be heard by other people as well?

Guy: We set out to create an experience that's very personal; but it can be experienced by other people. In fact, we've had open-house sessions where somebody has experienced or performed the work, while other people stand around and watch and listen then ask questions and discuss it.

Jillian: Do you think that each unique composition could be a stand-alone audio track?

Guy: I actually think it works very well. I recorded the sound that someone generated from the system as they were interacting with the work in Glasgow. It is included on the DVD (with this publication). Certainly people can experience it without being physically involved, but I would argue that they aren't getting the whole experience. And I think that the people who have experienced *Intimate Transactions* would agree. The really interesting thing about the experience happens when you use your body to engage with the technology, to interact with someone else's body, and produce sound at the same time.



Intimate Transactions - audio system diagram
diagram: Guy Webster

Programming Intimate Transactions: A Layered Ontological Approach

Marcos S. Càceres

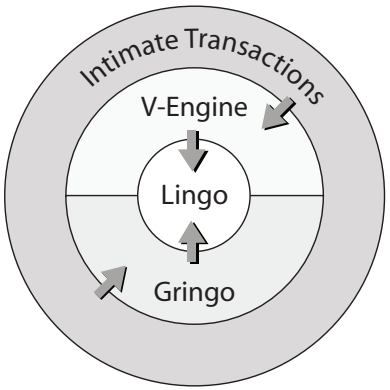
Marcos Càceres is a researcher and programmer at Creative Industries Computing Services, Queensland University of Technology (QUT), Brisbane, Australia. He is undertaking a PhD at QUT on interaction design and user experience design in collaboration with the World Wide Web Consortium's Web Application Formats Working Group. He teaches interaction design and Web development part-time in the Communication Design discipline at QUT. Marcos was the lead programmer and system designer of Intimate Transactions.

During the third development phase of *Intimate Transactions*, the Transmute Collective recruited programmers with backgrounds in interaction design to contribute to the project. Close collaboration between the programmers (including myself and Cameron Owen) and conceptual artists (Keith Armstrong, Lisa O'Neill and Guy Webster) guided the design and development of the final work. The fusion between the work's coding and conceptual design is exemplified by the design of the source code around the principle of computational layers.

The development of three layers of code emerged out of the establishment of a shared *ontology*. In computer science, ontology is generally understood to be a formal specification of something that exists or may exist. This formal specification usually takes the form of virtual objects running within a computer program. In philosophy, ontology is generally understood to be the framing of an individual's understanding of being and reality, and how those concepts differ from person to person. Within the design of *Intimate Transactions*, we blended these definitions so that a working ontology came to be shared by the artists, the programmers, and the system of *Intimate Transactions*. This shared ontology serves to define both the conceptual and computational *ecology* of the work (what it is and what it is supposed to do) and to determine its relationships — how the 'living' virtual organisms (icons and avatars) relate to each other, the users, and their simulated environment. More specifically, the description of the ontological specification ranges from concrete things like the effect of gravity on the environment, to the expression of the values and beliefs of creatures and how they respond to particular interactions and disturbances in the virtual environment. The development of this ontology was crucial for the integration of the principal

artistic concepts of *Intimate Transactions* into the realised interactive work.[1]

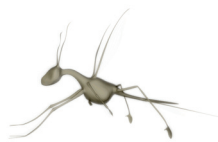
The computational layers that emerged to support this shared ontology within the system design are as follows: *Lingo*, *Gringo* and the *V-Engine*, and *Transmute*. Each layer extends the next, in a hierarchical manner. In all, these three layers make up nearly 30,000 lines of source code: some automatically generated using a purpose-built system, some taken from previous projects, but most written from scratch. The principles and relationships of these layers are illustrated in the accompanying diagram and described below.



Code layers of *Intimate Transactions* diagram: Marcos Càceres

The Lingo layer is the most concrete layer of the work. It is, programmatically speaking, the stuff from which the virtual world is built — its building blocks or DNA. Lingo is the language interpreted by Macromedia Director, the main computer program on which *Intimate Transactions* runs. Lingo provides the possibility of creating simple objects, known as *classes*, from which other larger objects may be built, much like constructing with Lego blocks. Lingo also provides programmers with the logical tools (numbers, mathematical operators and a dimension of time) that are required to make objects behave dynamically. And, by providing access to different parts of the computer's operating environment, it allows them to control and manipulate the core elements of the interactive work: image, video, audio, text, time, and the network. To the programmer, *Intimate Transactions* can simply be viewed as an aggregate of the combination and coordination of these core elements.

The Gringo layer, which I designed, is a layer of abstractions that sits on top of the more concrete Lingo layer. In some Spanish-speaking countries, Gringo is a slightly disparaging term for a foreigner. I coined the term Gringo for this layer because it exploits Lingo's core elements and transforms it into a mutant language. This evolved foreign language uses abstract metaphors and strict language rules. In technical terms, the Gringo



layer introduces to Lingo some of the strictness and regimented structures seen in more sophisticated programming languages such as *Java* or *C#*. Because these regimented structures make the source code easier to write and consistent to read, they support collaboration between programmers.

Within *Intimate Transactions*, the Gringo layer provides a host of tools for network communications, midi-signal generation, detection of sensor activation and control over multimedia playback. Importantly, Gringo enforces two programming paradigms upon the work: *event-driven programming* and *concurrency*. The idea behind event-driven programming is simple yet tremendously powerful: every action or 'trigger' in the system can cause a reaction — an 'event' to which a 'listener' responds. In the case of *Intimate Transactions*, when a user leans back on the Bodyshelf, this may trigger a transaction event. The creatures of the virtual world are listening for such events and may respond by, for instance, beginning an intimate transaction with the user. The concept of concurrency is also simple and powerful: it means that multiple things can be happening in the system at exactly the same time. When *Intimate Transactions* is running, more than forty different processes may be happening simultaneously. For example, the system may be detecting what the user is doing on the footboard, rendering images on the screen and, at the same time, sending messages over the network to synchronise the visual displays of both sites.

Sitting parallel to the Gringo layer is a Visualization Engine (V-Engine) designed by Cameron Owen. The V-Engine is a fast, custom-built image-processing engine that is capable of dynamically manipulating images with real-time visual effects such as blur, shake and smear. What makes the V-Engine important is its tree-based design, where visual elements are treated as individual leaves and branches. Branches of the V-Engine's rendering tree can be selected and visually manipulated in real time. In effect, the visual processing that takes place at higher branches in the tree cascades down through lower branches to the leaves to create cumulative visual effects and colour changes. This tree structure provides us with fine-grained control over when, where, how and why visual effects are applied.

The Transmute layer is the layer that most closely resembles the conceptual ontology of *Intimate Transactions*. Within this layer, bits of code are entitled 'Bodyshelf', 'Creature', 'Sound Spirits', 'Avatar', and so on. They are endowed with certain dynamic qualities that are tied to the concepts associated with each element of the work. For example, the creatures include dynamic

qualities such as 'agitation', 'tolerance' and 'wellness'. These qualities are defined mathematically within the code as quantifiable numeric ranges (e.g. 1 to 100) that smoothly change in value over time. On a second level, however, these quantities are intrinsically tied to each other and form a relationship to a core numeric value that we refer to as a 'network tension', which is shared by the two networked Bodyshelves. This means that a change in the tension on one networked site immediately passes to the other site, causing local actions to produce a global/ecological effect in the system as a whole. It is the intricate interaction between the array of ever-changing local and networked quantities (which occurs in response to the numerically-translated input gathered from the users' interaction) that forms the user experience of *Intimate Transactions*.

It is important to note that each bit of code within the Transmute layer is directly built from elements found at the lower code layers, so that a creature, for example, is an extension of an animated image as defined by the V-Engine, and an animated image is a collection of images being represented over time, as defined by the Lingo layer. The lower programming layers (Lingo, Gringo and the V-Engine) provided the concrete building blocks upon which we explored, tested and realised the higher-level artistic concepts. The three code layers of *Intimate Transactions* were thus developed iteratively, to explore and represent the concepts and themes of the artwork.

Intimate Transactions was produced out of a shared understanding that was built between the team of artists and programmers around what we wanted to create and how we all imagined things would work (the philosophical ontology). The realisation of the work came about through a final, higher-level programming abstraction that we call *Intimate Transactions* (the formal ontology). Through their development (and limitations), the layers that emerged out of this formal ontology had a significant influence on the final form of the work and how users perceive and understand it. Because it is relatively easy to explore and represent abstract ideas through programming, a creative discipline like software engineering is well suited to realising conceptual artistic works such as *Intimate Transactions*, as long as there is enough time to fully and collaboratively explore, test, and refine ideas.

1 For a description of the conceptual design of the work around the principle of 'ecological subjectivity' see Keith Armstrong's essay in this volume.

Laughter and the Undeniable Difference Between Us

Pia Ednie-Brown and Inger Mewburn

Pia Ednie-Brown is a senior lecturer in the architecture program at Royal Melbourne Institute of Technology (RMIT). Her practice negotiates multiple research areas including interactive installations, animation, sculpture, creative writing and theoretical analysis. Her research incorporates embodied knowing, radical empiricism, emergence theory and computation, politics and aesthetics.

Inger Mewburn was a Masters student at RMIT at the time of this project and is now a PhD student at Melbourne University. She teaches architectural theory, communication and design at various universities. Her research interests include hybrid physical/virtual surfaces, educational environments and tactile interfaces.

Both are members of the 'Liveness Manifold' research cluster at the Spatial Information Architecture Laboratory (SIAL), RMIT.

Together, they developed the haptic feedback system for Intimate Transactions *as part of ACID's ACIN research project.*
pia@rmit.edu.au
inger@mewburn.net
http://www.sial.rmit.edu.au

inger: (2:43:36 PM)

My sister gave me a good analogy for the design review process the other day. She said that hearing what a critic has to say about your creative work is a bit like going through customs at the airport.

pia: (2:43:45 PM)

Is this a story about underwear?

inger: (2:43:51 PM)

Sort of ;-)

inger: (2:44:21 PM)

It goes like this: You arrive at your destination. Jet lagged. You open your suitcase on the table and invite the guard to look inside. They say, "do you have anything to declare?"

inger: (2:44:55 PM)

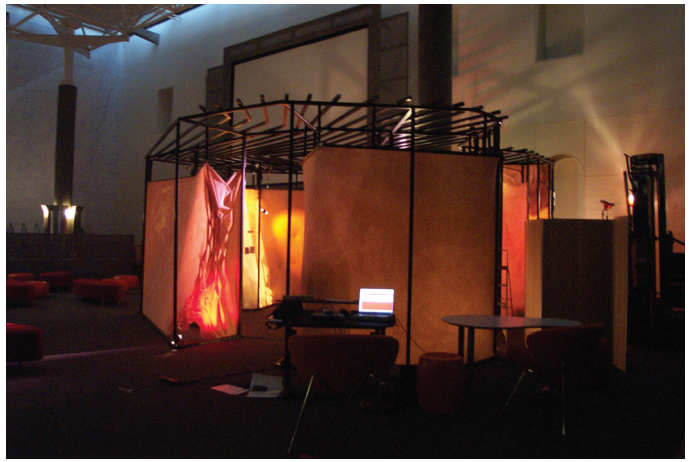
You reply, "No". The guard (or critic if you like) rummages inside, pulls a huge bottle of whiskey out and says, "Well, well — what's all this then?" You are very surprised and say, "I honestly don't know! I guess I must have packed it ... but I don't remember doing it."

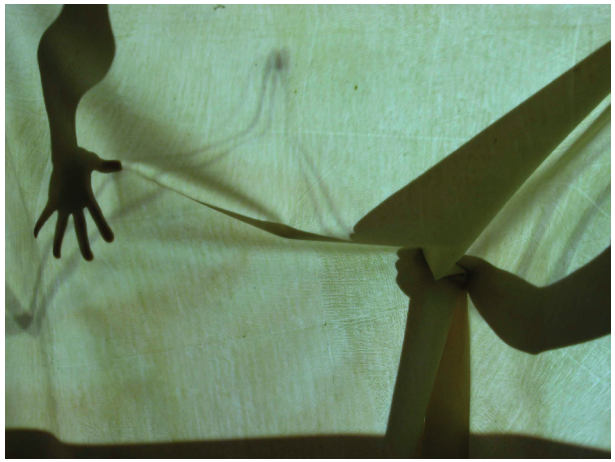
pia: (2:45:01 PM)

:-)

right: *Skins of Intimate Distance*, 2003
photograph: Inger Mewburn

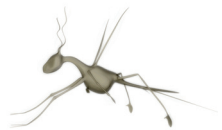
far right: Detail: backlit latex material, *Skins of Intimate Distance, 2003*
photograph: Inger Mewburn





At RMIT's Spatial Information Architecture Laboratory (SIAL), collaboration across geographic distance is commonly an important aspect of research projects.[1] Undergraduates and postgraduates from diverse disciplinary backgrounds often come together within explicitly collaborative projects. The difficulties and risks are always high, but the research rewards exceed them. *Intimate Transactions* was such a project.

One of our aims in writing this chapter is to document our contribution to the development of *Intimate Transactions*: the haptic feedback system. But for us, this project has primarily been a vehicle for research, so we will go further here than simply describe an outcome. Although this project has involved the production of an artwork and has dealt with questions of a technical nature, neither of these issues defines the research problem itself. In writing this paper, we have unpacked the developmental process and riffled through its contents, uncovering a few surprise realisations amongst the undergarments. We have seen real value within the challenges that we might usually rather forget once the process is over: all those obstacles and tensions that seemed to complicate the ease of passage towards desired outcomes. As it turns out, these challenges neatly dovetail with the major defining problem that this project has grappled with. As we see it, the general



research problem can be summarised as: *the difficulty of forming a sense of shared experience amidst the undeniable difference between us*.

Once framed in this way, the research undertaken in developing the particularities of this project can be understood to have implications well beyond the specific project itself.

The Threads of Design

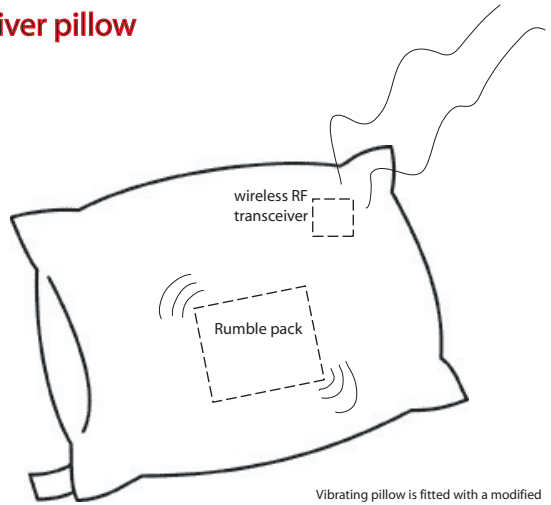
The history of our collaboration with the Transmute Collective goes back to August 2003. We were working on an exhibition entitled 'Skins of Intimate Distance'[2] (see figures on previous page) with a number of others who were gathered under the banner of the *Liveness Manifold*[3] at SIAL.[4] From a *fibreculture* announcement, we became aware of the Transmute Collective and their earlier version of *Intimate Transactions*.[5] An email exchange between Pia and Keith Armstrong in October 2003 led to a joint proposal for a collaborative project through the auspices of the Australasian CRC for Interaction Design.

During the initial development phase, Inger acted as a kind of energetic provocateur, throwing up concrete ideas, one after the other, for the crowd of collaborators to chew over and develop. Obviously, many of these ideas fell by the wayside but we resurrect them here because they reveal something about our predilections and the background threads that shaped the haptic feedback system that we went on to develop.

The first suggestion was to incorporate a modified, refreshable, digital Braille reader into *Intimate Transactions*' input device — a Bodyshelf that requires whole-of-body movements to trigger interaction. Digital Braille devices are composed of linear arrays of small, movable pins that configure themselves in response to text information from the screen. We proposed adapting this device to produce dynamically forming pin patterns that would press into the skin of players. The abstract nature of the patterns and their capacity to generate an enormous palette of differently felt contours were the main strengths of this suggestion. However, existing Braille devices turned out to have a very low resolution and building our own would have been both time-consuming and expensive.

The next proposal involved the use of hot and cold water to produce dynamically differentiated zones of warmth and coolness against the players' bodies. Perhaps a pair of colourful, bubbly fish tanks would act as water reservoirs and the water would run through a series of tubes — embedded, but still visible, within the Bodyshelf. The mechanics of this design afforded the possibility of playing up certain aspects of the experience

Quiver pillow



Vibrating pillow is fitted with a modified rumble pack which has three intensity settings. Activated by changes in shared environment.

Rumble pack has various pulse rates that can be set to send vibration 'patterns' or single pulses.

Pillow has wireless RF transceiver so it is able to be used with the shelf without being physically attached.

Back of the pillow has velcro tabs which allow it to be flexibly mounted on Bodyshelf to suit user height.

The user may also choose to hold the pillow against their body in other positions.

above: Concept diagram for the quiver pillow design
diagram: Inger Mewburn

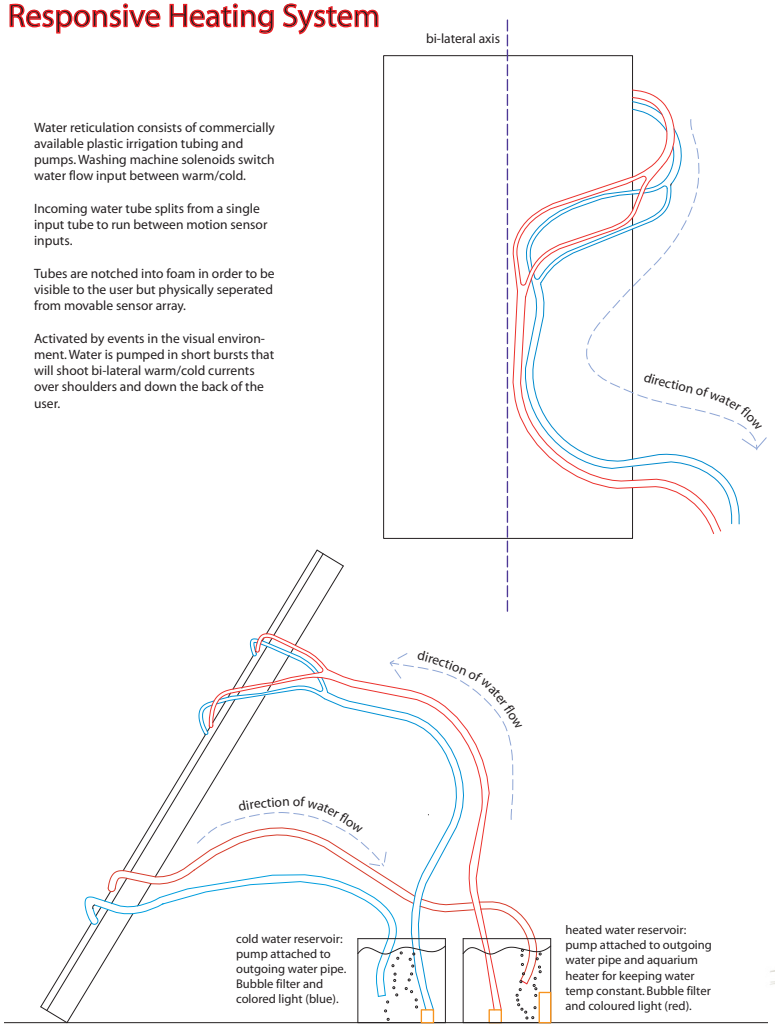
Responsive Heating System

Water reticulation consists of commercially available plastic irrigation tubing and pumps. Washing machine solenoids switch water flow input between warm/cold.

Incoming water tube splits from a single input tube to run between motion sensor inputs.

Tubes are notched into foam in order to be visible to the user but physically seperated from movable sensor array.

Activated by events in the visual environment. Water is pumped in short bursts that will shoot bi-lateral warm/cold currents over shoulders and down the back of the user.



right: Concept diagram for the hot/cold water reticulation design
diagram: Inger Mewburn

of the technology, such as the hissing of water as it pumped through the tubes. There were some technical hurdles with this proposal but the main attractions for us were the quite visceral bodily associations of the fluid running through the pipes and the explicit physicality inherent in temperature changes. In relation to the project's aspirations towards providing a sense of intimacy, the idea of producing dynamic, bodily warmth through the Bodyshelf seemed qualitatively strong. Outfitting the Bodyshelf in this way would have turned it into something akin to a responsive hot water blanket, and brought a sensual, enveloping quality to it.

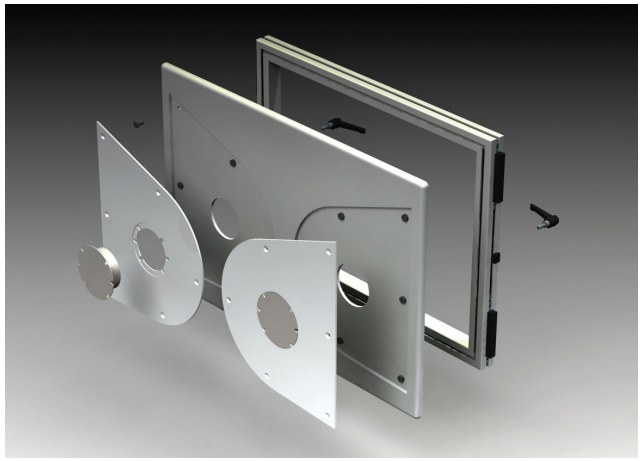
Our subsequent idea of a wireless, vibrating pillow drew upon similar associations between intimacy and the bed. Here we envisioned players positioning the pillow on any part of their body to receive its touch. The incorporation of vibration would enable us to build upon the Liveness Manifold's prior research with vibration-based interactivity — specifically Boo Chapple's *Close for Comfort*[6] and Pia Ednie-Brown's *The Shower*.[7] Off-the-shelf 'rumble packs' would be used to create the vibrations. Cheap and easy to modify, they offer a good range of differentiation within the vibrations themselves. We liked the idea of the fleshy bulk and cosy comfort of the pillow. However the Transmute Collective were concerned that the simplicity of the interface might be compromised by moving the pillow around. Nonetheless, the potential of the vibrations seemed clear to us all and this became the favoured approach.

We settled on developing a vibratory system that would be embedded both within the Bodyshelf and within a garment to be worn by the players. This approach incorporated various aspects of the previous ideas: the dynamic patterning of the pin array and the contouring of responsive feedback through soft, bodily closeness at work in the pillow and hot water blanket. Vibrations offer a form of tactility that can be contoured and embedded with texture through modulations (such as frequency, intensity, rhythm and texture) with relative technical ease. The capacity to embed qualitative difference into the tactile feedback was of great importance to our approach.

The buttocks and the stomach were identified as the two bodily regions through which the players would feel the vibrations. These are the two fulcrums through which the body moves as it negotiates the Bodyshelf. The buttocks are a site of relatively continuous contact with the Bodyshelf. They are also a region of the body that is highly sensitive to intimate touch. To incorporate vibrations that can be felt in the buttocks, a vibrating actuator has been attached to each of two plates that have been built into the shelf, one for each cheek of the buttocks. These are activated during the 'meeting' of the

right: CAD Image of the Bodyshelf, showing the position of vibrating actuator plates
drawing: Steve Curran, Upside Solutions

far right: CAD images of the actuator plates
drawing: Steve Curran, Upside Solutions



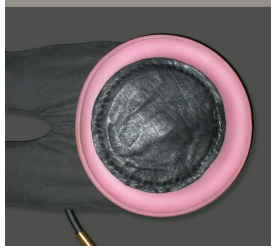
two players' avatars, when they become locked together in joint movement. As each player attempts to direct the shared avatars by moving their backs from side to side against the sensors in the Bodyshelf, data is generated in relation to their directional 'push'. This data generates the feedback vibrations in the two buttock plates, so that each player can feel the directional push of the other.

The second component of the haptic device is a garment that is worn around the neck and fastened around the waist so that it is held against the stomach. It is designed to house another vibrating actuator. The design of *Intimate Transactions'* interaction involves a choreography of movement that revolves around the stomach and incorporates the legs. As defined by choreographer Lisa O'Neill, the stomach is a central hinge through which the body curls as the back is pressed on to the shelf or is lifted away when moving from one game space to another.[8] Importantly, the stomach is also a very sensitive part of the body.

Vibrations in the pendant have been related to the player's contact with the various characters in the game space. They are activated every time the characters are 'touched' by the movement of the player's avatar across their image. These characters, in the form of creatures, have been descriptively named 'conflict', 'insatiability', 'torment', 'permanence' and 'change'. Working with Lisa O'Neill, we attempted to approximate the 'feeling' of these names through the way the vibrations of

left top: Rumble pack
photograph: Pia Ednie-Brown

left middle: Design of pendant in development
photograph: Pia Ednie-Brown



left bottom: Close up of final pendant showing pink hyperflex material
photograph: Pia Ednie-Brown

the pendant are contoured for each of the resident characters. This affords each character a unique signature, which is sketched through a rhythmic pattern of amplitude and frequency modulations. Furthermore, the strength or loudness of each character's vibration signature is affected by the global state of 'viscosity' in the game, so linking the vitality of the creature with the state of the environment. In these ways, we hope that players will feel a sense of the character with which they have made contact, as well as the state of the environment, through their stomachs.

Vibrating with Difference

> Laughter does not deny the difficulty of reconciling personal standpoints; it joyfully finesses the issue by tapping a visible corporeal bond ... to insist on presumptively shared reality.
>
> Jack Katz, *How Emotions Work*, 1999[9]

As is usually the case, our predilections and silent preconceptions, as well as those of the Transmute Collective, initially operated more implicitly than explicitly. Each proposal in the catalogue of early versions was left behind for a range of reasons: some pragmatic and technical, others to do with sensibility. Sensibility was always the least explicit contention, probably because it is harder to validate let alone admit

to. But sensibility was a very real and extremely active tension in this collaboration. Our soft, warm, pink, bodily predilections did not glide well into the cool and stylish palette of the existing *Intimate Transactions* aesthetic.

These differences in sensibility became most explicit in the process of designing the garment to house the stomach actuator. To undertake the design process, we commissioned the assistance of Naomi Raggatt, a recent fashion design graduate from RMIT. The design constraints on this piece of clothing were formidable. It had to house the electronics securely, be adjustable to many different body sizes, be resistant to sweat and body odour, be attached and detached within twenty seconds, and allow people to easily mount and dismount from the Bodyshelf. Nonetheless, these issues were resolved relatively easily. The bigger difficulty lay in the hotly contested issue of the appearance of the garment. We were always very conscious of, and insistent that, the most important aesthetic consideration was the garment's tactile qualities. Part of Naomi's brief was to find materials that were not only robust but felt soft and skin-like. We wanted to push, as far as we could, the sense that the garment is a part of the body it is strapped to. So while we openly admitted that if we had free reign, it would probably be very pink, fleshy and possibly hairy, we weren't too bothered about pulling its form and colour back toward the cool-toned, functionalist minimalism already established in the visual aesthetic of *Intimate Transactions*. From our perspective, the garment was to be felt, not looked at.

Our insistence on the amplification of tactility nevertheless produced problems. After we had mocked up the first prototype we noticed that, when the vibrations started, people often put their hand on the actuator, holding it snugly against their body. In an attempt to work with this touch, we worked a piece of hyperflex into the design of the garment. An elastic rubber with an extremely soft texture, hyperflex is a very strange material with unusually powerful tactility: people often liken its textural qualities to the delicate skin of lips and genitals. They usually react strongly to it — often to laugh. As it turned out, the least garish colour available was a muted pink. Our collaborators in the Transmute Collective were not altogether happy. While they agreed on its textural qualities, they described its difference to the established aesthetic as 'whimsical', and thought the sexual tone of it inappropriate to the project.[10] They asked us to play down the 'giggle factor' and the splash of colour in order to "match the body shelf aesthetic (grey aluminium and charcoal neoprene backrests and footboard)". They suggested that, "the design [of the garment] needs to be in greyscale [to] match the visuals and give a svelte, stylish look".[11]

Some tense email exchanges and telephone conversations ensued. The ground of difference between us had opened up and now rang with vibrant tension. Negotiating this disagreement posed difficulties. Even if we risked being a little clumsy and crude, especially in relation to the cool and beautiful construction of *Intimate Transactions*, we felt that making 'cool' with this garment worked against its efficacy. The aesthetic difference it enacted — an aesthetic grounded in touch — seemed productively resonant and, as we saw it, ushered a strange tactility and quality of intimacy into the *Intimate Transactions* environment. At one point, we realised that our artistic differences were becoming a bit like *Barbarella* vs *2001* [two science fiction films made in the same year (1968)]. Our sensibility was obviously *Barbarella*: colourful, sensual, playful and a bit clumsy. The Transmute Collective's was closer to *2001*: mysterious, compelling, slightly spooky and highly composed.

Haptic devices
photograph: Keith Armstrong

We had to laugh.

We also had to hold our ground. The pink fleshy rim was not removed, nor was it recoloured. We can only hope that the Transmute Collective warmed to it eventually.

Embodying the Difference: the Double Trouble of Distance

From the beginning, the geographical distance between the two teams made the collaborative process difficult. Most of the action was at the ACID lab at Queensland University of Technology in Brisbane, some 1,600 kilometres away, and always seemed hard to access despite the plethora of communication technologies at our disposal. And then, both groups had their histories: their own, mostly unspoken, internal dynamics and shared assumptions. Each group had almost no way of working out how the other ticked because we rarely met.

As a consequence, our knowledge of *Intimate Transactions* and our engagement with it — not to mention with the Transmute Collective themselves — often felt like it was partial, tenuous and slightly out of reach. Our artistic differences pointedly highlighted this constant issue of almost, but never quite, understanding each other. In retrospect, we wonder if this issue of

distance — both geographical and social — acted to strengthen our insistence on retaining some remnant of the qualities at work in the catalogue of developmental ideas: sensual vibrancy, embodiment, warmth and closeness. We always wanted to bridge the gap that we felt was between us by pushing a sense of the body into the picture.

All this leads us to a sweet and poetic realisation. There was a deep and poignant irony at play amidst this particular research process. The Transmute Collective and the Liveness Manifold had the same problem to deal with as the one that ACIN and *Intimate Transactions* sets up for its two players. Our situation embodied the very acute problem that the whole project addresses: the difficulty of forming a sense of shared experience when there is so much distance (and difference) between us.

Laughter as Realisation of the Problem

There is another irony that unfolds here. Our desire to bridge the gap involved a desire to acknowledge and work with difference. In everyday life, the need often arises to smooth over cracks in the fragilities of social cohesion because we are compelled to maintain ease in social relations. In his study on laughter, sociologist Jack Katz points to Arthur Koestler's argument that humour is, "in its essence a simultaneous orientation to two or more inconsistent perspectives."[12] But, as Katz goes on to point out, this is only part of the story. In addition to these incompatibilities he suggests that, to provoke laughter, "a formal inconsistency of perspectives must become practically untenable."[13] In other words, there has to be a compulsion to integrate or exert a common interest.

Laughter does not obfuscate the extreme difficulty and frequent absurdity of our attempts to pretend that we act together easily. It simply acts as a bridge while leaving the gaps open. There is a risk that such bridges will close the opportunity for a deeper moment of sharing. Often, perhaps mostly, this danger plays itself out. But, in the meantime, the potential for a sense of shared experience has been both invigorated and complicated through laughter — even if this is simply a shared acknowledgement of irreconcilable differences. When we laugh it is often because what generated the humour is unspeakable or unthinkable: if we stop to think, we often have difficulty articulating or explaining precisely what made the moment funny (without, at least, explaining the humour away). Laughter marks for us that we have felt a provocation and expressed its touch.

One of the most interesting observations taken from the research sessions where we observed *Intimate Transactions* in use at the Australian Centre for the

Moving Image (ACMI) was that people often laughed at the moment when the avatars of the two players finally made contact and connected. When connection was really felt, people vibrated of their own accord: they laughed in an eruptive recognition of contact that was realised despite the radical distance involved between them. They expressed the ground of difference through their own, qualitative vibration. What seems so delightful to us in this act is that they rendered the vibrations of the actuators virtually redundant. Our response to the broad research problem (of inserting vibration into the work) met neatly with their embodied response to the *felt realisation* of that problem.

Every fold of this research project has seemed suspended in the particular problem of meeting amidst the vibrations of difference. This is precisely what laughing can achieve. Laughter not only rescued us all from bouts of frustration and awkward moments, it prodded at precisely the problem we were working with. What laughter suggests is that despite — or possibly because of — the gaps we have to bridge, intimate connections still occur. It tactically and tacitly offers the possibility of the emergence of another shared territory between us. Of course, laughter is not always such a positive force. It does not, in itself, necessarily initiate happy moments of shared experience. It is, instead, very often interpreted as derisive: where the act of acknowledging a difference or incompatible points of view is also one of mocking, alienating, or negating by not taking something seriously enough. But once difference is acknowledged, once we are not worried that we might have different understandings and different ways of doing, humour is a powerful tool for bringing people together. It helps to form and strengthen a community from which potential developmental unfoldings can proceed.

The Power Between Us

Our laughter is not intended to be flippant or derisive here. This research project was of great and significant value for us and for our research. But we also believe it holds value beyond us. We must ask, "what, after all, is the value of this project?" Or, to put it another way: "How is it interesting?" In approaching these very questions in relation to measuring the value of research, Isabelle Stengers responds with further questions:

> Does it have the power to create a new link between us which nobody could reduce to a matter of belief or of interpretation? In other words, does it have the power to situate itself between us?[14]

Could any questions resonate more poignantly with *Intimate Transactions* as a research project? Certainly

we found that its fruits lay in understanding something of the nature of the power situated between us: a power that vibrates with the texture of difference. In our opinion, the value of this particular project lies in actively exploring ways and means through which we might deal with that difficult political, social, ethical and perhaps universal problem we keep repeating: *the difficulty of forming a sense of shared experience amidst the undeniable difference between us*.

And doesn't this quite simply involve managing to mutually and respectfully be affected by difference? We suspect that this often entails declaring the baggage we often hold close to the chest — both to ourselves and to one another. It also means that we must often look out for those threads that are often overlooked but erupt in moments, such as those filled with laughter, when we feel the unthinkable.

1 Professor Mark Burry's work on the *Sagrada Familia* and his involvement in the complex, cross-disciplinary and globally distributed *Aegis Hyposurface* laid important ground upon which SIAL's expertise in this area has developed. See http://www.sial.rmit.edu.au

2 See http://liveness.sial.rmit.edu.au/skins

3 Ibid.

4 http://www.sial.rmit.edu.au

5 http://www.fibreculture.org

6 This project was part of *Skins of Intimate Distance* and is documented at http://corpuseclectica.net/closeforcomfort.html

7 'The Shower' is a sonic-architectural, interactive installation piece produced in collaboration with Bruce Mowson. It is documented at http://www.onomatopoeia.com.au

8 This approach was developed through Lisa O'Neill's dance practice, which deals with energy in the stomach and through the legs. It is discussed in detail in her essay in this volume.

9 Katz, Jack, *How Emotions Work*, Chicago, London, 1999, pp. 318-319.

10 Armstrong, Keith, email to Pia Ednie-Brown, Inger Mewburn, Naomi Raggatt, (cc. Guy Webster, Gavin Winter), January 21, 2005 9:33:17 PM GMT+11:00.

11 Ibid.

12 Quoted in Katz, Jack, *How Emotions Work*, p. 104.

13 Katz, Jack, *How Emotions Work*, p. 105.

14 Stengers, Isabelle, 'Another Look: Relearning to Laugh', Penelope Detacher (trans.), *Hypatia 15*, Fall, 2000, p. 48.

Deploying GrangeNet for Dual-Site Connectivity of a Creative Work

Gavin Winter

Gavin Winter is the Research Technology Manager of the Australasian CRC for Interaction Design (ACID), where he develops and maintains high-end computing environments for ACID's research programs, including the Australasian Creative Industries Network (ACIN) project. His research interests include the co-location of streaming media content and the development of a high-speed, low-latency network system for the exhibition of co-located, interactive, creative works.

The Australasian Creative Industries Network (ACIN) was formed with the agenda of providing a suite of tools and methods to support collaboration — both between an online community of creative practitioners and between gallery visitors in networked exhibitions and real-time events. ACIN's research scope therefore includes enquiry into quality of service issues for the software, hardware and high-speed networks required for participatory, online, interactive exhibitions. As a dual-site interactive artwork that utilises visual, sound, and physical computing systems within an integrated technology architecture, *Intimate Transactions* provided us with a test ground for several communications protocols and network technologies including TCP/IP (Internet Protocol) networks for the (Macromedia) Shockwave Multi-user Server and Access Grid™ video conferencing system, MIDI Network for sound events, and Serial (RS428) communications for local (end-user) sensors and controllers. The artwork's distributed installation at The Block in the Creative Industries Precinct at Queensland University of Technology (QUT) in Brisbane and the Australian Centre for the Moving Image (ACMI), over a thousand kilometres away in Melbourne, provided the opportunity to extend the use of the Australian GrangeNet research network into an exhibition/installation context.

Using IP networks to facilitate participant collaboration within *Intimate Transactions* posed particular technical challenges because, while technology like Access Grid had been established in academic institutions for meetings and collaboration, the requirements are very different for a creative work. Artworks like *Intimate Transactions* combine digital and traditional mediums and involve human performers. These characteristics place high demands on IT systems and production values (vision, audio, lighting, setting, etc.) and it is vital that the systems are reliable to ensure an uninterrupted and seamless experience of the work. In the short essay that follows, I will describe the approach taken and the challenges faced by ACIN

in extending the role of IP networks into the realm of creative art and distributed gallery sites.

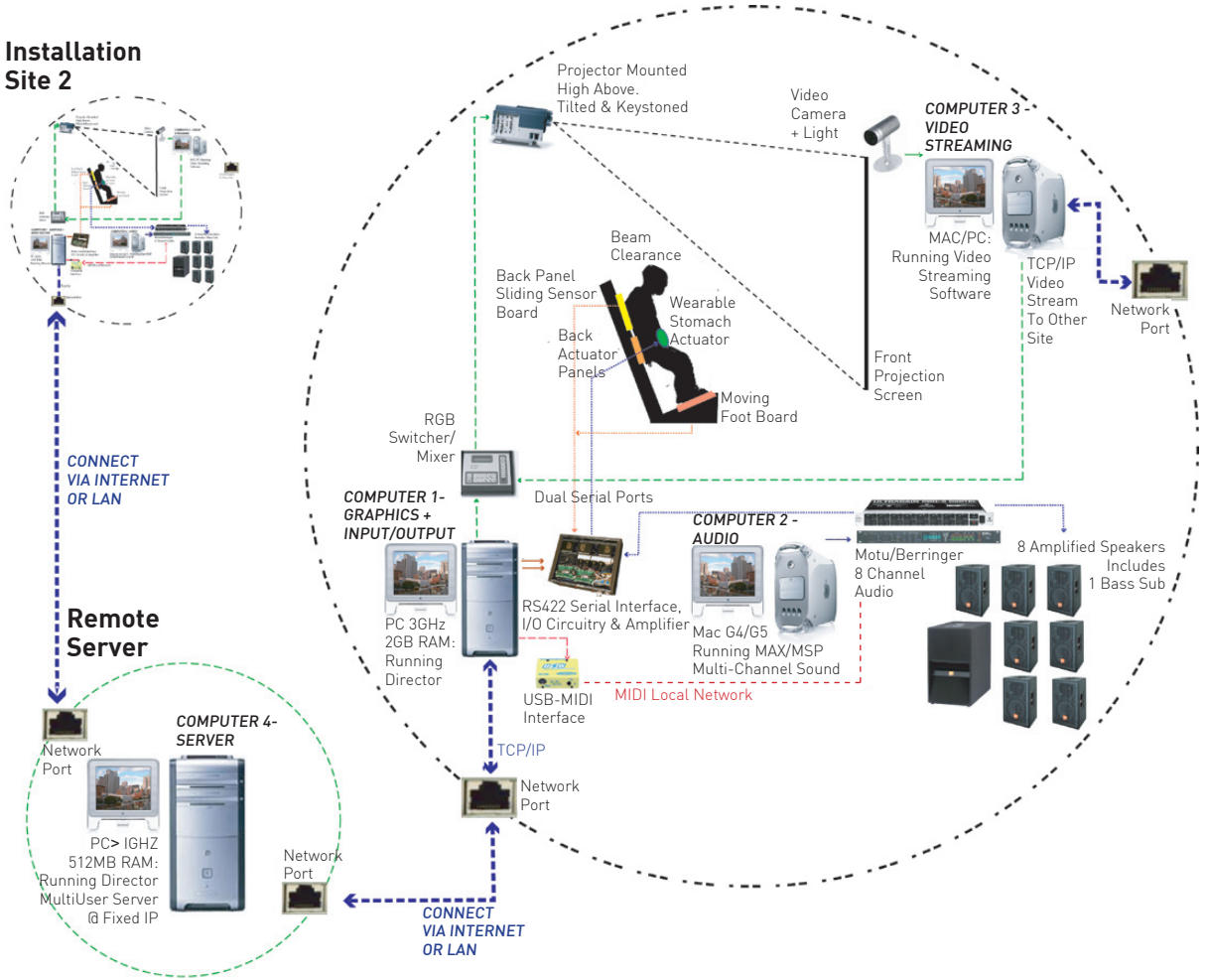
TCP/IP Communications and GrangeNet

Intimate Transactions requires connection to an IP network to communicate the input data from pressure sensors in each of its Bodyshelves to the computational system that generates the movement and events of each onscreen avatar. This data is passed via a Shockwave multi-user server at about the same volume as a streaming video from a broadband news service. However, while the transmission of streaming media content can sometimes have intermittent delays or quality levels, for the purposes of *Intimate Transactions* the data must be transmitted rapidly, continuously and without corruption in order to ensure a smooth experience for the end users. This requirement makes the commodity Internet unsuitable and the use of new research networks mandatory. Therefore, the dual-site installations of *Intimate Transactions* at QUT and ACMI were connected via GrangeNet.

Separate from the commodity Internet, GrangeNet is a high-speed research network that spans the east coast of Australia with tie-ins from west coast networks. It is a division of AARNet, a government-owned organisation established to provide academic and research institutions across Australia with next generation network connectivity.[1] While GrangeNet was established to provide high-speed connectivity to universities for the purposes of conferencing, it had not yet been deployed in a museum setting for the purpose of connecting an artwork between sites using high-speed data transfer to produce concurrent, real-time effects. We therefore not only had to establish and configure the networks of both institutions to ensure maximum efficiency and high-quality service, but also tune them to support the specific needs of interactive, collaborative creative works within a dual-site museum setting.

The überPAG: the Portable Access Grid System

GrangeNet is also used to support Access Grid video conferencing between participants after their experience of the work. The Access Grid provides them with a second tier of communication, where they can see who they have been collaborating with through the work. During the trialling of the work at its first venues, Access Grid conferencing was also used to coordinate backstage operations, allowing operators and stage technicians to communicate and synchronise each session and it was



Intimate Transactions system diagram
diagram: Keith Armstrong, 2006

utilised by researchers in each city to exchange analysis and feedback on the work.

Access Grid is an IP-based video, audio and data application suite. Because it is conducted over an IP network, it is superior to traditional video conferencing because it maintains high-quality video and audio with minimal latency. (The Access Grid Toolkit uses standard video codecs[2] including H.261 video codec which allows transmission of 30 frames per second at about 1026 Kbps and allows audio to be transmitted and received at 16Khz-mono at 256 Kbps.) Because of this high-speed data transfer, Access Grid allows multiple participants to join virtual collaborative environments and to share and interact with data in real time. To meet the needs of creative works such as *Intimate Transactions,* which move from gallery to gallery as part of a touring programme, we built a Portable Access Grid (PAG) at ACID. Essentially, it is a computer in a cabinet on wheels, with a special cooling system (required to minimise noise within the small rooms that constituted the installation environments).

A Unicast-bridge

Although we faced many challenges in network services, network security, computer system design and AV systems (each of which introduced possible points of failure that would affect the work), the main problem with potential unreliability was presented by the *unicast-bridge* server required to connect the ACMI *unicast* connection to the QUT *multicast* connection (the Victorian Cultural Broadband Network (CBN), which provides GrangeNet to ACMI, did not enable multicast at the time). To use Access Grid on a unicast connection, the computer being used must route all video and audio data through a unicast-bridge. During the initial test installation, the bridge server available to the team periodically required rebooting due to an unidentified cause. This either delayed the research sessions or caused them to be cancelled. (Work has since been conducted to enable multicast on the CBN.)

The Challenge of Network Security

Another challenge the team faced was network security. GrangeNet is provided to clients within universities as part of the corporate network topology. This means that stringent security systems are built into it to ensure that the network remains safe from external threats (i.e. Firewalls). The *Intimate Transactions* software system required a range of inbound and outbound network communications, and at times it was hard to identify the specific port numbers that needed

Lisa O'Neill interacting with a creature's internal objects, 2005
photograph: Keith Armstrong

to be opened in the Firewall because Access Grid also requires inbound and outbound access on arbitrary port numbers. We therefore worked with IT Security engineers who provided open access for the system. Often, such access was required at short notice due to the limited available testing windows.

Conclusion

To ensure the success of creative work that will be deployed across the high-speed network, the principles of network design, data prioritisation, and the application of traditional production values must all be incorporated into a work's design and implementation. To support the installation of creative works on the network, network engineers and administrators must analyse their network and tune it to meet creative needs. We must take into account latency minimisation, simplified data routes, quality of service and network security. In the case of *Intimate Transactions* we also had to plan for touring, through the mobility provided by the Portable Access Grid. After taking these considerations into account, the *Intimate Transactions* installation operated to expectations and was well received by participants. Since the first installation, which acted as a test case, the technical lessons we learned from the experience have helped us to deliver more complex and professional productions.

1 Identical services exist in the USA (Internet2) and in the UK (JANET).

2 H.261, H.263, G.711, G.723.1, G.728.

Supporting Innovative Artworks in Public Art Galleries and Museums

Mike Stubbs

Mike Stubbs is the Head of Exhibitions at the Australian Centre for the Moving Image (ACMI), Melbourne, where he has produced and curated a number of exhibitions including the award-winning 'White Noise' in 2006. Encompassing a broad range of arts and media, his own art practice has been internationally acknowledged. In 2002 he exhibited at the Tate Britain and was awarded a Banff Fleck Fellowship in 2003. He was part of a feedback group to beta test versions of Intimate Transactions *and, along with ACMI curator, Alessio Cavallaro, he oversaw the installation and exhibition of* Intimate Transactions *at ACMI in April 2005.*
http://www.forma.org.uk/artists/mike_stubbs.html
http://www.acmi.net.au

At the age of five, I pressed a button at the Science Museum in London and a scale model steam engine stirred into life. It made a strong impression on my young memory. I was satisfied, but did anyone notice other than my dad? Over time, the process of measuring customer satisfaction has improved. Now, in addition to counting smiles, staff at the Science Museum conduct qualitative research on prototype displays in order to gauge a wide range of responses. Access, intelligibility, entertainment value and durability of the interface are all assessed to predict a range of user experiences. These evaluations directly influence the final exhibition design and display process.

Inevitably, similar strategies of trialling installations with sample audiences in order to provide a more satisfying experience for the public have been increasingly adopted by cultural institutions, as they evolve from housing and displaying public treasures to offering interactive experience. Competing in a market-driven environment alongside theme shopping, commercial sport and mass entertainment, it is now essential for large-scale organisations such as the Australian Centre for the Moving Image (ACMI) to meet key performance indicators — including visitor numbers and policies of social inclusion — in order to fulfil our obligations to funding bodies. Because we recognise that our audiences make return visits when they have been actively engaged, it is important for organisations like ACMI to make the display of the moving image a hands-on experience that provokes curiosity and interaction.

However, a 'hands-on' approach has significant implications for cultural institutions. The early experiences of pioneering hybrid museums quickly demonstrated this. The grand opening weekend of ZKM, Center for Art and Media, Karlsruhe, in October 1997, saw 20,000 people celebrate one of the most significant

developments in the exhibition of new media art. Adjacent to ZKM, the Contemporary Art Museum curated its paintings to provide historical context for ZKM's video installations and interactive media. Unfortunately, some of their collection was damaged. Having been encouraged to interact with work in the media museum, audiences attempted to 'activate' some of the paintings.

The presentation of interactive artworks also has economic ramifications for host institutions, especially when their interaction design establishes new protocols. For while there now is a general familiarity with the interactive touch-screen interfaces and 'push' technologies that commonly make us active participants in museums and art galleries, many new media artworks anticipate a higher expectation of interactivity. As the complexity of interactive artworks increases, the time and assistance required for audiences to become comfortable with them does too. This presents new responsibilities for the host institution, including the need to train staff to operate unfamiliar systems and to assist with supporting audiences.

Intimate Transactions, which was presented at ACMI in April 2005, is an example of an artwork that places particularly high demands upon its audience and support staff. This is because it occupies the uncharted space where research and development meets public access. *Intimate Transactions* provides a new and unfamiliar interactive experience. Understanding its dual-site experience is a complex task in itself, but the work also requires audiences to become performative participants and to create relationships with the work. As with all new relationships, protocols need to be learned before the participants can relax enough to enjoy the experience. The artists behind the work, the Transmute Collective, therefore worked through a range of issues with the Client Services team of ACMI beyond the generic issues of engagement and way-finding.

One of our Visitor Services Officers, Kate O'Hara, made a number of interesting observations during the week of the installation of *Intimate Transactions* at ACMI. Kate's role was to help participants to become comfortable using the work's Bodyshelf and interface. She noticed that patrons often felt nervous prior to the experience and they would frequently call out for assistance. Audiences had now become performers, and performance anxiety can be an inhibitor. One participant, close to tears, had to be reassured that there was someone behind her to help before she began to relax. Even participants who were more savvy (including one who was known to be part of the alternative games

developer community) initially sought guidance on the interface and the explanation of a clear objective. Some younger participants wanted to know how to 'shoot'.

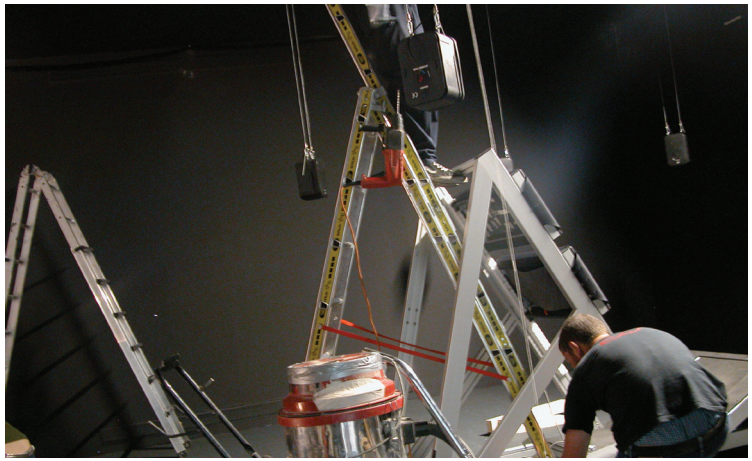
Intimate Transactions is subtler than the steam engine installation I experienced a long time ago at the Science Museum. Its non–objective–driven interaction was difficult for some participants to initially conceptualise. The experience of *Intimate Transactions* relies upon the discovery of the effect that the participant has had on the artwork's world. To abbreviate this would lessen the impact of the experience. To a certain extent, the participant needs to be under the misapprehension that the objective is to collect all the objects in the virtual world for meaning-making to occur. The artists had therefore requested that, rather than giving definitive answers about what participants should do, our support staff should suggest 'exploration' and explain how to interact with the participant at the other location.

ACMI has presented a number of interactive works that have tested and rewarded the willingness of audiences to interact. Like *Intimate Transactions*, installations by Ryoji Ikeda, Adam Donavan, Char Davies, Jeffrey Shaw, Simon Penny and Troy Innocent have required relatively high levels of staff support and very particular briefings for those on the front end of public engagement. My experience in curating artworks such as these has made me aware that building context and supporting audience engagement is as important as the artwork itself. People learn new software and approaches to interaction through an intuitive process, which comes from inquisitiveness but is supported by experience. In the meantime, people's learning abilities are directly related to their level of confidence. Having the friendly faces of trained staff to encourage and assist them helps them succeed.

Over time, we have begun to see changes in the technical sophistication of audiences. Earlier presentations of interactive works with less sophisticated forms of interface (such as *Faraday's Garden* or *Systems Maintenance* by Perry Hoberman in the early 1990s in northern England) required as much guidance from staff as complex works like the Transmute Collective's piece do now. This is because patrons who return with prior experience of media artworks need less induction, but also because innovation is gradually subsumed into everyday life through commercialisation and broader awareness. As they have become ubiquitous, technologies that require interaction (from computers to mobile phones) have increased people's ability to adapt to different interfaces.

Supporting innovative artworks such as *Intimate Transactions* as they transition research and development into the realm of public interaction is an important role for institutions like ACMI. If, as cultural institutions, we are to engage with 21st century audiences, we must be involved in the processes of mediating complex ideas and enabling audiences to be comfortable as they engage in new processes, experiences, language sets and meanings. However, there must be an understanding that the installation of interactive art makes significantly different demands to the exhibition of static objects in a museum. The shift in the perception of our audiences from consumers to participants must be accompanied by the understanding that we need to become involved in active conversations with them, both to encourage their interaction and to listen to their feedback. Interactive artworks require a real commitment to this support and monitoring of audiences, with all the resource implications that this entails. Nonetheless, it is only through such a commitment that organisations such as ACMI can continue to stimulate, educate and entertain a broad sector of the population through artworks that challenge existing understandings and relational models.

With thanks to Kate O'Hara and Sam De Silva for assistance in writing this essay.



Installing Intimate Transactions
at the Ars Electronica Festival,
Linz, Austria, 2005
photograph: Keith Armstrong

Am I the Lighter One? Awareness in a Dual-Site Networked Installation

Jamie Madden and Stephen Viller

Jamie Madden is a postgraduate student in the School of Information Technology and Electrical Engineering (ITEE) at the University of Queensland. His Masters topic, Supporting Awareness in Collaborative Communication, focuses upon awareness and presence within Computer Supported Cooperative Work (CSCW).

Dr Stephen Viller is a lecturer in the Information Environments Program at the University of Queensland, He conducts research in the Interaction Design Research Division within ITEE. His interests lie in the CSCW field, particularly in methods for informing the design of cooperative system.

Together, they conducted a study on user experience of Intimate Transactions.
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The field of Interaction Design provides multiple perspectives on how we might understand and influence the experience of interactive technologies. We are particularly interested in how the networked new media art installation, *Intimate Transactions*, can be viewed as an example of Computer Supported Cooperative Work (CSCW). CSCW is concerned with understanding social settings and the design of technologies that support the people within them. Despite its name, which belies a (mid 1980s) origin in a workplace-oriented view of the world, this field has grown over the years to encompass a wide variety of systems and technologies in a range of social settings including the home and entertainment. *Intimate Transactions*, when viewed as an example of CSCW, is a work that explores how two people in different locations can interact with each other via embodied[1] interaction devices (Bodyshelves) in a virtual environment where they *transact* with each other as well as the environment's population of on-screen creatures.

When we joined the Australasian Creative Industries Network project, our primary interest was in its agenda to explore how interactive media artworks could be developed, installed, and ultimately exhibited within computer-based, networked environments. Our backgrounds in CSCW and Human Computer Interaction naturally drew our attention to how networked environments can be developed to support multiple-site installations like *Intimate Transactions*. As the project unfolded however, and the primary focus shifted from how to develop a general-purpose high bandwidth, low latency networked environment to support such works towards the more targeted development of *Intimate*

Transactions as an exemplar of how such a work could be supported as a deployment of collaborative technology, our research refocused. We became particularly interested in how people can collaborate via an application of technology that not only removes them from the now 'traditional' interaction devices of keyboard, mouse and screen, but also creates an abstract virtual environment through which the collaboration takes place. Our aim became one of understanding how collaboration is supported in this context and what lessons, if any, can be drawn from this project to inform the design of CSCW technologies in general.

One of the enduring aspects of CSCW research has been an ongoing investigation into the nature of 'awareness', including how it can be supported in collaboration technology. Awareness initially came to be of interest to CSCW researchers due to a number of ethnographic workplace studies that revealed the way in which people not only maintain a sense of what activities their co-workers are currently engaged in but also orient or display their own activities so that they are more open to scrutiny and monitoring by others.[2] Ultimately, a number of different characterisations of the phenomenon were identified including 'passive awareness', which is concerned with how awareness information is embedded in our surroundings in a way that it can be attended to indirectly by others[3] and 'mutual awareness', which relates to the reciprocal nature of monitoring and displaying awareness information (and how to manage it in a collaborative virtual environment).[4]

Various technologies have been developed to explore these notions of awareness. The implicit and seamless coordination of activities in everyday collaborative settings are a feature that many designers of CSCW technology have attempted to support. Notable early developments occurred within 'media spaces', which are permanent audio and video connections between different locations (often research laboratories) to support informal communication between distant colleagues.[5] Collaborative Virtual Environments (CVEs) were created as places where colleagues could meet and collaborate.[6] One of the challenges in developing such CVEs involved managing displays of information about each participant's activities in order to avoid the situation where every action is visible (and audible) to every participant regardless of their current focus or location. This problem was ultimately solved with the development of a spatial model of interaction that creates boundaries within which participants are mutually aware of each other (in much the same way as the walls of rooms form the boundaries of physical interactions).[7] Simple

awareness features are now built into commonly used systems such as instant messaging (IM) applications (e.g. ICQ, MSN, iChat) to allow different degrees of awareness information to be displayed (such as basic 'away' or 'idle' states through to text descriptions that the user can enter to provide more information about their current activity and availability).

Kjeld Schmidt, a prominent writer on CSCW, has qualified the understanding of awareness that has been described. He argues that,

> 'Awareness' is not the product of passively acquired 'information' but is a characterisation of some highly active and highly skilled practices. Competent practitioners are able to align and integrate their activities because they know the setting, they are not acting in abstract space but in a material environment, which is infinitely rich in cues.[8]

Although the settings that Schmidt refers to are primarily workplace settings, within which the actors have a degree of familiarity or 'competency' in interpreting the available cues regarding their co-workers' current activities and status, as well as in making similar cues available for scrutiny by others, it raises an important consideration for our study on how awareness manifests in participants' experiences of *Intimate Transactions*. It must be noted from the outset that, while some of the participants in our study were relatively competent (because of their previous experience of *Intimate Transactions* in its earlier incarnations), on the whole the participants should be considered novices.

Given that *Intimate Transactions* is a dual-site, networked installation that is designed for use by two people who may never see each other, we were particularly interested to find out how effectively the abstract representation of a participant via an avatar transmits awareness information to the other participant. The ultimate focus of our study was concerned with how an abstract interface, such as the one offered by *Intimate Transactions*, might inform the design of awareness cues in other remote collaboration settings.

The Study

Our user study was conducted during the *Intimate Transactions* dual-site showing at The Block at the Creative Industries Precinct at Queensland University of Technology in Brisbane and the Australian Centre for the Moving Image in Melbourne. Each of these

institutions housed a site: a small 'black room'. As described elsewhere in this publication, it contained several speakers, a large projection screen, a Bodyshelf and a wearable haptic device. To minimise possible interruptions, only the participant and an operator were present (besides ourselves as observers). The operator was available to assist with putting on the haptic device, introduce the operation of the device, start a short training video, and answer any questions before the start of the experience. The training video presented participants with an illustration of the representations of self and the other participant in the work, a demonstration of how to control these avatars through the use of the feet and back on the Bodyshelf, and all the possible interactions that the participant could have with the person at the other location. As the work was very popular, it was necessary to limit each participant to twenty-five minutes on the Bodyshelf, including the training video.

The study was conducted through observations of the research participant, focus group feedback and a questionnaire. There were six observation sessions in total, each involving a participant at each site. The primary focus of the study was evaluating the effectiveness of the abstract information display for the participants. There were also many questions about perceptions of the levels of abstraction, training, and the technology behind the artwork that were of interest to us.

Observations were conducted at both sites. They consisted of the participant, the operator and a number of researchers who observed the interactions from the back of the room.[9] On occasion, the observations were conducted from outside the room via a control room, where interactions at the current site and the remote site could be seen simultaneously (via an Access Grid video link). The participants were unaware of this external observation until after the conclusion of their interaction.

The focus group discussion sessions occurred immediately after each interaction. They centred on the effectiveness of the awareness information display. Gauging the effectiveness of these representations was measured by asking each participant if they were able to sense the presence of the other participant. All sessions lasted between twenty minutes and an hour and were recorded on digital videotape using lapel microphones to ensure high quality audio for later review. The high-speed Access Grid video network was used, when available, to provide an open video and audio dialogue between the participants and researchers at both sites.

A brief, two-page questionnaire was also provided to everyone who participated in *Intimate Transactions* at both sites. Six questions addressed our research interests and those of the artists. They covered the participant's previous experience with *Intimate Transactions*, how they felt about the experience overall, the feeling of presence of the other participant, how the vibrations from the tactile device contributed to the experience, what they felt about interacting via the Bodyshelf, and how they felt at the end of the experience. An open question requesting feedback on any aspect of the work and on the study itself completed the questionnaire.

The results of the six research sessions were then collated from the videos, the hand-written notes taken during the discussions, and the questionnaires.

Conclusions

So what did we learn as a result of conducting this study? Firstly, the participants gave overwhelmingly positive feedback about their experience of *Intimate Transactions*. They found it engaging, and were invariably surprised when their fifteen-minute session was over. Participants often mentioned an altered perception of the flow of time, in concert with high levels of engagement.

With the help of the training video, most of the participants were quickly able to learn how to use the new interaction device (the Bodyshelf) with only one participant requiring assistance from the operator. Many of the participants reported that, once familiar with the interface, it was easy to interact with the environment and the avatars. All but one of the participants reacted to the appearance of the other avatar and began an attempt to connect with them. "Once I saw the other participant, I wanted to dance," reported one of the participants. "As soon as I saw them, I wanted to chase them," mentioned another.

Alongside this positive feedback and willingness to engage, there were some perceptual issues with regards to the abstract representations of 'self' and 'other'. While all respondents reported that they knew what the two avatars meant and were able to achieve a sense of presence from this knowledge, their ability to be 'aware' of the other person was nevertheless difficult. As one participant reported, "I had a sense of them, I knew about them, but not about the person or what they were doing." Another participant wondered, "Can they sense me?". This participant also had trouble understanding the actions of the other person, stating that, "I saw the other avatar and it disappeared straight away. Why did you

move away?" Another commented, "I was excited, but lonely, I wasn't aware of the other person." This led us to conclude that a full sense of awareness of the activities of the other person was not achieved.

This diminished sense of awareness can mainly be attributed to the work's spatial partitioning model. Although the environment is shared, it is possible to enter your own, personal space. While the larger world is a shared space, the smaller environment (inside the creatures) is an isolated and individual space. When your opposite goes inside one of the creatures to transact with it (collect objects), there is no representation in the main space to denote where they are. Four of the participants spent most of their time inside the creatures, which made it difficult for their opposites to locate them. This confused some of the participants, with one reporting, "I wasn't able to find the other person, I knew there was someone there, but I couldn't find them." [In this case, the operator intervened, encouraging the other participant to return to the larger environment so that they could experience the intimate transaction.]

Secondly, there was no direct communication between the two avatars and this led to difficulties for some of the participants in understanding how to coordinate with one another when they wanted to join. Thirdly, for three of the participants, the abstract representation of self and other as light and dark versions of the same avatar presented difficulties. While they found that it wasn't difficult to understand the single avatars or the meaning of the appearance of both on the screen at the same time, when the two avatars overlapped to join together, they found it hard to distinguish who was who. This led one of the participants to ask, "Am I the lighter one?".

It is important to note that none of these issues prevented participants from reporting positive experiences on the whole. Nonetheless, it means that findings that can be applied to the design and implementation of abstract representations to produce awareness in CSCW systems are unfortunately limited. A major contributing factor to this lack of transferability is the issue of 'competency' of the participants. We use competency here to reflect the terminology used earlier in this chapter, and its reference to everyday, routine competency within a particular working environment. The ecology of a workplace that one is familiar with offers many cues and opportunities for displaying and attending to 'where things are at', based on one's

knowledge of the norms and habits of others. Twenty-five minutes interacting with *Intimate Transactions* is hardly enough time to gain basic competency in navigating around the environment using interaction controls that are unfamiliar. Therefore, only the participants who had experienced *Intimate Transactions* previously were likely to be in a position to demonstrate this kind of ecological awareness.

Some of our unexpected findings may be of consequence to the field of CSCW however. Firstly, as one of the participants suggested, the intimate transaction was a form of communication in itself. And it is clear that perceptions of the other person were created by the relationship that was established through this communication. For example, one participant was surprised to find that the other party was actually a woman. "That's strange, I thought it was a guy at the other end," She reported. When asked to justify why, she responded with, "At first they were absent, and when they were there they were trying to be dominating".

Here lies a noteworthy contrast between *Intimate Transactions* and mainstream CSCW technology. It involves the impact of knowing or not knowing who is at the other end of the interaction. The case presented above of mistaken gender was not isolated. There seems to be something about the inherent potential for conflict when it comes to the collaboration required in the *Intimate Transaction* in order to return the objects to the creatures, which in our study led to people of both genders assuming that the person at the other end was male. We therefore suggest that future studies might perhaps explore the effect of providing a brief video link-up prior to the experience of *Intimate Transactions*, as well as afterwards. We are interested to know whether a brief glimpse of the person at the other end would lead to differences in behaviour through the artwork.[10]

Secondly, the abstract and ambient nature of awareness information in this project may be of interest to the field. Participants are told in the instructional video that their actions inside the creatures (collecting and removing objects) will have an effect not only on their own virtual world, but also on the remote collaborator's world as well. This means that an individual's activity is reflected remotely through modifications to the representation and behaviour of the environment and the creatures within it. This is not something that was referred to by the participants following their experience, which suggests that the effects might be too subtle when compared with the local effects of one's own

activity. Alternatively, it could be an argument in favour of further, longer-term studies on people's interaction and engagement with this type of collaborative installation to see if more subtle insights into awareness of remote presence and activity can be attained.

1 Dourish, Paul, *Where the Action Is: The Foundations of Embodied Interaction,* MIT Press, Cambridge, MA, 2001.

2 See, for example, Harper, Richard H., Hughes, John A., and Shapiro, Dan Z., 'Working in Harmony: an Examination of Computer Technology in Air Traffic Control,' in *ECCSCW'89: Proceedings of the First European Conference on Computer Supported Cooperative Work*, J. Bowers and S. Benford, eds. Gatwick, UK, 1989, pp. 73-86; Heath, Christian and Luff, Paul, 'Collaborative Activity and Technological Design: Task Coordination in London Underground Control Rooms,' in *ECSCW'91: The Second European Conference on Computer Supported Cooperative Work*, L. Bannon, M. Robinson and K. Schmidt, eds. Amsterdam, 1991, pp. 65-80.

3 Dourish, Paul and Bellotti, Victoria, 'Awareness and Coordination in Shared Workspaces' in *Proceedings of ACM CSCW'92 Conference on Computer-Supported Cooperative Work, New York*, 1992, pp. 107-114.

4 Benford, Steve, Bowers, John M., Fahlén, Lennart E. and Greenhalgh, Chris, 'Managing Mutual Awareness in Collaborative Virtual Environments' in *VRST'94: Proceedings of the ACM SIGCHI Conference on Virtual Reality and Software Technology*, G. Singh, S. K. Feiner and D. Thalmann, eds. Singapore, 1994, pp. 223-236.

5 Dourish, Paul and Bellotti, Victoria, 'Awareness and Coordination'.

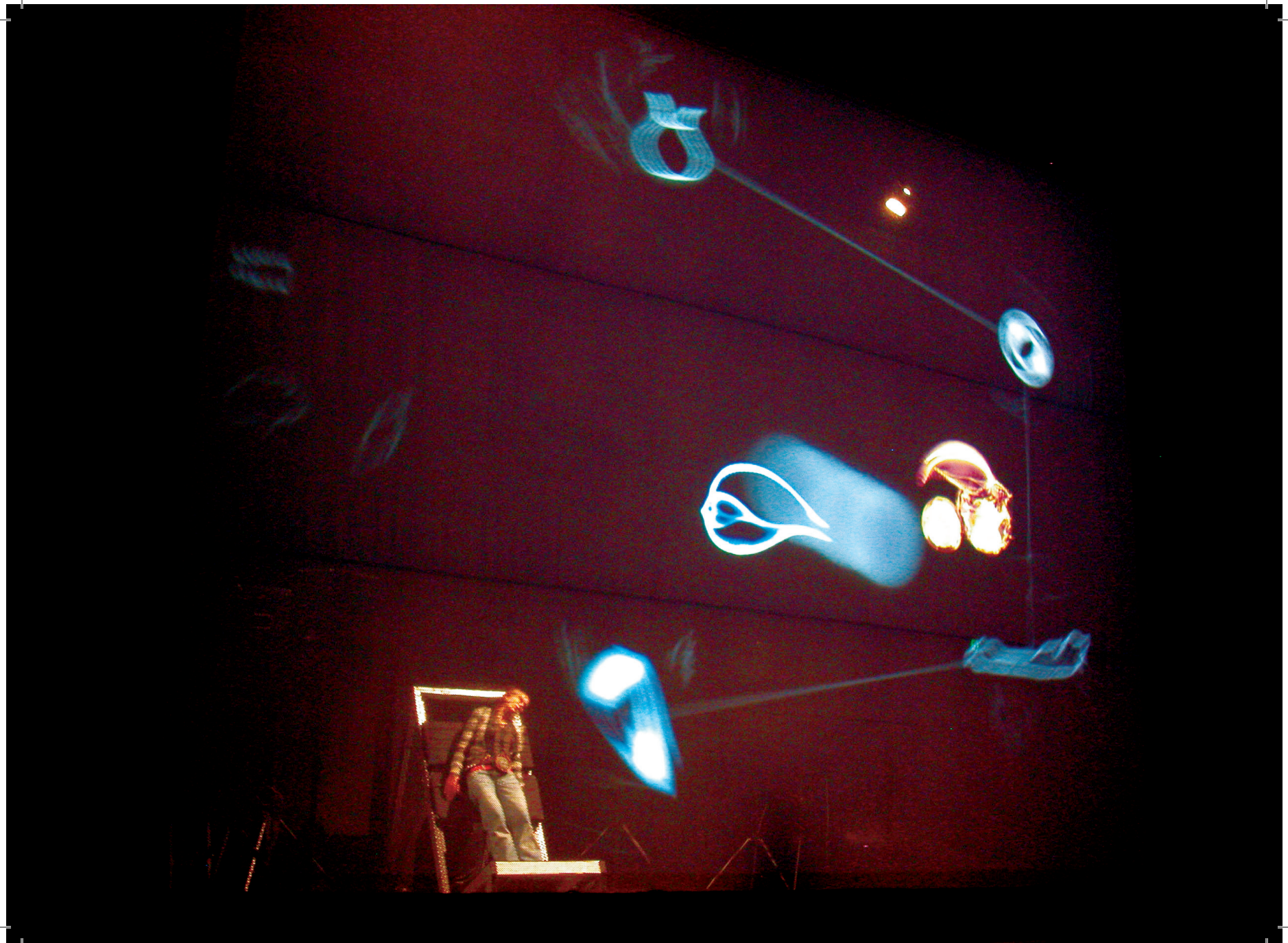
6 Benford et al., 'Managing Mutual Awareness'.

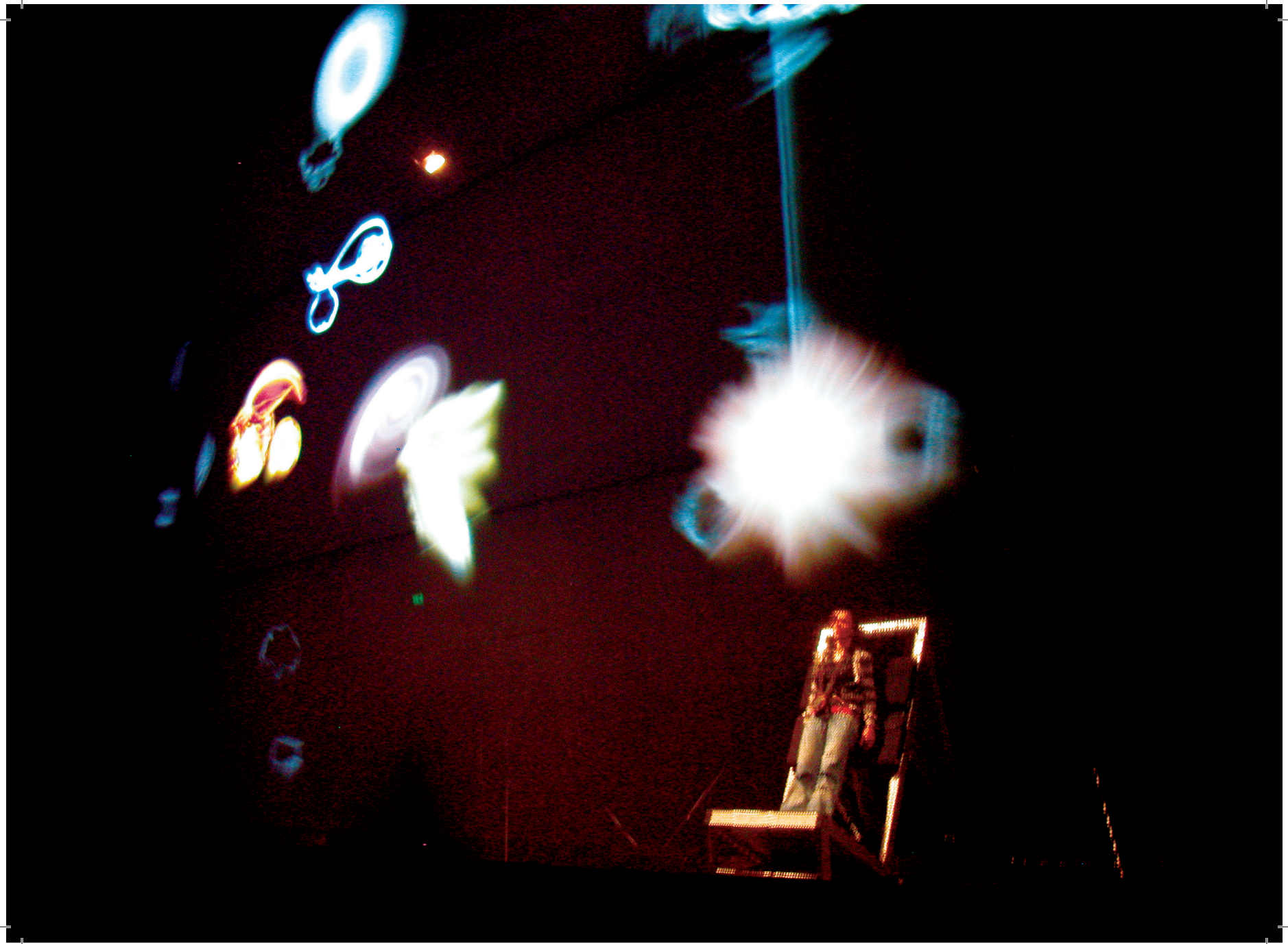
7 Benford, Steve and Fahlén, Lennart, 'A Spatial Model of Interaction in Large Virtual Environments,' in *Proceedings of the Third European Conference on Computer-Supported Cooperative Work - ECSCW'93*, G. de Michelis, C. Simone and K. Schmidt, eds. Milan, 1993, pp. 109-124.

8 Schmidt, Kjeld, 'The Problem With "Awareness": Introductory Remarks on "Awareness in CSCW"' in *Computer Supported Cooperative Work*, Vol. 11, No. 3-4, 2002, p. 292.

9 We would like to acknowledge a number of other researchers who were present during these sessions at both sites and who made the study possible: Guy Webster, Keith Armstrong, Lisa O'Neill, Lizzie Muller, Pia Ednie-Brown and Tess De Quincey.

10 We are also keen to explore the possibility of participants viewing the previous person interacting with the artwork while awaiting their own session in order to explore how the social setting might support learning of the interface to supplement or replace the training video.





Transactivity

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1. Participatory Situations

A shift in focus seems to have taken place in much contemporary art practice. Some publications (e.g. *Contemporary Art from Studio to Situation*, 2004) suggest that the studio and the museum are increasingly irrelevant to today's creative strategies. The emphasis in site-oriented practices of social engagement and participatory media arts is neither on any traditional particularities of aesthetic form nor on the place of creation or exhibition, but on the conditions of coming into being.

This focus on 'becoming' has brought about an extension of the term site-specific. This term has historically defined a range of artistic practices including sculptural objects that are grounded irrevocably in the geography of their site and draw attention to the physical properties of a place (Richard Serra); land art that creates a dialectic between a work's material site and its 'non-site' representations in the art gallery (Robert Smithson);[1] installations that take site and spectatorship as not phenomenologically innocent but socially and institutionally determined (Hans Haacke, Krysztof Wodiczko or Lone Twin); and artworks that incorporate the site as a referent to conceptual or philosophical issues (Mel Chin).[2] Recently however, British sculptor John Newling has argued that art is always site-specific because the contextual relations of place, materials and public reaction or participation are always uncertain and subject to negotiation. He writes,

> When an art form becomes part of a place a situation is formed. The work may not necessarily be part of

> the assumed context of the place but the situation that is made between the placed and the place changes our contextual view of that place. Situations are bridges by which we learn and challenge the conventions of a given place. The cognition of the placed and the place, as a situation, can challenge the etiquettes of both place and art form.[3]

Newling refers to this negotiation as a 'transaction' between the artwork and its site, a condition of its coming into being.

The concept of the site-specific, in its phenomenological privileging of the physical conditions of a place, may be considered to be the opposite of the dematerialising tendencies of digital art and its mobilisation of information, images and distributed data. Yet interactivity provides a new theoretical model for site-specificity — for spatial and media practices which articulate the 'transactions' between event, site, and visitor. In contemporary telematic performances with distributed action, images and sounds are created not simply to be transmitted by artists from one location to another, but to spark a multidirectional feedback loop with participants in remote locations. In *Intimate Transactions*, the distributed interactive media installation by the Transmute Collective, what is at stake are the etiquettes at play between the sites of this work and the people who 'participate in the situation' and thus walk on the bridges. A shared world comes into being through this walk.

But are we justified in making this swift transition from situated practice to interactive media art? And what is meant by 'shared world'? To answer these questions, I believe that it is vital to understand interactivity through its uneasy relations to the historical trajectory of participatory and site-specific performance. Newling's comments on 'forming a situation' and 'transactions' reverberate with much of what we remember in the history of live art in which bodies are placed in 'situations' — in a particular place and time. For example, discussing the performance work of Brith Gof, Nick Kaye refers to their site-specific work as an articulation process during which the 'host' (site, architecture) is confronted and dispersed by the 'ghosts' of performance narratives and techniques which operate on many layers of 'restless relationships' between host site and audience.[4] Similarly, as live art grows more hybrid and the remediations of bodies in the terrain of digital information grow more complex, the body is no longer its own site of performance but a form of 'becoming'.

Firstly, bodily transactions that occur in immersive environments have begun to look more and more abstract, post-human. Even if derived from bodily motor data or other body rhythms such as pulse, heartbeat or breath, real-time synthesis and animation often generate molecular graphics, particle structures and nanospheres. The voice is shredded, its sound processed through granular synthesis or other filters. At the 2005 Ars Electronica festival, such becoming of hybrid creatures, cultures and ecologies was celebrated: the festival welcomed hybridity and techno-cultural ecologies as a 'way of life'. Such digital performance renders a different kind of becoming through constant (self)modifications.

Secondly, interactive performance design includes the body with all its transactional capabilities — its expenditure of energies. Through pervasive dimensions (networks, wearables, bodies provide data to touch sensors. But such a technical description does not tell us much. What is more interesting is the quality or role of gestures: how the body touches and what this touch generates. This is an important dimension of the Transmute Collective's work. *Intimate Transactions* produces a networked performance that continuously leaves the host, flowing away to come into touch with a whole (a-life) ecology. Bodily movement affects the virtual world and the species that live in it. What emerges here is a new composite form of human-machinic performance as the streaming media is produced by physical action but affects an environment of artificial life. Armstrong, O'Neill and Webster conceive of this resonation as immersive: transactions between participants make us sense our role in a wider web of relations and possibilities that connect living forms.[5] This is the philosophical aspect of the work. It extends notions of social sculpture (Beuys), 'relational aesthetics' (Nicolas Bourriaud),[6] and collective propositions for participation (Oiticica) into the digital.

If we investigate the question of the work's re-placement, Transmute's installation offers striking concepts of movement converging with a virtual environment as well as, from an ecological point of view, concepts of the preservation and sustainability of its elusive nature. Within *Intimate Transactions*, interactive performance no longer assumes control of digital images and sound animations, but inter-action is emergent, dynamic. The mutation of media forms is interdependent. Bodily energy is the ghost in the restless relationship.

In previous writings I have proposed a categorisation to distinguish various types of interactive environments (sensory, immersive, networked and derived

environments). When the parameters of these types are mixed, we speak of mixed reality or hybrid environments.[7] *Intimate Transactions* is another category, a transactive environment, involving telematic performances with distributed action, where images and sounds are created not simply to be transmitted from one location to another, but to cooperate in an evolving feedback loop via a virtual ecology. The site of the body is a transactional collectivity: fluid, transitory, ungrounded. I want to call it *transactivity*.

2. Intimate Transactivity

How did I confront the uncertainty of the situation and negotiate the experience of the artificial world? I now will address the physical/virtual interface and the bodily experience in the transactive, multisensory environment of *Intimate Transactions*.

Paradoxically, the 'local' performance in the installation created by Keith Armstrong and his collaborators is a solo performance, first re-turning the physical and sensory attention of the visitor to our own, individual body. I enter the space alone and am 'placed' on the Bodyshelf. But the task explained to me is to walk on to a bridge: to collaborate with a remote, unknown partner via the screen-world. Physical gesture will drive the emerging digital species/avatars. This implies another way of looking at transmissions of site: the material body cannot be transplanted somewhere else, yet the modelling and simulation of biological life is possible in a-life.

In its operation, *Intimate Transactions* surprises with an interface design which is unusually thoughtful, sensual and challenging from a synaesthetic perspective, as the Bodyshelf combines various motor-sensory, tactile and haptic dimensions. It detects shifting balances of weight and different types of back pressure. The ocular focus on the mediating visual world (video projection) is maintained, but the transitive sensory relation to the screen is rather complex, as I operate in the virtual world through the soles of my feet, shoulders and back. With another participant, situated in a different physical location, I will transact with the work through core surfaces of the body, not the obvious peripheral limbs such as the hands. Reclining within a new form of furniture that reacts to whole bodily movements, we are simultaneously surrounded by immersive sound-scapes and engage flowing combinations of digital imagery (ghostly, ethereal shapes and avatars) by moving the feet or rubbing the back and shoulders against the shelf. Using the physical interface, gently swaying our bodies on the 'smart' or responsive surfaces and by working

both individually and collectively — observing our avatar-species float in space, connect and disconnect — we are able to create convergences of movement, which in fact influence the evolving world created from digital imagery and multi-channel sound. This world, however, also exists without us.

How do I experience my relationship to this world? I would call the situation that is formed a paradoxical one. I cannot see or know the other person with whom I am connecting. I am in a dark, closed space, while a visually-projected world opens up and develops behaviours. In this 'intimacy' I forget entirely that my condition is distributed to another site and that another human actor elsewhere is going through my motions. I become self-absorbed, beginning to lean into the interface, as I had to first learn the transactive behaviour (tilting my feet, rubbing with shoulders and spine) that moved my avatar into contact with the other avatar. Thus I explore coordinating my movements in such a way that the life forms in the virtual world emerge and merge. Only at this point can I imagine changing my orientation.

This is the learning curve, a process of adaptation. The initial self-absorption is the first kinaesthetic effect of the installation. The first level of engagement is one of orientation, literally of proprioception. This auto-referential sensory processing is not directed at the outer world. As I concentrate on my sensations, I am cognitively innocent (I don't know what to do, what I am looking at) and I await instructions, which arrive and tell me the rules of engagement. The instructions, of course, increase my uncertainty. I start again, stop and start again (I did the wrong footstep, the unfolding world folds back). As I slowly begin to trust the relation of movement to world, I gain confidence. My slight problem is that I get confused by the avatars (who am I — the bright one or the dimmer one?) I try to catch the brighter, only to realise that I may very well be the brighter one myself. This is good identification: I forget which one is mine and which one may belong to another player.

The sensory intimacy with the other, far-away person is, of course, purely an illusion. This is not telematic dreaming or consensual hallucination, but hard work. The erotics of transactivity may lie entirely in the realm of fantasy, yet there is physical feedback, and also a certain amount of cognitive thrill once the mind recognises the plural movement in this world. My body's perceptual relationship to this environment of movement patterns is subjected to the digital phenomenon of the swirling, unpredictable creatures. I am not fully aware of what I do, I don't know their rhythms and cannot place myself in the virtual world, but on an unconscious level I am

rewarded. Through a pouch in front of my stomach I sense vibrations when I am able, stumblingly, to connect my avatar-creature with other creatures. It feels as if my energy — connecting as it does with the digital world and my fellow creatures — is radiating from the centre of my body. As Lisa O'Neill's Suzuki-inspired choreographic vision for the work unfolds, such energy streams, physiologically and emotionally, from the bodily centre into all spatial directions.[8]

The stomach vibrations create a sense perception of 'streaming' which I have rarely experienced before except in heightened moments of telematic performance, when the sonic energies of multi-channel sound, white noise and flickering pixels pulsate through the networked studio and resonate deep inside the bowels of my body.

On the non-post-human level, what resounds most strongly, however, is the motor-somatic activity in *Intimate Transactions*. The interface activates my body in a way I do not normally activate my muscles. When I step down at the end, I almost cannot walk any more: my muscles are cramped, sore. How much I must have focused on some parts of my body (feet, calves, thighs, shoulders, back, neck) and not others. I enjoy this, as I enjoy muscle ache after any practice, dance or sport. But I only notice it after the fact as disequilibrium in my cramped, intimate body.

The cramping could also be a psychological effect. This complex installation, more explicitly than any of the interactive artworks I have seen in the past, challenges our affective sensory relationship to the constantly evolving virtual world to which we become oriented.[9] I was not as fluid or experienced in its navigation as I would have liked to be. I could not fully perceive it. Facing the abstract flows of the virtual ecology, I never fully understood how my physical behaviour and emotional attitude affected the world, and how it affected me. Can one be too immersed to even realise one's body as a source of action? Following Bergson's theory of perception, how can I experience the digital media environment from within?[10] And, if I am affected in my body through my motor-sensory action, can I process such perception without recourse to the representational content of the media? The challenge of *Intimate Transactions* lies precisely in the uncertainty I have about the digital world even though I sense my connection to it and to the other person who is (not) there.

Digital video is image space after all, and not a world. It thus cannot behave with the physics of 3D space, and the convergences of our embodied perceptual rhythms with the behaviour of the digital creatures are without consequence. Yet, I could say that I moved through the image world, with feet and back and that I felt it in

some way, but not explicitly, and that I also sensed it acoustically, but again not consciously. The affectivity in this work appears necessarily subconscious.

This accentuation of the physical and the virtual contradicts conventional analytical ways of interpreting which, dominated by the transference of the linguistic to the non-linguistic, make the body a secondary phenomenon and sensation redundant. In this artwork, the immediacy and presence of the physical and virtual bodies, their co-evolution or adaptation in a hyperplastic media environment, are made the focus of interpretation.

Intimate Transactions is therefore a formidable work that requires us to reinterpret the correlation between the participant's body (placed in action) and the digital situation. In the terms I evoked in the beginning of this essay, the world (non-site) of virtual ecology is neither external nor preconstituted but irreducibly bound up with our (collective) movements, the transactions of energies between another's and my own body. This suggests that perhaps phenomenological investigations into the sensing body need to be revived in order to understand complex transactive media environments, especially interactive art which uses sensory processing involving haptic feedback and embodied perception which is primary and yet transient.

1 In the case of Smithson's *Spiral Jetty* (1970), the dialectic between material site (the entropic site, the Jetty's submersion under the water and exposure to the elements) and non-site (its representations or pictures in the art gallery) are particularly interesting, as Smithson's notion of the non-site suggests a kind of abstract mapping: the non-site designates the site, while the site itself is open, unconfined and constantly being changed. See also Miwon Kwon, *One Place after Another: Site-Specific Art and Locational Identity,* MIT Press, Cambridge, Mass., 2002.

2 Mel Chin's *Revival Field*, in which the contaminated earth of a toxic landfill in St. Paul, Minnesota is reclaimed through hyper-accumulator plants, refers to the issues of habitat devastation and environmental restoration.

3 Newling, John, *John Newling's Writings 1995-2005*, Vol.1, Warwick, 2005, p. 55.

4 Kaye, Nick, *Site-specific Art: Performance, Place and Documentation,* Routledge London, 2000, pp. 52-57.

5 Transmute's evolving world of creatures symbolises inter-species behaviour and there are interesting parallels to be drawn with other contemporary experimentations which link performance and cellular biology, for example in SymbioticA's work with tissue cultures. *www.symbiotica.uwa.edu.au*

6 Bourriaud, Nicolas, *Postproduction*, Jeanine Herman, (trans.), New York, 2000.

7 Birringer, Johannes, 'Dance and Interactivity,' *Dance Research Journal* 35:2/36:1, 2004: pp. 88-111; 'La Danse et la Perception Interactives,' *Nouvelles de Danse,* p. 52 2004: pp. 99-115; and 'New Environments for Interactive Dance,' in *Performing Nature: Explorations in Ecology and the Arts*, Nigel Stewart and Gabriella Giannachi, (ed.), Frankfurt, 2005, pp. 303-325.

8 Tadashi Suzuki's training method, sometimes called 'grammar of the feet,' helps performers to realise unconscious patterns for movement and posture, which they will then be able to alter. Interestingly, the quality of contact of the feet with the floor, in this method, determines the quality and energy of spiritual, mental and emotional expressiveness. The presence of the group in this training method generates a physical pervasiveness that allows participants to experience a sense of fictional space. The interactive design of Transmute's installation is meant to provoke this transindividual energy, connecting the player to the virtual world.

9 For important insights into affective perception, see Massumi, Brian, *Parables for the Virtual: Movement, Affect, Sensation,* Duke University Press, Durham, 2003. My reflections on digital phenomenology are inspired by Hansen's theorisation of the digital image (extending Henri Bergson's theory of perception in *Matter and Memory*), particularly his description of interactive information environments which *become* a bodily process of filtering and composing images. See Hansen, Mark B.N., *New Philosophy for New Media,* Cambridge, 2004, pp. 93-124.

10 See Henri Bergson's theory of perception in *Matter and Memory,* N.M. Paul and W. Palmer (trans.), Allen and Unwin, London, 1911.

following pages: *Intimate Transactions*
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photograph: Peter Cullin

A Reformation of Space: Intimate Transactions in Art and Distributed Communication

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In a darkened gallery room sits a softly lit, L-shaped structure. If not for its slight tilt, it would assume the aspect of a shelf. Larger than the proportions of the body, it is an imposing physical presence in the small room. As my eyes adjust to the light, I map out its discrete form: a regular shape, reduced surfaces and cool, charcoal tones. I find reassurance in the presence of a solid, heavy object that appears to draw upon the minimalist traditions of Robert Morris and Donald Judd.

This certainty is fleeting however. An assistant steps out of the shadows and invites me to stand on the shelf. As I do, its base gives way under foot and I compensate by shifting my balance. The base begins to oscillate and a screen-world opens up ahead. The movement of my feet and the compensation of my back, as it presses and rolls against the shelf, cause an avatar to begin to motor through the screen-space. Awkward at first, I gradually begin to align myself with its pace and rhythm, then together we start to explore the unfolding planes.

Immersed in a fluid field of images, sound and vibrations, I become absorbed in the layered depths of this alternate world, engrossed in my interactions with its strange, poetic creatures. I see a second avatar — another person somewhere else is floating through the screen-world. I edge closer, our avatars overlap and lock. We begin to tug back and forth as we negotiate the direction we will take. I feel their sideways pull against my back. At this moment, as their touch is relayed across the network, I experience the simultaneous expansion and collapse of space.

This experience was produced by *Intimate Transactions*, an interactive new media artwork by the Transmute Collective, which was installed at The Block at QUT in Brisbane and the Australian Centre for the Moving Image in Melbourne in late 2005. This artwork presents a number of challenges to established conventions of the art object. It requires interaction — a form of choreographed performance — to bring it into being. Its concrete presence is subsumed by

the transient, generative nature of the work. And it produces an experience of space that sets it at odds with traditional expectations of the relationship of the art object to the gallery. Its performative interaction and paradoxical expansion and collapse of space also exceeds our expectations of networked communication.

In pursuit of an understanding of this experience of space, I will consider *Intimate Transactions* from a number of perspectives: its technical connection of co-located gallery sites; its perceptual suspension of space within the gallery and between gallery sites; and its production of embodied social relationships between participants. I will then go on to establish the inter-relationships between these aspects of the work and discuss their significance for the fields of art history, virtual environments and networked communication.

The Expansion and Collapse of Space

During the twentieth century, a number of Western art movements were aligned with social preoccupations with the expansion of space. Perhaps best known are the early Futurist and Cubist experiments with the involution and extension of the boundaries of form. They occurred at the time of several, concurrent explorations: X-ray technology, with its potential to peer into the internal crannies of micro-space; non-Euclidean geometry, with its insistence on the curvature of space; and air travel, with its challenges to the conventions of spatial perspective. Land Art is another well-known example. It extended the space of the gallery out to remotely constructed jetties and lines in the desert and substituted the art object with photographic documentation during a period of unprecedented popular access to distant travel and captured documentary. Early digital art can also be mapped on to technical and social developments in the expansion of space. Sculptural, electronic body-extensions such as Stelarc's *Exoskeleton* (1999) reflected the development of prosthetic and ambient technologies that augmented the body by extending its grasp. Online artworks such as Maciej Wisniewski's *netomat*™ (1999) and Mark Napier's *Riot* (1999) were experiments with the structure and display of remotely delivered content through the communication networks that were expanding to envelop the earth at the time. By the end of the twentieth century, as the frontiers of space were being pushed past their limits and Damien Hirst was converting his art into an instrument calibration chart to accompany Beagle 2 Lander's journey to Mars, artists had come to be referred to as 'boundary riders'.[1]

In this new century, a seemingly paradoxical social preoccupation has begun to emerge. Instead of ambitions of expansionism, cultural analysts are

now referring to space in terms of its compression or collapse. However, expressions such as 'the world is flat' do not refer to a return to an antiquated world-view.[2] Instead, they refer to developments that are entirely contingent upon the rapid expansion of global networks at the end of the twentieth century. They refer to the conjoining of distant locations through the electronic convergence of sites. We now live in a time in which the diasporas that were dispersed between continents in earlier, expansionist centuries have reunited in real time, Skyping across telecommunications networks. Live broadcasts bounce off satellites and reality — from terrible events a world away to the mundane musings of local housemates — streams into the depthless non-space of our televisions and site after site flickers to the dance of the remote control. Just like theme parks or shopping malls, network television and the Internet deliver so many worlds in one. They produce a kaleidoscopic world-view, a conceptual contraction of space: a small world.

This compression of space by network technologies is bi-directional, for it also allows us to extend ourselves across the distributed network. When we stand at an ATM or order a book online, our touch has affect beyond the screen. Enabled by complex computational systems, it ricochets through sequential locations, manifests as action and, in turn, elicits a response. This is a preliminary form of telepresence. It reconfigures our body image by allowing us to reach beyond our corporeal selves, beyond our physical limits — to act remotely in the world.[3] As we become co-located, the space between our physical presence and the site of our affect, no matter what its depth, contracts.

Together, the possibilities of remote insight and distributed affect have enabled what is perhaps the most profound social impact of the network: new forms of reciprocated dialogue and exchange. No longer contingent upon geographical proximity and the familiarity of face-to-face relationships, global, self-organising communities now cluster around mutual concerns that have been filtered through a vast matrix of online possibilities. Communities of Interest use network technologies to exchange information and ideas around shared concerns. Communities of Practice and Communities of Action come together to find solutions around a common problem.[4] Through these networked collaborations, we are moving beyond the information age. The network is not simply a site of information dispersal or expanded distribution, but a site of transaction. As Tony Blair recently commented, we now live in an 'age of interconnectedness'.[5] We are beginning to reconfigure our local and global social relationships because digital dialogue, online interaction and co-

located transactions have begun to discount the distance between us.

Again it is possible to map works of art on to the radical advances that are occurring in technical and social understandings of space. *Intimate Transactions* is such a work. It harnesses the new research network, GrangeNet, to support remote insight and telepresent affect and it pursues a research agenda that investigates the potential of the high-speed network for communication. However, this artwork does not simply reflect contemporary technical advances and social concerns. Through the Transmute Collective's creative, experimental use of network technology, *Intimate Transactions* produces innovations of its own. These are achieved through the work's technical, conceptual and perceptual approaches to the formation of space.

The Electronic Convergence of Sites

On a technical level, *Intimate Transactions* compresses space through the electronic convergence of sites. Like Jeffrey Shaw's *The Legible City* (1989-90) which used motion-tracking technology to allow visitors to navigate through a (simulated) external site by pedalling a surrogate bicycle within the gallery, or Ken Goldberg and Joseph Santarromana's *Telegarden* (1995), which employed telerobotics to allow externally located, online audiences to view and control an environment within the gallery, *Intimate Transactions* deploys technology to breach the architectural confines of the gallery and bridge geographical distance.[6] It uses the high-speed network to conjoin an artwork that is located in two separate gallery spaces. Participants in the work may be in adjacent rooms in the same building or on different continents, but they engage with the work simultaneously. Together, they navigate through its projected three-dimensional landscape, exploring its abstracted environment and interacting with the individuated creatures that populate it. Their interactions with these creatures, and with each other, trigger a response in the computational system that is manifested as immediate, bi-directional feedback in the form of changing images, sounds and vibrations. In this way, *Intimate Transactions* establishes the possibility of telepresence: action and triggered reaction (feedback) that is relayed in real time across the network. GrangeNet, which transmits data between the two sites almost 20,000 times faster than a 56k modem,[7] effectively compresses space by compressing time to produce a perceptual contraction of space between the co-located participants.

The Activation of Gallery Space

Along with this apparent diminution of distance between gallery sites, *Intimate Transactions* alters perceptions of space within the gallery. From the moment a participant responds to the request of a gallery attendant to step on to its large, L-shaped shelf, their gestalt perceptions of the autonomous artwork and its surrounding gallery space, which were identified by minimalists such as Robert Morris,[8] become dislodged. A common experience of the work is that, during the period of interaction, everything beyond the participant's relationship with the work's internal world — the space of the gallery and real time — appear to fall away.[9]

To understand this phenomenon, it is important to first consider the interaction that is required by the work. As is the case with telepresent art in general, *Intimate Transactions* is temporal and processual in nature.[10] It relies upon the audience's physical participation to bring it into being, and their ongoing interaction to maintain its presence in the world. This engagement with the work provides the foundation for a transformation of the perception of the space, but it is *Intimate Transactions*' particular approach to interaction that produces it. When designing this work, the Transmute Collective bypassed established interaction conventions of mouse and keyboard input devices. The input device they designed, which is referred to as a 'Bodyshelf', requires whole body movements to activate the motion sensors embedded in its surfaces. This shifts the participant from a relatively passive wrist/hand interaction with the interface to a physically active, whole-body engagement with it.

This approach to interaction produces a sense of embodiment and immersion in the work in two, inter-related ways. The first is through the absorption of the Bodyshelf into the participant's body image. Elizabeth Grosz helps to explain this effect through reference to psychoanalyst Paul Schilder's writings on body image.[11] She argues that, perceptually, the boundaries of our body image are not fixed but fluid and osmotic. Objects, implements or instruments — from a scalpel or pen to a jet aircraft — all become a part of the body image when we use them as tools or as mediums of expression. During the period of their use, the implements we use become, "intimate, vital, even libidinally cathected parts of the body image".[12] The most expressive example that Grosz refers to is the process of manoeuvring a car. She writes, "Chasing another car or trying to fit into a small parking spot, are all experienced in the body image of the driver".[13] The driver experiences the vehicle as an extension of their physical self because, as they determine its motion and direction through their bodily movements, they anticipate, then incorporate, the effects of this motion. They must project their body boundaries

outwards and absorb the vehicle's physical proportions into them to be able to do so.

This process of incorporating material objects into the body image is not immediate or seamless. Grosz continues,

> Part of the difficulty of learning how to use [implements and instruments] is not simply the technical problem of how they are used but also the libidinal problem of how they become part of the body image, a body shell for the subject.[14]

This is certainly the case with a car, as anyone who has learned to drive can attest. It also helps to explain often-reported experiences of interacting with the Bodyshelf.[15] At first it requires self-conscious, intellectual grappling with its processes and their resulting effects in the screen-space but, at some point during the twenty-minute experience of *Intimate Transactions*, a transition tends to occur and the body eases into the pace and rhythm of the on-screen avatar so that it becomes an expression of the body in action. When it does, the Bodyshelf that sits behind the participant has become absorbed into their body image.

Besides incorporating the Bodyshelf into their physicality, the participant also projects forward. Their interaction with a responsive interface produces a second embodied relationship: one with the screen-space. As Toni Dove has pointed out, there is a difference between observing a screened film and interacting with a responsive screen interface. While the audience of a movie may empathise with a character and may even perceptually enter the screen-space (because filmmaking conventions tend to assume the spectator's point of view),[16] the viewer remains physically passive. Therefore, the inactive and disassociated body remains behind. She argues that, by contrast, the body assumes an active role in relation to a screen avatar. As the participant exerts their agency, and the avatar immediately responds to/reflects their body's actions, an integrated relationship is produced in which the viewer comes to feel connected with, or 'stuck to', the character. Dove suggests that this leads to a partial perceptual transference of the self in to the screen-space. She writes, "[the subject becomes] simultaneously aware of their presence 'in' their body and 'in' the screen".[17] Dove concludes that overcoming this split in perceptual location between the body and screen causes the intermediate space to be traversed, and so to become 'activated' and 'charged'.

Dove's argument relates to common computer-screen interfaces and mouse-to-screen interaction. *Intimate Transactions* maximises this potential for an activation of the space between the body and the screen.

Firstly, because its characters are highly rendered and three-dimensional, and because they slip through a layered series of deeper inner worlds, a spatial depth is produced that pulls the participant beyond the surface of the projection screen into a fathomless anterior space. This both increases the 'tug' of the character and produces a 'transparency' of the interface by causing its physical properties to perceptually recede.[18] Secondly, *Intimate Transactions* maximises the sense of integration with the screen character through the type of body movements that it requires. Choreographed by dancer Lisa O'Neill, these movements revolve through the centre of the body, pivoting around a central hinge: what O'Neill describes as the body's 'energy centre'.[19] The kernel of these pivotal gestures has been transposed into the characteristics of the on-screen avatar, which moves through the same, central axis. The movements of the participant are thereby simultaneously located both within the body and within the screen character/avatar, not just through the reflected motility and direction of action but through the very quality and expression of their gestures. This reflected bodily expression enriches the connection with the screen character, which, in turn, both increases the participant's immersion in the activity and produces an intensified sense of presence in the screen-space. This optimises the potential for the activation and perceptual traversal of the intermediate space between the participant's body and the screen.

The activation of the space immediately surrounding the participant is completed by engrossing feedback that is produced in response to their interaction with the inhabitants of the screen-world. A team of interdisciplinary artists have designed multi-sensory feedback around a dramaturgical approach to each of the creatures.[20] Each creature is inscribed with a uniquely defined personality which causes it to react in highly individuated ways: some by moving gently away from movements towards them, others through screeching, violent vibration and swirling floods of colour. Because it was developed collaboratively around this dramaturgical model, while each interaction causes a unique combination of changes to the onscreen images, shifts in the rhythm, tempo and volume of the evolving sound-scape, and vibrating shudders that are felt through a haptic pendant worn on the participant's chest, the multi-sensory feedback is always combined in concert. An integrated environment is effectively composed on the fly by the participant's ongoing physical gestures and interactions with the screen-world.

The approach of integrating multiple sensory mediums within a single artwork is not new. It can be traced back as far as 1849 and Wagner's *Gesamtkunstwerk* ['Total Artwork'], in which opera served as the vehicle for the 'fusion of the arts'. The synthesis of the arts, including music, dance, poetry,

visual arts, and performance, is also evident in more recent mediums — from Futurist cinema and Bauhaus theatre to happenings, performance and installation art by contemporary artists. It is also a key component of multimedia which, as Randall Packer and Ken Jordon point out, is intended to "appeal to all the senses simultaneously".[21] In all of these mediums, the purpose of synthesising multi-sensory art forms is to cause the audience to become absorbed in the artwork. Wagner described this effect, writing that, "[the public] forgets the confines of the auditorium, and lives and breathes only in the artwork".[22] From the perspective of interaction design, the purpose of multi-sensory feedback is the same. It is now well established within the field of Human Computer Interaction that even low levels of visual or auditory feedback contribute to a user's sense of 'flow': that is, immersion in an activity that leads to altered perceptions of time and the exclusion of peripheral surroundings and events.[23] When such feedback assumes the form of multiple layers of resonant imagery, surround sound and vibration that combine in concert, the potential for flow and deep immersion in the world of the artwork is exponentially increased.

The space within the gallery is therefore transformed through the experience of *Intimate Transactions* in several inter-related ways. The Bodyshelf behind the participant is absorbed into their body image, as it becomes an extension of the body in action. At the same time, the mirroring of the participant's bodily motility and expression in the onscreen avatar establishes a sense of presence in the screen-space, so forming a bridge between the action of the body and the action on the screen. Therefore, both posterior and anterior space is traversed, perceptually embraced and absorbed. As the participant performs within this suspended space, they are enveloped by multi-sensory feedback, which further contributes to the diminution of attention to peripheral activity and exterior space. It is not until the assistant steps out of the periphery of perception to conclude the experience that the space of the gallery begins to unfold again.

The Compression of Distance Between Co-located Sites

The perceptual compression of space within the gallery is also extended to include the distance between gallery sites. As I have already explained, this bridging of geographical distance occurs on a technical level through the distributed network which conjoins the sites to facilitate telepresent insight and affect. But this compression of distance also occurs at a deeper, embodied level through the nature of the interaction that is established between the co-located participants.

Because both participants' avatars are identically described in both their visual representation and bodily expression,[24] the perceptual 'tug' of the onscreen characters extends to embrace the avatar of the second participant. That is, not only is the individual's relationship with their own avatar experienced both 'in the body' and 'in the screen', so is their relationship with the other person's avatar. The relationship between the distantly-located participants also becomes embodied through the physical sensation of touch that is relayed through the work. The Bodyshelf not only senses motion to translate as interaction with the screen-world, it also transmits the movements of the co-located participants across the network. When their avatars are conjoined, the participants feel the movements of each other through haptic devices pressing against their backs.

This introduction of tactile sensation produces an effect that is quite different to that of other telematic art such as *Telematic Dreaming* by Paul Sermon (1992). In that work, two participants lie on beds at separate sites and each sees a high-definition projection of the other beside them. They can react, in real time, to the movements, gestures and voice of this apparition as it is relayed through high-speed video-conferencing between sites. According to some analysts, *Telematic Dreaming* produces a sensory impression of tactile interplay between participants.[25] But this sensation is achieved synaesthetically. Within *Intimate Transactions*, the collaborator's presence is experienced as both visual representation in the screen-space and as physical sensation through the Bodyshelf.

This has quite a profound implication. If, as I have suggested in the previous section, the participant becomes immersed within the work through their simultaneous projection into the screen-world and absorption of the Bodyshelf into their body image, then it follows that the relationship with the other participant is also experienced within the participant's extended body boundaries. It is experienced both visually within the traversed space of the screen-world and as touch within the absorbed space of the Bodyshelf. The relationship with someone thousands of kilometres away is wrapped, libidinally, into this intensely intimate, embodied and suspended space.

Reducing the Distance Between Us

Finally, I will look beyond the technical compression of geographical space and the perceptual suspension of gallery/inter-gallery space and consider a third way in which *Intimate Transactions* reduces distance. Through its system design, it provides a model that can help to bridge the social distance between us.

Designed by Keith Armstrong, the creative director of the Transmute Collective, the system design of *Intimate Transactions* establishes a series of social interconnections — between the participant and the creatures of the virtual world; between the two networked participants, and between the participants and the virtual environment. At first, the association between local transactions and the larger world is oblique. Drawn into the internal chambers of the creatures, the participants find an array of assets: abstracted flora, insects and crustaceans. Following the usual conventions of computer games, they typically begin to collect them. Their transactions begin to impact upon the global environment/system. As the resources are gradually depleted, the integrity of the world is compromised. The creatures begin to shudder, images dim, sound softens, and movement in the world slows down. Because a defining principle of the system design is 'change for one equals change for all', the depletion of resources in one local environment affects the vitality of both, interconnected worlds.[26] This inter-dependence gives rise to a productive relationship between the participants. To restore their co-dependent environments, they must connect and collaborate. Their avatars linked, they must work cooperatively to return the assets to the creatures and thereby reinstate the viability of their shared worlds.

Armstrong developed this complex relational model around a series of transitional shifts between the subjective associations of Me/Us/Other. Its production of a series of integrated, environmentally contingent relationships supports the work's allegorical function. An instantiation of relational aesthetics,[27] *Intimate Transactions* produces an accelerated experience of environmental degradation, coupled with an alternative trajectory of recognising the interdependent nature of our relationship with the environment and the importance of establishing interpersonal cooperation to ensure global sustainability.

Beyond this specific purpose within *Intimate Transactions*, this system-design model has wider potential use, for it demonstrates how networked environments might move beyond the function of a backdrop for bi-directional conversation or competitive game-play. It illustrates how complex, contingent and productive relationships can be established within networked virtual environments. This has implications for the emerging field of commercial massively multiplayer online games like *Second Life* or *Dotsoul*, in which participants design and shape an evolving environment and social community.

To understand this potential, it is necessary to consider the philosophical foundation of Armstrong's

approach. In his essay in this volume, he attributes the development of the work's relational model to an interest in ecosophical philosophy, which has emerged, in part, out of Deep Ecology. The use of the term Other within ecosophy and, by extension, Armstrong's Me/Us/Other relational model shares some commonality with the ethics of alterity described by Emmanuel Levinas.[28] For Levinas, the self is not pre-given but is formed in continuity with the Other through a 'face-to-face' relation. The self is constituted as a subject by becoming a respondent to the Other's call: through an openness, responsiveness and (self) responsibility to the Other's existence.[29] Ecosophy appears to extend this principle of alterity beyond the human subject to other inhabitants of the environment.[30] That is, returning the assets to the creatures within *Intimate Transactions* might be understood as a response to the 'call' of the Other and a (self) responsibility to their existence.

Ecosophy introduces a significant departure from an ethics of alterity however. Where, for Levinas, the self meets an Other as an autonomous and irreducible subject,[31] as Roger Gottleib explains, within an ecosophical ethics the subject is not understood to be 'autonomous' but is an integral part of a contextualising social system and ecological environment. The subject comes out of them, is imbued within them, cannot exist without them.[32] Or, as Arne Naess, the founder of Deep Ecology proposes, the notion of a person 'in' an environment must be overridden by a 'relational total field image'.[33] Ecology is therefore not 'Other' because it is not in any sense separate from the self. Gottleib goes on to argue that, by extension, social relationships are also necessarily integrated into, and contingent upon, the ecological environments and social systems in which they are formed because they are an in-common co-requisite of the self's and the Other's shared existence. According to Gotleib, ethical relations must therefore necessarily assume an 'inter-identification' with the environment.[34] Returning the assets to the creatures in *Intimate Transactions* should therefore be reinterpreted as arising out of a recognition of mutual inter-dependence with a shared environment.

This configuration of an ecosophical system design, in which intersubjective relationships are integrated into a larger, inextricable relationship with an interdependent social and ecological system, demonstrates how collaborative online spaces might produce a shared world that is emergent, contingent and deeply interconnected (as real life contexts are). It also introduces a social and environmental ethics, which not only has an impact upon relationship formation but redefines the constitution of the self (as character).

The Significance of a Reformation of Space

Art that is most often remembered is that which employs newly emergent technologies and reflects pertinent social issues to become an expression of its time. *Intimate Transactions* conforms well to these criteria. Because it utilises the distributed network for interaction and communication, it maps on to one of the most significant technical and social advances of our era and, through its theme of environmental sustainability, addresses one of the most compelling problems of our time. At its best, art does more than simply adopt new technology to illustrate contemporary concerns however. It is an experimental site of investigation that approaches technology, materials and concepts laterally to produce innovations and solutions of its own.

Intimate Transactions has produced a number of innovations that have significance for several fields. In the field of art, the performative interaction that is required to bring *Intimate Transactions* into being not only produces a dematerialisation of the art object, it also introduces an audience agency that ensures that each instantiation of the work is uniquely configured, with a generative, ever-changing combination of images, sound and vibration. The perceptual suspension of gallery space that is produced by this work undermines the audience's traditional gestalt relationship to the artwork and the gallery. Combined with the compression of space between its geographically separated audiences, this causes the reception of the work to lose its locatability. *Intimate Transactions* therefore challenges traditional understandings of the materiality, duration, display and reception of the art object.

For Deep Ecology, *Intimate Transactions* serves to advance the effectiveness of an allegory of environmental degradation/sustainability. Unlike a linear narrative, the work's interactivity causes its participants to pursue the assumed agency of choice, to realise the subsequent consequences, then to assume responsibility for reparation through collaboration. It thereby produces a realisation of environmental and social interdependence that occurs not through a didactic explication but as *embodied experience* of both the effects of accelerated (observable) environmental degradation and the possibility of alternative social models.

In terms of technical innovation, the production of a whole-of-body, hands-free input device; the work's relational integrated system design; and the use of haptic devices to transmit bodily movement across the network all make significant contributions to the developing field of interaction design.

These innovations, which combine to produce the compression of relational distance between co-located participants, are particularly significant for the field of networked communication. Firstly, the combination of co-habited screen-space; choreographed interaction with the screen characters; multi-sensory feedback; and the transmission of haptic sensations across the network produces immersive participation within the intimate, suspended space of a shared world. This perceptual sensation might be described as *embodied co-presence*.

Secondly, the conceptual approach and system design of *Intimate Transactions* reduces the relational distance between otherwise autonomous participants by introducing ecological and social inter-identification, an emergent and contingent environment, a shared fate and mutual responsibility. This produces the need for active collaboration and introduces ethical responsibility into dialogic communication.

Together, these qualities of *Intimate Transactions* reduce the perception of physical distance and social distance between participants. They provide a model which moves distributed relationships beyond autonomous verbal communication into the realm of a shared corporeal — visual, aural and tactile — engagement. That is, they establish the possibility of an enriched, relational, intimate transaction within networked space.

1 I take this term from the title of The Biennale of Sydney, 1992/1993, which was directed by Tony Bond.

2 Friedman, Thomas L., *The World is Flat: A Brief History of the Twenty-First Century*, Farrar, Straus and Giroux, New York, 2005. Friedman discusses ten 'flatteners' including the arrival of Netscape, search engines, open sourcing, self-organising collaborative communities, the globalisation of the production and distribution of commodities (including outsourcing (call centres), off-shoring (production) and supply chaining) and ubiquitous technologies.

3 Dove, Toni, 'The Space Between: Telepresence, Re-animation and the Re-casting of the Invisible', in Reiser, M. and Zapp, A. (eds.), *New Screen Media: Cinema/Art/Narrative*, British Film Institute, London, 2002: p. 208.

4 The term Community of Practice refers to a context for social learning in which people with a common interest share references, ideas and insights, collaborate on solutions or cooperate in producing innovation. Communities of Action, on the other hand, involve collective design teams that share common goals.
For example, an artwork may be proposed, co-produced, amended and extended across horizontal and vertical layers while the work's open source development tools simultaneously evolve through a similar process of co-production (eg. HypArt, HyGrid and Gridscom).
The production process of *Intimate Transactions* fits within this category.

5 This expression was used by Tony Blair in the following statement when addressing the Australian parliament: "We believe that the changes happening in the world that make it more integrated, the globalisation that with unblinking speed reshapes our lives, is an opportunity as much as a risk ... This is the age of the interconnected. We all recognise this when it comes to economics, communication and culture, but the same applies to politics." Reporter: Eleanor Hall, 'Tony Blair addresses Australian Parliament', *The World Today,* Radio National, Monday, 27 March, 2006, 12:26:00. *http://www.abc.net.au/worldtoday/content/2006/s1601717.htm* (accessed 29th March, 2006).

6 Other artworks in the field of telepresence include *The Home of the Brain* by the ART + COM Institute (1991) and *Uirapuru* by Eduardo Kac (1999). A useful discussion on Telepresence Art is provided in Grau, Oliver, 'Telepresence: Art and History of an Idea', *Virtual Art: From Illusion to Immersion*, MIT Press, Cambridge Mass, 2003.

7 A modem transfers data 56Kbit/sec or 56,000 bits per second compared to GrangeNet's potential 10 Gigabit/sec or 10,000,000,000 bits per second. That is, the backbone of GrangeNet has a capacity speed of 178,571 times faster than a 56K modem. (However, clients only ever connect at 1 Gigabit/sec or 1,000,000,000 bits per second, at a speed of 17,158 times faster than a 56K modem.) Source: Dr Greg Wickham, Infrastructure Development Group, AARNet; Email correspondence with the author, 'How fast is GrangeNet?', 9 October 2006 11:51:44 AM.

8 Such gestalt perceptions are related to the audience's encounters with a static, discrete object. As Robert Morris explained in 'Notes on Sculpture' in Artforum in 1966, kinaesthetic traces, memories and other physiological factors allow us to draw associations between the body, the art object and the architectural space of the gallery. Our a priori understanding of objects in space allows us, at least in the case of simple solids, to assume a constancy of shape and form. Morris writes, "their parts are bound together in such a way that they resist perceptual separation ... One need not move around the object for the sense of the whole — the gestalt to occur. One sees and immediately 'believes' that the pattern within one's own mind corresponds to the existential fact of the object."

9 Madden, Jamie and Viller, Stephen, 'Am I the Lighter One? Awareness in a Dual-Site Networked Installation'.

10 Grau, Oliver, 'Telepresence: Art and History of an Idea', p. 273.

11 Schilder, Paul, *The Image and Appearance of the Human Body*, International Universities Press, New York, 1950.

12 Grosz, Elizabeth, *Volatile Bodies; Towards a Corporeal Feminism*, Allen and Unwin, NSW, 1994: p. 79.

13 Ibid.

14 Ibid.

15 See Birringer, Johannes, 'Transactivity' in this volume.

16 For more on the relationship between the audience, the gaze and filmic conventions see Olin, Margaret, 'Gaze', in Nelson, R. and Shiff, R. (eds.), *Critical Terms for Art History*, The University of Chicago Press, Chicago, 1996 and Mulvey, Laura, 'Visual Pleasure and Narrative Cinema' in Bennett, T., et al. (eds.), *Popular Television and Film*, British Film Institute in Association with The Open University Press, London, 1981 (first published in *Screen*, No. 16, Autumn, 1975).

17 Dove, Toni, 'The Space Between: Telepresence, Re-animation and the Re-casting of the Invisible', p. 210.

18 The term transparency is used by Dove who defines it as, "the degree to which the interface disappears or falls into the background while the viewer is immersed." Dove, ibid.

19 See O'Neill, Lisa, 'Placing the Participant in the Performing Role' in this volume for more details on this principle and its foundation in the Suzuki Actor Training Method.

20 Approaches to each medium are described in this volume by individual artists.

21 Packer, Randall and Jordon, Ken, 'Overture' in *Multimedia from Wagner to Virtual Reality*, WW Norton, New York, 2001: p.10.

22 Cited in Packer, Randall and Jordon, Ken, 'Pioneers', *Multimedia from Wagner to Virtual Reality*, http://www.artmuseum.net/w2vr/timeline/Wagner.html, accessed 20th September 2006.

23 Pace, Steven, 'A Grounded Theory of the Flow Experiences of Web Users', *International Journal of Human-Computer Studies*, 60, 2004: pp. 327-363.

24 The avatars are represented at slightly different intensity. For discussion on audience perceptions of their similarity see Madden and Viller, 'Am I the Lighter One?'.

25 See Grau, Oliver, 'Telepresence: Art and History of an Idea', pp. 274-275.

26 For more detail see Armstrong, Keith, 'Towards a Connective and Ecosophical New Media Art Practice' in this volume.

27 I refer here to the term used by Nicholas Bourriard in *Relational Aesthetics*, Presses du reel, Paris, 2002.

28 Levinas, Emmanuel, 'Time and the Other' and 'Ethics as First Philosophy' in *The Levinas Reader*, Hand, S. (ed), Basil Blackwell, Oxford, 1989.

29 Mikhail Bakhtin similarly proposes that it is through the process of our responsiveness to others - on the 'borderzone' between an inner polemic of the self and the social voice of the Other - that our own subjectivity is (re)produced. Bakhtin, M., 'Discourse in the Novel', *The Dialogic Imagination, Four Essays*, Holquist, M. (ed.), University of Texas Press, 1981.

30 Armstrong, Keith, 'Towards a Connective and Ecosophical New Media Art Practice'.

31 Levinas sees this as distinct from identifying likeness and difference in order to assume a primacy over the Other. Levinas, Emmanuel, 'Time and the Other'.

32 Gottlieb, Roger S., 'Ethics and Trauma: Levinas, Feminism and Deep Ecology', *Cross Currents*, Vol. 44, No. 2, 1994, pp. 222-240.

33 As cited by Armstrong, Keith, 'Towards a Connective and Ecosophical New Media Art Practice' p.15.

34 Gottlieb, Roger S., 'Ethics and Trauma,'p. 235.

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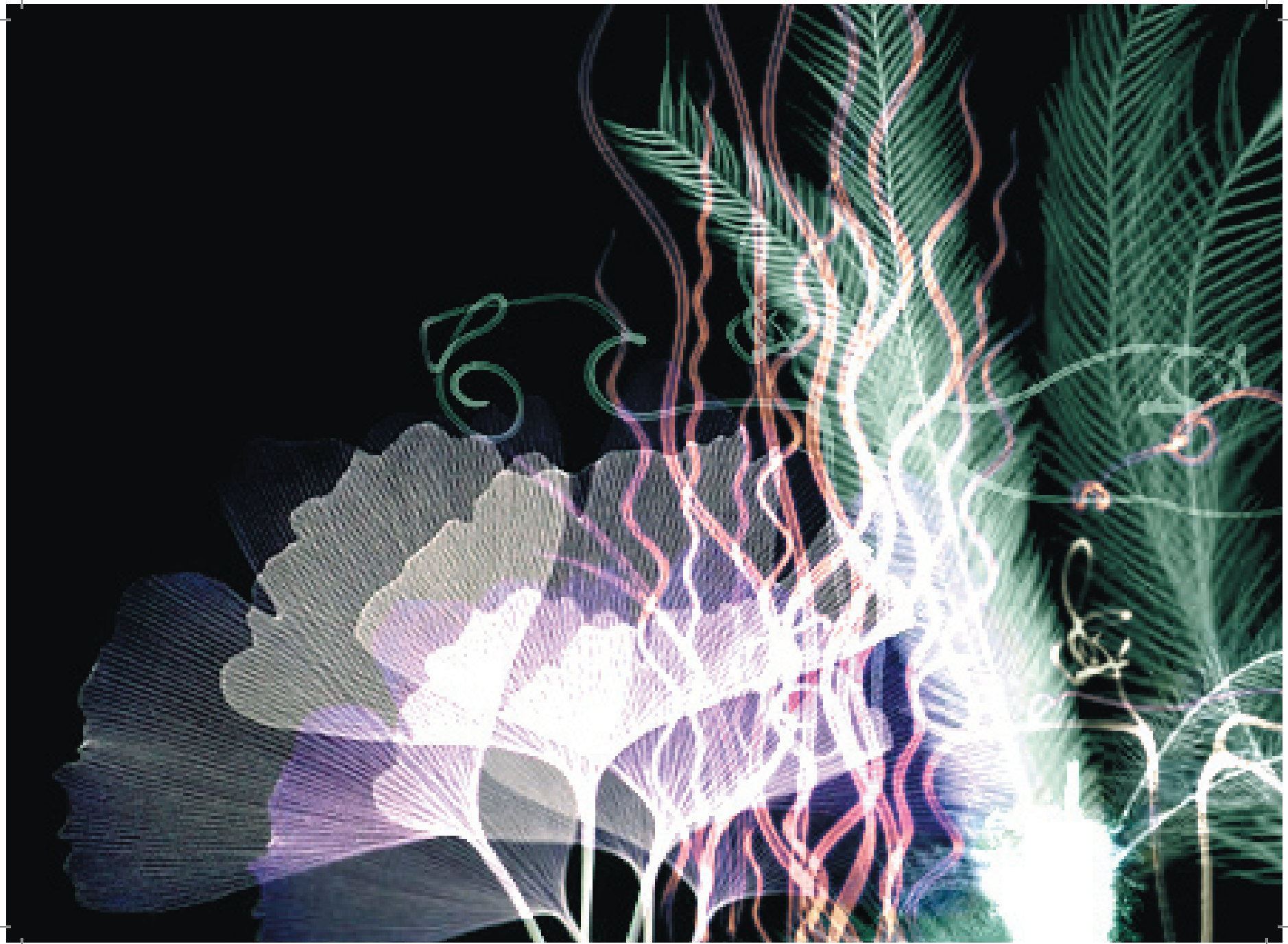

The publication is accompanied by a DVD with documentaries, sound, images and animations from Intimate Transactions.