

PixelRaiders 2: Interdisciplinary Art/Design Conference, 6-8 April 2004, Sheffield
Hallam University, England

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Investigating Ecological Subjectivity: *Intimate Transactions (Shifting Dusts)*

Abstract/Summary

I illustrate the social dimensions of digital creativity that drive my interdisciplinary praxis by introducing an art making methodology guided by eco-philosophical concerns, known as 'ecosophical'. I demonstrate its application by describing the development of a new work *Intimate Transitions (Shifting Dusts)*. I conclude by suggesting new directions for this type of practice.

Acknowledgements

I would like to acknowledge the support of QUT's Creative Industries Faculty, Professor Stuart Cunningham, the other members of the Transmute Collective (particularly Lisa O'Neill and Guy Webster), my numerous creative co-collaborators and Julie Dean.

Brief Authors Biography

Dr. Keith Armstrong specialises in collaborative, hybrid, new media works with an emphasis on performance and site-specific installation. His research over the previous decade has focused on how scientific and philosophical ecologies can both influence and direct the design and conception of networked, interactive media artworks. Keith's artworks have been shown and profiled extensively both in Australia and overseas. He is a creative director, media designer and system integrator within multidisciplinary teams, and is the founder and director of the interdisciplinary collective, 'Transmute'. Keith is currently a Postdoctoral New Media Fellow at Queensland University of Technology's

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Abstract

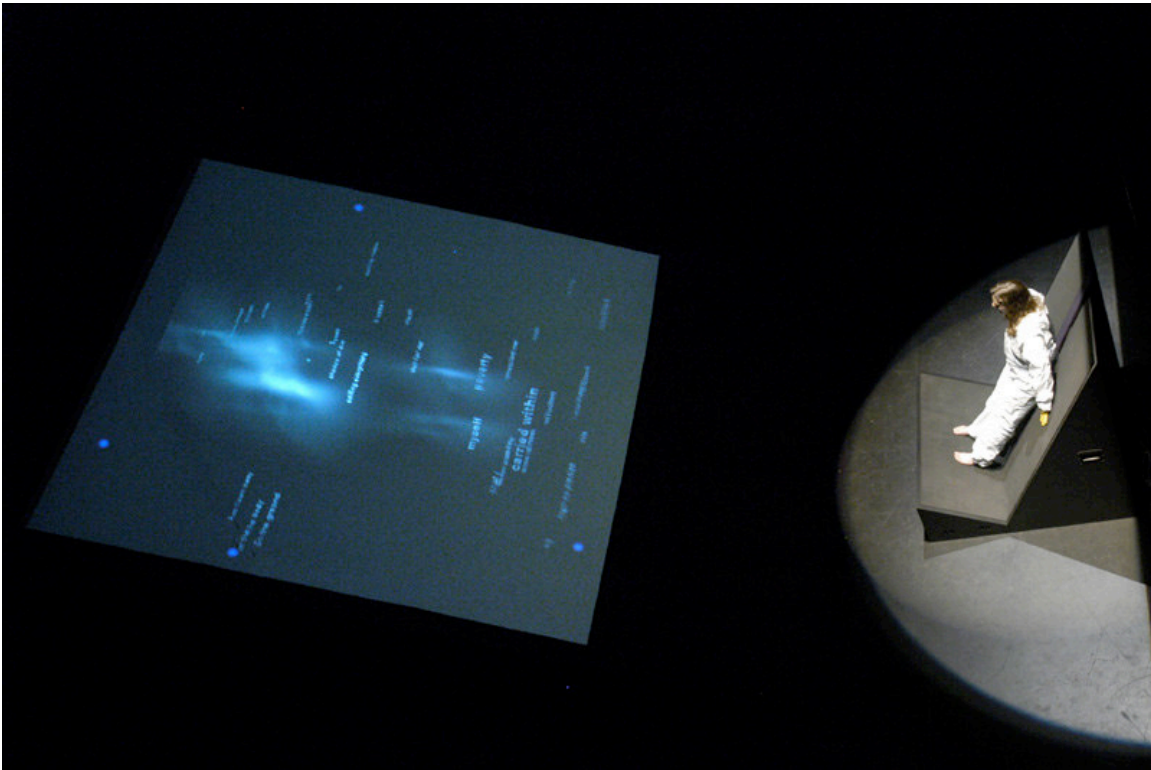
Despite countless warnings over past decades we continue to carve away the life support systems that we and our future generations depend upon. We live under the enduring mantle of a global crisis, a self-imposed act of unparalleled and seemingly irrational self-destruction which we misname as ecological – we are the crisis. Numerous contemporary theorists have suggested that 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. Having observed how much new media art praxis operates largely without awareness of the homo-ecological implications of those practices I began developing new processes for conceptualising and developing media art works to which I applied the term 'ecosophical'. My objective was to discover whether such works could be used to create contexts within which participants might reflect upon connections between the 'problem of ecology' and the proposed problem of humanity/human subjectivity. To demonstrate this I introduce the history and context for ecosophical

praxis and describe a project under development, *Intimate Transactions (Shifting Dust)*. I conclude by suggesting new directions for other artists interested in engaging with this type of praxis.

Key Quotes

These artworks invent a gift-exchange community involved in a more intimate sense of transactions that we usually consider impersonal. I have coined the term Intimate bureaucracy to capture this type of experimental art that depends on networks of participants (Saper 2001, p. x)

The imperative of confronting the unsustainable becomes more pressing. In actuality it is the greatest challenge, terror, opportunity and adventure that the species has ever faced in that our future, and the future of much else, is literally in our hands (Fry 2000)



Intimate Transactions Proof of Concept, Brisbane Powerhouse. Photo Sonja de Sterke

Ecological Context

We remain darkly shaded by the enduring cloud of our induced ecological crisis. Extreme weather events, ozone depletion, dramatic loss of forest cover, chemical contamination and a host of other environmental malaises blight every part of our planet. The international community struggles to ratify even the first-steps of the Kyoto Protocol with the USA Australia and now Russia abrogating their global responsibilities¹. Terrorism rises ever more prominently on the back of inequity, neo-imperialism, injustice and cronyism².

As a digital media practitioner living in an economically privileged city in a peaceful, multicultural society, couldn't I be forgiven for ignoring such issues?

Numerous contemporary theorists such as Merchant (1992, 1994), Fry (1999, 200, 2003a, 2003b), Baker (1997), Guattari (2000), Sessions (1995) and Naess (1995) have shown that our acute *problem of ecology* is underpinned by a crisis of human subjectivity³. They argue that by continuing to wilfully cause such acute damage to the support systems upon which we depend, we must fail to comprehend how ecologies function or our key roles within them. In other words by not imaging our selves as being embedded within these systems our understanding of self is non-ecological. Australian Design Theorist Tony Fry (2003) suggests that this 'pervasive condition of unsustainability' indicates a myopia

¹ For example see news report http://www.abc.net.au/news/scitech/2002/06/item20020626051522_1.htm

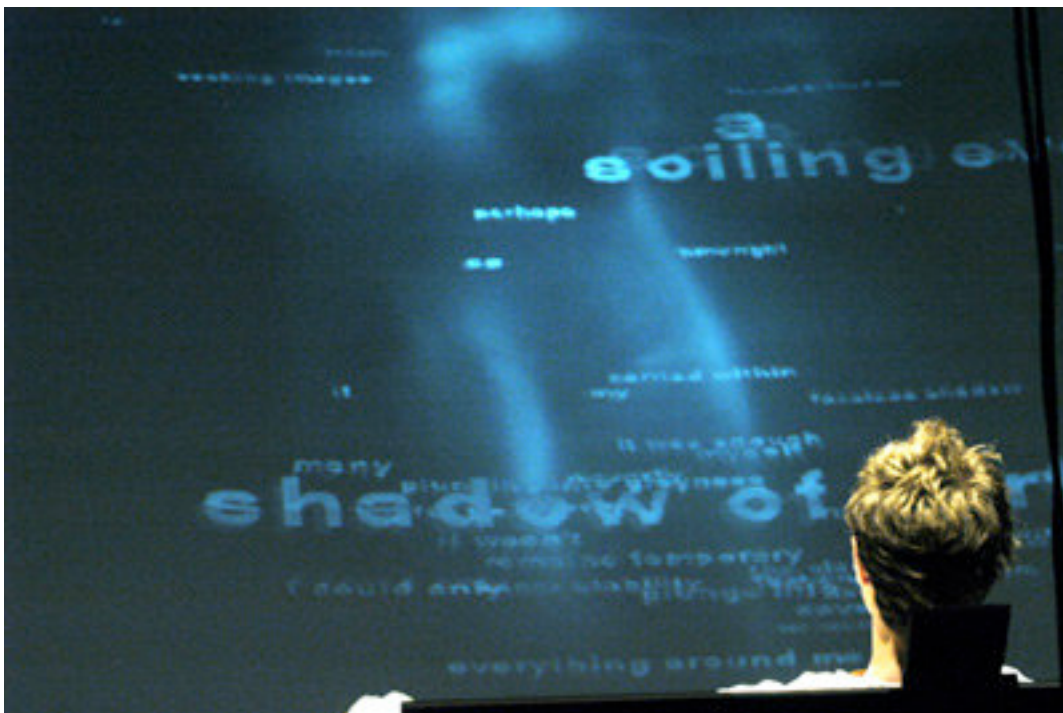
² For example see comment at (URL: <http://www.themodernreligion.com/terrorism.htm>, accessed 12/12/03) or (URL: <http://www.guardian.co.uk/terrorism/story/0,12780,1101859,00.html>)

³ Translators Pindar and Sutton in Guattari (2000, p.12) explain how Guattari calls subjectivity 'singularity' (although they clarify he does not mean it is about being singular per se), but rather it acts at a 'pre-personal, pre-individual level'. They use the example of a crossroads 'where several components of subjectification meet to make up who we think we are'.

based upon anthropocentricism. He explains that unsustainability is typically conflated with global ‘environmental crisis’ and constituted by events such as global warming.

.. while significant biophysical problems get constantly objectified as fixed empirical facts they are frequently the product of human agency, with their severity relative to the positive or negative actions we take en mass. (Fry 2003)

He explains how we must each strive to understand and act through the ‘thinking, designing and making that has to be done in the face of this situation’, reminding us that our futures ultimately depend on tackling this enormous problem. By clarifying that the problem of ecology is a fundamental problem of perception, a problem of how we think and of how we act, he extends the mantle of ‘sustain-ability’ squarely over our cultural domain. For the digital maker, designer and artist Fry’s words are an unambiguous challenge to (reflective) action.



Intimate Transactions Proof of Concept, Brisbane Powerhouse. Photo Sonja de Sterke

A Response

During the past two decades, issues of ecology and unsustainability have rarely been far from my mind. I am part of a British generation raised under Thatcherism and now as a recent Australian choke under a slick of ecologically unfriendly Liberal-Conservative politics. During my own forty-year life span the level and speed of environmental destruction, combined with a paucity of debate at a governmental level, has been breathtaking⁴. However cultural theorists have long connected environmental unsustainability with social injustice⁵ and also the unsustainable practices with which we live our lives⁶.

Whilst I lacked specific skills in the disciplines which I had commonly assumed to have a monopoly over potential solutions (such as Environmental Sustainability Science or Environmental Engineering) I was aware of digital media's power for stimulating and catalysing public consciousness and conception⁷, particularly when lateral, oblique, suggestive and poetic approaches are pursued⁸. My own long-term approach has involved

⁴ Australians have long enjoyed a particular closeness to ancient country (see URL: <http://www.wilderness.org.au/campaigns/wildcountry/>, accessed 12/12/03) in a way that is much harder to experience in Europe. My first hand witness of its overt demise via the wood pulping of old growth rainforest in Tasmania (See (URL: <http://www.wilderness.org.au/campaigns/forests/tasmania/styx/> and <http://www.wilderness.org.au/campaigns/forests/tasmania/tarkine/>, accessed 12/12/03)) and the rapid deforestation practices of neighbours such as Papua New Guinea, Malaysia and Indonesia added to my growing sense of alarm.

⁵ Eg. Horkheimer and Adorno exposed connections between the domination of humans and the domination of nature in the 1940's.

⁶ E.g. (Fry 1999).

⁷ E.g. (URL: <http://www.earthday.net/footprint/index.asp>, accessed 13/12/03) offers a compelling method of calculating world citizens' environmental footprint. Such discussion and promotion of ecological ideas can be enhanced by capacities of databasing, interactivity, connectivity and rapid communications.

⁸ Its computational heart affords it an adaptability that has led it to augment or enhance most traditional media forms, birthing powerful new interactive forms and thoroughly infusing many aspects of art making practice (See Manovich 2001, Paul 2003, Rieser and Zapp 2002, etc).

such investigations in and through media arts practice, with outputs primarily being artistic works and associated critical writings. These artworks aim to link participants situated in physical and tele-virtual spaces through custom-designed interaction and communication frameworks.

Over the past decade I began to note that most new media art praxis appeared to be operating without specific awareness of the ecological implications of those practices. I was also concerned that my long-term practice as a media artist (and prior careers in IT and electronics) apparently depended upon an unsustainable tool set. The environmental deficits of computer technology include bulk energy usage, a cocktail of lethal manufacturing materials, built-in rapid obsolescence and numerous problems with recycling and waste treatment⁹. However Fry and Willis (2000)¹⁰ explain how digital media technology's ecological impacts may be considered from an alternate perspective.

IT is balanced between worsening problems or redressing them. For the latter to happen, its nature, variable forms, uses and economy (that is, its ecologies) all need to be far better understood, modified and redirected. (Fry and Willis 2000)

They go on to explain how,

.. in the emergent sign/image powered cultures of the age what is needed more than anything else is for the image of the relational impacts of IT to be confronted and engaged as an ontological designing - this implies the beginning of a new kind of information culture in which response-ability and sustain-ability meet in the frame of new desires. (Fry and Willis 2000)

⁹ Numerous websites on this topic include
(URL: http://pubs.acs.org/subscribe/journals/esthag-w/2002/nov/tech/kb_microchipanalysis.html, accessed 13/12/03)

¹⁰ See Fry and Willis's detailed discussions of the immediate material, relational and immaterial impacts of IT at (URL: <http://www.edf.edu.au/Pathfinding/Archived/IIT/BriefPart1.htm>, accessed 12/12/03)

It became clear to me that unless I could re-configure my digital media practice in the context of Fry and Willis' 'response-ability' and 'sustain-ability', as a means for engaging with the interdisciplinary problem of ecology, I would be compelled to change to a less destructive form. I therefore began developing new processes for conceptualising and developing my praxis, to which I applied the term 'ecosophical'¹¹ (Armstrong 2003). I proposed new roles for digital makers interested in engaging with issues the problem of ecology, arising from the presentation, development and theorisation of art works. My objective was to discover whether such approaches could be used to create contexts within which participants might reflect upon connections between the 'problem of ecology' and the proposed problem of human subjectivity. I described these approaches in my doctoral thesis (Armstrong 2003) and the paper Towards an Ecosophical Praxis of New Media (Armstrong 2003b).

¹¹ Michael Heim (1998) explains the etymology of the word ecosophy as being the wisdom (Sophia) about dwelling (eco or oikos).



Inti

mate Transactions Proof of Concept, Brisbane Powerhouse. Photo Sonja de Sterke

Ecosophical Questions

From 1996 I began to develop a method for Ecosophical praxis, refining a series of key questions via a process of cyclical action and reflection that involved the production of three major art works¹². These were refined into ten key questions¹³.

For the design of our major new work Intimate Transactions (Shifting Dust) I drew upon five of these Ecosophical questions. Question 1 suggests a liquid form of experience whereby participants' actions and choices are configured as being integral to the development of a work in ways that makes them feel both an integrity and an affinity with

¹² See #14, Public Relations and Transit_Lounge at (URL: <http://www.outlook.com.au/keith/projbase.htm>, accessed 12/12/03)

¹³ These are listed in Armstrong 2003

its outcomes.

Can the work can be identified as being a part of a cyclical process of experiencing.. This implies the need to carefully shape the way in which participants interface with new 'media spaces', so that they experience the work through a 'living' of the experience that the work either instigates or sets the context for. It is this living that becomes the key factor in the subsequent processes of making meaning for participants. (Armstrong 2003, p. 274)

The cyclical nature of such work implies the continual sending and receiving of media, albeit in re-cycled or degraded forms. This is an approach particularly suited to nodal, networked artworks.

Question 2 implies offering participants forms of interface that involve physical and visceral participation, whilst generating audio-visual cycles evocative of systemic energy flows. Here 'energy' is experienced as a form of connectivity with other participants and involves an increasing sense of intimacy, despite the fact that participants may be separated by electronic networks.

Works should allude to the processes of 'energy' flow from place to place within ecological systems. 'Energy' must actually pass through participants in a way that makes them integral parts of the cycles of energy transfer, exchange and recycling. Therefore are participants are actually woven within the experience and systemic operation of the work itself? (Armstrong 2003, p. 274)

Question 3 stresses how these interpersonal ecologies become a key layer within the work.

Are participants involved within broad scale processes of dialogue that involve both the work and all other participants, and through such processes of exchange and transfer may they begin to feel part of a broader and broadening dialogue which incorporates both the work and all other participants? (Armstrong 2003, p. 274)

Question 4 refers to an aesthetic sensibility that infuses the entire experience.

Is a whole field experience being constituted from which a poetics of energy transfer might be seen to develop? (Armstrong 2003, p. 274)

The term poetics here refers to what Judith Wright calls a ‘responsibility’ that forms a way of knowing and living in the world. Wright (in Brady 1998, p.viii) describes this poetics as that which fosters ‘an awareness of our relationship to and responsibility for the living world around us’. This implies that through the experiences of the artwork participants become sensitised to the ecologies implicated within the flows and thematic orientations of the artwork.

Question 5 is a reminder that ecologies may be deeply upset by human actions.

Will the work react to major imbalances occurring at places of energy transfer in a system in ways that may potentially cause a catastrophic failure of the whole system?
(Armstrong 2003, p. 275)

The work should not be immune to participant’s urges if they so choose to ‘crash’ or partially destroy the experience for themselves and others. This may also happen accidentally, albeit infrequently.

Configuring Intimate Transactions (Shifting Dust)

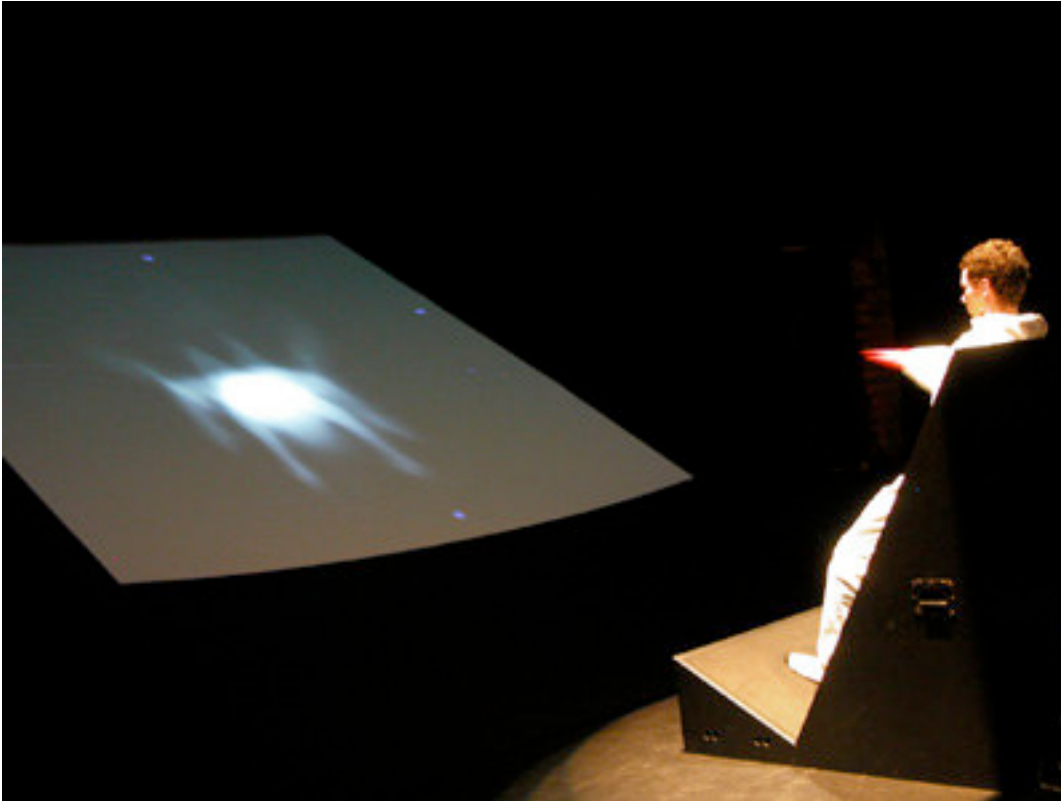
Introduction

This is how one pictures the angel of history. His face is turned towards the past. Where we perceive a chain of events, he sees one single catastrophe which keeps piling up wreckage upon wreckage and hurls it in front of his feet. The angel would like to stay, awaken the dead, and make whole what has been smashed. But a storm is blowing from Paradise; it has got caught in his wings with such violence that the angel can no longer close them. The storm irresistibly propels him into the future to which his back is turned, while the pile of debris before him grows skyward. This storm is what we call progress.

Walter Benjamin, Theses on the Philosophy of History, IX (1940)

In the 1940s Walter Benjamin created this dramatic and sobering picture of progress,

called the 'Angel of History'. This image continues to be influential in the development of *Intimate Transactions (Shifting Dust)*, a large-scale, new media artwork, due for major public showings in 2004.



Intimate Transactions Proof of Concept, Brisbane Powerhouse. Photo Sonja de Sterke

Intimate Transactions (Shifting Dust) builds upon an extensive lineage of prior works¹⁴. It will be realised from several interrelated and lightly cooperative physical and on-line installation elements connected by electronic networks. It is scheduled for completion in late 2004 with final presentations in 2004–06 and is being trialled in phases throughout 2003-04. At the time of writing (December 03) it had been shown as a single, non-networked installation for a small invited reference groups of peers, public, curators and partners at the Brisbane Powerhouse Centre for the Live Arts. After each showing we

¹⁴ See a full back catalogue at (URL: <http://www.outlook.com.au/keith/projbase.htm>, accessed 12/12/03)

facilitated substantial feedback sessions which were recorded, analysed and used to make a documentary video of the work. This document will be shown at the Pixel Raiders conference in April 04. *Intimate Transactions* was created by the Brisbane-based 'Transmute Collective' which I direct and includes performance director Lisa O'Neill and sound director Guy Webster, working with numerous other co-collaborators¹⁵.

In the completed work particular modes of interchange between each installation site/node on the network will be controlled by an online server which filters, augments or bounces information between sites. Particular operations will be based upon a programmed model that draws conceptually upon aspects of a simplified ecology (described later). Participants will activate this interactive work both as individual and collective subjects within the aegis of this systemic model, allowing them to act within dialogic frameworks of interaction and cooperation. Hence they will have integral roles to play in the shifting of these informational flows. These approaches are consistent with the first and third ecosophical questions discussed previously. The work will be designed to be experienced fluidly and seamlessly with images comprised from a generative, evolving, flowing combination of bodily images, dynamic texts and spatial sound (also consistent with Question 1).

Two or more networked participants situated in different physical or geographical locations will interact simultaneously with the work by making subtle movements with their bodies. Online participants will also interact remotely via online interfaces. Each

¹⁵ For full details see (URL: http://www.outlook.com.au/keith/projects/intimate_t/intrans.htm, accessed 12/12/03)

participant may choose to act in a loosely collaborative manner (consistent with Question 2). In order to both maintain and enhance each participant's experiences of fluid navigation within the artwork all participants learn how to avoid states of acute imbalance¹⁶ (consistent with Question 5).



Intimate Transactions Proof of Concept, Brisbane Powerhouse. Photo Sonja de Sterke

Participants lean backwards into an abstract form of furniture, coined the 'body-shelf' which sustains the needs of a constantly moving body. This form is a tangible interface device which uses embedded sensors and smart materials to detect subtle bodily movements and gestures. Throughout this visceral and virtual experience participants have the opportunity to maintain clear awareness of their bodily actions as they build impromptu performances from simple physical movements. Participants therefore share

¹⁶ This is achieved through differing physical-audio-visual-kinetic combinations

an experience that is simultaneously embodied and yet also immersive. (Consistent with Question 2). The basis of this interface has already been created and is detailed in the accompanying images.

Developing Intimate Transactions

Intimacy evokes ideas of subtle indirect qualities, arising from close personal relationships and implied interrelated influence. *Transactions* are communicative exchanges involving two or more people with outcomes that affect all parties. The completed work allows participants to experiment with simple principles of ecological subjectivity by invoking *Intimate Transactions*, considered as being a pre-requisite of ecological subjectivity and therefore a key conceptual vehicle for the work.

It is intended that the resulting experience will increase participants' sensitivity to what Baker (1997) calls 'ecological selfhood' (consistent with Questions 3 and 4). This would be achieved by pairing showings of *Intimate Transactions* with seminars, publications, festivals and forums where ideas of ecological subjectivity would be presented via written texts, presentations and discussions. Baker explains that such understandings of subjectivity, (epistemology and ethics) should be located within social and ecological systems that acknowledge their processes of relationality, historicity, reflexivity and narrativity. In a recent conversation (Baker and Armstrong, 2003) she suggested a model that implicates ecological selfhood based upon a dialogic relationship between three enfolded conceptions: 'me', 'us' and 'others'.

ME is.. that bit the participant identifies as them – as he or she – it's that bit that's ME– that includes my fingers my toes, my headache, whatever.. as well

as this thing I call me. It's how I'm feeling, the fact that I'm nervous because I'm sitting here and everyone is watching..

US – for most people on the planet US is other people like me! Other PEOPLE like me. US is a more inclusive term. US is those entities with whom I relate. They are like me in some way and that might be a forest or a dog or a tree or a grub or a sand dune or whatever – and therefore the notion of what is us is fuzzy and inclusive of nonhumans.. different sorts of humans and the possibilities of aliens or whatever.

And then you've got the OTHER – which is that stuff which is not like me, that stuff that is really other to me that I have no connection to.

(Baker, E. and Armstrong, K 2003)

Ideas of ecological selfhood are imbued within dynamically shifting combinations of these three senses of self. Each participant will navigate through enfolded layers of image, sound and physical sensation¹⁷, also named *me*, *us* and *others*. This suggests a form of social innovation which requires being at ease not only with what we know or have affinity with, but also with total otherness; those people, things or experiences with whom we have an inimical relationship, regardless of whether we can or are able to recognise that relationship.

¹⁷ comprised of graphic imagery, interactive sound (including substantial sub sonics) and other physical experiences such as wind blast and changes in moisture



In conversation after the showing with Dr. Liz Baker, Photo Sonja de Sterke

Shifting Dust: An Embedded Ecological Metaphor

Our world is literally and figuratively turning to ‘dust’. The use of the concept of ‘dust’ as a content vehicle throughout the proposed work acknowledges decay and renewal and the transitional, cyclical natures of interrelated ecologies. It also suggests advanced levels of degradation potentially beyond repair.

Dust¹⁸ exists both on and beneath the border of our unaided vision. Dust particles are predominantly forms of disintegrating solids that often become the substance or catalyst of future forms. Like many tiny forms dust is an often unnoticed residue with ‘planet-size consequences’. (Holmes 2001, p.3)

¹⁸ Dust is defined as a sub 63 micron particles (Holmes 2001, p.3)

Humble dust.. built the very planet we walk upon. It tinkers with the weather and it spices the air we breathe. Billions of tons of tiny particles rise into the air annually – the dust of deserts and forgotten kings mixing with volcanic ash, sea salt, leaf fragments, scales from butterfly wings, shreds of T-shirts, and fireplace soot. And eventually of course, all this dust must settle. (Holmes 2001, p. Dust Jacket)

Within *Intimate Transactions (Shifting Dusts)*, any action one participant will make in either of the *me*, *us* and *others* layers may impact on every other participant due to visible and audible ‘dusts’ they inherently ‘kick up’. These residual dusts of prior experiences¹⁹ become ‘spread’ across the network by the server just as physical dusts move in wind-blown ‘oceans’ across our globe and through space. The custom server software which connects all physical and virtual installation spaces together controls the ‘weather’ patterns that in turn steer these dusts. Whilst participants are always creating dusts they learn over time of its qualities through receiving them, resulting from the actions of other participants across the network.

Navigating the *me*-ness layer will initially suggest increased individual agency through a familiar, recognisable, ‘uncontaminated’ audio-visual environment, free of such incoming ‘dusts’. Participants may remain in this layer and choose to limit their exposure to these dusts, but in doing so will limit the scope of their experiences. Subsequent navigation through layers of *us*-ness into layers of *other*-ness will present them with less familiar, controllable experiences. The work’s server will ensure that exposure to most diverse dusts lies in the user zone of *other*-ness. Just as human intimacy often requires a move beyond one’s own sense of *me*-ness (or personal comfort zone), so increasing *intimacy of transactions* will occur the more participants choose to expose themselves to

¹⁹ For example this is achieved in audio through techniques of granular synthesis

other-ness. Therefore the experience of the work for each participant has the potential to involve the understanding and reconciliation of these three ‘ecologies’ of *me*, *us* and *others*.



Intimate Transactions Proof of Concept, Brisbane Powerhouse. Photo Sonja de Sterke

The process by which each participant will secure *intimate transactions* with others across the network is made possible by the conceptual vehicle of *dust*. This happens via an indirect, affective process whereby each participant begins to sense the intimate presence²⁰ of the others across multiple physical, functional, perceptual and disciplinary

²⁰ This borrows the language of the Liveness Manifold research group led by RMIT's Pia Ednie Brown. On their web page they state their interest in liveness across networks as engendering,

an emphasis on the production of closeness across geographic and/or representational distance or, in other words, the sense of immediate, intimate presence through remote means. Attention is focused on ways that affective (qualitative, emergent) dimensions of events might be transduced across distinct

spaces. Within this operational process many modes of participant experimentation will be possible and the choice to either cooperate or act in ways that make other participant's experiences less satisfying (or even distressing) are optioned. By understanding the 'dustiness' of their own actions through reading others' incoming 'dusts' participants will begin to sense the role, place and influence of each participant of this simplified ecology.

Therefore the overarching research question for this work becomes how, when and at what level might each participant's understanding of the evolving model lead them to act in ways that balance *me-ness*, *us-ness* and *other-ness* in ways of benefit to the entire network, rather than favouring any one individual participant alone.

Feedback

It is too early to know how some of these proposed features will be used by participants in the fully realised version of the work. However interviewee comments following the first proof of concept showings suggest a level of consistency with the originating Ecosophical questions, and indicate potential new directions for Ecosophical praxis.

Ecosophical question 1 suggested that the work should be experienced through

a "living" of the experience that the work either instigates or sets the context for. It is this living that becomes the key factor in the subsequent processes of making meaning for participants. (Armstrong 2003, p. 275)

This sense of oneness or living with the evolution of the work is implied by the following

media, moments and spaces: how we allow the openness of affectivity to survive (instrumental) shifts of register.

respondent's comments.

It was hard to separate out what I was thinking from what I was seeing, from what I was doing. And it got more and more like that. And sometime it would become very slow and you wouldn't want to move it at hardly all but there'd be lots of shifts occurring within that, and I found that really quite haunting and really very intense .. as you started to explore the different range of gestures within those limits, you know, you got different kinds of qualities coming through and I found that really very moving sometimes. (Respondent 2003)

(It was) not so much navigating as, almost expressing. (Respondent 2003)

These responses also evoke Question 2's 'poetics of energy transfer' in that they imply the potential of increasing sensitivity to the ecologies implicated within the flows of the work. They further evoke Question 2's concept that participants are 'woven within the experience and systemic operation of the work itself'.



Keith Armstrong Demonstrates The Theoretical Structure of the Intimate Transactions, 2003, Image Sonia de Sterke

This connectivity between participants' bodies and resultant image, in a way that suggests a melding of energy flows, is implied by the following respondent.

You're in direct relation with the image that you are seeing so your body space is really extended out to the screen, and that's really interesting, you know metaphysically, but when you network that, that's going to be incredible! .
(Respondent 2003)

New Openings for Ecosophical Praxis

The challenge now lies in realising the full scope of this work in a form suited for broad scale public exhibition within the context of a scholarly debate. At this early stage (following the first proof of concept showing) a number of new questions for Ecosophical practice are beginning to emerge.

These include the particular power of seamless, visceral, physical experiences to engender a bodily understanding of ecological flows, replacing the necessity to think out actions in advance with a trust in the individual languages of the moving body. Another emerging issue involves the particular scenographical positioning of the interface and presentational devices in ways that increase a sense of empathy between participant and media. A further area of questioning lies in an interrogation of the emergent properties of the work as they function at an entire network level, and their subsequent effects upon participants' experiences and actions when fed back and recycled into the entire system.

These questions will be elaborated and developed in future papers as the work continues to be created. When fully realised in late 2004 it is intended that this experiment with the

'problem of ecology' will be one further fibre in a dense embroidery of offerings needed to tackle what Fry (2003b) has rightly called the 'greatest interdisciplinary problem' of our time.

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