Interrogating Interactive Interfaces: On balance in the evocation of environmental responsibility in the creation of Responsive Environments

A thesis submitted for the degree of Doctor of Philosophy of The Australian National University

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June 2010
Statement

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

This thesis and artworks are the result of my own original work, except where otherwise stated. In the case the parts of research or artwork production were carried out jointly with others, the contribution made by the candidate is clearly indicated. Other sources are explicitly acknowledged in the text, footnotes and references in the Bibliography.

Signed.......................................................

Date...........................................................
Acknowledgments

The briefest possible summary of the eight year journey documented in the following dissertation, and tangentially reflected in my accompanying artworks, would be a bastardised borrowing from Hunter S. Thompson’s: *Long Weird Trip*. Leaving aside near all events that transpired in this time, I give grateful thanks to the following, in roughly chronological order of their involvement with this project:

At the University front…

Professor Mandy Thomas, who I met in 2002 at the Sydney University Department of Anthropology, to discuss this proposed PhD project for the ANU…two hours after submitting my Honours thesis to that department. She provided great advice about my PhD and was encouraging about my proposed half film/half thesis project, which, at the age of 22 and having not yet completed undergraduate study, was all the more invaluable. Since then, she has continued to be a pillar of support, being instrumental in how I came to be at the ANU, as one of my original supervisors, and then after she left the ANU (and returned!) as a kind colleague, including opening my first solo exhibition in 2008.

Great thanks also to David MacDougall, as the other principal person for whom I came to the ANU, due to the intersection of our three biggest interests at the time: filmmaking, anthropology…and India. Having provided great advice for my Honours thesis, David has seen the continuity over my evolving project, as the first Chair of my Supervisory Panel, and as Advisor to my current project.

I would also like to thank Chris Gregory, who like Mandy and David, provided invaluable advice for my Honours thesis, and made up the trinity of my panel as co-Supervisor. Catherine Summerhayes, who became a co-Supervisor when Mandy left the ANU, provided sagely advice when I had to give up the original topic as I could not get the required visa to return to India. She also provided wonderful continuity, as she supervised the original and
current topic. For helping me weather this transitional storm, and for their beneficence, I would also like to thank Carolyn Strange and Paul Pickering. In their successive roles as Directors of Graduate Studies at the RSHA, both were instrumental in moving from the ‘India Project’ to the ‘Art Project’.

However moving between these two projects would not have been possible without Debjani Ganguly becoming Chair of my Supervisory Panel, Martyn Jolly from ANU School of Art joining as co-Supervisor, and Jeffrey Shaw from The iCinema Centre for Interactive Cinema Research at UNSW joining as External Advisor, all in 2005. A heartfelt thanks their supervision since then, along with the continued supervision from Catherine and David.

At the institutional level, thanks to the following ANU departments that made this project possible, through their provision of a collegial and stimulating research environment, scholarships and administrate support: Centre for Cross Cultural Research, Humanities Research Centre, School of Art, Centre for New Media Art, Centre for European Studies, Research School of Humanities and the Arts, and College of Arts & Social Sciences.

At the Art front...

This project owes a great deal also to those friends, collaborators and colleagues I worked with, on projects big and small. As there are too many names to list everyone, I would like to thank Splendiferous Productions and the Synarcade Collective, the two collectives I worked in to make the artworks for this PhD. Outside of these collectives, a debt of gratitude to Keir Smith for being a consultant for Emergence v2 and Greg Turner for his involvement in Emergence v3 and Jeffrey Shaw for being my Mentor for Emergence v2 and v3.

Thanks also to the cultural institutions, grant bodies, exhibition venues, galleries and performance spaces that supported the production and/or staging of the artworks: Australian National University; Australia Council for the Arts; Australian Film and Television Radio School; The Studio, Sydney Opera House; The Street Theatre, Canberra; Arts House, North Melbourne Town Hall; National Association of Visual Artists (in particular Tamara Winikoff), Sydney University Cultural Grants Program, Film Society and Broadcasting Services; MetroScreen; The Magical Theatre, Sydney; Dorkbot Sydney; Dorkbot Canberra; Canberra Contemporary Art Space; Museum of
Australian Democracy at Old Parliament House; The National Museum of Australia; and the 2004 Balmain Hybrid Happenings Festival, Sydney.

In the spheres of life beyond Universities and Art...

To: my friends and family for inexpressible benevolence and understanding. My parents, Jo and Alex, sister Helen and brothers Saul and Daniel; my Sydney scenesters: Monica, Fabian, Rob, Walt, Zehra, Rich C, Phil, David B, Mike, Rich S, David W, Harriet, Alex and Sophie; my Canberra bulwarks against das kapitale: Anto, Tom, Silke, Kaka, Owen, James, Christian Guy and Marilu.

Lending an interested and/or sympathetic ear to the ebbs and flows over the evolution of this project has helped fund the ‘reality check’: those who thought it a little odd I returned to India in 2003 to do preliminary PhD fieldwork by descending the entire length of the Ganges solo over six months have since smiled, laughed, probed and sometimes cajoled and sometimes even shaken my frowns upside down as to the myriad shifts whereby I changed to do my PhD in art on art stirred by matters of biology, evolution and the sciences of complexity.

Yes, its been a Long Weird Trip...
The storm drives him irresistibly 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, *On the Concept of History*

Life can only be understood backwards; but it must be lived forwards.
— Soren Kierkegaard, *Either/Or*
Abstract

This Practice Based Research PhD concerns how Responsive Environments may be created to evoke environmental responsibility. As a diverse constellation of practices within Interactive Art, participation, interactivity and responsivity form the poles of Artist-Artwork-Audience relations in Responsive Environments. Within these artforms, responsibility may be evoked to the physical environment of the artwork itself and/or in the social responsibility arising from the interaction between artist, artwork and audience.

This study is conducted in two interrelated domains: a dissertation and my solo and collaborative creation of a suite of artworks. Dissertation and artworks form a combined exploratory journey through questions arising from and refined by practice. Both explore context- and content-appropriate approaches for evoking environmental responsibility according to the relationship between an artworks’ responsivity and the responsibility thus created for audiences.

The iteratively designed artworks produced for this PhD include a series of sight-specific plastic art installations, a non-linear single channel electronic artwork, a multi-channel semi-immersive performative-installation and a full scale multi-channel immersive installation. They were staged in exhibitions, performances and installations in Australia between 2004-2009. These artworks are presented through audiovisual documentation on a DVD and an exegesis on their production.

The dissertation contextualises my strategies amongst the broader challenges to creating Responsive Environments according to relevant practitioner-theorists. Both exegesis and dissertation highlight balance as the pivot point for all such strategies, wherein artists negotiate trade-offs between the seemingly mutually exclusive properties of authority-control, determinacy-
indeterminacy, simplicity-complexity and narrativity-interactivity. The dissertation discusses three principle ‘ingredients’ that determine the balancing act between these properties: content, form and Interaction Design. How these ‘ingredients’ may be combined with one another to evoke environmental responsibility is explored over the career trajectories of three solo and two Interactive Art collectives.

Combining these case studies with the account of my own practice contributes to understanding the challenges intrinsic to evoking environmental responsibility in Responsive Environments. Together, the suite of artworks and dissertation contributes to the small, but growing, interest in bridging gulfs between art, science and technology; analogue and digital art; and environmentalism and Interactive Art.
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Preface: Project Components & Mediums

This PhD is conducted through three components that operate in tandem with one another: a Creative Component\(^1\) which is a series of interrelated artworks staged\(^2\) over the course of the PhD, a text-based dissertation and, included in the text, an exegesis on the artworks which comprises Chapters 4, 5 and 6 and Appendixes A, C, D and E. Thesis refers to the totality of all text and artworks while dissertation refers to all text.

The Practice Based Research (PBR) traverses diverse art practices from a position located ‘outside’ an art school, in an interdisciplinary centre for humanities research. This gives the PhD a stance of in-betweenness consistent with the terrain it explores: interactions and interrelations between human-computer-machine-environment, between built environment-natural environment, between art-science-technology, between artist-artwork-audience, between practice-theory, and between arts-humanities-social sciences.

Due to the ephemeral nature of the art produced for this PhD, records and recordings of artifacts staged between 2004 and 2009 (included on the attached DVD) are provided in place of the actual artworks. These works cannot be re-presented or re-staged as they were by design a product of the moment, even if the logistics of their original stagings -which each took upwards of 10 months to organise- could be reproduced. However, each artwork was informed by research and development preceding and following the staging, making a cycle of critical reflection between successive works. Both sequence of dissertation and recordings on the DVD chronologically document and reflect the stages of my art practice and stages of critical reflection. Thus there are references in the dissertation to corresponding interface designs, installation designs, film, music and sound art included in the video documentation of the DVD.

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\(^1\) ‘Creative Component’ is used for purposes of brevity, as producing the textual component is also a creative processes. Creative Component refers to the artworks made for this PhD and not to my other art practices which are listed in Appendix B.

\(^2\) ‘Staged’ is more appropriate than ‘exhibited’ as it includes the diverse performances, screenings, installations and exhibitions I produced and presented for the PhD.
1.1 Set & Setting: The Scene of Environmental Responsivity

You walk into a dark room: the sanctified zone of the art gallery/museum/performance space.

You see only outlines of people like yourself, exploring the space with a mixture of curiosity and caution.

You go about your own journey, as there are no intervening intermediaries.

You are enveloped in random pandemonium of polyphonic waves of amplified sounds traveling all around the space.

You are immersed in a maelstrom of abstract images projected onto all manner of surfaces.

You are surrounded by an arsenal of technical apparati, with all their uncomfortable connotations of the military-industrial machinery of the night.

You seem to be a cog in a gigantic breathing living machine, with an architecture whose malleable proportions wax and wane.

You search for some reassurance - some contraption/gizmo/hot spot/cursor/button-to-click - but must resign yourself to the invisibility of the interface.
You realise the burden of being unencumbered, as it is you yourself, interfacing with the environment, that forms the interface. It dawns on you that the consequences of your actions and inactions are amplified in a collective contribution to the environment.

You don’t like being treated as part of a collective homogenous entity.

You motion a gesture with your hand and instantly trigger a noise that corresponds with and tracks your hand’s movement, as if you are conducting an invisible orchestra.

You breathe a sigh of relief as you surmise that the seeming chaos of the environment is a projection of the random actions of the participants.

You repeat the same gesture, but with intentionality as you probe whether causality is determinate. This time the sound you trigger is different, perhaps due to the miniscule contrast between a randomly exploratory gesture and its deliberate repetition, or perhaps the computer system is engaging you in a conversation, whereby each action is a culmination of previous responses.

You’ve been to theatrical plays, you’ve watched sports players compete, you’ve played computer games and now you’re not sure who is playing whom: in the complex web of interrelationships, are you a player or are you being played, as a tool or a fool?

Your friends you came with are lost to you, as you cannot make out form in the frenetic multiplicity of strangers.

You’ve been offered power and control but your trigger happiness dissolves into responsibility to collectively engage with the environment in cooperation with a room full of strangers, as it is only through interactions with its inhabitants that the environment springs to life. To passively and safely sit and watch from the back is no option. The only people sitting in the building are probably the overseers with eyes fixed on computer monitors, scanning through reams of linguistic and logico-mathematical rules. They alone seem to be above this panopticon law. When everyone is under surveillance, entry equals consent and all are equal: sensors judge gestures, contact with walls and floors, eye movements, breathing rates and the like with the indiscriminacy of machines. The environment appears charged with power: the power of electricity linking machines and bodies via electrostatic charges and the power of a democratic free-for-all of collective reciprocity.
In this Responsive Environment, an amplifying cycle is formed between your external bodily projections and their re-internalisation through cybernetic feedback loops. Any sense of stability with the environment is replaced by a sense that the ecosystem perpetually oscillates between anarchy and autocracy. As your heart beat returns to normal, you experience communion amidst the myriad interconnections between animate and inanimate entities. In this more focused state you hear an amplified heartbeat embedded in the surrounding sound that is so in sync with yours that you realise something as interior as your heartbeat is being projected into the world outside your body. With such a direct feedback loop, your response to the environment alters: your breathing rate and carbon dioxide emissions feedback into the system. The environment responds in kind. Equilibrium gives way to entropy as if in response to the inability of humans to co-operate without hierarchy and the imposition of order.

You realise why you were instructed to enter with bare feet as, looking down, you see computer generated Artificial-Life organisms, evolving according to kinetic energy transfer from naked human feet.

However there are no officiating intermediaries, only complexity deities, and in the agora, spontaneous factions form as people inform one another. A stranger approaches, offering advice gleaned from repeated exposure to this environment. Ordinarily you won’t socialise with a stranger, as your cultural conditioning has you ignoring the ubiquitous Other when present before inert art. However here your bewilderment welcomes a kindness with its promise of transmitting intergenerational information.

The stranger talks of a narrative structure without beginning, middle or end. Instead of linearity, indeterminate immersion through the rooms offers a non-linear journey of spatialised understanding. The stranger explains away the complex causal relationships between trigger mechanisms and sequencing of the audiovisual media. Cause and consequence relate via combinations of previous generations’ actions with your own, such that the tabula rasa is an evolving culmination of all events and effects. Little wonder that nothing directly yields to your command: you’re picking up a conversation between parties you have never heard that began a week before you entered a scene that has no script.
You hope that you’ve inherited an environment that hasn’t been soiled by those that have gone before as you reflect on the bind of passing on the space with some semblance of stability for those to come.

Your impromptu dialogue is stopped as spontaneously as it began as you become aware that a hidden microphone adds your conversation to a generative database of audience feedback.

Your conversation becomes fragmentary phrases played back using an Artificial Intelligence linguistic process that intermittently answers with emergent, unpredictable responses.

You’ve seen enough to know you’ve seen enough, and out of desire for conclusion, you go in search of the exit. As you leave the space you intercept an infrared beam that causes a crystal vase to drop from a shelf, irreparably smashing onto the ground nearby. So much for virtual responsibility in a virtual environment. At least in the wider world anonymity and indifference prevail. However, the street outside appears changed: you sense interconnections between the concrete encased tree surrounded by parked cars in the park. Strangers outside seem strangely familiar. The connection clicks like yet another mouse-click: audiovisual representations of those milling around the space are processed into the installation, implicating those that may still be unaware. As you move further away from such an electrically and politically charged space, you are surprised that you still feel a heightened sense of connection to the environment. You attribute this to a strategically placed car park sign stating that surveillance cameras transmit the random indeterminacy of cars leaving and arriving, levels of emission and so forth, as another stream of data fed into the installation.

You look down the street, seeing radiating levels of diminishing significance in the suburban surrounds. Wanting closure, you look at the installation booklet. There, in print at the end is evidence of further domains of implicit complicity: navigation through the installation’s website is altering the interior architecture of a neighbouring room. Over the narrative of the installation, participants over the internet are collectively authoring/irreparably destroying a kinetic sculpture composed of hacked walls. As you drive off you try so hard but you don’t understand just what you will say when you get home...
1.2 The Pivotal Problem and Research Question

This bricolage just described draws on pivotal artworks by others and myself, which are the subject of this thesis. These artworks take the forms of architecture, robotics, biorobotics, kinetic sculptures, electro-acoustic music/sound, aural and visual literature (as speech and computer generated text), visual media (as animation, photomedia, motion-paintings and video), and innumerable recombinant hybrids between these artforms.3

From these forms and mediums, this thesis explores a constellation of practices known as Responsive Environments. Myron Krueger coined the terms Responsive Environment and Interactive Art in 1969 at the University of Madison, Wisconsin.4 His practice as an artist, computer scientist and academic posited Responsive Environments as immersive, interactive, electronic artworks whose technological responsivity was of fundamental importance. A central concern in this endeavor, of evoking responsibility through such responsivity, is readily apparent in Environments, an earlier artform that Krueger argues was fundamental in the formation of Responsive Environments. The notion of artworks as Environments was introduced and pioneered by Allan Kaprow,5 beginning with the first staging of his Environment Words, at the Smolin Gallery in New York City in 1962. In the catalogue for this exhibition, Kaprow stated that Words “is an ‘environment,’ the name given to an art that one enters, submits to, and is -in turn- influenced by.”6 Environments denote immersive, participatory and multi-sensory ‘total works of art’ in the manner of gesamtkunstwerk.7 In the case of Words this involved

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3 Such artforms are commonly presented in installations termed Virtual Environment, Virtual Reality, Mixed Reality or Augmented Reality. These practices are referred to with capital letters to denote an artistic or scientific practice. As an example, virtual reality may refer to such contexts as philosophies of ‘reality’ and ‘virtuality’ while Virtual Reality refers only to an artist and/or scientific construction of a mediated environment where humans engage with computer generated sound and vision.


two neighbouring rooms filled with strips of words written on the ceiling and walls and with variable lighting and modifiable record players and loudspeakers. Audience participation with the content and form was central to this Environment, as attendees were invited to “turn on the phonographs; roll the rollers; [and] add your own words.”

The pivotal problem explored in this thesis may be seen in an excerpt from Kaprow’s statement for the first exhibition of *Words*:

> Of course, being active, we can misuse any environment, natural or artistic. We can destroy a landscape through carelessness, and here we can refuse to consider what responses are appropriate to the nature of the idea. For instance, it is inappropriate to staple word-strips askew, onto the floor or anywhere in the smaller room; and it would be just as unfit to write with the coloured chalks in the larger room. There are freedoms for the visitor (as there are for the artist), but they are revealed only within the limits dictated by the artwork’s immediate as well as underlying themes.

In this thesis, what Kaprow referred to as “freedoms” for attendees and artists are considered ‘environmental responsibilities’: for how artists as the “instigator” create the Environment for how “participants” may write, re-write, move and remove the content (in this instance words on cardboard, paper and chalk) and influence the overall dynamic of the physical environment (in this instance modify the lighting, record players and loudspeakers). In such situations participants negotiate a hybrid responsibility: to the social environment, being fellow attendees within the *gesamtkunstwerk*, and to the physical environment, being their interventions with the material content of the space. Collectively, environmental responsibility was evoked by

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9 Kaprow in Reiss 1999:14.

Kuzmanovic’s favoured terminology is ‘participants’ as it encompasses states of being a passive audience and active interactants, given the range of statuses participants may traverse in any one encounter. In this thesis, the term ‘attendee’ is also used, as it denotes the extensive range from passive to interactive behaviour of anyone attending an interactive work.
participants explicitly engaging with the content of the Environment to influence both contemporaneous co-participants and future participants. Kaprow argues that attendees and artists responsibilities were “revealed…by the artwork’s immediate as well as underlying themes”: he ceded significant responsibility to participants (via incorporating their unpredictable influences in the form and content of *Words*) within a structure of limitations whereby his authority as author was maintained (via the instructions for different participation in the different rooms). In so doing, *Words* explored the permeable membrane between immediate material responsibility and implicit or “underlying” social responsibility in participant-participant interaction. Kaprow highlighted one of these “underlying themes”: combining these two intertwined modes of responsibility evoked environmental responsibility, as *Words* questioned whether people “misuse any environment, natural or artistic.”

These themes are amplified in the electronic form of Responsive Environments, whose technological basis adds a significant dimension to how they represent the “misuse [of] any environment, natural or artistic.” In Responsive Environments, artist and audience responsibility grows in complexity with the complexity of the artwork. Through the computationally generated behaviour of Responsive Environments, audience responsibility is no longer to inert words on cardboard strips, but with interactive entities that may unpredictably respond to participants, such as the description in the opening bricolage of using Artificial Intelligence to formulate semi-autonomous responses to participants’ speech. However, evoking participants’ responsibility via technologically mediated responsivity, as described in the opening bricolage, creates myriad challenges for engaging participants in a Responsive Environment, whose engagement is a precondition for being able to be responsive to the artwork and thus be responsible.

The central research question of this thesis is thus: how may Responsive Environments be created to evoke environmental responsibility in the interaction between artist, artwork and audience? On balance, such evocation is determined by combining three principal ingredients -content, form and Interaction Design- in a recipe appropriate for the subject and context of each artwork:
1) Content

Content and subject matter signify what a Responsive Environment is about. Artworks expressly about the subject of responsibility may evoke responsibility to the physical environment of the artwork using relatively simple interactivity. One such means is combining environmentalist subject matter with interactivity that encourages awareness of the influences of participants’ behaviour on the artwork. This approach prioritises narrativity over interactivity, to communicate the content in a relatively ‘intact’ fashion. Such levels of interactivity allow the content to retain narrative cogency, which may implicate attendees in the subject matter through relatively easier engagement with the narrative. Consequently, the responsivity of such artworks is relatively simplistic, wherein attendees’ responsibility may be relatively indirect, implicit and symbolic.

My artwork Kali Yuga presents an evocation of environmental responsibility through prioritising engagement with the content in a correspondingly “reactive environment.”

2) Form

Form, structure and functionality extensively influence one another in Responsive Environments. They denote the linearity, sequencing, malleability, modularity and granularity of the content that forms the artwork. Prioritising form over content may facilitate greater complexity and more interactivity, through which participants may exert more nuanced and multifaceted consequences. Consequently, the interactivity of such artworks may be relatively complex, such that attendees’ responsibility may be relatively direct, explicit and literal.

My artwork StilmS presents an evocation of environmental responsibility through prioritising form, structure and functionality to offer literal and direct environmental responsibility.

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Kali Yuga is the subject of Chapter 4.3 on p184.

13 StilmS are the subject of Chapter 5 on p214.
3) Interaction Design

Interaction Design -and the sub-field of Interface Design\(^1\) which forms part of the overall design of interactivity- decisively influence how participants may engage with the artwork (and one another in works for multiple simultaneous co-participants). Whether content is expressly about responsibility, whether form is simple or complex, Interaction Design is pivotal to evoking responsibility through audience engagement. In works for multiple simultaneous participants, one such means for how Interaction Design may evoke responsibility is through guiding co-participants as to what influences on the artwork individuals may and may not be responsible for.

My collaborative artwork *Emergence* presents an evocation of environmental responsibility through prioritising Interaction Design to explore multifarious environmental responsibility for multitudinous participants.\(^2\)

As the combination of content, form and Interaction Design determine the manner of responsivity, so too do they determine the associated mode of responsibility. This arises since responsivity and responsibility reinforce and are indexically tied to one another in a Responsive Environment. Responsivity and responsibility share a common etymology and make meaning relative to one another, given "the ethical conception of responsibility as responsiveness to the other."\(^3\) The Oxford English Dictionary defines "responsivity" with two words. It is defined as that which is “answerable,”\(^4\) as well as that which is "responsible,"\(^5\) which etymologically belongs to "responsibility” as “a moral

\(^{1}\) In this thesis, Interaction Design is used to refer to the design of interactivity as well as Interface Design as Interaction Design includes the design of material interfaces and immaterial processes of interfacing. The interrelationship between Interaction Design and Interface Design is discussed on p72.

\(^{2}\) *Emergence* is the subject of Chapter 6 on p243.


obligation to behave correctly towards or in respect of a person or thing.”¹⁹ For David Rokeby, widely considered the most influential and innovative interactive artist, “accepting responsibility is at the heart of interactivity” as he defines responsibility as being “literally, the ability to respond.”²⁰ It is this dimension of responsibility that this thesis is concerned with, due to what Terry Smith calls “the interaction between responsiveness (the motor dimension of interactivity) and responsibility (its moral/social dimension).”²¹

This thesis explores the evocation of responsibility as distinct from ‘ethics,’”²² in line with the artists who are the subject of this dissertation, as they overwhelmingly favour the term ‘responsibility.’ In the above definition of responsibility used in this dissertation, that of “a moral obligation to behave correctly towards or in respect of a person or thing,” what may constitute correct behaviour arises from the specific context and content of each artwork. This encompasses the potentially amoral nature of responsivity as this thesis includes art that evokes ambiguous and uncertain responsibility, rather than the targeted use of art to induce ‘ethical’ behaviour. Behaving responsibly in response to the interactivity required to engage with an artwork may include behaviour considered irresponsible according to bylaws or societal conventions. This conundrum is outlined below in Section 1.5.1, where I recount my experience of being invited to give an electric shock to the performer of an interactive artwork. This thesis aligns with Rokeby’s argument that interacting in a Responsive Environment offers “a representation of responsibility” wherein “each participant in an interaction receives the sensation of responsibility; each has the ability to respond.”²³ The concern is


²¹ Terry Smith. E-mail message to author, November 17 2005.


creating Responsive Environments to evoke a “sensation” or “representation of responsibility,” as evocation is defined as bringing an experience to “the conscious mind” and to “elicit (a response)”24 rather than to catalyse, advocate or induce ‘ethical’ behaviour.

The diverse implications arising from coupling ‘environmental’ with ‘responsibility’ require an outline of the dominant modes of responsibility and responsivity in Responsive Environments. Artwork-specific responsivity and responsibility are discussed over the course of this dissertation, as they arise from the particular content and context of each artwork. In summary they are:

1) In artworks for one-on-one interaction (being one attendee at a time engaging with the work with no one else present), responsibility is negotiated between the artist, artwork and the participant interacting with the artwork. The participant’s responsibility is to the physical environment of the artwork in the real-time of their engagement. Artists’ responsibility is in retaining authorial responsibility while creating sufficient scope for interaction to evoke responsibility in the participant’s engagement with the artwork.

2) In artworks with one-on-many interactivity (being one participant at a time with other non-interacting attendees present), environmental responsibility takes on an additional dimension. The participant interacting with the artwork also acquires responsibility to the social environment regarding how their influence on the real-time behaviour of the artwork influences non-interacting attendees. Non-interacting attendees negotiate individual and collective social responsibility to the interacting participant regarding how they influence the participant’s interaction with the artwork.25

3) In artworks for one-on-one interaction where the artwork evolves, adapts or responds based on cumulative participant interaction,

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25 As discussed in this thesis, many artworks for one-on-one interaction are engaged with in one-on-many interactivity, despite the artist’s intention for the work to only be engaged with in one-on-one interaction. The dominant effect is undesirable impatience toward the interacting participant who may be burdened by their performative participation.
environmental responsibility takes on additional dimensions to that outlined in 1). The participant’s responsibility is to the physical environment of the artwork in the real-time of their engagement and in the ensuing influences produced on future states of the artwork. Artists’ responsibility is extended in communicating to participants what the ensuing consequences of their interaction may be while their responsibility to the artwork is lessened according to how autonomous the behaviour of the artwork becomes as it evolves or adapts.

4) In artworks with one-on-many interactivity where the artwork evolves, adapts or responds based on cumulative participant interaction, environmental responsibility for artists and attendees comprises all the dimensions listed in 2) and 3).

5) In artworks for many-to-many interactivity (being interaction with multiple simultaneous participants), participants’ responsibility to the social environment is negotiated between contemporaneous co-participants in the real-time of their engagement. Participants’ responsibility to the physical environment of the artwork is between each co-participant and the real-time behaviour of the artwork. The negotiation between individual and collective responsibility arises from their intertwined responsibilities to both social and physical environments of the artwork.

6) In artworks for many-to-many interactivity where the artwork evolves, adapts or responds based on cumulative participant interaction, environmental responsibility for artists and attendees comprises all the dimensions listed in 2), 3), 4) and 5). Evoking participants’ responsibility to the physical environment of the artwork creates additional challenges, such as communicating which participant influences what in real-time and which real-time influences from which participant led to which ensuing influences. In this context environmental stewardship more accurately describes participants’ responsibility due to the figurative custodial role they play in the synthesised or simulated evolution of the artwork.

In these six modes the ‘environment’ referred to in the coupling ‘environmental responsibility’ is the social and physical environment of the
artwork. In Responsive Environments these two interconnected domains impinge upon one another: the social environment encompasses cybernetic cycles of Human-Human interactions (artist-attendee and attendee-attendee), while the physical environment encompasses Human-Environment interactions (artist and attendee with the physical environment of the artwork). The physical environment includes the interface through which artist and attendee interact: namely Human-Machine interaction, whereby attendees interact with the artwork.\textsuperscript{26}

All the above categories and domains may seek to evoke additional dimensions of environmental responsibility: to exterior environments of non-human ecosystems and/or the quotidian and ubiquitous ‘real world.’ While the physical environment technically encompasses the natural environment, in this thesis ‘physical environment’ refers only to urban or built environments and ‘natural environment’ refers only to non-human ecosystems. ‘Quotidian environment’ refers to the combined social and physical environment outside the artwork. As such, inside\textsuperscript{27} refers to the social and/or physical environment of the artwork, while Outside refers to the natural and/or quotidian environment of the wider-world.

Blurring boundaries between Inside and Outside is instrumental in evoking environmental responsibility in Responsive Environments. This occurs through the Inside environment representing a proxy for an Outside environment. Key practitioners, such as Simon Penny, argue that interaction between participants in a Responsive Environment fosters “Synthetic Sociality”\textsuperscript{28} of harmoniously acrimonious Outside environments. For Penny, the “aesthetically manipulated quality” in such artforms is “‘behaviour’” of the

\textsuperscript{26} Other interfaces include “HPI (human-plant),” “HHI (human-human)” and “PCI (plant-computer)” as Maja Kuzmanovic outlined on behalf of her art collective FoAM in her presentation ‘FoAM’s GroWorld Initiative’ at Skopje Electronic Art Fair, Skopje, June 15-17 2001. http://fo.am/node/1348. Accessed March 12 2006. FoAM is the subject of the case study in Chapter 3.6.

\textsuperscript{27} ‘Inside’ and ‘Outside’ are capitalised to denote symbolic intent.

artwork and participants’ interaction with the artwork. With artists’ responsibility focused on designing the “aesthetic of behaviour” he argues that “the model for this behaviour must necessarily be human behaviour, the way in which humans interact with each other, or with other living things.” As an engineered microcosm of quotidian environments, responsibility on the Inside may symbolically represent responsibility to the Outside. Evoking this Inside-Outside relationship stems from the influence of Environments on Responsive Environments. Kaprow expanded upon this Inside-Outside relationship in ‘The Shape of the Art Environment’ in his Essays on the Blurring of Art and Life which articulates the central concern in his Words. In such a constructed context participants’ responsibility determined their collective and cumulative “misuse” or use of the “natural or artistic” environments. This Environment evoked implicit responsibility to the natural environment by evoking explicit responsibility to the social and physical environment of the artwork.

A permeable membrane between Inside and Outside is further explored when evoking Outside natural environments in Responsive Environments. Boundaries between the synthetic “engineered environment” and the natural environment are explored in Responsive Environments that systematically model or optically depict natural environments. In this approach, responsibility to the physical environment of the artwork symbolically represents responsibility to the natural environment. Optical depictions may evoke responsibility to this surrogate natural environment through representationalist content, such as audiovisual depictions of nature. This refers to prioritising content and narrativity in the above description of the three ingredients, whereby subject matter, such as environmental issues,

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31 Kaprow in Reiss 1999:14.

may be more cogently presented. Alternatively, systematic modeling may offer a greater degree of interactivity with abstract, complex and dynamic processes, such as evolution and adaptation. Through biomimesis, environmental responsibility may be evoked through such artworks’ more nuanced and involved interactivity afforded by their high degree of responsivity. This refers to the prioritisation of form in the above description of the three ingredients.

In turning from the abstract to the concrete, it is necessary to specify what participant ‘responsibility’ entails across such divergent artforms with such variance within and between artworks. Amidst all the above variables the constant remains: responsibility is defined by the content and context of each artwork. In particular, participant responsibility manifests through the means through which they interface, namely haptic, tactile, kinaesthetic and proprioceptive (including exteroceptive and interoceptive) processes.\(^3\) If a Responsive Environment responds to participants’ voluntary actions, such as their movement through the space, then their responsibility to the physical environment is through their external bodily processes. If a Responsive Environment responds to participants’ semi-voluntary actions, such as their breathing rate, then they may exercise intermittent responsibility to the physical environment through their internal bodily processes, as ones breathing rate may periodically be voluntary (by holding ones breath) but then becomes involuntary again when needing to take another breath. If a Responsive Environment responds to participants’ involuntary actions, such as their heart rate, then they can have no responsibility to the physical environment through internal bodily processes they have no conscious control over.

On balance, the pivotal determinant for evoking environmental responsibility is the litero-metaphorical balancing act between four binaries that are inherent to Responsive Environments: authority-control, determinacy-indeterminacy, simplicity-complexity and narrativity-interactivity. This

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\(^3\) Techniques include spatial navigation (such as infrared sensors, sonar sensors, 3D body motion tracking devices) and biofeedback (such as thermal heat imaging, heart and breathing rates, sweat and stress levels, eye motion sensors). The use of these techniques is discussed in *The Art and Science of Interface and Interaction Design*. Edited by Christa Sommerer, Lakhmi Jain and Laurent Mignonneau. Berlin: Springer. 2008.
balancing act is crucial for evoking environmental responsibility as a ‘balanced’ artwork offers potential conditions wherein artists maintain sufficient authorial responsibility while offering participants sufficient responsibility in their interaction with the artwork. The pursuit of balance informs the relationship between all the elements in an artwork and the negotiation between competing and contending considerations. Negotiating contested zones of responsibility between artist and attendee hinges on where the artwork is situated between artists’ authority versus the control they offer participants; where the artworks’ causality sits between determinacy and indeterminacy; where its behaviour sits between simplicity and complexity and how the artwork negotiates the trade-off between narrativity and interactivity.

Collectively, these four binaries create the relationship between the artworks’ degree of responsivity and the according degree of responsibility maintained by artists and thus required by participants. As an example, a Responsive Environment can either posses a high degree of narrativity or a high degree of interactivity, while negotiating the effect of this narrativity-interactivity trade-off on the trade-offs within the other three binaries. Highly interactive and highly complex artworks occasion equivalent responsivity, which requires a high degree of responsibility for participants as they exercise such control and influence over the artwork. However this combination may problematically evoke environmental responsibility as it may prove onerous for participant engagement with the artwork. Conversely, minimally interactive artworks with deterministic causality posses low level responsivity, meaning that participants exercise relatively insignificant responsibility to the artwork. However this combination may problematically evoke environmental responsibility as participants may not be compelled to engage when offered such a level of control and influence over the artwork.

The main challenge in creating Responsive Environments is combining the three ingredients subject to the four binaries to form recipes which maintain artists’ authorial responsibility while evoking attendees’ environmental responsibility. How this dissertation and my artworks probe this problem is discussed in the following two sections.
1.3 Exploring the Research Question through the Dissertation

This project has not developed new technologies or explored the effects new technology has on society and has not proven nor shown theoretical and technological possibilities. The research has focused on the challenges that develop from applying interactive video installations to the creation of evocative experiences.

Robin Petterd

The central research question - how to create Responsive Environments to evoke environmental responsibility in the interaction between artist, artwork and audience - is probed by considering its constituent parts: How may A (creating Responsive Environments) be attempted so that B (Artist-Artwork-Audience interaction) may occur according to criteria C (the Responsive Environment evokes audience responsibility). In this formulation of the question, the problem lies in C (negotiating between binaries inherent to Responsive Environments); the context the problem is explored in is B (Artist-Artwork-Audience interaction) and attempted solutions to evoking responsibility are found in A (examples from my own and others’ art practices).

The dissertation documents the search for solutions in the writings and artworks of relevant artists. Like Petterd’s above mentioned PBR PhD, this thesis also “developed methodologies for evoking sensations using interactive video installation art.” However the argument developed in my dissertation takes issue with Petterd’s contention that “the challenge with applying interactivity to create environments that aim to evoke sensual responses is the need for conscious interaction and any interface to be intuitive.” I argue against universalising methodologies of creation, in favour of context- and content-appropriate approaches that encompass intuitive and counter-intuitive interactivity. My discussion of such approaches is grounded in the artworks considered.

Context- and content-appropriate approaches denote issues particular to respective artforms, as it is only viable to explore select facets of Responsive Environments in this thesis, given the extensive terrain over which they spread. My concern is explicit and implicit environmental responsibility rather than efficacy of a Responsive Environment to instill environmental responsibility. Rather than ‘test’ if artworks ‘successfully’ evoke environmental responsibility, I am concerned with potential evocation through combining content, form and Interaction Design in creating rather than receiving art. Keith Armstrong’s PBR PhD similarly found evaluating audiences’ reception of his artworks was beyond a viable scope, as it would have required collaboration with a social scientist concentrating on audiences.37 Affirming Armstrong's insistence of involving a social scientist for understanding audiences’ experiences, the art collective FoAM have collaborated with anthropologist Magdalena Wesolkowska for such endeavours.38

While Beryl Graham’s PBR PhD examined “the particular problems” for Interactive Art in “conventional art gallery or museum spaces,”39 this thesis examines the problems particular to interactive installations in conventional (art galleries and museums), semi-conventional (theatrical and performative spaces) and unconventional spaces (public indoor and outdoor areas, illegal/‘illegitimate’ spaces and Artist Run Initiatives). Most fields of ‘Interactive’ Art are excluded, as only cited artworks are relevant. For example, only online interactivity related to ‘real-space’ interactivity is addressed, as, like Rokeby, my concerns are human scale experiences in human scale physical environments:

37 I was able to research audiences’ reception of Emergence as that project had suitable conditions for so doing (see p287).
physical presence and involvement, scale and sense of space, and real-timeness are factors that are often important in my work and hard to implement on the web.40

The main source of information is writings by practitioner-theorists, as these provide insight into their embodied knowledge from writing about their practice.41 Comparing catalogue essays and artist statements provided at their stagings with their academic writing reveals aspects that may not be explicitly articulated in the actual artworks, such as their rationale for their form, content and Interaction Design. Such comparison is integral for understanding artists’ attempts to evoke responsibility in their work as their practice may explore ambiguous responsibility, while their scholarly writing may articulate their rationale for evoking such modes of responsibility.

As a case in point, Ken Feingold’s *The Surprising Spiral* (1991), one of the first canonical Interactive Artworks, utilises trammeled interactivity, which is antithetical to the intuitive interactivity Petterd advocates. In *Against Friendly Interfaces: Aesthetics of Trammelized Interaction*, Maciej Ozog defines trammeled interactivity as “bewildering, changeable and unpredictable forms of the artefact and/or creating unconventional forms of the interface that hinder the interaction with the artefact.”42 Feingold’s scholarly writing details his rationale for such interactivity, wherein the “complex cause and effect structure” involved non-predictable variations between instantaneous, delayed and cumulative consequences from participants’ interactions with *The Surprising Spiral*. He designed the work for participants to be ambiguously responsible for future participants’ experiences whereby “the actions of previous viewers will also affect the structure found by another viewer.”43 Feingold’s rationale was that he “wanted these [types of consequences] to


41 Such text is produced on a laptop, the same device used for the vast majority of the art produced for this PhD. It is meaningfully distinct to compare a composer or filmmaker writing about their practice, given that the mediums they practice in are different from the mode used to produce their writing.


mirror our daily cause and effect experiences” which he argues are similarly complex and ambiguous. As public information at the stagings of this artwork did not mention these topics, Feingold found that “many who encountered this work were frustrated”44 while Erkki Huhtamo observed that “users have frequently felt puzzled.”45 Nevertheless Ozog, like Feingold, maintains that trammelised interactivity may viably evoke responsibility, provided “the construction of the artefact and the interface should disclose the interactor’s role in the process of interaction and emphasize his/her responsibility for its course.”46 This highlights the role of artists’ disclosure in their scholarly writing for emphasizing audiences’ responsibility, given the discrepancies between that which can be communicated solely by an artwork and writing designed to augment an artwork. Such discrepancies are widespread, given that ambiguity and indeterminacy are desired qualities in the cited artworks. A similar gulf exists between the information I provided at stagings of my artworks and this dissertation.47

In this vein I have omitted contemporary non-academic artists from this discussion, such as Rafael Lozano-Hemmer, since they generally do not communicate about their practice beyond relatively trivial catalogues and artist statements provided at exhibitions. For related reasons, I have deliberately focused on artists’ own words, to minimise the obfuscating tendencies of ‘artworld’ rhetoric that clouds artists like Lozano-Hemmer. Even so, my discussion augments the self-reflexive writings of cited artists by drawing upon art history,48 media-art theory,49 and critical theory,50 as these

44 Feingold 2002:123.
47 The influence of this on my strategies for my Kali Yuga and StilmS is discussed on p187 and p242.
48 Principally: Söke Dinkla, Allan Kaprow, Jack Burnham, Peter Weibel and Timothy Druckrey. Media archaeology is a related sub discipline.
49 Principally: Andrew Cameron, Erkki Huhtamo, Lev Manovich, Mitchell Whitelaw, Noah Wardrip-Fruin, Mark Meadows and Grahame Weinbren.
perspectives on interactivity, responsibility and artist-audience relations in Interactive Art illuminate facets of Responsive Environments. These perspectives are referenced in Chapter 2 to illuminate a review of this field of art practice. Chapter 3 presents five case studies which explore various strategies for using interactivity and responsivity over the career trajectories of three solo (Garth Paine, Jon McCormack and David Rokeby) and two Interactive Art collectives (Keith Armstrong/Transmute Collective and FoAM). The relevance of other artists such as Myron Krueger, Bill Seaman, Christa Sommerer, Laurent Mignonneau, Eduardo Kac, Karl Sims and Simon Penny are referenced in Chapter 2. Specific resonances with other artists, such as Luc Courchesne, Grahame Weinbren, Ken Feingold and collectives such as Time’s Up, Blast Theory, The Mixed Reality Lab and The Builders Association are referenced in the discussion of my PBR in Chapters 4, 5 and 6.

The dissertation concludes with conjectures about the direction practice appears to be taking, given that balance has always been and seems always to be elusive, in light of practices that anticipate imminent advances in Artificial-Life (Alife) science, Artificial Intelligence and Complexity Sciences. Speculation posits the possibility of balanced positions of the ineffable binaries inherent to Responsive Environments, with artworks operating somewhere along frail, fertile and porous boundaries at the edge of chaos. Conjectures about future directions concern a strive for ‘evolving’ artworks using ‘dialogical’ interactivity to evoke environmental responsibility in harmony with

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56 These artworks are explored in Chapter 7: Conclusion.
myriad other mutually exclusive aspects of aesthetics, form, function, medium and subject matter.

1.4 Exploring the Research Question through the Creative Component

Ideas exist between ideal realms of “life-as-it-could-be”\(^{57}\) in Alife and real realms of “life-as-we-know-it”\(^{58}\) in Biological-Life (Blife).\(^{59}\) As a practitioner-theorist working between these realms, Jon McCormack aims “to investigate the possibilities of ‘art-as-it-could-be’”\(^{60}\) based on his Alife research into “the idea that life-as-it-could-be might create”\(^{61}\) these necessary conditions. Alife science is integral to this possibility, as it concerns “a philosophy that supposes life can be defined in general terms by its mechanisms, not in any particular materialisation.”\(^{62}\) However unlike The Beauty to Be - the subtitle of McCormack’s article from which this definition is taken - this thesis documents how ideas require a material substrate in order to ‘Be’, as becoming the Blife of art-as-it-actually-is pivots on what is possible in any artform, rather than what may become possible in emerging artforms.

My negotiation between the realms of real and ideal involved conceiving and executing a suite of artworks where interactivity and responsivity were but two (albeit major) elements in the totality of creation and production. Their iterative development demonstrates content and context-appropriate strategies to address the problems inherent in interactivity and responsivity when these are the major elements addressed in both creation and production.


\(^{59}\) Braeckman 1995:269. The apotheosis would be an application of Helmreich’s “life-as-it-should-be” to ‘art-as-it-should-be’ according to the discussion in the conclusion in Chapter 7.


\(^{61}\) McCormack 2004a:3.

\(^{62}\) McCormack 2004a:1.
The following outline of the suite touches on points that are extensively discussed in Chapters 4, 5 and 6, and in Appendixes C, D and E:

1) **Inverted Preverted** (2004-5), **D#Generative** (2004-7) and **Sly Drooler** (2004-5). Refer to Chapter 4.2 for photographic documentation of the making of and completed works in their site-specific installation.

2) **Tat Avam Asi (Kali Yuga) v1** (2004) and **v2** (2005-8) (hereafter **KYv1** and **KYv2** respectively). Refer to Appendix A for **KYv1** and Chapter 4.3 for photographic documentation of a 2008 staging of **KYv2**.

3) **StilmS v1-v3** (2004-5). Refer to Appendix A for video documentation of a 2004 staging and Chapter 5 for photographic documentation of four 2004 stagings of **StilmS**.

4) **Emergence v1** (2004), **v2** (2005) and **v3** (2007). Refer to Appendix A for a documentary film about **v2** and an entire **v3** staging and to Chapter 6 and Appendix E for photographic documentation of **v2** and **v3**.

The suite chronologically progresses from control over content creation and execution (in 1 and 2), to control over content with purposefully subjugated control over execution (in 3) and to collaborative co-creation amidst dialogical engagement with multiple simultaneous variables (in 4). In parallel, the works progress from Plastic Art (in 1), to non-linear single channel Media Art (in 2), to multi-channel semi-immersive performative-installation (in 3) and to full scale multi-channel immersive installation (in 4). Similarly, my authorial responsibility shifted from a high level of control over singularly created content (in 1) to focusing on creating context through Interaction Design in increasingly collaborative works (in 4).

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63 The last stage in this progression was in professional practice: as an Interaction Designer on the making of the Museum of Australian Democracy at Old Canberra House. While this involved Interaction Design that was highly relevant to **Emergence** and in an international collaboration with dozens of co-creators in diverse domains, it is
The suite purposefully transcends boundaries between mediums and artforms, relative to four broad fields and periods of Interactive Art:

1) Combining ‘analogue interactivity' with painting and sculpture relates (1) to “pre-electronic” precedents to Interactive Art, such as works by Jasper Johns, Max Ernst and Roy Ascott.

2) Combining a dramaturgical cinematic narrative with trammeled interactivity relates (2) to early 1990s narrative based Interactive Art such as works by Courchesne and Weinbren.

3) Combining audience interactivity with organicist audiovisual data-sets relates (3) to Seaman’s “recombinant poetics” and Feingold’s approaches to Responsive Environments.

4) Combining instantaneous and cumulative influences as exerted by groups of participants relates (4) to contemporary synthesised evolution and adaptation in Alife and Artificial Natures approaches to Responsive Environments.

Diverse interactivity and responsivity modalities were used, according to artwork-appropriate approaches. Artworks 1) to 4) chronologically progress from:

not discussed as my areas of involvement in the Museum were still being created at the time of submitting this PhD.

65 See p172.
66 See p185.
68 See p34.
69 See p98.
1) Implicit environmental responsibility in non-responsive and metaphorically interactive works

2) Indirect and metaphorical environmental responsibility for a single-participant in a “reactive environment”

3) Direct, literal and instantaneous environmental responsibility for small group interaction in a semi-immersive Responsive Environment

4) Indirect, direct, literal, metaphorical, instantaneous and cumulative environmental responsibility for large group interaction in a highly immersive Responsive Environment.

Production was in the following domains:
1) Solo and collaborative performances: ephemeral works at theatres, performance spaces, festivals and in installations

2) Creation of original materials: ‘scriptwriting’, live action fiction filmmaking, computer animation, video art, music composition, sound design, architectural design, installation design, costume design, interface designs, photographic art, painting and sculpture

3) Design of intangible processes: concepts, methods and procedures for immaterial audience interaction and material audience interfacing

4) Technical: Electronic+Digital System design, Information Architecture (structure, organisation and operation of the real-time behaviour of Responsive Environments), computer programming, performative operation of computer hardware and software

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70 Dinkla 1996:281.
71 This term is not wholly accurate, as writing the non-linear, multi-channel and modular narratives for KY and Emergence was not in the traditional domain of a scriptwriting.
5) Logistics: Project Management (finances, administration, staging, publicity, funding, touring, building, dismantling), collaboration with other artists, designers, social scientists, computer scientists, electrical engineers, mechanical engineers and technologists.

Having outlined my PBR that is the subject of Chapters 4, 5, 6 and Appendixes A, C, D, E the following positions my motivation and rationale for my PBR.

1.5 Motivation and Rationale

My formal training is in art, I am an amateur in fields of robotic engineering, artificial intelligence and cognitive science. My knowledge is unsystematic, it has been acquired on the basis of need and interest. However my outsider status has allowed me an external and interdisciplinary perspective on research in these fields.

Simon Penny

Unlike Penny, my formal training is not in art, although I share his “outsider status” to this field of inquiry. My formal training is in anthropology and philosophy, however this thesis also draws upon my background in diverse art practices and artforms. While anthropology and philosophy influenced my PBR for KYv1, KYv2 and StilmS v1-3, my research and practice progressively moved in tandem toward the sciences of complexity, emergence, self-organisation, evolution and biology for StilmS v4 and Emergence v1-v3. These developments involved a progressive exploration of artforms that distribute responsibility between collaborative co-creators, and artwork and audiences composed not of groups of individuals, but of groups of teams as encouraged and facilitated by the artwork. This journey forms the backbone of this dissertation, as the following anecdote illustrates.

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73 See Appendix B: Curriculum Vitae.
1.5.1 Executing the Myth of the Tortured Artist

On a Saturday night in April 2005 I was at a party in Darlinghurst in Sydney. Amongst the merriment and fervor, I invited some friends and collaborators at the party to Kingdom Come and/or Punch Holes In The Body Politic, an avowedly political, topical and controversial “performance/installation/ordeal” that Mike Parr was staging a kilometre away at Artspace in Woolloomooloo. The work involved Parr sitting, standing and sleeping for 48 continuous hours, while wired up to receive electric shocks should any interactors’ movement intercept infrared beams placed within Artspace (Figures 1-1, 1-2, 1-3). He wore an orange uniform modeled on then detainees in Guantanamo Bay. The entire 48 hours was broadcast live on the Internet, including those interactors who entered the ‘active’ part of the space to give him an electric shock.

Figures 1-1, 1-2: Mike Parr Kingdom Come and/or Punch Holes In The Body Politic (2005)
Figure 1-3: Publicity for a similar Mike Parr work Aussie Aussie Aussie Oi Oi Oi [Democratic Torture] (2005)

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74 One of whom was my closest collaborator for my artworks discussed in Chapters 4-6.
I led half a dozen friends from the party for an intended hour-long interlude, after which we would return to the party. We arrived at Artspace around 1am, only to find Parr on the far side of the near empty warehouse on the cold concrete floor in the fetal position, either asleep or semi-conscious, as he was too far away to tell. Although I had informed everyone he was 36 hours into the performance, we were initially disappointed, as we left the party to see ‘something’ other than a man asleep on the floor next to his urine bucket. We reconvened outside to discuss leaving or staying to see if ‘something’ happened.

In ‘Unassumable Responsibility’: Watching Mike Parr, Burvill’s article about his encounter in the same space some 14 hours before mine, he also found a deliberate ambiguity and absence of information about “What are the rules here?” and “What kind of spectator do I have to be here?” As a Performance Studies academic, who has personally known Parr and his work for many years, Burvill found that since the work had “no instructions” and “no warning” it provoked investigation on behalf of visitors “a behaviorist training of the spectator” as to what happened in the work and what they could and/or should do. He found that he “had sent students along and had tried to prepare them as far as I could, but I did not know in detail until after my own experience just what it was that Mike Parr had prepared.” Although knowing the artist statement and publicity from the Artspace website in advance, I also was not prepared for such uncertainty as to my roles and responsibilities. Due to Parr’s reservations about what power he potentially granted strangers, Jeni Porter wrote in Waiting to Get Wired, her review of the work, that the performance promotion “was so obscure [that] the event attracted virtually no

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76 Burvill 2006a:3.
advance press” since Artspace was “wary of people getting their rocks off giving Parr shocks.”

Curious, I returned inside solo to seek the gallery assistant to ask about the etiquette parameters. The assistant pointed to two of the nearer vertical wooden beams and informed me that anyone could trigger an electric shock by walking in between them. The two beams were strategically and symbolically located very close to Parr’s chair, next to which he lay. To inflict pain required performatively walking ‘into’ the ‘active’ area and passing across Parr’s path. I went outside and informed my friends what was required if we were to see ‘something.’ We debated the ethics of doing such and whether it was better to wait to see if someone else would interact with the performance. We found ourselves facing the same challenge as Burvill. For “if we spectators hold back - ‘withhold’ our proximity, ‘keep our distance’, things are calm” since Parr is not “shocked, but then a large part of the ‘show’ will be inactive too.”

In reference to Levinas’ “unassumable responsibility,” Burvill asks:

How to assume this responsibility in this situation? What becomes of relationality and ethics in this ‘face to face’? Whatever this situation might metaphorise or thematise, conceptually refer to, what about my relation to the body of a guy I have talked to and liked, and in this situation, during this event, can only either watch dumbly and inertly, or hurt by my closer, intrusive presence?

For our group, these issues were amplified by making a collective decision about our collective actions (or inactions). None of us was willing to shock him, so we discussed options of “I’ll do it if you and you then do it” and “if we go through at the same time we won’t know who actually triggered the shock.” Eventually we agreed one of us would go first, followed by a second or third person, depending on the consequences of the first shock, as we had no gauge about what would happen. With so few people around Artspace at that

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80 Burvill 2006a:3.
82 In addition, Burvill reflects on what may happen: “If I go, and nobody comes, how long will he endure—without spectators? I feel the pressure of enforced non-communication build up in me.” 2006a:4.
time of night (the space is generally open during daylight hours only), I decided to take on this mantle, as the self appointed representative from our group. This also stemmed from our conundrum of comprising the majority of the audience during the time we were there, which arose from the “contradictory experience” that the work created, being “based on ethically compromising the spectator if at all possible by almost forcing them to hurt Mike.” The others seemed somewhat relieved, as three would see ‘something’ without having to interact with the work, while the other two could decide to not interact, pending my encounter.

I slowly walked forward between the two pillars under the watchful eye of the gallery assistant. I carefully and cautiously monitored Parr’s sleeping face as I did so, but he did not stir and ‘nothing’ seemed to happen. The assistant informed me he was so asleep he did not feel the shock, or the infrared sensors had not successfully registered my presence. So I returned, to approach even more slowly. Suddenly Parr’s whole body convulsed and violently shook as the electrical charge shot through. The instantaneous and involuntary reaction shocked me, as he rapidly became alert, giving me a ‘death stare’ and yelling profanities at me. This only heightened my state of shock as Parr has an international reputation for highly demanding endurance performances involving self-inflicted and other-inflicted levels of pain that are unique in experimental performance art, let alone life outside courtroom prosecutions for violent assaults. Shamefully I returned to my friends on the other side of the warehouse, whom I noticed in surprise were also quite distraught. Two of the girls started crying, and the others were speechless. In silence, we returned outside Artspace to collect ourselves. I turned over my shoulder to take a last glance at Parr, now sitting on the chair with his head slumped and the gallery assistant tending to him with his hand on Parr’s shoulder.

After some moments internally processing our experiences, we exchanged perspectives about our respective responsibilities for the ‘something.’ Like Burvill, my sense of responsibility stemmed from “trying to be both an ethical and as much as possible the interactive spectator Mike

83 Burvill 2006b.
apparently wanted.” My keenness to absolve myself of my guilt for what I had caused was uncannily met by confessions from the rest of the group who professed their sense of responsibility for being explicitly complicit in the ‘something’: none had argued against me doing what I did, even after the first pass produced no response. We realised that perhaps this was what the artwork ‘was’: an impetus to evoke environmental responsibility in all who attended, whether they regarded themselves as visitors (a.k.a ‘innocent bystanders’) or interactors (a.k.a ‘guilty participants’). The shock I triggered led to lengthy discussions between us as we walked back to the party.

Three years later I ‘met’ Parr, just before his lecture about his practice as part of his Artist Residency at ANU School of Art. A capacity audience awaited in anticipation. I advanced, to thank him for the above experience, and to apologise for my actions. I also approached in the hope, were he not angry with me for what I did, that I might interview him for this PhD. To my surprise, he remembered who I was after I told him what I had done. Little did I know, he remembered the incident as I was the straw that broke the camels back of that artwork: he was already near delirious (which the gallery assistant omitted from his summary of Parr’s condition when I enquired) and decided as a consequence of my shock to disconnect himself from the machine and terminate the performance. To have unintentionally exerted such an immediate and ongoing influence came as a further shock: for while I had known my individual responsibility was coupled with the cumulative collective actions of all that had gone before, what I could not know was that it had been so great that I denied the same possibilities for future attendees. The work embodied a performative equivalent to the artificial evolution described in the opening bricolage above, as in both the interactions of each individual amount to something beyond the sum of their parts: the emergence of the collapse of the work. And to make matters more bewildering, Parr greeted me with enthusiasm once he found out it was ‘me’ who ‘broke’ that performance, for he turned the tables by asking to interview me for a book he was co-writing about artist-audience interaction in his practice. In a strange moment of mutual respect and understanding, we both smiled and shook hands, before I sat to hear about his commanding and highly influential practice.

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84 Burvill 2006b.
The responsibility at the heart of the work was emphasised in Porter’s review. Her interviews concluded that all gallery staff were instructed by Artspace’s director [Tsoutas] that “‘if some dickhead walks in and just wants to get his jollies off’ to eject him.” However her review incorrectly reasoned about the caesura\(^{85}\) of the performance. Porter argued that “early on Sunday the only person Parr thought was a dickhead was Tsoutas himself,” based on Parr’s understanding, before we had the above discussion, of how the performance was broken:

> About 2 a.m. the 60-year-old endurance performance veteran decided he’d had enough of sitting around waiting for someone else to zap him. He claims he turned off the power, slid onto the floor, and fell into a deep sleep only to be woken by a jolt delivered courtesy of Tsoutas reconnecting him.\(^{86}\)

In a manner redolent of the Inside-Outside relationship in Section 1.2 above, the ensuing consequences profoundly shaped my understanding of audience and artist responsibility in Responsive Environments. Burvill also found the work evoked an Inside-Outside relationship, whereby interaction with the social and physical environment of the artwork affects one’s relationship to the quotidian environment outside. From such associations, he rhetorically asked: “should the spectator respond both inside and beyond the performance space?” for “if so what might an ‘appropriate’ response be?”\(^{87}\) Two notable examples of my ‘answers’ include *NoPainNoGain*, a proposed iteration of *Stilms v4* in which participants would collectively control my arms via electrode induced charges\(^{88}\) and the fictitious shocks administered by participants in *Emergence v2*.\(^{89}\) This involved a similar set up to the Milgram experiment whereby voluntary participants punished the protagonist of the work by whistling into a microphone, which simulated an acoustic-shock as played live by the actor on a video projection.

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\(^{86}\) Porter 2005.

\(^{87}\) Burvill 2006b.

\(^{88}\) See p236.

\(^{89}\) See p281.
1.6 Contributions

The Visual Anthropology PhD I began was initially titled Contributions to the Understanding of the Ownership of the Colour of Water. The title expressed an idea that humans stole the ‘colour’ of water from one another. It concerned how the ‘natural’ transparency and translucence of this water in the high Himalayas became ‘owned’ by the global forces of industrialisation and consequent environmental degradation in the Indian plains. As water first emerges brown (rather than clear) from beneath Himalayan glaciers, due in part to precipitous glacial melting, the responsibility for the ‘natural’ colour of water, which used to belong to those at the remote source, now extends to those downstream who have come to ‘own’ the premature colouration. The prism of human ecology was used to examine contending usages of the physical environment by pilgrims, priests, tourists, tourism operators, NGO workers, conservationists and activists around the Himalayan sources of the Ganga River. This PBR project could not be continued when I was denied a Research Visa to return to India in 2005, at which point I commenced the current topic.

The subject of environmental responsibility has persisted in my current dissertation, which also concerns opaque rather than incontrovertible contributions, like the variable opacity of water itself. Such contributions are through research-produced evocative art that harnesses insoluble qualities of indeterminacy and ambiguity over verifiable ‘contributions.’ In this PBR, “a creative artefact is the basis of the contribution to knowledge” as opposed to

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90 This was the working title from 2002-2004 and referred to Franz Boaz’s PhD Contributions to the Understanding of the Colour of Water (Department of Physical Geography, Kiel University, Germany 1881). When the PhD was formerly commenced in 2004 the title became The Idea of North: Pilgrimage and Progress in the Garhwal Himalayas. There were four interrelated components: a thesis, feature length ethnographic film, a DVD and a website containing and connecting all components. The ‘film’ would use multiple narratives representing diverse perspectives on environmental ethics regarding the Garhwal Himalaya. The subjects, issues, locations and methods were devised during six months preliminary anthropological fieldwork I conducted in India in 2003, following the Ganga from its Himalayan source to the sea in the Bay of Bengal. This topic was also the impetus for Kali Yuga and StilmS as discussed in Chapter 4.3 and 5 respectively.
Practice Led Research (PLD), wherein “the research leads primarily to new understandings about practice.”

This thesis addresses two related deficits. Not only have Responsive Environments received negligible critical analysis internationally, but relating Responsive Environments to environmental responsibility has not previously been proposed. As of March 2010, not one PhD cites Responsive Environments as any subject in the Australasian Digital Theses Repository while global PhD inventories reveal a similar absence. Furthermore, a Google search in May 2010 returned 718000 results for “environmental responsibility” and 41100 results for “responsive environments,” yet 0 results for “environmental responsibility in responsive environments.” Responsive Environments remain marginalised to intermittent, eclectic and ‘patchy’ discourse, due to the absence of a unified ‘field,’ corpus of texts, agreed approaches, debates on analysis, ‘school’ of artists, or accepted disciplines.

This is not a matter of terminology, but of critical understanding. FoAM decry the absence of a “consistent classification or evaluation mechanisms” for Responsive Environments, although they reason this stems from their indefinable and all encompassing properties, as they can “comfortably span approximately 20 existing colloquia” such as “an installation in a visual arts context; as a performance in a sound or theatre world; as a demo session on visual tracking by computer vision experts; or as a statistical usability lab for social scientists.” This is exemplified in Stephen Wilson’s Information Arts: The Intersection of Art, Science and Technology, which

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provides nearly 1000 weblinks to artworks and mentions dozens of specific and obscure categories, but does not mention Responsive Environments.\footnote{Stephen Wilson. \textit{Information Arts: Intersections of Art, Science and Technology}. Massachusetts: MIT Press. 2002. The cited artworks are listed at http://userwww.sfsu.edu/~infoarts/links/wilson.artlinks2.html. Accessed March 5 2007. In line with FoAM’s argument above, some artworks could be considered Responsive Environments as per the practices discussed in Chapters 2 and 3.}

Guattari and Carolyn Merchant’s critical theory approach to ecology, \textsuperscript{101} the complex technology integral to Responsive Environments limits the relevance of dialogue with such discourse or practices. Nevertheless, attempts are made to use the technologically intensive nature of Responsive Environments to evoke environmental concerns and to bridge such gaps. Armstrong’s PhD is particularly noteworthy in these regards as it pioneers a self-reflexive application of environmentalist principles to collaboratively create artworks that explore interactivity and responsibility. Armstrong’s contribution stems from “having observed how much new media art praxis operates largely without awareness of the ecological implications of those practices.” In response, he “began developing new processes for conceptualising and developing media art works”\textsuperscript{102} according to self-reflexive use of complex technology and ecological principles.

In tandem, this thesis contributes to the small, but growing, interest in bridging gulfs between art, science and technology; analogue and digital art; and environmentalism and Interactive Art. While bridging such gulfs is beyond the scope of this project, my “reflective practitioner”\textsuperscript{103} methodology enables the combined artworks and dissertation to be useful to similar practitioner-theorists and curators, critics and academics working in these fields of practice.


\textsuperscript{102} Armstrong 2002:91.

1.7 Methodology: Process and Praxis

My creative process doubles as a personal critical inquiry into ideas of relationship and interaction and the ways that the explicit mechanical interactive relationships made possible by computers change, challenge, enlarge and diminish notions of relationship and interaction.

David Rokeby

Like Rokeby, my PBR “doubles” as an investigation of relationships in my works and Inside-Outside relationships evoked by my works as I oscillated between “hybridised” and “bricolage” methodologies for singular and collaborative practice and solo dissertation research. Rokeby does not refer to his art as practice, but rather “as a research practice” where staging works formed “a public research laboratory where my ideas about interaction and experience are tested, affirmed, or shot down.” The distinction, as applied to my PBR, is that being research practice, Rokeby’s works begin with “a couple of questions” principally about interactivity and interrelationships, wherein a resultant work will entertain “a dialogue within itself” rather than “end with a finished piece.” Similarly, creating my suite privileged process over product, via the “dialogue within” the successive iterations of individual artworks. This iterative design methodology harnessed what Bob Dick describes as the “emergent” nature of action-research, whereby I used “a cyclic or spiral process which alternates between action and critical reflection.”

105 Graham 1997:19.
106 Armstrong 2002:68.
While methodologies of collaboration lie beyond this project’s scope, it is necessary to account for relevant precedents that presage Chapters 3.5, 3.6, 4.3 and 6.2 on contemporary art collectives. Penny uses a similar PBR methodology over his long career involving an exceptionally wide skill set across disparate domains. Citing *Petit Mal* (1993-5) (Figures 1-4, 1-5), his “autonomous robotic artwork,” Penny “define[s] my research as ‘the aesthetics of real-space interaction’”\(^{111}\) through which *Petit Mal* simultaneously explores Human-Computer and Human-Human Interaction. For Penny, such “research emerges from artistic practice and is therefore concerned with subtle and evocative modes of communication rather than pragmatic goal based functions.”\(^{112}\) However this raises a methodological bind between artwork requiring artist-audience communication and the required collaboration and communication to create such work. While finding collaboration “a necessity” in his PBR, Penny argues that communication in collaboration is fraught with difficulties. As his production process “necessitates deep and sensitive engagement with people trained in disciplines so distant from the goals of art that conversation can, at times, seem impossible,” he argues that “solving technical problems and resolving communications issues among the collaborators is a labor in itself.”\(^{113}\)

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111 Penny. 1997b.

112 Penny 1997b.

In contrast to the above two examples of PBR in internationally established artists, methodologies of collaboration are neglected in PBR PhDs. My methodology was deliberately grounded in recourse to a comparative corpus of recent PBR PhDs broadly representative of an emerging generation of practitioners undertaking similar projects. This involved ongoing discussions, collaborations, analysis of submitted PhDs and/or interacting with artworks produced for the Australian PhDs of George Khut, Greg Turner, Lizzie Muller, Chris Fortescue, Keir Smith, David Wolf, Robin Petterd, John Drummond, Karl Willis and Peter Fitzgerald. Importantly while Khut, Turner and Muller worked with one another (in various combinations) to realise their collaborative artworks for their PhDs, these collaborations were acknowledged as distinct contributions toward respective PhDs. For example, Muller’s PhD focused on audiences’ understanding and experiences in the above mentioned collaboration, while Khut and Turner’s respective PhDs focused on separate but related aspects of creating the collaborative artwork. It was more appropriate to ground my own PhD in these PhDs of similar scope and subject, rather than the artists in Chapter 3 who are an earlier generation with established international art practices over their relatively long careers.

Of notable exception to this gap in the discourse is the collaborative methodology at the heart of Turner’s PhD: Supportive Methodology and Real Time devotes one journal per year to Australian PBR PhDs in art. Beginning with the ‘Postgraduate Revolution’ issue in August 2005, these issues cover how and why the dominion of text is being augmented by PBR.

The authors and their Australian Universities are (in order of relevance to this thesis): George Khut (DCA UWS), Greg Turner (PhD UTS), Lizzie Muller (PhD UTS), Chris Fortescue (PhD ANU), Keir Smith (PhD UNSW), David Wolf (MA RMIT), Robin Petterd (PhD UoT), John Drummond (DCA UWS), Karl Willis (PhD CMU) and Peter Fitzgerald (DCA UoW). While Khut and Fitzgerald submitted a DCA, and Wolf an MA, the nature of their projects are still highly relevant in form, subject matter and execution. Collaboration included: Smith as an Interface Design Consultant for Emergence V2, Turner as the initial Audiovisual Media System Programmer for Emergence V3 and collaborating with Wolf on a live audiovisual performance at Gadget, Canberra Contemporary Art Space, December 7 2005. I interacted with Khut’s Drawing Breath in 2005, interacted with Willis’ Light Tracer in 2005, attended Fitzgerald’s performance of one of his compositions for his DCA, attended two exhibitions Muller curated for her PhD and attended Fortescue’s exhibition of the artworks he made for his PhD.
Technology for Creating Interactive Art. However this relates back to the distinction between PBR and PLD, as Turner’s PhD contributed “primarily to new understandings about practice” rather than contributing original creative artifacts through PBR. In contrast, Armstrong’s PhD contributes to understandings about creative processes arising from the specificities of the artworks produced for his PhD, rather than the theoretical focus on collaborative methodology that Turner’s PhD contributes. With a practice similar to Penny, Armstrong’s PhD likewise argues for the necessity of highly collaborative artwork production, despite periodically contested roles and responsibilities. Armstrong’s approach to this conundrum of collaborative bricolage methodologies poses a similar argument to Armstrong and Penny. Extending the “metaphor...of conversation itself” in the conversational interactivity in *Individual Fancies* (1997), her PhD artwork, to its production process was instrumental in bridging her difficulties for meeting the “demands [of] hybridity” between her respective roles as artist, practitioner and researcher for her PhD.

Creating such art stemmed from her metaphor of the artist as ‘host’ of a dinner party, like a facilitator “enabling community art.” Her ‘betweenness’ when staging *Individual Fancies* restrained her as a metaphorical rather than actual host. While she “want[ed] to help [interactors] all the time” with their interaction with her work, she decreed that she “must stand back and just give people the ‘tools’” as it was the designed responsibility of her self-sustaining artwork to engage audiences and not hers. These ‘tools’ allowed participants

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117 Candy 2007.

118 Armstrong discusses such, one example (2002:80-85) being his collaboration with Transmute Collective on #14, an artwork made for his PhD. Similarly, Beth Jackson described Transit Lounge, another artwork made for his PhD, as “a major exercise in collaborative authorship, due to the very specialist nature of the expertise needed to realise the work.” Beth Jackson. *Art and Interactivity – Are we Game?* Broadsheet Magazine, 1999, cited in Armstrong 2002:245.

119 Graham writes: “I have to have many conversations with many people because the range of skills is so wide and the information not readily available. I have to persuade and bargain and give and take, and my ideas are often changed by other people’s opinions, like real conversation. I often seem to end up over real tea and biscuits, reflecting the artwork itself” as *Individual Fancies* involved participants having ‘virtual’ tea and biscuits. Graham 1997:227.
to considerably control Graham’s relatively ‘closed system,’ due to the metaphorically conversational role it offered audiences. In taking her metaphor and developing it in his context, Armstrong too sees this ‘host role’ as offering a methodology of collaboration. In his usage “such an interaction design” requires that the artist-as-host “may say little but can carefully facilitate the introductions that cement the overall success of the party.”

He employed this strategy to negotiate the simplicity-complexity trade-off, as he found a ‘host role’ facilitated engagement with artworks with relatively simple form as “the complexity of response and operation can be brought to the work by the audiences themselves.” The parallels with my approach are discussed in my account of StilmS and Emergence.

1.7.1 Responsive Environments as all Encompassing ‘Field’

While these PBR PhDs influenced my strategies for creating Interactive Art, few touch on environmental responsibility or Responsive Environments, let alone environmental responsibility in Responsive Environments. Accordingly, they were augmented by a comprehensive global online then in situ survey of artists and artworks, to explore related approaches to combining content, form and Interaction Design to evoke environmental responsibility in a Responsive Environment. Search criteria aimed for a middle-ground of being inclusive enough to incorporate heterogeneous Interactive Art and Responsive Environments, but exclusive enough to form a comparative corpus of intrinsic rather than imputed connections between artists. Incrementally refining the criteria elucidated some of the pivotal contributions, by making more apparent what has and has not gone before.

Successively refining the survey filters eventually produced the following criteria:

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120 Armstrong 2002:265.
121 Armstrong 2002:265.
1) Artists who identify environmental responsibility as central to their work and/or for art in general
2) Artists who engage in reflexivity/critique of debates surrounding interactivity, authorship, control, complexity, narrativity, and environmental responsibility in their works and/or their writing about their work
3) Artists whose scholarly writing forms part of their art practice and whose art practice forms part of their scholarly writing
4) Artists with career trajectories that may reveal changes in their practice and ideas about responsivity and interactivity
5) Artworks which evoke environmental responsibility, whether or not they are considered Responsive Environments. This explored if artists in other disciplines and artforms share similar motivations to the selected corpus
6) Interactive artworks involving Artificial Nature, Alife, emergence, evolution, or adaptation
7) Interactive artworks where the content and/or modus operandi evokes interaction in an Outside environment
8) Co-created artworks involving collaboration between artists, technologists and scientists
9) Artworks staged in public access museums, galleries or outdoor public spaces

Despite rendering most ‘Interactive Art’ as irrelevant, these criteria highlighted extensive connections between the artists discussed in Chapters 2 and 3, who share similar motivations despite working in diverse artforms.123

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123 The artists listed are on p36 above.
1.7.2 An Exclusive ‘Field’ in Fieldwork

Knowledge of broader trends about who is working on what is supplementary to understanding the artforms through first-hand experience. Responsive Environments have particular properties that problematise second-hand information and understanding. Whether an unpredictably morphing garden maze or a hermetically sealed data-set of content, each encounter reveals literally and hermeneutically different facets for different participants. Unlike Benjamin’s dictum on The Work of Art in the Age of Mechanical Reproduction, requiring in situ experience resists the age of tele-presence and space-time compression. These works of installation art, many of which are ‘Editions of One,’ challenge the age of mechanical reproduction. They privilege process over product, as they offer dynamic processes that restore direct experience to primacy rather than ‘finished’ artworks. With relevant works seldom staged, principally due to formidable logistics and technical obsolescence, first hand experience itself becomes the precious commodity. Consequently, artist’s statements, interviews, websites, research articles, video documentation and reviews of their work became of primary importance.

Coupled with such barriers toward first hand experience, artworks are further hindered by sharing understanding of incommunicable or solipsistic experiences that emerge from different encounters with the ‘same’ work. To these ends, Graham’s “hybrid and pragmatic research methods” of curating and visiting works formed the “public research laboratory” for her quantitative and statistical examination of audience engagement. Her PhD concluded that many audiences did not reach/find/explore/encounter significant portions/areas/elements of many works due to their

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125 As installations and performative-installations can only exist in one place at one time (or between two or more simultaneous places in telematic art) they may potentially be unique and site-specific. Strictly speaking, artworks such as Stelarc’s Prosthetic Head (discussed on p69) are not unique or site-specific, as in this case three editions were for sale. As is the case with Rokeby’s artworks which have been sold as permanent installations, which may be considered ‘installation commodities.’

126 Graham 1997:147.

127 Rokeby 1998.
understandings of responsivity and their associated responsibility. This revealed a wide disjuncture between artists’ intentions and audience experience, which impedes the evocation of responsibility through artwork-audience interaction. Importantly this disjuncture existed in these works’ hermetically sealed form and Interaction Design, with all participant influence contained with pre-defined possibilities for their interaction (as was the state of the art at the time).

The disjuncture between artists’ intentions and audience experience is exacerbated in works involving evolving and emergent forms, due to highly variant responsivity-responsibility ratios. However, I sought such works during fieldwork in Germany, Austria, Holland, Belgium and England in 2006, involving visits to major festivals, galleries, museums and cultural institutions, and attendance at workshops, symposia and conferences. Observational analysis, non-structured individual and group discussions with audience members and/or interviews with artists were conducted with the few works relevant to the above criteria. This further problematised observational analysis of audience interactivity, as non-cumulative responsivity precluded the observation of how an audience adapted their behaviour in response to the changing behaviour of an artwork.

While encountering many aesthetically or technically innovative artworks, my response was similar to Armstrong’s fieldwork conducted six years earlier at the same principal sites. It was not possible to find a work suitable for conducting longitudinal research, in terms of where and when it was staged, Interaction Design and content. The very few that manifested any such properties were collapsed into the timeframe and attention span permitted amongst the fervour and fever of major international festivals or colossal group retrospectives. In his curatorship of Interactive Art, Huhtamo

129 The organisations, exhibitions, conferences and festivals I attended in 2006 were: ZKM Centre for Art+Media, Karlsruhe; Today’s Art, The Hague; V2 Centre for Unstable Media, Rotterdam; De WaaG, Amsterdam; Crossmediaweek/Picnic ’06, Amsterdam; Steim, Amsterdam; FoAM, Brussels; Technopolis, Mechelen; The Institute for Contemporary Art, London; London Science Museum, London; Tate Liverpool, Liverpool; Tate Modern Art Gallery, London; Foundation for Art and Creative Technology, Liverpool; Ars Electronica Conference, Linz; Ars Electronica Centre, Linz; OK Centre for Contemporary Art, Linz; Lentos Art Museum, Linz; Time’s Up, Linz; and Kununiversitaet Linz: Lab of the Institute for Interface Culture, Linz.
has inveighed against how the mayhem of such carnivalesque forums is not conducive to evoking environmental responsibility in audiences.\textsuperscript{130} As a case-in-point, \textit{Time’s Up}, an international collective of interactive artists based about five kilometers from the colossal Ars Electronica (AE) Centre in Linz, Austria, launched their book about their collaboration with \textit{FoAM} during the 2006 AE Festival as a completely separate event from the AE Festival, despite working in the same ‘field’ of art. In conversation, both collectives explained they had disassociated from AE, because the types of Interactive Art promoted in such contexts were not conducive to the considered engagement they desired for their works.\textsuperscript{131} This stance is representative of the artists whose work I sought to experience\textsuperscript{132} but who had largely shunned the major international forums by the time I did fieldwork. This seismic shift among these artists is taken up at the beginning of the following chapter, and is further discussed in the case studies in Chapter 3. In light of what I termed the ‘Relevance of Irrelevance’\textsuperscript{133} I returned to focus on Australian works which I could experience \textit{in situ} and/or attend public talks with the artists to ask questions about their work.

\section*{1.8 Summary}

These broad brush strokes have established the stage within which this project sits. Having situated the rationale and methodology for the project, and the cultural context in which it is situated, the following chapter fleshes out the content that fills this stage, to illustrate what makes these art practices and research so pertinent to our times.

\begin{footnotesize}
\begin{itemize}
\item\textsuperscript{130} This includes curating \textit{Alien Intelligence} (KIASMA Museum of Contemporary Art, Helsinki, 2000) and co-curating \textit{Australian International Video Symposium} (1994), \textit{ISEA} (1994), \textit{MuuMedia Festival} (1990-92), \textit{Machine Culture: The Virtual Frontier} (1993), \textit{Toshio Iwai Retrospective} (1994), \textit{New Media Topia/New Media Logio} (1994) and \textit{The Vasulkas} (1992).
\item\textsuperscript{131} This was a conversation with Nik Gaffney and Maya Kuzmanovic from FoAM and Tim Boykett from \textit{Time’s Up} at the launch of their joint publication \textit{x-med-a} at \textit{Time’s Up} headquarters in Linz on August 5 2006. \textit{Time’s Up}, based in Linz is “a research institute using experimental situations as a means of investigating the behaviour of the public individual in everyday and nearly everyday situations.” \textit{Time’s Up Profile}. http://grig.info/partners. Accessed September 5 2008.
\item\textsuperscript{132} These are the contemporary artists discussed in Chapters 2 and 3 that are the subject of this dissertation.
\item\textsuperscript{133} That is, why the majority of Interactive Art is irrelevant to myself and those artists discussed in this thesis.
\end{itemize}
\end{footnotesize}
# Chapter 2: State of the Art

## 2.1 Introduction

The problem is...most successful communication involves a great deal of craftsmanship and authorship and point of view and storytelling and narrative... Interaction largely destroys all that. By giving the audience control over the raw material you give them precisely what they don't want. They don't want a load of bricks, they want a finished construction, a built house.

Max Whitby[134]

This chapter explores the State of the Art of Responsive Environments and their challenges for evoking environmental responsibility. It is structured

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## 2.2 The Ingredients/a.k.a Recipes for Reciprocity

- **2.2.1 Betweenness**
- **2.2.2 Interrogating Interactive Interfaces**
- **2.2.3 Responsive Environments**
- **2.2.4 Responsivity and Responsibility**
- **2.2.5 Authorship: Between Artist, Artwork & Audiences**

## 2.3 The Balance of Trade-Offs/a.k.a Strategies for Solutions

- **2.3.1 Authority versus Control**
- **2.3.2 Alife versus Blife**
  - **2.3.2.1 The Limitation of Imitation**
- **2.3.3 Determinacy versus Indeterminacy**
- **2.3.4 Simplex: Between Simplicity and Complexity**
- **2.3.5 Narrativity versus Interactivity**

## 2.4 Summary

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by disaggregating issues arising from creating Responsive Environments into relevant components, to partially separate their discussion. As this chapter discusses the issues ingredient-by-ingredient, the components are collectively explored artist-by-artist in the case studies in Chapter 3. The Inside-Outside relationship - whereby participants' responsibility to the social and/or physical environment-of-the-artwork may evoke responsibility toward natural and/or quotidian environments - forms the organisational principle for the two halves (Sections 2.2 and 2.3) of this chapter. Section 2.2 constructs an 'external' analysis of the State of the Art via broader art historical and cultural frameworks within which Responsive Environments exist. That is, how they are received and understood by theorists and practitioner-theorists. This responds to the deficit in understanding Responsive Environments due to the scant discourse about what their ingredients are and the issues in combining them with one another. Section 2.3 constructs an 'internal' analysis of practitioner-theorists' attempts to balance ingredients within and between one another to create Responsive Environments. The membrane between Outside (2.2) and Inside (2.3) is permeable, as the issues in each section intersect with one another in artists' attempted 'solutions' to intractable impediments to evoking responsibility in Responsive Environments.

Such 'solutions' harness algorithms as recipes for creating Interactive Art. Algorithms can be usefully understood allegorically as recipes for complex problem 'solving,' which for this thesis denote recipes for combining the three ingredients and four binaries to create Responsive Environments that evoke environmental responsibility. Each recipe may target select challenges, as no single recipe may 'solve' the myriad of mutually exclusive considerations that are negotiated to create Responsive Environments. The writings of the artists cited in this thesis lay bare their algorithmic recipes and choice of ingredients, which assist in providing 'solutions' through sharing their strategies for creating Responsive Environments. Creation is commonly approached via analogies with designing/inhabiting dwellings (as illustrated in Whitby's quotation above) and cooking/eating food, which is central to

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135 As discussed on p49 in the last chapter.
136 As well as in related artforms such as Generative Art. Food was literally used as a generative agent in my artwork D#generative discussed on p174.
Graham, Armstrong and FoAM. This thesis similarly approaches Responsive Environments via allegories and analogies, in parallel with Katherine Hayles literary criticism approach to *Narratives of Artificial Life*. Due to the “complexity” of Alife art+science, she reasons they are “best approached through indirection, by looking not only at the scientific content of the programs but also at the stories told about and through them.” This thesis analyses the complexity of Responsive Environments by a similar “indirection”: their techno-scientific tools of creation, alongside their “stories,” which are told through their recipes and ingredients. The remainder of this introduction illustrates the usefulness of allegories and analogies in reference to Whitby’s above quotation, which succinctly encapsulates some of the central challenges to evoking responsibility in Responsive Environments.

To describe participant responsibility in *Individual Fancies*, her PhD artwork, Graham directly refers to Whitby’s above quotation. Her “interactive teatable” *Individual Fancies* (Figures 2-6, 2-7) allegorically engaged participants in “at least a semi-complete house rather than a shell,” with lesser participant responsibility required due to the relatively simple and narratorial form of a rigid “semi-complete house.” Graham applied this strategy to facilitate engagement through such intuitive and immediate responsivity, as opposed to greater responsivity and responsibility amidst the more fluid and malleable form of a “shell.” Accordingly, the form and behaviour of *Individual Fancies* were somewhat pre-authored and pre-determined, to further facilitate intuitive interactivity amidst the “semi-complete house.” While Graham advocates a balance between the extremes of a completed house and an

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137 FoAM’s strategies for engaging audiences incorporate the preparation of food, from communal seeding to gardening to cooking to eating, as figurative recipes for creating their Responsive Environments. FoAM write about these processes in *Open Kitchen* (http://fo.am/open_kitchen and http://fo.am/feedingwell), *Molecular Gastronomy* (http://libarynth.org/molecular_gastronomy) and provide a guide to restaurants in the regions of their headquarters and partner organisations (http://libarynth.org/restaurant_guide). Accessed 16 March 2010.


140 Graham 1997:108.
empty shell, Whitby argues for pre-authored and pre-determined structures, wherein their “construction” as houses is “finished,” as interaction “destroys” the “craftsmanship” of the authors. This extreme impedes the evocation of participant responsibility as it confines participants to the minimal responsibility arising from minimal ‘interactivity’ possible with a “finished construction.” The other extreme, of presenting participants with “a load of bricks,” concludes the first half of this chapter, as it first traverses the ground in-between these extremes.

Whitby’s quote is taken from Andrew Cameron’s 1995 article, *Dissimulations: Illusions of Interactivity*, written at a time when Huhtamo’s “old school” was commanding respect for the unique issues its members explored through Interactive Art. Cameron railed against the euphoric rhetoric surrounding interactivity in art which preceded the disillusionment when Interactive Art ‘failed’ to achieve its emancipatory ends. Cameron and Huhtamo argued for the potential of interactivity in electronic art, by using Huhtamo’s “media archeology” to reveal what Interactive Art dissimulates in light of its archeological pre-history. In-depth discussion of the “archeology of

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141 Whitby in Cameron 1995:42.
142 The ‘members’ Huhtamo cites as producing “‘classics’ of interactive art” are Lynn Hershman, Jeffrey Shaw, Myron Krueger, David Rokeby, Ken Feingold, Agnes Hegedues, Grahame Weinbren, Luc Courchesne, Christa Sommerer, Laurent Mignonneau, Michael Naimark, Perry Hoberman, Paul Sermon, Toshio Iwai, Paul DeMarinis and Rafael Lozano-Hemmer. Huhtamo 2004:40.
interactivity” is undertaken through the case studies in the following chapter, as the sections below consider the historical-through-to-contemporary State of the Art of Responsive Environments. These sections situate Responsive Environments in relation to debates about the potential of interactivity in electronic art, by way of select canonical works from Huhtamo’s ‘old school’ and subsequent critiques of contemporary Interactive Art. The central issues are identified and clarified according to their order in the thesis title and research question, beginning with the state of betweenness that interconnects such disparate elements.

2.2 The Ingredients/a.k.a Recipes for Reciprocity

2.2.1 Betweenness

Interrogating interactive interfaces denotes pivotal processes by which Responsive Environments explore relations between entities, being in-between and betweenness itself. However, betweenness and hybridity are obstacles to understanding as they represent interstices that have not yet been defined as terms or core qualities. Betweenness has been recognised internationally as a core quality of Interactive Art since around 1990 when interdisciplinarity and hybridity were recognised as being integral to such art. In Australia, this culminated in the Australia Council for the Arts controversial replacement of their New Media Arts Board in 2005 with two alternate categories: ‘Inter-Arts’ and ‘Hybrid Arts.’ The same terms are highlighted in the four international benchmarks for displaying, facilitating and critiquing Interactive Art: the International Symposium of Electronic Art (ISEA); Ars Electronica (AE) in Austria; ZKM Centre for Art+Media in Germany; and ICC in Japan, which is termed an

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'Intercommunications Centre’ rather than a ‘Communications Centre.’ In 2006, when I did fieldwork, the festivals titles of ISEA and AE were respectively 7 Days of Art and Interconnectivity (Figure 2-8) and Simplicity: The Art of Complexity (Figure 2-9), with AE 2005 being Hybrid: Living in Paradox (Figure 2-10).

These festivals and symposia reveal a major shift in approaches to using interactivity in art between 1990-2008: from optimism surrounding the necessity of ‘inter-ness,’ when Krueger’s Videoplace (1974-1984) won the inaugural AE ‘Interactive Art’ prize in 1990, to increasingly negative reactions in the last decade by central practitioners and theorists against what these dominant benchmarks, particularly AE, consider Interactive Art to be. These negative reactions stemmed from the growing tendency in the intervening years to consider non-interactive artworks as ‘Interactive Art.’ This is particularly relevant for the artforms addressed in this thesis, as the vast
majority of the artworks cited in this thesis have won or placed very high in the annual AE festival.\textsuperscript{146} To account for the extent of this shift, a compendium of AE judges provided a retrospective of their changed stances toward 'Interactive Art' between 1990-2004, by which time works without any audience interactivity were (and are still) winning the 'Interactive Art' prize.\textsuperscript{147} The judges reasoned that such work makes manifest our expanded definition of interactivity and criteria in that the reception and contemplation of this work does not require the active audience participation that was so crucial in the early stages of the development of the genre.\textsuperscript{148}

Huhtamo argues AE’s stance has global ramifications, as AE is widely regarded as the most important exponent of Interactive Art.\textsuperscript{149} In 2007 AE introduced the new category of ‘Hybrid Arts’ in addition to ‘Interactive Art.’\textsuperscript{150} This led the nearby Ludwig Boltzmann Media.Art.Research Institute to analyse all 350 entries to AE 2007 to “better identity suitable descriptive models for interactive art” due to their perceived difficulties in defining “specific categories of

\begin{itemize}
\item This particularly refers to the works that won the prize for ‘Interactive Art’ in 2004 (Ben Rubin and Mark Hansen), 2005 (Esther Polak and Ieva Auzina), 2006 (Paul DeMarinis) and 2008 (Julius von Bismarck).
\item The scope of the influence of AE is the subject of Timothy Druckrey’s Ars Electronica Facing the Future: A Survey of Two Decades. Massachusetts: MIT Press. 1999.
\item AE’s descriptions of these two categories are: “Interactive Art...is open to all types of current interactive works in any form: installations, performance, audience participation, virtual reality, multimedia, telecommunication, etc. Criteria for judging the works include the form of interaction, interface design, new applications, technical innovations, originality and the significant role of the computer for the interaction” and “the ‘Hybrid Art’ category is dedicated specifically to today’s hybrid and transdisciplinary projects and approaches to media art. Primary emphasis is on the process of fusing different media and genres into new forms of artistic expression as well as the act of transcending the boundaries between art and research, art and social/political activism, art and pop culture.” http://90.146.8.18/en/archives/prix_archive/prix_kategorien_uebersicht.asp. Accessed 20 April 2010.
\end{itemize}
interaction” in the history of AE. To explicate “categories of interaction” that apply to Responsive Environments, the following section outlines the ‘inter-ness’ that remains central to Responsive Environments, in spite of the dominant shifts that have undermined the ‘inter-ness’ of contemporary Interactive Art. The “categories of interaction” are established by outlining the relationship between the following three keywords, which inform the practice of those artists who are similarly at odds with dominant approaches to Interactive Art.

2.2.2 Interrogating Interactive Interfaces

‘Interactive’ is defined in two different contexts as two or more things which are “reciprocally active” as they are “acting upon or influencing each other” and in Human Computer Interaction as an “electronic device that allows a two-way flow of information between it and a user, responding immediately to the latter’s input.” Co-dependency between interactivity and interrogation is evident in the Human Computer Interaction underpinning Responsive Environments, where interrogation involves “transmit[ing] a request for information to a device or program with the expectation that an immediate response will trigger further interaction.”

Outside of these Human-Machine and Human-Computer contexts, discrepancies exist with what interactivity denotes in Human-Human and Human-Environment approaches to interaction in art, media and science. In all these contexts, the term has become increasingly nebulous as an ill-defined

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151 Kwastek 2008:23.


153 Taken from the dictionary on my laptop used to write this thesis and make much of the art for this PhD: New Oxford American Dictionary, Mac OS10.5, s.v. ‘Interrogate.’ Interrogate is also defined in this context in the Oxford English Dictionary as “to cause (a computer memory or memory element) to give a signal that corresponds to or reveals information contained in it.” Oxford English Dictionary (Second Edition) s.v. ‘Interrogate.’ http://dictionary.oed.com/cgi/entry/50119621?query_type=word&queryword=interrogate&first=1&max_to_show=10&sort_type=alpha&search_id=CBvd-Klikjv-930&result_place=1. Accessed 20 April 2010.
hallmark of electronic art in popular vernacular.\textsuperscript{154} The still-frame below from the TV cartoon \textit{Futurama} (2005) parodies the current ubiquity of meaningless interactivity (Figure 2-13). Each episode in \textit{Futurama} begins with a mock caption below the title. In this instance, the caption advertises that \textit{Futurama} is “NOW INTERACTIVE!” (which seasoned viewers know is a joke) since “JOYSTICK CONTROLS FRY’S LEFT EAR.” An ear can barely be moved, let alone controlled, while controlling only one mocks the tokenistic control now equated with ‘interactivity.’ Furthermore, which ear is ‘left’ depends on where \textit{Fry} stands relative to Screen Left and Viewers’ Left. This alternation between which ear is actually the ‘left’ ear creates confusion for the millions of viewers who might think they can influence this ambiguous ear.

With such variance in applying interactivity in Interactive Art (let alone in sociological and scientific approaches to interactivity) key practitioners, such as Kac, argue that context-specific definitions are required. Kac argues for interactivity to only refer to dialogic exchange in a mediated environment, given that “in computer-based interaction works, interaction often becomes synonymous with operation, manipulation, or control.”\textsuperscript{155} Huhtamo also argues for more nuanced understandings of the term, in that while “interactive art can –and should– stretch the definition of interactivity and explore its limits” he asks whether the term should be “reserved to cases where active and repeated user-intervention plays a significant role in the functioning of the system” for it “to retain anything about its former distinctiveness.”\textsuperscript{156}

Stelarc’s \textit{Prosthetic Head} (2003) (Figures 2-11, 2-12) exemplifies interrogating interactive interfaces along the lines advocated by Kac and Huhtamo. I saw Stelarc demonstrate it at the National Gallery of Australia in 2005\textsuperscript{157} and interacted with it in Sydney later that same year.\textsuperscript{158} Interrogators

\textsuperscript{154} Erkki Huhtamo traces the development of the term ‘interactivity’ and how it has come to be ubiquitous in these contexts in his article ‘From Cybernation to Interaction: A Contribution to an Archaeology of Interactivity.’ In \textit{The Digital Dialectic: New Essays on New Media}, edited by Peter Lunenfeld, 96-111. Massachusetts: MIT Press. 2000.

\textsuperscript{155} His implementation of this approach is discussed on p81 below.

\textsuperscript{156} Huhtamo 2004:6. As a case-in-point, Huhtamo is specifically referring to the AE prize for ‘Interactive Art’ being awarded to Ben Rubin and Mark Hansen in 2004.

converse with a large 3D projection of a CGI animation of Stelarc’s actual head by typing questions or statements on a keyboard and the ‘head’ verbally responding. *Prosthetic Head* uses dialogic exchange in a mediated environment to utilise “active and repeated user-intervention” so that interrogators play “a significant role in the functioning of the system.” This arises since “what Stelarc calls the process of interaction” is the cumulative consequence of each Q-and-A encounter, as through Artificial Intelligence processes the ‘head’ learns to conduct ‘better’ conversations by incorporating vocabulary and grammar newly provided by each interrogator. In effect, Michelle Jensen argues that *Prosthetic Head* “becomes the sum of its interrogators” as “each interrogator supplies the data needed to expand it.”

In reference to the six dominant responsivity-responsibility modes outlined in Chapter 1 on p26, participants have a one-to-one responsibility to the physical environment of the artwork in the real-time of their engagement and in their ensuing influences on the ‘evolution’ of the learning of *Prosthetic Head*. The artwork evokes environmental responsibility to the here-and-now which collectively influences the then-and-there of future states which cumulatively reflect the “sum of its interrogators.” Accordingly, the artist’s authorial responsibility is also indeterminately distributed to the artwork and each interrogator, as Stelarc argues the ‘head’ is “becoming more autonomous in its responses” through its learning, such that he can “then no longer be able to take full responsibility for what his head says.” These contested zones of responsibility fulfill Rokeby’s criteria for “a good interaction system” wherein participants’ actions are each “as much a question as a statement...in an unfolding dialogue in which neither the user nor the system is in complete control of the course of things” as the “system” never knows what it will be asked, while interrogators will be increasingly unable to predict how the “system” will respond due to the “unfolding dialogue” between them.

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In Rokeby’s “good interaction system,” interactivity and responsibility would be realised to their full potential of mutually reciprocal action in the Alife of “‘art-as-it-could-be.’” This would entail the interactionism of bi-directional causality between mind and body rather than the sleight-of-hand of ‘art-as-it-actually-is’ which underpins the relationship between participants and Prosthetic Head. This discrepancy emerges as Prosthetic Head subliminally interrogates participants by analysing composite meta-patterns of participants’ interactivity. In this interview-like relationship, Prosthetic Head illustrates the near pervasive power disparity between artists and audiences, wherein audiences can rarely interrogate artists to the same extent that artists interrogate audiences. To Rokeby this has “disturbing implications.” He asks rhetorically whether such interrogation involves an “artist sending the audience, like rats, through a laboratory maze” where “they feel that their ‘behaviour’ is being judged.” The field of practice which emerged in light of these “disturbing implications” -Interaction Design- concerns how Artist-Artwork-Audience may interface to facilitate non-interrogational relationships.

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In popular usage the terms interface and interaction have become so merged that the field of Computer Human Interface is now termed Human Computer Interaction. Physically, an interface is the meeting point between otherwise incommensurable entities, where one is translated or transmogrified in terms of the other, such as a Graphical User Interface which renders computer code intelligible at the ‘surface’ level of the desktop. Behaviorally, interfacing refers to the plane at which entities (Human-Computer) or parties (Artist-Audience) engage one another, where interface means “to act together or affect each other or to make things or people interact.”

Amidst the burgeoning of technological interfaces in society and art-at-large, the nascent area of Interaction Design concerns how audiences interact with an artwork and one another. Rokeby is adamant about the repercussions of Interaction Design for evoking multifarious responsibility, since interfaces are material devices relating artwork to audience and immaterial processes through which content is engaged with. He argues “the interface becomes the organ of conscience, the mechanism of interpretation, the site of responsibility” such that “the design of these technologies becomes the encoding of a kind of moral and political structure with its attendant implicit social contract.”

Although an interface can be programmed, it is impossible to program how people may interface with it, if their autonomy and agency is upheld. Under the cloak of art, the dominion of programming computers has been extended to people, so that Khut describes his Interaction Design as incorporating “Experience Design.” This is ethically problematic for experience to remain

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beyond ‘design,’ even if interactivity is subsumed into a carefully ‘designed experience.’

The discussion will now turn to the relevance of the Interactive Art elements just described to the ‘sub-field’ of Responsive Environments.

### 2.2.3 Responsive Environments

A technology is interactive to the degree that it reflects the consequences of our actions or decisions back to us…To the degree that the technology reflects ourselves back recognizably, it provides us with a self-image, a sense of self. To the degree that the technology transforms our image in the act of reflection, it provides us with a sense of the relation between this self and the experienced world. This is analogous to our relationship with the universe.

David Rokeby

The introduction to this dissertation outlined Responsive Environments in relation to Kaprow’s Environments and Krueger’s formation of the notion of Responsive Environments. In this section, Responsive Environments are contextualised in their wider art-historical origins, as they also stem from challenges to artist-audience responsibilities initiated by Dada, Surrealism, Fluxus and Happenings. As Krueger was first to articulate the particular challenges to using responsivity to evoke responsibility in Interactive Art, the following discussion is centered on him and related contemporary artists who explore these challenges, which are encapsulated in Rokeby’s quotation above.

Although the concept of Responsive Environments has become more prominent in the last two decades within architecture, design, and

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168 Rokeby 1995b.


171 The two seminal texts for these approaches are Responsive Environments: Architecture, Art and Design, by Lucy Bullivant (London: Victoria and Albert Museum, 2006) and Responsive Environments: A Manual for
computer science, in comparison with art-practice, these fields employ utilitarian, commercial or techno-centric approaches in which responsivity and responsibility are peripheral. For example, Responsive Architecture was founded in 1967 by Nicolas Negroponte through his Architecture Machine Group at MIT. Although close in space and time to Krueger’s 1969 coining of Responsive Environments at the University of Madison, Wisconsin, neither substantially relates to the other, due principally to being architectural and artistic endeavours respectively. Nonetheless, multi-faceted interactivity in Responsive Environments, such as those of FoAM and Transmute Collective, incorporates architecture, design and computer science.

In his approach to Responsive Environments, Krueger contextualised the artform as principally stemming from Environments and Dada. Significantly, FoAM and Garth Paine, a contemporary collective and artist respectively, also situate their approach to Responsive Environments within these same precedents. For Krueger, Responsive Environments extend the practice established by these precedents whereby “the artist surrendered immediate control, stepped back to a higher level, and gave the actors and the audience a level of control heretofore unknown.” However, in From Participation to Interaction: Towards the Origins of Interactive Art, Dinkla reasons that participants’ unprecedented responsibility in Environments was actually “located along a fragile border between emancipatory act and manipulation” since heightened audience responsibility was not matched by artists’ relinquishing their authorial control. Krueger’s notion that audiences requested such ‘surrendering’ by the ‘subordinated’ artists stepping “back to a higher level” is indicative of artists’ emancipatory rhetoric of that era. Responsive Environments do not require artists to “accept” less authorial

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172 The Massachusetts Institute of Technology lab called Responsive Environments predominantly concerns computer science, with little or not mention of artistic applications. www.media.mit.edu/research/groups/responsive-environments. Accessed March 16 2010.


175 Dinkla 1996:283.
responsibility, as the voluntary and partial control offered over the “realisation of the piece”\textsuperscript{176} is at their behest. However, in Artificial Realities II, Krueger’s manifesto about Responsive Environments, he positions artist and audience responsibility as integral to the artform. He argues that “when participation becomes the subject of the aesthetic work, the viewer’s critical faculties are given new responsibilities” such that “their own actions complete the piece. Thus, within the framework of the artist’s exhibit, the participants also become creators.”\textsuperscript{177}

These “new responsibilities” hinged on technologically mediated participation that was inspired by the non-technological participation in Environments and Plastic Art belonging to Manovich’s “Duchamp-Land”\textsuperscript{178} of conceptual/theoretical/fine-art orientated artforms. Penny terms such artforms “pre-electronic”\textsuperscript{179} due to their segue to electronic Responsive Environments. However they had incommensurable forms as they could not involve the science and technology that are integral to Responsive Environments. Consequently, “Duchamp-Land” artforms may evoke relatively metaphorical responsivity, since they cannot embody “an awareness of the contradictions inherent in mediated interactivity,”\textsuperscript{180} such as evoking responsibility to the natural environment via inexorably complex Responsive Environments. Nevertheless, Penny argues for the contemporary relevance of artists such as Max Ernst, Man Ray, El Littizsky and Jasper Johns, as their Plastic Art evoked conceptual ‘interaction’ by pioneering strategies for “dissolving the artist/audience division” by using ‘user ‘interface’ and ‘interaction’ as their subject matter before anyone thought of the terms.”\textsuperscript{181}

Responsive Environments also draw on Environmental Art, which Sam Bower, the Executive Director of greenmuseum.org, defines “as an umbrella

\textsuperscript{176} Krueger 1991:44.
\textsuperscript{177} Krueger 1991:91-92.
\textsuperscript{178} Manovich 1996.
\textsuperscript{179} Penny 1997a.
\textsuperscript{180} Rokeby 1995b.
\textsuperscript{181} Penny 1995b. Examples of Max Ernst and Jasper Johns are discussed in Chapter 4 on p172.
term to encompass...‘ecological art’...‘land art’ and “art in nature.” While these artforms are non-technological, non-performative and non-participatory, their relevance for Responsive Environments stems from their qualities of construing artwork-as-Environment and of engaging with natural environments as part of the artwork. Responsive Environments incorporate the qualities of Kaprow’s Environments in conjunction with the indeterminate causality of Environmental Art, as they may augment the human-powered responsivity within Environments with computer-powered biomimetic responsivity. These influences are outlined on the first page of Artificial Realities II. Krueger posits Responsive Environments to explore contradictions between two unknown ‘Others’: “benign Nature” from an unobtainable and unvanquished “Nature” of time immemorial and the immanent yet elusive future of “technological developments that make us anxious.” One approach to exploring these contradictions is in how Responsive Environments may evoke Environmental Art processes where responsivity occurs in Deep/Geological Time of eons. Responsive Environments may biomimetically evoke natural processes (such as evolution and adaptation) by collapsing ‘real’ spatio-temporal processes on the order of magnitude of millions-to-one. As an example of how this mandate has been taken up, FoAM’s groWorld evoked the “out of reach” properties of “biological growth” with human spatio-temporal scales. While offering the immersive and participatory qualities of Kaprow’s Environments, technology is pivotal for such Responsive Environments, as groWorld used technology to connect these two scales and responsivity types so as to “inspire more responsive (and perhaps responsible) forms of design, engineering and social organisation.”

The uptake of such science and technology stems from the influence of Manovich’s “Turing-Land” of technological/scientific/experimental

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185 Manovich 1996.
artforms. “Turing-Land” had particular relevance for the formation of Responsive Environments, as the appropriation of computers into art in the 1960s led to increasingly technological artforms that explored Artist-Artwork-Audience interaction in light of Cybernetics and Systems Theory. The necessity of science and technology to Responsive Environments was expressed by Burnham, an art theorist in the 1960-70s, who held that increasing connections between art, science and technology would create contexts through which to explore heretofore inaccessible zones of responsibility between Artist-Artwork-Audience. In relation to 1970s kinetic sculpture and robotics he predicted that “an aesthetics of artificial intelligence will evolve” so that corresponding artforms with “true intelligence” would offer “reciprocal relationships with human beings” before the 21st Century. The apotheosis of this is discussed below on p98 with regard to evoking environmental responsibility through Alife approaches to Responsive Environments.

Krueger similarly aspired toward artforms that could offer “reciprocal relationships” with participants. A central preliminary in Krueger’s projected trajectory was the inculcation of participants’ awareness of their influences, so that “participants should be aware of how the environment is responding to them.” This is pivotal, as the challenges for cultivating participants’ awareness of responsibility are fundamental for evoking environmental responsibility. Krueger reasoned this since audiences are not expected “to admire invisible paintings or to listen to inaudible music, interactive art is pointless if the audience is not cued in to it.” However, Robert Rauschenberg’s White Paintings (1951) (Figures 2-14, 2-15) expected “people to admire invisible paintings” and John Cage’s 4’33 (1952), expected people to “listen to inaudible music.” These seminal and controversial works involved audiences “not cued in to it,” yet were integral to “alter perception, and to define a new category of beauty,” which is central to Krueger’s criteria for

187 Krueger 1991:42.
the aesthetics of interactivity in Responsive Environments. Accordingly, Krueger acknowledges the pervasive influence of Rauschenberg’s *Soundings*, which in Dinkla’s view forms the prototypical “reactive environment”190 as it offered an immersive Environment for participants to actively manipulate the sonic and haptic media of the artwork.

The direct linear causality in *Soundings* restricted the Environment to being “reactive,” while Krueger sought to create Environments that were responsive, according to behaviour arising via computational interactivity. Under the heading “Response is the Medium!” Krueger calls for a responsivity “that engages participants in dialog” whereby “the medium...accepts input from or about participants, and then responds in ways those people can recognise as corresponding to their behaviour.”191 Causality is integral “to define relationships between the participants’ actions and their perceived consequences” since “the laws of cause and effect are composed by the artist” such that “it is the composition of the relationships between action and response that is important.”192 However Krueger advocates highly deterministic Human Computer Interaction, wherein “the artist anticipates the participant’s possible reactions and composes different response relationships for each alternative” while “the participant explores this universe, initially triggering responses inadvertently, then gradually becoming more and more aware of

191 Krueger 1991:86.
192 While Krueger interchangeably describes his work as “Responsive Environments” and “Artificial Realities,” I use Responsive Environments since this is the most relevant aspect of his work and “Artificial Realities” is problematically differentiated from Augmented Reality, Virtual Reality and Mixed Reality. Krueger 1991:86.
causal relationships.” Given participants’ diverse experience/background/familiarity, Krueger downplays participants’ individual agency by presupposing their progression from ignorance to understanding. Furthermore, anticipating “the participant’s possible reactions” is logically and technically impossible as this would require finite and programmable human behaviour. His design credo that “the computer should adapt to the human, rather than the human adapting to the computer” is also self-contradictory, as in the above scenario humans adapt to the computer as they modify their behaviour to match their growing awareness of the causality “composed by the artist.”

These internal contradictions pervade contemporary practice rather than stem from an inadequacy peculiar to Krueger’s approach. His ideas permeate contemporary practice, although they are now taken up self-reflexively. Three seemingly disparate examples include the above mentioned ‘Experience Design’ with its desire to anticipate ‘all’ possible responses (p72), Feingold’s reaction against this design credo for authorial responsibility (p34 and p84), and Rokeby and Huhtamo’s analysis of audience interactivity that overwhelmingly reaffirms participant progression from ignorance to understanding via Rokeby’s ‘First Test of Interactivity’ (p142). However the discrepancy between Krueger’s practice and current Responsive Environments is exemplified in his emphasis on surveillance-derived interactivity, which has not been followed by Rokeby, Penny and FoAM though they are heavily influenced by him. Whereas Krueger’s interactivity relied heavily on surveillance (rather than sensing) apparati, in Human-Scale Systems in Responsive Environments, FoAM advocate “systems that can sense (rather than detect) not just presence or absence, but the range and subtleties of human gestures and interactions.” This departure stems from Rokeby’s critique that Krueger’s use of surveillance had “effectively taken control of the interactors’ subjectivity [by] depriving them of their idiosyncratic identity.” Rokeby found

this problematised participant responsibility, since identity deprivation means that “the fact that the system responds to the interactor does not guarantee in any way that the system is responsible to the user.”\textsuperscript{196} Rokeby creates artworks that are responsive to the participant while the participant is responsible to them, as demonstrated in more than 25 years of producing re-iterations of \textit{Very Nervous System} (1982-2004), his most acclaimed work, which stems from Krueger’s \textit{Videoplace}.\textsuperscript{197}

The quotation from Rokeby at the start of this section expresses how interactivity in Responsive Environments influences behaviour in Outside quotidian environments as the evoked Inside-Outside relationship “is analogous to our relationship with the universe.”\textsuperscript{198} For the same reason, Penny advocates sensing idiosyncrasy over detected surveillance, due to the artist’s “ethical responsibility regarding cultural objects which might function as training environments to build behaviours which will ultimately be expressed in the real world.”\textsuperscript{199} Due to the evocation of Outside responsibility within the environment of the artwork, as influenced by the artist’s design of responsivity, Rokeby is adamant that, based on his “experience creating and exhibiting interactive systems…the creation of interactive interfaces carries a social responsibility.”\textsuperscript{200} This relationship between responsivity and responsibility is explored in the next section.

\subsection*{2.2.4 Responsivity and Responsibility}

The interrelationship between responsibility and responsivity occurs due to two further properties they invoke: reciprocity and dialogism. Andrew

\begin{thebibliography}{99}
\item \textsuperscript{196} Rokeby 1995b.
\item \textsuperscript{198} Rokeby 1995b.
\item \textsuperscript{200} Rokeby 1998.
\end{thebibliography}
Schaap argues that “the wider ethical conception of responsibility…refers to an obligation ‘to respond’ in the sense not only of being accountable for but of being responsive to.” Referring to Paul Ricoeur’s discussion of ethics, Schaap employs the “metaphor of a balance book” as an analogy for a reciprocal responsivity between two entities, based on “moral bookkeeping” centred on a “balance” between “positive or negative.” Reciprocity and dialogism emerge from these relations since that which is responsive is inherently dialogical with regard to reciprocity. That which is reciprocal is inherently responsible (or irresponsible in the scenario of Mutually Assured Destruction). The responsiveness of dialogism is explicit in these relations. Dialogical is defined in The Concise Oxford Dictionary of Literary Terms as being “constituted by the interactive, responsive nature of dialogue rather than by the single-mindedness of monologue” especially with regard to Mikhail Bakhtin’s dialogism and Martin Buber’s interactional sociolinguistics.

Kac alludes to Bakhtin and Buber when discussing responsibility in his practice. In Negotiating Meaning: The Dialogic Imagination in Electronic Art, Kac critiques the inability of prevailing exemplars of interactivity to evoke responsibility. Accordingly his practice gives “precedence instead to interrelationship and connectivity” as they “enable the emergence of dialogic artworks” (Figures 2-16, 2-17). Dialogism is pivotal for evoking environmental responsibility as Kac argues that communication “must imply bi-directionality or multiple directionality” which implies a “shared spatiotemporal responsibility” between co-participants. He argues that the Inside-Outside relationship is viable for evoking Outside responsibility through “both the aesthetic bidirectionality of the art experience as well as the ethical awareness

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201 Schaap 2004:3. Emphasis in original.
203 Schaap 2004:3.
of the social implications of the work.” As two of the few practitioner-theorists arguing strongly for reciprocity and dialogism, both Kac and Rokeby acknowledge these ideals are problematically realised in ‘art-as-it-actually-is.’ Kac’s article title expresses this: while negotiation has to involve dialogue, it is yet an unobtainable potentiality within “The Dialogic Imagination.” This conundrum is encapsulated in the following discussion on the indexical relationship between responsivity and responsibility.

All environments -social, physical and natural- are essentially capable of responsivity, but only some are interactive. Outside, in the natural environment, when a person picks a flower it responds (by starting to die). Inside, in a physical environment, when a sculptor sculpts a piece of metal by pushing it, it responds (by moving in the direction of the applied force). However, such responses are not interactive. Combining responsivity with interactivity can form a middle ground between these extremes. Gardening is an oft used analogy for this middle ground and is central to the environmentalist ethos of the corpus in Chapter 3. In gardening, cumulative interaction arises from the dialogue between gardener and semi-autonomous nature. A gardener is responsible for cultivating the vegetation (including planting seeds, picking flowers and pruning branches) in a negotiated balance between the autonomy of the natural vegetation and the human influence that fashions vegetation into a garden.

Responsivity inherent to Outside natural environments is only shared by Inside “engineered environments” that manifest synthetic responsivity.

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207 Kac 2000:207.
208 Dorin 2004:77.
Accordingly, high levels of responsivity through dialogical interactivity necessitate corresponding levels of participant responsibility. Such ‘free flowing’ dialogues are generally restricted to artworks with one-on-one interactivity, as combining a “‘broad bandwidth’ of interaction”\(^{209}\) with many-to-many interactivity is liable to turn otherwise intelligible conversation into an incomprehensible cacophony of co-participants speaking over the top of one another, rather than with one another and the artwork. Correspondingly, low levels of responsivity occasion low levels of responsibility but may be more appropriate for artworks with many-to-many interactivity wherein ‘conversation’ is limited to relatively trammeled processes. Such interactive modalities may evoke co-participants’ responsibility to the social and physical environment of the artwork, as simpler responsivity can more predictably respond to the diversity of group behaviour, whereby individual participants may be cognisant of their respective influences. Between these two extremes lie differing tiers of artist and audience responsibility, as they negotiate their respective authorship of the artwork and/or the execution of the artwork.

### 2.2.5 Authorship: Between Artist, Artwork & Audiences

Interactive artists are engaged in changing the relationship between artists and their media, and between artworks and their audience. These changes tend to increase the extent of the audience’s role in the artwork, loosening the authority of the author or creator. Rather than creating finished works, the interactive artist creates relationships.

David Rokeby\(^{210}\)

At all levels of responsivity, Artist-Artwork-Audience relations may produce triadic interrelationships in the sense of a musical triad. Combining three pitches simultaneously at even intervals one third apart creates a ‘harmonious’ sound as the frequencies form mathematically harmonious ratios. However, the equilaterally triangulated nexus thus formed:


\(^{210}\) Rokeby 1995b.
does not denote egalitarianism between elements. Rokeby’s writings on the “harmonics of the interaction”211 and Penny’s notion of “Synthetic Sociality”212 posit artist and audience as figuratively interrogating one another from ‘opposing’ sides of the triangle, with artworks acting as intermediary. Evoking audience responsibility is hindered by audiences being a highly varied entity amidst the generally unidirectional interrogation of audiences by artists via the artwork, such as the example of Stelarc’s Prosthetic Head described above (p69).

In light of Rokeby’s description (at the beginning of this section) of how interactivity affects artist-audience relations, practitioner-theorists seek to clarify respective roles and responsibilities of artists and audiences through more nuanced and accurate categorisation of their statuses.213 Feingold reasons that artists anticipate audiences’ roles since “one initially has to put oneself in the position of the one who will encounter this work in a public place.” This raises an intractable problem for creating art (in contrast to Design), as he contends that

imaging oneself as another, adds a layer to the creative process, which is highly problematic. Can I imagine myself as another, or do I imagine them as myself? Is there a loss of integrity when the artist tries to imagine his or her audience, as if targeting a product for a market?214

In The Myth of Interactivity or the Interactive Myth, Kristoffer Gansing argues that establishing audience responsibility is highly problematic, as audiences oscillate between such states as his notion of “active spectatorship”215 and “interpassivity”216 (a term used by Latitia Wilson in

211 Rokeby 1990.
212 Penny 1996b.
213 An example is the Ludwig Boltzmann Institute’s analysis of categories of Interactive Art in AE, which is discussed on p67.
214 Feingold 2002:126.
Interactivity or Interpassivity: A Question of Agency in Digital Play). Attendees’ statuses may vary immensely over the duration of their engagement with an interactive artwork, subject to innumerable moment-by-moment variables of their own and others’ behaviour, the different approaches of other people to the same work (such as a passive response to an interactive work) and the particular influences the work allows (such as real-time instant responsivity and/or cumulative and collective influences over an evolving artwork). These variables create equivalent variance in authorial responsibility.

The stage at which attendee interactivity commences in the production timeline of an artwork affects their ability to be responsible for their behaviour when engaging with the content, which may include contributing content to the artwork. Attendees generally commence their engagement after content creation, and the design of the form by which the content is engaged with, has been completed. Even if real-time content is derived from sensing their behaviour, such works are, in effect, hermetically sealed, in which participants co-author their experiences with one another when executing the work in real-time. Their responsibility to the physical environment (and the social environment in one-to-many and many-to-many artworks) is determined by the extent to which they may ‘author’ the real-time behaviour of an artwork with largely pre-determined content and form. In contrast, participants have considerably more responsibility in generative systems which evolve via a gardening like process. Earlier participant involvement fosters greater responsibility for the evolution of the work, as it is analogous to planting seeds which continue to grow after they have finished interacting with the work. Analogies between responsibility in gardening and responsibility in a Responsive Environment are central to Latham and Todd, Whitelaw writes that “Latham and Todd introduce an analogy linked to this twofold artistic role that suggests another important side to the constructions of agency operating in these systems. ‘The artist first creates the systems of the virtual world...then becomes a gardener within this world he has created.’” Whitelaw maintains that Latham and Todd “frequently refer to these roles simply as artist-creator and artist-gardener.” Mitchell Whitelaw. Metacreation: Art and Artificial Life. Massachusetts: MIT Press. 2004:56.

217 FoAM’s artwork GroWorld creates “a network of...hybrid gardens, in which the physical sites (pocket-ecologies) are connected to each other through a persistent 3D virtual, online GroWorld” such that events and conditions within the physical sites can directly influence the evolution of the online world, making it grow and
Machiko Kusahara, Rokeby, Riika Pelo, Armstrong and McCormack. However responsibility for exerting real-time influences which also condition future states of the work may be beyond the capacity of most participants due to the potentially onerous amount of responsibility required from participants.

As an example of the extent of attendee variability, Andrew Brown, from the Australasian CRC for Interaction Design, proposed the term decay, shrink and expand, mutate or homogenise - becoming an increasingly autonomous, distributed wilderness or a tamed, cultivated work of art.” Kuzmanovic 2001a.  


In her work Telegarden Kusahara writes that “a garden is a field of possibilities, and so is the Telegarden…the garden is a field that elicits communications among its users…users can participate if they agree to reveal their names and email addresses to other users. Each user accepts responsibility for maintaining the garden and respecting others…the garden on the internet is a Commons in the traditional sense (as in Boston Common). It literally offers users a common ground. A Commons elicits and requires communications among users.” Machiko Kusahara. ‘Presence, Absence, and Knowledge in Telerobotic Art.’ In The Robot in the Garden: Telerobotics and Telepistemology in the Age of the Internet, edited by Ken Goldberg. Berkeley: University of California. 2000:206.

Rokeby and Erik Samakh’s Petite Terre (1992) involved a 1x1 metre bonsai garden with embedded sensors that played animal sounds that from inside the garden. The sounds were influenced by human motion in the near vicinity of the garden, with the basic premise being that approaching the garden caused the sounds to cease while a participant was in close proximity to the garden. ‘Petite Terre Program Notes.’ David Rokeby’s Website. 1992. http://homepage.mac.com/davidrokeby/pt.html. Accessed September 5 2008.

Her artwork Marina’s Garden is discussed below on p112.

Of his work Transit Lounge Armstrong remarked that “its most obvious ecological metaphor lay within its ‘digital flower garden,’ which formed the heart of the work.” Armstrong 2002:266.

Regarding Future Garden McCormack says “in their simplest form, gardens are human arrangements of nature, though the very fact of their construction makes them unnatural” and then cites Wilson’s Biophilia. His work Future Garden was “a meditation about how the concept of a garden might be reformulated...from the perspective of contemporary ideas in artificial life, artificial nature and generative systems.” McCormack 2004:97. It would have cumulatively developed via “memory traces” derived from “patterns of behaviour of people and the local environment” so it would be “constantly evolving to its environment.” This constructed a “meditative experience of nature in silico” which he envisaged as having neither “end or purpose,” as it was biomimetically modelled on biological evolution. Jon McCormack. ‘Art and the Mirror of Nature.’ Digital Creativity Volume 14(1). 2003:15-17.
“Appreciator” for someone who “attends but does not influence the work.”

This term raises further questions: Can someone appreciate something if they do not interact with it? What if they choose to not influence a work precisely because they do not appreciate it? Devising such terminology of audience categories is akin to Graham’s “unending, obscure task dedicated to pinning down the intangible” of her Interactive Art taxonomy in her PhD. However, in respect of authorship I also found “some kind of classification might be useful.” It remains to be seen whether establishing categories of authorship can represent the actual nuances of authorial responsibility occasioned when art is made to be interactive.

The shared etymology between authority and authorship suggests that authorial responsibility in Responsive Environments can be positioned along a continuum from Authoritative Authorship (‘traditional’ omnipotent authorial control); Authorised Audience Authorship (audience contributions authorised by ‘The Author’); Unauthorised/Authoritative Audience Authorship (audience contributions unauthorised by ‘The Author’); to Authorised Anti-authoritarian Authorship (artworks whose authorship may embrace high levels of unpredictable sentient influences). This continuum can be equally applied to co-creators’ collaboration, as Responsive Environments generally require collective authorship that transcends the abilities and resources of any single author. These categories exist along the same continuum described in Whitby’s analogy at the beginning of this chapter: Authoritative Authorship denotes a minimally interactive “finished construction,” or “built house,” which requires minimal audience responsibility, while Authorised Anti-authoritarian Authorship denotes a highly interactive “load of bricks” which may learn, adapt or evolve according to participants’ cumulative patterns of interaction. Returning to Kaprow’s Words, with which this dissertation began, the continuum extends from restriction allowing rearrangement of only whole words on this Environment’s ‘bulletin boards,’ only for them to revert back to their prior position after someone ‘completes’

225 This term was defined in ‘Modes of Creative Engagement,’ his presentation at Engage: Interaction, Arts & Audience Experience conference, Creativity and Cognition Studios, University of Technology, Sydney, 26-28 November 2006.

their re-arrangement, to freedom to edit and write new words to form new sentences that exist for future participants to read and/or re-edit if they choose.

In *Models of Authorship*, Manovich examines Barthes “death of the author” and the inferred ‘rise of the reader’ in remixing and sampling electronic artforms. His views on Interactive Art are conveyed succinctly in his heading *Interactivity as Miscommunication Between the Author and the User*. Manovich argues against viable collaborative interaction with evolving or adapting works, as interacting with even a hermetically sealed work is still dominated by “‘miscommunication’ between the author and the user” about roles and responsibilities. Graham similarly argues that “‘the death of the author’” is exemplified by this culture of re-appropriation, involving the “power of the reader to not only re-read, but to change the order and form” of artworks. However Barthes’ “death of the author” does not resolve the ambiguity between whether it is the author, or the concept/notion/category of the author, that has died. Hence Section 1.5.1 is called “Executing the myth of the tortured artist” as these artforms are not literal executions.

The prevailing categories of ‘User’ and ‘Audience’ arise from generalisations made by many artists about audience interactivity and behaviour. Both terms blur the boundaries between artists’ and audiences’ responsibility since “the user” implies “the artwork is at the service of that person” suggesting “an imbalance in the relationship between person and artwork.” In contrast, the artists in this dissertation have sought more nuanced terminology to delineate respective responsibilities. Examples include Augusto Boal’s transformation of spectator to “spectactor” in his manifesto on Participatory Art, Seaman’s hybrid “vuser (viewer/user)” to describe the oscillation between ‘passive viewer’ and ‘active user’ in their “inter-

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230 Rokeby 1995a:157. Despite not finding a “satisfactory term” Rokeby prefers the term “‘interactor.’”

authorship\textsuperscript{232} of his work, Kac’s “interactants,”\textsuperscript{233} Char Davies’ “the ‘immersant’”\textsuperscript{234} to describe people engaging with her Responsive Environment \textit{Osmose},\textsuperscript{235} Paine’s “inhabitants” to describe people engaging in his “interactive responsive environments,”\textsuperscript{236} Joanna Jakovich’s “inhabitant”\textsuperscript{237} to describe people engaging in her interactive installations, Feingold’s hyphenated “viewer-participant” in his \textit{The Surprising Spiral},\textsuperscript{238} Graham’s notion of artist’s “host”\textsuperscript{239} role, Armstrong’s similar notion of “stewardship”\textsuperscript{240} involving artists as “designer/architect” or “manufacturer/builder”\textsuperscript{241} and \textit{FoAM}’s argument for “artists [to] become more like architects or instrument makers, rather than creators of a finished piece of ‘art’”\textsuperscript{242} to the extent they advocate removing the terms “‘author’” and “‘content provider.’”\textsuperscript{243} \textit{FoAM}’s contribution becomes a “‘context provider’” for “‘content’” that is a “distributed” co-creation “between the facilitators, the entities experiencing the environment”\textsuperscript{244} and the appurtenances used to construct the Responsive Environment. In contrast, Huhtamo rejects

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\item[233] Kac 2004.


\item[236] This term was defined in Jakovich’s presentation at \textit{Engage: Interaction, Arts & Audience Experience Conference}, Creativity and Cognition Studios, University of Technology, Sydney, 26-28 November 2006. By extension audiences can be considered ‘dwellers,’ as an inhabitant generally refers to someone inhabiting their own home, but a visitor in public spaces may be said to be ‘dwelling.’

\item[237] Feingold 2002:123.

\item[238] Graham 1997:145.


\item[240] Armstrong 2002:106.

\item[241] Kuzmanovic and Gaffney 2005:10. This raises the issue of if the artists are the instrument makers, who is playing who? Are audience members the cogs in the wheel or the instrument itself? Analogies between Responsive Environments and instruments are discussed in Paine (p123) and Rokeby’s (p145) practice.


\item[243] Kuzmanovic 2001b:2.
\end{itemize}
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the notion that artists relinquish their authorial responsibility according to Barthes’ “death of the author.” Instead, he argues artists become “merely a context-maker, who provides the basic ingredients, sets up the situation, and then disappears.”

*FoAM* and Armstrong as ‘architects’ providing the “basic ingredients” and recipes for Jakovich and Paine’s ‘inhabitants’, represent the opposing extreme to Whitby’s position outlined in the cooking and architecture analogies that began this chapter. Whitby’s contention that audiences prefer “a built house” rather than “a load of bricks” is at odds with these artists. Between the two extremes of a rigid inflexible structure (“a built house”) or an unstable and unlivable structure (“a load of bricks”) lies an elusive middle ground. Seaman found in his PhD artwork, *The World Generator* (1996-7), that such “a delicate balance” stemmed from negotiating authorial responsibility between “that which the initial author imbues in the system in terms of content and that which the vuser contributes in terms of their input.”

By Huhtamo’s model, Seaman provided “the basic ingredients” and the context and then had figuratively disappeared, according to the “inter-authorship” of his work. Seaman extrapolates from this model to the pervasive issue of balance, leading on to Perry Hoberman’s summary of this challenge:

> In interactive art, we can find two seemingly opposite tendencies in the approaches to interaction: on the one hand a sharing (or even an abdication) of responsibility (or intentionality) on the part of the author; and on the other, a remarkable extension of the author’s domain, an unprecedented attempt to control his/her audience and their response on every level.

The second half of this chapter now explores contemporary practitioner-theorists’ strategies for evoking environmental responsibility in Responsive Environments by balancing between these extremes.

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2.3 The Balance of Trade-Offs/a.k.a Strategies for Solutions

The challenge has been to achieve the right balance in restricting or ceding creative control to the user. In many ways my goal was to deliver both simple, fluid interactivity, empowering the user to create in diverse ways. In actuality I found that one compromises the other, introducing more functionality encroaches upon how fluidly we are able to interact.

Karl Willis

Whitby’s analogy that began this chapter refers to the organicist basis of Responsive Environments being made from a “load of bricks” that are composed into configurations. These units are also referred to as “primitives” in McCormack’s computer code or “interactive granularity” in Willis’ audiovisual mediums. All refer to the size, form and micro-structure of the components and their associated means for being combined into macro-structures that collectively create Responsive Environments. In the three most commonly used media of words, images and sounds, the smallest may respectively be phonemes, pixels and, through granular synthesis, sound particles of roughly 25 microseconds. Primitives heavily influence the evocation of responsibility as they determine the relationship between content, form and Interaction Design.

In his practice, Willis posits “the challenge” as being about achieving the “right balance” between the size of primitives and their corresponding interaction modalities. This balancing act requires a compromise, which Willis terms “the balance of specification,” being the relationship between primitive size and interactive potentiality. Negotiating this relationship is instrumental for balancing the binaries of authority-control, determinacy-indeterminacy, simplicity-complexity and narrativity-interactivity. This negotiation is pivotal as

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the trade-off within each binary affects the trade-off between other binaries. As an example, determining the size of the primitives affects all four binaries, with smaller primitives permitting “more functionality” and hence difficulty of interaction, with larger primitives offering less functionality and hence more “simple” interactivity in Willis’ above scenario.

Balancing primitive size with interaction modality is not readily apparent without a guiding principle or rationale. For this thesis, this concerns the creation of Responsive Environments to evoke environmental responsibility in the interaction between artist, artwork and audience. In applying this rationale to Whitby’s analogy, Responsive Environments made from smaller Lego sized “bricks” create greater scope for audiences to recombine them into more complex and diverse structures. In contrast, larger Duplo sized bricks have less recombinant potentiality which limit audience responsibility to interacting with relatively inflexible structures. Willis positions the innumerable options for arriving at a “balance of specification” along a “scale [where] finer granularity provides smaller individual elements with which the interactor can begin to construct and create in diverse ways” (as represented by Lego) while “coarser granularity with larger individual elements” allows for a “merely selective,”252 or in Lunenfeld’s terminology, “extractive interactivity”253 (as represented by Duplo). Willis argues that smaller primitives “allows greater creative possibilities but can potentially create a more complex learning process”254 due to their greater recombinant potentiality. If these primitives coalesce into a narrative (such as a deliberate sequence of words, images or sounds) then smaller primitives offer engagement with their more fragmentary narratives, while larger primitives facilitate semi-cogent narratives by being relatively less interactive.

Whitby’s primitive –bricks– have relatively finite malleability (in contrast to sand or cement). This is at odds with artists’ common composing with mutable forms, as they do not merely repackage existing structures like bricks or Lego but rather generate the “raw materials” (in Whitby’s analogy)

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252 Willis 2007:2.
and the rules and tools for their recombinant potentiality. This is illustrated via the analogy between creating Responsive Environments and cooking according to practitioner-theorist’s algorithmic recipes for diverse ingredients. In a Responsive Environment composed of ingredients being Alphabet Soup, each primitive is a piece of pasta shaped as a letter. John Bird uses a similar approach, defining “primitive” as “a basic building block of a system that cannot be derived by combining other elements. A useful analogy is to see primitives as letters of an alphabet that can be combined in different ways to form words.”

Dry letters are combined to spell words or sentences. If artists construct words and sentences that audiences re-arrange without being provided with a guiding principle or rationale, the artists effectively abrogate their authorial responsibility. To evoke participant responsibility to the physical environment of the artwork, recombinant potentiality is subject to constraints, within which artists communicate by engaging audiences through interactivity without the content being rendered ‘meaningless.’ This relates to Kaprow’s Environment Words, with which this dissertation began. Kaprow defined the primitive as one word, so participants were requested not to chop words up into letters or to add individual letters that were not part of a phrase. He also instructed that words should only be written in chalk in the smaller room (which had chalk boards) and it was “inappropriate to staple word-strips askew” in the larger room, composed entirely of words on cardboard strips.

My approach to using interactivity without the content being rendered ‘meaningless’ employed two strategies which were used to create the artworks for this PhD. I termed them Intact Syntax and Arpeggiated Hierarchy. Both concern negotiating influence that engages audiences, while leaving the syntax

Bird 2004:45. With regard to Eden, one of McCormack’s artworks that is discussed on p132 of the following chapter, Bird argues that Eden has “the potential to display ‘combinatoric emergence’” whereby it “can explore the conceptual space defined by the primitives and the rules for combining them” however the limitations of the type of emergent behaviour that such a system can manifest were due to the fact that “the additional ‘letters’ were selected form a pre-specified, finite list and it is a matter of debate whether a computational system such as this can transform its underlying generative system in a way that is comparable to the creative emergence evident in biological evolution.” Bird 2004:46-47.

Kaprow in Reiss 1999:14.
of the work (including its words, sounds or images) relatively ‘intact,’ so responsibility may still be evoked via cogent engagement with the narratives.  

Within Interaction Design, Intact Syntax denotes the narrativity-interactivity trade-off whereby selected components which ‘carry’ the narrativity are non-malleable, while other components entertain greater plasticity. Arpeggiated Hierarchy concerns the hierarchy of consequence in determining what should be influenced and how. It denotes the form, whereby different ‘layers’ of media, such as words, sounds and images, are vertically overlayed as an arpeggio. Those ‘carrying’ the narrative are like the sustained bass notes that anchor contrapuntal music, such as Bach’s solo organ compositions: they modulate infrequently since they carry the major harmonic shifts in the work (Figure 2-18). They may be likened to the building foundations in Whitby’s analogy. Too much interactivity results in all layers of music (including the sustained bass notes) becoming structurally unsound as upper register notes rely on the solidity of the foundational bass notes to construct their harmonies. Arpeggios of brief high pitched notes become mutable and malleable without disrupting the greater narrativity of the work. They represent the primitives audiences may interact with while immutable base structures guide their engagement. Re-arranging sequences of higher pitched and shorter duration notes into varying permutations and combinations within the harmonic constraints of the existing music scale still produces quasi-palatable musical phraseology. However, modifying their scale and/or the sustained bass notes as composed by the artist may result in disharmony, symbolised by narrative disjuncture. The hierarchy of consequence in Kali Yuga and Emergence meant the playback and order of certain visual sequences were unalterable while more modular elements such as sound and tactility entertained greater real-time interactivity. These

257 The way Intact Syntax and Arpeggiated Hierarchy located a balance between the primitive size and its combinatoric potentiality was also informed by literary precedents, such as Découpage (the ‘cut-up method’), the Surrealists’ Exquisite Corpse and the French collective Oulipo which pioneered similar attempts, but in literature that was not designed for ‘audience’ interaction. An example of how I applied Intact Syntax and Arpeggiated Hierarchy to the domain of language was TripleTriplet, a sound collage that formed part of StilmS. The order of the triplet of words could be rearranged by participants, but due to the careful selection of words and their phonetic similarity, they ‘made sense’ in any permutation and combination of their arrangement. TripleTriplet is discussed on p219.
structures of limitations are further explained in returning to the linguistic analogy.

Figure 2-18: Excerpt from Johann Sebastian Bach Art of the Fugue (1745)

In applying Intact Syntax and Arpeggiated Hierarchy to words (symbolising a primitive in any medium), words and middle letters of words can be re-arranged, but the first and last letter of each word is in a fixed position. In this relationship between primitive size and interactive modality, the brain can still read sentences, such as the following from Hamlet:

To be, or not to be: that is the question:
Wheedhr ‘tis nbelor in the mnd to suffer
The snlgs and aowrrs of ougautores furntoe,
Or to take amrs angisat a sea of tboulres,
And by oopinpsg end them?

The brain reads the first and last letters of each word, paying inconsequential attention to the order of the letters in-between. This opens hermetically sealed databases to participants’ responsibility for exerting novel and unpredictable influences, by allowing variable levels of primitives (words and letters) and flexible recombinant potentiality that is subject to constraints (only middle letters can be re-arranged) which guide participants’ interactivity. This represents the approach to evoking responsibility to the physical environment of the artwork by using recipes that (ideally) balance narrativity with interactivity. However in Responsive Environments the form of the letters themselves are also mutable, as artists seek to evoke responsibility to form as well as content.

In this Alphabet Soup, artists’ responsibilities are raised when applying heat and liquid over time to deconstruct the letters so they may be cut, molded

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or squeezed to make pliable and malleable shapes, or even a new ‘alphabet.’
Progressively deconstructing the primitives increases participants’ responsibility to subsequently recombine such primitives free even from the strictures of language. At this level there is little, if any, guidance (or responsibility) maintained by the artists, as the primitives are at the behest of the audience. While some may enjoy this freedom, others may become disengaged or feel burdened by the responsibility to do anything with the putty they hold in their hands. Individual letters provide the comfort of communicating by forming words, but sacrifice the ability to make freeform abstract graphical constructions with the malleable form of the primitives. This represents the approach to evoking responsibility to the physical environment of the artwork by using recipes that sacrifice narrativity in favour of greater interactivity. Willis argues a “level of granularity” which uses “mere pixels, sound samples, words or letters...are therefore not narrative based, but instead focus on free-form creativity and play at the base level.” He sees such “open interactions” as “promoting highly participatory creative experiences, rather than arranging heavily authored content into narrative-like structures.”

The following considers the challenges toward evoking responsibility in such “open interactions,” before concluding with the relatively ‘closed’ interactivity of narrative based approaches, as I found these to be the most appropriate approach in creating the artworks for this thesis.

### 2.3.1 Authority versus Control

In fully interactive technologies, the flow of information goes both ways; the apparati become more like permeable membranes. If there is a balance of flow back and forth across this membrane, then the interactive technology is an intermingling of self and environment. If there is an imbalance, then the technology extends either outwards from the organic boundary of the interactor or inwards into the interactor.

David Rokeby

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259 Willis 2007:2.

260 Rokeby 1995b.
Chapter 2 – State of the Art

The next sentence in Willis’ ‘challenge scenario’ that begins Section 2.3 above refers to Rokeby’s same challenges in creating open flows across the “permeable membranes” between “self and environment” in Rokeby’s *Very Nervous System*. While arguing for interactivity as being “about encounter rather than control,” avoiding an “imbalance” in Rokeby’s scenario hinges on balancing authority and control to allow participants sufficient responsibility to co-influence the work. This requires artists to “strike a balance” that prevents “the system from becoming closed” by trading sufficient authority for participants’ control over the “responsive system’s behaviour.” Graham’s PhD survey of Interactive Art reached a similar conclusion that a “delicate balance between” artists’ authority and participants’ control was “one of the key skills of interactive art.” She writes that audience control must be in “a delicate balance within the work” in relation to the work’s “surprise, suspense, or chance” which requires “an absence of control.” Rokeby also locates the solution to artists’ “common” and “apparent contradiction between the desire for control and the desire for surprises” being in their ability to “balance control and surprise to suit their ‘interactive aesthetic.’”

Surprise becomes pivotal in determining the authority-control trade-off, as greater participant control denotes greater responsivity which increases artists’ surprise at the less-predictable behaviour of participant and artwork.

This “apparent contradiction” regarding surprise is integral to Responsive Environments. Artists “desire for surprises” in artworks as well as audiences' behaviour reaches its apotheosis in the authority and control negotiated between artists, audiences and semi-autonomous Alife artworks. This refers to Burnham and Krueger’s desired trajectory for Responsive Environments, as discussed above on p77. Rokeby posits these desires as determining any balance between control and authority in Alife art, with “the surprises that Krueger” seeks lying in “emergent properties” that offer “transcendence of the closed determinism implied by the technology and the

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261 Rokeby 1995b.
262 Rokeby 1995b.
264 Rokeby 1995b.
artist’s own limitations.” That is, artists aim to engage audiences in artforms that behave unpredictably even with their creators. Rokeby situates this desire within “interactive artists all the way back to the 1960s” endeavouring to “create systems that surprise[d] them.” A “loss of control” to the artwork as well as participants is central to “experiments in artificial life and artificial intelligence” which he decries “must transcend the control of the programmer” as artists explore audience responsibilities toward semi-autonomous artworks. The following considers these conundrums for evoking environmental responsibility in the two principal approaches to Alife art: systematic and optical Alife art.

2.3.2 Alife versus Blife

When we express our relationship to ‘the natural’ through poesis, explicitly or implicitly we express our concern about control. Nature is seen as a force that must be controlled, harnessed and tamed. This belief is reflected in popular notions of nature as ‘the chaos’, the uncontrollable force, and is exemplified by its effects and their consequences (death). For example, the act of gardening is often quoted as a metaphor to describe aesthetic selection. In some sense, gardening is about mastering the uncontrollable – harnessing nature and manipulating it for aesthetic purposes.

Jon McCormack

Alife art represents idealised “‘art-as-it-could-be’” through highly complex Alife science and technology, while Blife art denotes relatively simple analogue usages of nature, such as Environmental Art. As such, ‘Nature’ may be the subject of Blife art, while in Alife art it may be both subject (optical Alife

265 Rokeby 1995b.
266 Rokeby in Simanowski 2003.
While Blife and Alife art concern “harnessing nature and manipulating it for aesthetic purposes,” as in McCormack’s above quotation, the following discussion concerns their differences for evoking responsibility to the natural environment. This is illustrated by the centrality of control for evoking participants’ responsibility to social and physical environments in Alife and Blife art. While Alife art “seeks to exploit the out-of-control nature of nature,” McCormack is dubious about the ability of Alife artists to do “a very difficult thing,” which is to “acknowledge that control must really be relinquished” to create such semi-autonomous art. The difficulty lies partly in McCormack’s argument that “we humans live within a narrow band that tries to order chaos, but will not accept complete order.” Control is of necessity ceded to ‘Nature’ in Blife art, but such analogue forms do not permit cognisant interaction with human spatiotemporal dimensions, as discussed above in FoAM’s GroWorld artworks.

Nature is not what it used to be: hence Richard Coyne’s Technoromanticism, subtitled as Digital Narrative, Holism and the Romance of the Real. Coyne outlines the rationale of Alife, in “renouncing ‘centralised thinking’...wherein emergent behaviours apparently challenge the need for centralised, hierarchical, and autocratic control structures, and artificial-life researchers devise computer systems to manifest evolution, growth, and holistic behaviour in artificial organisms." In The Darwin Machine: Artificial Life and Interactive Art, Penny reasons why interactive artists appropriated Alife sciences as “an alternative to the current all too deterministic paradigm of interactivity as pre-set responses to user navigation through an ossified database.” He argues this saw the emergence a “new artform” of biomimetic artworks based on models of “human behavior.”

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269 This distinction holds, despite the fact that Alife art may also be about ‘Nature.’


274 Penny 1995c.
are two principal Alife approaches in this “new artform”: systematic and optical. Systematic Alife art “employ[s] ‘nature’ not as a representation but in the structure of the systems”\(^\text{275}\) as “the dynamics of biological systems are modeled more than their appearance.”\(^\text{276}\) This approach prioritises form over content as Penny argues that “systematic” representation “is akin to the move from harnessing the products of biodiversity to harnessing the mechanism of biodiversity.”\(^\text{277}\) In contrast, optical Alife art prioritises intelligible content in representationalist depictions of artificial nature, generally being CGI animations of natural environments.

As the first monograph on Alife art, Whitelaw’s *Metacreation: Art and Artificial Life* is unprecedented in its illustration of the intrinsic connections between Alife, emergence and environmental responsibility. Whitelaw positions aspirations toward “emergence and to the surprise, the excess, the ’something more’ which that entails”\(^\text{278}\) as central to Alife art. Emergence arises from insoluble interrelationships between causality and determinism. A multiplicity of interrelated interdependent parts produces a whole that “cannot be predicted”\(^\text{279}\) as it is beyond the sum of its parts. Through this process, interactions produce a being that belies its process of becoming. Whitelaw argues emergence is at the core of both a-life science and a-life art practice. Emergence is the process by which complex systems seem to acquire new properties from one level of scale to another; centrally, how the complex interactions of matter at the microlevel give rise to life at the macrolevel.\(^\text{280}\)

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\(^\text{275}\) Penny 1996b.


\(^\text{277}\) Penny 1996b.

\(^\text{278}\) Whitelaw 2004:22.

\(^\text{279}\) McCormack and Dorin 2001:12.

\(^\text{280}\) Whitelaw 2004:22.
Ceding control and gaining surprise are primary motivations for emergent behaviour in art, as these “complex lifelike behaviours are not directly controlled or specified; rather they arise spontaneously from microscale interactions.”

The Inside-Outside relationship is highlighted through such artforms, as they evoke “a sense of the processes of nature in machines.” However this raises the issue of whether this relationship is perceptible, given the following conundrum.

Emergence is fundamental to understanding environmental responsibility in semi-autonomous self-perpetuating artworks manifesting synthesised or simulated evolution and adaptation. Via biomimicry, participants’ responsibility to the social and physical environment is designed to evoke their responsibility to natural environments optically and/or systematically represented in the artwork. Furthermore, participants become environmental stewards, responsible for diverse immediate-through-cumulative long-term influences on the artworks’ evolution. This occurs through the form of using a “process which is authored or established by the artist, and which primarily operates independently of the author” once participants start exerting cumulative influences from interacting with the artwork. Responsibility in such artforms is negotiated between the artist’s establishment of the genotype “instructions” or “axioms” or “rules about interactions” and participants’ responsibility for influencing the phenotype forms of the “work as it is experienced by a viewer.”

However this invokes an intractable dilemma. Cumulative causality holds considerable scope for engendering participants’ responsibility to current and future states of an artwork. The challenge lies in how to communicate participants’ awareness of their responsibility for their immediate, collective and cumulative influences. While this is discussed in the practice of the corpus in Chapter 3, the following explores what I termed ‘The Limitation of Imitation’: being the ability of

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281 Whitelaw 2004:207.
282 McCormack and Dorin 2001:12.
biomimesis to evoke responsibility to natural environments in either systematic or optical Alife art.

2.3.2.1 The Limitation of Imitation

Nature can be seen as a complex system that can be loosely transferred to the process of design, with the hope that human poiesis may somehow obtain the elements of physis so revered in the design world. Mimicry of natural processes with a view to emulation, while possibly sufficient for novel design, does not alone necessarily translate as effective methodology for art however.

Jon McCormack

Optical and systematic Alife art prioritise the imitation (or “emulation” in McCormack’s terminology above) of evolutionary and emergent process, to the detriment of cogent narrativity. This is not a criticism against Alife practice, as this is a conscious decision undertaken by such practitioners. Systematic Alife art is highly appropriate for exploring qualities like causality, complexity and malleability, although concomitantly indeterminate cause-effect correlations obscure participants’ responsibility to the physical environment of the artwork, as they are less likely to understand what they influence and how. As causality and determinism relate to all Responsive Environments the following pertains to optical Alife art.

With its intrinsic Inside-Outside relationships, Alife art appears to be highly suited for evoking participants’ responsibility to the natural environment. However canonical works of optical Alife art excessively prioritise visualising emergent processes over audience engagement with the processes. Karl Sim’s Genetic Images (1993) was one of the first of this ilk. Similar to McCormack’s Turbulence, Genetic Images involved pre-animated sequences of artificially evolved ‘creatures’ that participants affected in a literal adaptation of Darwinian natural selection. ‘Voting’ to continue a hereditary trait involved participants selecting a “‘parent’ image by running over and

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285 This work is discussed in the case study on McCormack on p129.
stomping on the pad beneath its display.” This selection mechanism and causal relationship was not self-critical or self-reflexive. In nature (represented by the evolving creatures on screen), stomping kills a creature, rather than assisting its reproductive process. If the work symbolised taxidermic appropriation of nature, stomping/’killing’ is an apt metaphor for the desire to preserve an image of a wild/dangerous animal in a benign pose for human appreciation, like a stuffed tiger in a hunter’s trophy case. Instead, stomping ‘assisted’ the creatures, as “the selected image instantly breeds 16 similar but slightly variant offspring, and these appear on the monitors for the next round of choosing.”

*Genetic Images* highlights how content and Interaction Design co-determine an evocation of participants’ responsibility to the natural environment by way of their responsibility to the physical environment of the artwork. This becomes even more pronounced in two key members of Huhtamo’s ‘old school’: Christa Sommerer and Laurent Mignonneau. Whitelaw terms their works “interactive environments” and “immersive environments” in which “human participants negotiate with the emergent behaviour of artificial agents” wherein “emergence is behavioral and interactive.” This denotes a Responsive Environment of “artificial ecosystems (or ‘cybernatures’) concerned with the dynamics of interaction and the construction of a whole, living space.” Their *Interactive Plant Growing* (1992), *A-volve* (1994-5), *Trans Plant* (1995-6) and *Eau de Jardin* (2004) appear fertile for evoking environmental responsibility through their “basic cybernatural disjunction” between the “play of inside and outside, and of nature and its simulation.” While works such as *A-volve* that “unequivocally evoke nature appear in a computational medium” Whitelaw argues that “these elements –technology and nature, medium and content– are brought together in an analogical relationship” in such a way as to undermine an evocation of participants’ responsibility to the natural environment. This is examined in their canonical

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289 Whitelaw 2004:64.
290 Whitelaw 2004:78.
**Interactive Plant Growing**, as it initiated the ethically problematic vein their subsequent works continue in.

*Interactive Plant Growing* includes five different real plants on plinths surrounding a video projection (Figures 2-19, 2-20, 2-21). The electrostatic charge of the human body is registered and measured as the hands of participants approach or touch the plants. Nuances of these charges are computationally analysed to control artificially evolved computer animations of ‘virtual’ plants projected onto the screen in the middle of the real plants. Taking heed of Whitelaw’s advice that “learning to control the virtual plants involves establishing a gestural and tactile relationship with a real plant”[291] I explored the range of responses to diverse interfacing with the work during a week at ZKM Centre for Art+Media. While Sommerer and Mignonneau claim that “by producing a sensitive interaction with the real plants, the viewers too become part of the installation” as “they decide how this interaction is translated to the screen and how growth takes place on the screen,” I found only direct, deterministic, repeatable causality in all my variations of being gentle and rough in my one-on-one and many-to-many interaction and when just observing others’ interaction. Despite their claims for variable consequences of nuanced interactivity, the work evoked ‘nature’ as submissive, predictable and controllable. In light of this, it appears troubling that they declare all variations ultimately depend on the viewers sensibility to find the different levels of approximation distances, as they are responsible for the different events in growing. Since it takes some time for the viewer to discover the different levels for modulating and building the virtual plants, he will develop a higher sensitivity and awareness for real plants.[292]

Such rhetoric does not match reality, which they do not comment on, of the inevitably detrimental effect of human contact (such as tearing and rubbing of leaves, disturbing the soil microorganisms and leaving oil residue from rubbing the plants). One possible reading from evoking such ambiguous responsibility is that to behave ‘responsibly’ in the manner encouraged by the

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artists (that is, making physical contact with the plants to trigger the computer animations) occasions ‘irresponsible’ behaviour toward the natural environment (of the plants within the artwork). Armstrong argues that such problematic responsibility stems from their use of Alife, which is not “intended to offer up any new insights on our failure to understand the implications of our mass disturbances to our own ecosystems (or indeed our ecosystems in interaction with post-human, post-natural forms)” as he finds they are “rather concerned with a simple praxis of simulation.”

Whitelaw argues attitudes toward nature evoked by such Alife art have disturbing consequences for evoking environmental responsibility, both to the physical environment of the artwork and the natural environment evoked by the artwork. He maintains the “celebration of interactive engagement” in their “artificial natures...acquires a twist” from their Alife art not being “interrogated for what it omits or implies” as they “adopt it uncritically.” This arises since works such as A-volve “signify a nature organised around human presence and agency” that consequently “evoke[s] a questionable analogy between biological and computational structures and, in the process, reinforce an anthropocentric notion of nature, not intentionally but as a consequence of their representational forms.”

In critically analysing these issues from the standpoint of *Narratives of Artificial Life*, Katherine Hayles approaches Alife art as ‘stories’ told by the work’s and their creators’ rhetoric surrounding them. She finds the long jump from programs that replicate inside a computer to living organisms... is bridged largely through narratives about the programs that map them into

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293 Armstrong 2002:263.
evolutionary scenarios traditionally associated with the behaviour of living creatures.\textsuperscript{295}

This culminates in the “high drama of a Darwinian struggle for survival and reproduction”\textsuperscript{296} that these works represent. Like Whitelaw, she finds the environmentalist concerns of Alife artists’ are problematically evoked in Alife art. As an example, the evolutionary biologist Thomas Ray advocated his Alife program \textit{Tierra} “be released onto the internet so that it could ‘breed’ diverse species on computers all over the world” while he simultaneously devised a biodiversity conservation plan for Costa Rican rainforests. While “Ray saw the two proposals as complementary,” for Hayles “their juxtaposition dramatically illustrates the reconstruction of nature going on in the field of artificial life.”\textsuperscript{297}

Having considered issues in evoking environmental responsibility in optical Alife art, the following section considers the related trade-off between determinacy and indeterminacy as they relate predominantly to systemic Alife art.

\section*{2.3.3 Determinacy versus Indeterminacy}

Where there is no perceptible correlation between the input gesture and the resulting sonic outcome, the feel of the system being interactive can be lost, as the relationship between input and response is unclear. It is a balancing act to maintain both a sense of connectedness between input and response while also maintaining a sense of independence and freedom.

John Drummond\textsuperscript{298}

\textsuperscript{295} Hayles 1996:147.
\textsuperscript{296} Hayles 1996:148.
\textsuperscript{297} Hayles 1996:146. Other examples include McCormack on being in Litchfield National Park as the inspiration for his artwork \textit{Eden} (as discussed on p132), Char Davies statement on her website that “in addition to her artistic and technological research in virtual environments, Davies cares for 400 acres of land in rural Quebec, the ‘real’ environment that is the source of inspiration for much of her work.” (www.immersence.com), and Brenda Laurel’s statement on her website that her “Personal Interests and Activities” include being “active in multiple organizations devoted to environmentalism and human rights” and “playing in nature: hiking, camping, snorkelling.” www.tauzero.com/brenda_laurel/resume/bl_cv_04-06.htm. Accessed April 28 2006.
\textsuperscript{298} Jon Drummond. \textit{Interactive Electroacoustics}. PhD Dissertation. School of Communication Arts, University of Western Sydney. 2007:119.
The preceding optical Alife approaches use relatively deterministic causality to facilitate participant engagement with the complex phenomena of emergence and evolution. In contrast, systematic Alife artists, such as Penny, Bill Vorn and Louis-Philippe Demers have more leeway to balance determinacy and indeterminacy as their works have no narrative agenda to uphold. Like Drummond’s above “balancing act,” Penny’s relatively indeterminate causality progressively inculcates participants’ awareness of the influences of their behaviour according to “the degree to which the changes in output are interpreted by the user as related to their behaviour.” To do so, he advocates interactivity that requires a “learning curve” where “the user must be trained or the system must teach the user”²⁹⁹ to interact in more complex ways. He places this high in his priority of strategies, as “a central issue in interactive art is managing the learning curve of the user.” While he finds this “is a key measure of the success of any interactive system,”³⁰⁰ it is not viable for works with many-to-many interactivity, where it is highly problematic for participants to interpret which changes are attributable to whose actions even with simple interactivity. Furthermore, in his rationale simplistic 1:1 causality would be ‘successful,’ even though this would not engage participants’ interest according to his argument that “the designer must successfully communicate that the user is having a controlling effect on the system and at the same time engage the ongoing interest of the user with enough mystery.”³⁰¹

Creating an appropriate amount of “mystery” hinges on balancing determinate and indeterminate causality between audience and artwork. This raises an intractable challenge for creating Responsive Environments: causality in natural environments is inexorably complex. Biomimetically employing such complex causality undermines attendees’ ability to behave responsibly. Rokeby argues “we begin to behave irresponsibly” including “paying little attention to the results of our actions” as he finds it unreasonable to “be expected to act


³⁰⁰ Penny 2000.

³⁰¹ Penny 2000.
responsibly if I don’t know what is going to happen” as the result of his actions. Using acid rain as his example of when “weather” becomes “interactive,” Rokeby proposes the ‘balance challenge’ as being to reconcile that “absolute prediction and control of very complex situations is not possible, and partial control often disastrous” with his edict that “we must learn to accept this fact without abdicating from the responsibility for the results of our actions.” He proposes the Inside-Outside relationship for this intractable problem, whereby “refining awareness of the ways in which we affect our physical and metaphysical environments is the only way to avoid increasing the apparently chaotic and cataclysmic behaviour of the universe.”

Refining such awareness of the affects of our actions hinges on balancing simplicity and complexity, as this binary is inextricably related to positioning an artwork between determinacy and indeterminacy.

2.3.4 Simplex: Between Simplicity and Complexity

While simple interaction may be accessible to a wider range of users, such interaction inherently produces more specific results from the interaction...

Ultimately more complex interaction allows the user greater creative possibilities, but at the expense of creating a more complex learning process for the user. Interactivity relies heavily on the balance between these two properties.

Karl Willis

The 2006 AE symposium I attended, Simplicity: The Art of Complexity, explored these realms as ideas and ideals, without mentioning simplicity or complexity in the form or Interaction Design of interactive art. In Responsive Environments these tropes are applied literally in “finding an appropriate balance between the difficulty of the interaction and the resulting complexity of the piece” as both extremes impede an evocation of audience


303 Rokeby 1985b. This is explored in Rokeby’s practice in Section 3.4.


305 Willis 2006:17.
responsibility. This quote from Willis refers to the centrality of balance as his guiding principle in negotiating all binaries. In his *Light Tracer* (2005), which I interacted with in 2005, his ‘solution’ was optional layers of interactivity stemming from simple and intuitive ‘drawing’ on a screen by the light of a torch left (Figures 2-22, 2-23). Video cameras periodically incorporated still images of participants onto the screens, so participants could interact with one another by such acts as drawing over the projected images of their co-participants. *Light Tracer* balances simplicity and complexity, as participants experience the instant feedback from ‘just drawing’ and/or explore the multifaceted interactions produced by the variable degradation of the lines of light and projected stills of participants. Through ‘levels’ of interactivity, *Light Tracer* offers differing degrees of engagement for those "seeking deeper contact."  


For overly complex works, Willis finds those “frustrated by the difficulty of the interaction will soon give up.” His “sweet spot” between these extremes is “where the user can interact fluidly without their attention being drawn to the difficulty of the interaction or the limited possibilities it offers.”

This ‘sweet spot’ hinges on the work managing Penny’s “learning curve,” discussed above in relation to the determinacy–indeterminacy trade-off. Of the “two undesirables” of overly simplistic or complex works, Penny rejects the “solution” of making “a work...so simple in the dynamics of interaction that it

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308 Penny 2000.
is easy to understand,” since he equates this with being “immediately boring.” However, as simple interactivity is concomitantly intuitive, it may facilitate experiencing the content rather than the means of engaging. While Willis also finds participants become “bored by limited possibilities of interaction,” this depends on the prioritisation of interactivity as modus operandi or subject of a work itself. Penny rejects works at the other extreme that are “so complex that the average user cannot discern the way in which they are controlling or effecting the events.” Rokeby’s solution to this conundrum is to ‘streamline’ participants’ influence as “it is difficult to sense interaction in situations in which one is simultaneously affecting all of the parameters.” This is not based on imposing control, but rather his experience that “interaction within a system that does not impose significant constraints is usually unsatisfying to the interactor” as “limiting the options available at any one time...assists the interactor in deciding how to proceed.” Rokeby arrives at such a rationale for simplifying interactivity within the complex causality of his work, as he finds

the interactor’s sense of personal impact on an interactive system grows, up to a point, as his or her freedom to affect the system is increasingly limited. The constraints provide a frame of reference, a context, within which interaction can be perceived...by relinquishing a relatively small amount of control, an interactive artist can give interactors the impression that they have much more freedom than they actually do.310

While the above strategies were highly influential in my approaches of *Intact Syntax* and *Arpeggiated Hierarchy*, my work differs from the artists cited above in evoking participants’ responsibility primarily through the final binary of interactivity-narrativity. This stems from the above artists’ relative disinterest in narrative based approaches, over their prioritisation of complexity and/or Alife.311 The concluding binary is discussed in three practitioner-theorists who also prioritise balancing the binary of narrativity-interactivity over balancing the other binaries.

309 Rokeby 1995a:140.
310 Rokeby 1995a:141.
311 As Rokeby says: “fixed narrative is great for story telling, but I am not really interested in story telling.” Rokeby in Simanowski 2003.
2.3.5 Narrativity versus Interactivity

If humanity were a building, each author would be a window. The view from that window would be the picture each author paints.

Mark Meadows

Meadows sees narrativity as the composite aggregations of perspectives from each window of each picture painted by each author. Rejecting the idea that the multiple perspectives of many authors standing at their windows are solipsistic, Meadows maintains narratives are the means by which our respective perspectives coalesce to give shape to the building. In *Pause & Effect: The Art of Interactive Narrative* he traces narrativity across millennia and the various media by which such stories are made and shared. In *Interactive Art*, trade-offs exist between the ability of narratives to engage and immerse audiences and the "pause and effect" when participants interact with narratives. Interactivity jeopardises the evocation of participants’ responsibility to the physical environment of the artwork when it impedes engagement by rupturing narratives, so much so that Cameron argues an “interactive narrative” is “a contradiction.” He maintains that the “narrative form appears fundamentally non-interactive,” as by introducing interactivity the “authority of the narrator is dispersed among the readers, and...the idea of cinema, or of literature, merges with that of the game, or of sport.” Similarly, Dinkla introduces the term “‘floating work of art’” in *The Art of Narrative - Towards the Floating Work of Art*, to account for how the “dynamic and fluctuating narrative material” is no longer “created by the process of narration by the author, but only in the interaction with the reader.” One ‘solution’ advocated by the following practitioner-theorists, which I also used in *Kali Yuga* and *StilmS*, is to devise narrative content and form which are amenable to rupture and reconfiguration, via Freudian dream interpretation.

Riika Pelo has explored this balancing act as a novelist who creates interactive artworks with discontinuous narratives. In *Caesura in ‘Marina’s Garden’: Interactive Narrative as a Drama of Responsibility and Interruption* she argues “we can think of writing a narrative as interface design.” She approached the conundrum of combining interactivity with narrativity by incorporating caesura into the content and form of her artwork *Marina’s Garden*. In desiring to “set up an ethical interface in the Levinasian sense...in which the visitor becomes responsible for the Other...within her temporality, her past and present times” Pelo invoked a non-linear and recombinant narrative structure that drew upon “Freud’s metaphor of the *Wunderblock*.” For this work, narrative was “only possible through the logics of dreaming and remembering” by harnessing the reconfigurability of non-sequential non-linear modular narrative fragments according to Freudian dream analysis. For his earlier explorations in negotiating the narrativity-interactivity trade-off, Weinbren’s *Sonata* (1991-3) used a similar Freudian approach to dispel illusions of sequential narratives, to facilitate interaction with a narrative that embraced caesura and interruption.

Seaman also employs Freud’s *The Interpretation of Dreams* for the narrative structure used in his *The World Generator* (Figures 2-24, 2-25, 2-26). Narrativity in this organicist work emerges from participants’ real-time activation of myriad audiovisual primitives through indeterminate permutation and combination. Seaman uses organicism in its artistic context of a holistic narrative composed of modular segments inextricably interconnected to one another. The work straddled narrativity and interactivity as Seaman designed it “to strike a balance between order and chaos,” with the immutable form and content of the primitives being recombined by participants into narrative segments. Due to their size and possibilities for real-time recombinations, he argues this narrative framework produces “inter-authorship” between audience and artwork, although does not indicate whether this can evoke

'inter-responsibility.' While his PBR PhD explores issues of “Environmental Engagement,”320 “Environmental Relations,”321 and “behavioral responsiveness”322 in creating his Responsive Environment it does not discuss such relations in terms of responsibility.

2.4 Summary

This chapter has identified and clarified the recipes and ingredients for creating Responsive Environments. It has situated them from the Outside—that is analysis via the broader art historical and cultural frameworks within which they exist—and then from the Inside—that is analysis of practitioner-theorists’ attempts to balance binaries within and between one another to create Responsive Environments. In combination, these Outside and Inside perspectives have created a portrait of Responsive Environments according to their heterogeneous artforms, media and disciplines that they incorporate. Accounting for their historical background has demonstrated how they relate to eclectic artforms and to attempts to explore relationships between art, science and technology.

The discussion of artists and artworks in this chapter has illustrated novel contributions to attempting to balance authority-control, determinacy-indeterminacy, simplicity-complexity and narrativity-interactivity in creating Responsive Environments. Specific facets of the practice of the artists in this

320 Seaman 2002:79.
chapter combine to form a multi-faceted but intentionally fragmentary picture of Responsive Environments. Each facet and fragment was detached from the ‘big picture’ for the purposes of illustrating the role of different recipes in combining the ingredients used in creating Responsive Environments. Returning to Whitby’s analogy that began this chapter, if Responsive Environments are “a finished construction” or “a built house,” this chapter has disaggregated them into “a load of bricks,” so that each brick may be examined in more detail than is possible when embedded in the labyrinthine maze of bricks that constitute a built house.

Discussing them ingredient-by-ingredient, or brick-by-brick, illustrates how they are potentially suited to evoking environmental responsibility. In turn, the case studies in the following chapter collectively explore their ingredients artist-by-artist, to illustrate shared trends and approaches amongst related practitioners of Responsive Environments. Considering their ingredients in their totality over the career trajectory of the five artists/collectives in Chapter 3 complements the approach taken in this chapter, whereby having disaggregated Responsive Environments into their ingredients and primitives, the following aggregates them into their true form as *gesamtkunstwerk*.

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323 Whitby in Cameron 1995.
Chapter 3: Case Studies - Context and Contextualisation

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3.1 Introduction

In the preceding chapter, the challenges and issues related to evoking environmental responsibility in Responsive Environments were discussed ingredient-by-ingredient. These challenges and issues -negotiating the relationship between authority-control, determinacy-indeterminacy, simplicity-complexity, narrativity-interactivity and responsivity-responsibility when creating Responsive Environments- are collectively explored artist-by-artist in the five case studies that constitute this chapter. The artists were selected through a comprehensive global online then in situ survey of artists and artworks during fieldwork in Europe and Australia. The five artists/collectives comprise a corpus of shared concerns and motivations which combine content, form and Interaction Design to evoke participants’ responsibility to the artwork-as-environment. Similarities illustrate intrinsic rather than imputed connections, while differences demonstrate alternative ‘solutions’ for negotiating a balance between their authorial responsibility and participants’ responsibility.

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124 This process and the selection criteria are described in more detail on p56.
The case studies illustrate trends between these same generation of artists, who mutually influence one another’s explorations of responsibility and interactivity in highly complex and technologically demanding artworks. Garth Paine, Jon McCormack and David Rokeby represent individualistic practice with intermittent collaboration on conceptual and/or technical aspects. When collaborating, their authorial responsibility, as instigator and director, is maintained. In contrast, the fourth and fifth case studies of Keith Armstrong/Transmute Collective and FoAM concern collaborative collectives.

Each case study explores key ideas from core artworks in the artist’s career, in light of Huhtamo’s “archeology of interactivity.”325 The focus is on seminal interactive artworks relevant to the topics of this dissertation, including the period when interactivity was eagerly embraced in the early 1980s, before being largely rejected or criticised by Huhtamo’s “‘old school’”326 by the late 1990s. The case studies present a detailed chronology of the broad shifts of practice discussed in relation to the State of the Art of Responsive Environments in Chapter 2. Huhtamo’s “archeology of interactivity” looks at divergent approaches to creating Interactive Art in the career trajectories of pioneering ‘old school’ Euro-American artists, as leverage to unearth a “‘metacommentary’ on the state of interactivity.” He argues that the practice of these artists “raises ethico-philosophical issues” as it “continuously de-mythicises and de-automates prevailing discourses and applications of interactivity from the inside,” such that their specific trajectories reveal wider trends and patterns of “a cultural critique of the nature of interactivity.”327 This argument is applied to the case studies which follow, including Rokeby, who was the main subject of Huhtamo’s “archeology of interactivity.” The case studies also expose “a cultural critique of the nature of interactivity” which is not concerned with geo-sociological art trends, as the Australian artists I have included practice and exhibit internationally. Nor do they form a ‘portrait’ of contemporary Australian Responsive Environments, as they operate against dominant trends in Interactive Art (as per Huhtamo’s above “‘metacommentary’ on the state of interactivity.”)

325 Huhtamo 2006.
326 Huhtamo 2004:1. These artists are listed in Footnote 142.
327 Huhtamo 1995:81-82.
Each case study is broadly chronological, tracing the evolution of strategies for evoking responsibility to Inside (social, physical) and Outside (quotidian, natural) environments in Responsive Environments. With upwards of 20 years of professional practice each, the artists’ works oscillate between outright interactive/responsive, satirically interactive and relatively non-interactive, with interactivity embraced as one component for some works. In tandem, the artists’ works oscillate between evoking individual and collective responsibility in direct, indirect, literal, metaphorical, instantaneous, cumulative and collective domains. Alongside diversity within each trajectory are shared explorations of intersections between art, science and technology; for instance, all the artists used chaotic, unpredictable weather patterns as impetus for interactive installations, all made artworks about and/or with natural/artificial gardens as subject and/or modus operandi for interactivity and responsibility and all exhibited/performed at Ars Electronica yet maintained an ambivalent relationship with such a dominant context for presenting and critiquing Responsive Environments.328 Their use of different interfaces -such as haptic, tactile, kinaesthetic and proprioceptive processes- illustrates a diversity of Interaction Design strategies which add up to a multi-faceted portrait of disparate but related artforms whereby each facet contributes, on balance, to a corpus which transcends any one artist, collective or artform.

These five case studies contextualise the journey of my practice, which also oscillates between different approaches to interactivity and responsivity, as the following three chapters discuss. Resonances and connections with my practice chiefly are found in these artists’ rhetoric and rationale rather than shared formal properties, as they herald from an earlier generation with established international art practices over relatively long careers, while my suite of artworks for this PhD are proof-of-concepts domestically produced and exhibited with limited resources, time, equipment and experience. For example, their practices generally constitute Alife inspired aspirations toward “art-as-it-could-be,”329 by using Alife scientific processes, or technological sophistication of equivalent complexity, while my practice is generally Blife in

328 This is discussed on p66 of Chapter 2.
the sense of “art-as-it-actually-is”\textsuperscript{330} by using an “under-engineering’ approach”\textsuperscript{331} with humans or biological materials (rather than programmed machines) as the mimetic agents of simulated adaptation, evolution and emergent behaviour. For this reason, it was more appropriate to ground my PBR in the corpus of recent PBR PhDs as representative of an emerging generation of practitioners, discussed on p54 of Chapter 1, without ignoring relationships such as that between my \textit{D\#Generative} (2005-8) and McCormack’s \textit{bloom} (2006) and \textit{Morphogenesis Series} (2001-4), where these occur.\textsuperscript{332}

### 3.2 Case Study #1: Garth Paine

Unless the system changes in response to accumulated user input...it is essentially responsive, and not interactive. I have therefore used the term, interactive responsive environment to describe my installations, which I believe herald a journey towards true interactivity.

Garth Paine\textsuperscript{333}

The following section discusses Garth Paine’s “journey towards true interactivity” in his suite of artworks made for his PhD between 1996-2000, as this journey highlights fundamental issues in creating Responsive Environments (and the similar journey undertaken in my PBR). Paine’s PBR evokes co-participants’ responsibility to the social and physical artwork-as-environment through prioritising highly responsive Interaction Design over content and form. This is facilitated by working in the relatively malleable medium of sound, as sound can be generated in real-time synthesis with minimal pre-authored or pre-structured content or form (relative to visual, textual, haptic and tactile mediums). Using reflective practitioner and iterative design methodology, Paine chronologically moved from more authoritatively

\textsuperscript{330} Braeckman 1995:267.
\textsuperscript{331} Penny 1997b.
\textsuperscript{332} This relationship is discussed on p180.
\textsuperscript{333} Paine 2002a:116. Emphasis in original.
controlled "'triggered' systems" toward highly responsive works generating audiovisual content according to real-time and cumulative patterns of participant interactivity. His Responsive Environments have been staged since 1996 in Australia, Europe, Japan, America, Hong Kong and New Zealand. As an "Academic, Composer, Installation Artist, Sound Designer" his PBR explores the role of interactivity and responsivity in "Sound Installation Works that engage with the environment and the people within them," principally through sensing unencumbered movement of co-participants within the environment.

In his article, *Interactivity, Where to From Here?* Paine criticises "widely abused" interactivity in electronic art. He aligns himself with artists such as Penny, who also "sets out to avoid" the "*standard interactive paradigm...* based on pre-determined paths through pre-constructed environments." For participants to have a high degree of responsibility to the physical environment of the artwork Paine seeks “to remove pre-made or pre-defined content from the installation works” through real-time sound synthesis based on participants' movement, as this creates “forms of interaction that contain as few predetermined factors as possible.” In this context Paine regards his authorial responsibility as being to “remove myself from the role of content creator and dictator of interactive outcomes.” He situates his intention within Surrealists and Fluxists, as he likewise seeks “to remove myself, as much as possible, from imposing an aesthetic; a collection of outcomes, a form, or a prescriptive experience," as these are inversely proportionate to participants being able to “mould their own individual experience.” His contemporary influences are Sommerer, Mignonneau, Rokeby and Krueger, although, like

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337 Paine 2002a:3.
Rokeby, Penny and *FoAM*, Paine departs from Krueger’s predominant use of surveying participants to detect absence versus presence, in favour of artificial perception systems that sense and analyse the subtlety and nuance of participants’ movement. Paine evoked participant responsibility in *MAP1* (1998), “an immersive interactive sound environment installation,”\(^{341}\) by “shifting” his role “away from content determination,”\(^ {342}\) using “very little pre-made content” in conjunction with generating real-time sound synthesis from participants’ movement. This made actualisation “more within the visitors control” as he placed “ownership of the experience onto the user”\(^ {343}\) to the extent that participants could submit their own audio content to be incorporated into the sound matrix that they interacted with in *MAP1*.

Paine argues against dominant modalities of Interactive Art, wherein the artist-audience relationship is analogous to the artist as conductor of the audience as chamber orchestra. Only conversational interactivity “is extremely dynamic,” with audience and artwork “constantly monitoring the responses of the other and using their interpretation of the other parties input to make alterations to their own response strategy.”\(^ {344}\) Like Rokeby and Graham, Paine models his Inside physical environments on the Outside quotidian environments of “everyday” interaction of “human conversation,” wherein “each exchange...must reflect the unique qualities of each particular dialogue.”\(^ {345}\) To achieve this, dialogue interactivity must be “capable of changing and evolving” by “reflecting the developing relationship or discourse between”\(^ {346}\) artist, artwork and audience. However this ‘evolution’ is partially pre-determined, given his caveat that it “must promise continually new outcomes” wherein “responses alter in a manner that reflects the cumulative experience of inter-relationship.” This argument hinges on Paine’s criteria that artworks should be semi-autonomous with “a level of cognition,” by which criteria “most

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\(^{342}\) Paine 2002a:52.

\(^{343}\) Paine 2002a:51.


\(^{346}\) Paine 2002b:5.
systems” without this capability are not “interactive, but simply reactive or responsive.”

While this cognition is unspecified, the “level” of cognition requires an “infrastructure that could establish the patterns of interaction based on historical knowledge, and act accordingly.” Ideally, “the system” (as artwork) would be “trained to analyse the aesthetic output of the interactive system” to create the possibilities of “algorithms of an interactive, responsive environment evolving over time.” The desired result would see the “response patterns of the installation adapt to an accumulated knowledge” regarding participant interaction. However this would significantly raise participants’ authorial responsibility as the cumulative consequences of their interactions would “totally discard the algorithms the artist/composer(s) established for the piece.” Such responsibility may be onerous, as it would require participants “to develop a cognitive map of the relationships between behaviour and environment, between action and reaction, between individual and communal.”

This refers to the conundrum discussed in Chapter 2, wherein complex responsivity through dialogical interactivity necessitates correspondingly high levels of participant responsibility. In particular, Paine's oeuvre demonstrates the complex endeavor of evoking responsibility in many-to-many interaction with a physical environment that evolves, wherein participants negotiate between individual and collective responsibility as environmental stewards.

In his PBR, Paine aims to evoke environmental responsibility through reciprocal relationships between participants and the physical environment, wherein participants’ “behaviour creates the environment, and the environment conditions their behaviour.” This is prescriptively applied, as he argues participants’ experience “should” involve “a symbiotic relationship with the

348 While not defining “accordingly,” or specifying the “level,” he suggests “neural networked computing” as the necessary “software infrastructure.” Paine 2002b:10.
350 Paine 2001:3.
351 See p83.
work that permits a real sense of freedom of interaction.” This is possible only if enjoyed by both artwork and audience, as it is self-contradictory undermined by his works like *Ghost in the Machine* (1997), “an immersive interactive Audio/Visual environment Installation,” where participants were “able to command the environment” and “to play” it like an “instrument.” Under Rokeby’s influence, most of Paine’s PhD artworks were created with Rokeby’s *VNS Software*. However *VNS*, Rokeby’s principal work created with *VNS Software*, was designed to not be an “instrument that you play with your body” due to the connotations over the “level of control” Rokeby found in such a relationship. Nevertheless, participant-environment reciprocity existed from *Ghost in the Machine* inverting the roles for participant and artwork relative to *Moments of a Quiet Mind* (1996), his preceding installation. *Ghost in the Machine* required participants to “move more and more rapidly” to “maintain a serene state” of the real-time behaviour of the audiovisual content. Participants were informed by the program notes that each “acts as an irritant to the space” that was pre-determined to be “soothed” by more chaotic human behaviour. This text was an adjunct to the responsibility to natural environments evoked in the work, as the program notes declared that “the environment reverts to a serene state” without participants.

Subsequent artworks negotiated responsivity-responsibility relationships by attempting to balance the number of co-participants with the mode of interactivity. *MAP2* (1999-2000), an “interactive sound environment installation,” offered “an environment in which people can consider the impact they make on their immediate environment and the causal loops that exist between behaviour and quality of environment.” In this work, Paine used “balance” as the “required” principle for causal determinacy between “mappings that were immediately perceivable, and mappings that provided

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357 Paine 2002a:58.
complex, multi-faceted responses.”\textsuperscript{358} Causality in his earlier deterministic “triggered’ systems”\textsuperscript{359} was now balanced with “complex and multifaceted” interactivity involving indeterminate causality between participants’ actions and the ensuing effects on the physical environment. As he desired for participants to enter into “causal loops” of cybernetic feedback, Paine applied the caveat that causality should not be “obscure or indeterminate.” His solution to these mutually exclusive properties was to balance the complexity of the interactivity with correspondingly appropriate numbers of co-participants.

This involved re-appropriating the exploration of his earlier \textit{Moments of a Quiet Mind} and \textit{Ghost in the Machine} which aimed for “a balance within the [installation] space” between the intensity of individual participants’ behaviour and the feedback cycles they exerted on the work. In \textit{Moments of a Quiet Mind}, balancing the number of co-participants with corresponding complexity of interactivity aimed to encourage participants “to consider the relationship between the ‘perceived’ and ‘actual’ consequence of behaviour.”\textsuperscript{360} While this “advocated an intermediate level of behavioral intensity, a middle way,”\textsuperscript{361} making participants’ respective influences apparent was hindered by their engagement with cumulative responsivity from the collective interaction from all previous participants. Consequently, “inhabitants”\textsuperscript{362} were given “no option but to develop a communal language for the exploration of the installation.” This common (spontaneous) “language” required developing spontaneous “communal agreements as to what distinguishes a preferential environment, and what characterises preferential behaviour.”\textsuperscript{363} Like Krueger, Paine also found that participants “wanted to see a direct and immediate relationship” between the consequences of their interactions, to offset being “unsure what the outcome of their individual activity was within the space.” Paine’s solution was to make causal relationships more discernable through having minimal simultaneous co-participants and encouraging repeated

\textsuperscript{358} Garth Paine. MQM Program Notes cited in Paine 2002a:29.
\textsuperscript{360} The term used by Paine to describe those interacting with his works.
attendances with different volumes of co-participants, so participants could “explore the interactive potential of the installation to its fullest,” as exemplified in *Gestation* (2003).

Paine’s exploration of the balance between complexity of interactivity and appropriate numbers of co-participants was an important reference point for my *StilmS* and *Interaction Design for Emergence*. Likewise, his candid reflections on these challenges are discussed in the sections on *Transmute Collective* and *FoAM* below. While these artists share an exploration of synthesized evolution and adaptation in their artworks, the practice of the following artist, Jon McCormack, forms the apotheosis of balancing the number of co-participants with responsibility for co-influencing Responsive Environments that ‘evolve.’

### 3.3 Case Study #2: Jon McCormack

A pristine new nature begins to form in a remote inner chamber. Supported by expensive, sophisticated technology, this nature offers several advantages over the rapidly unravelling original. It is enormously malleable; it might resemble the ‘old’ nature or some fantastic environment of our own imagination. Being immaterial, it is entirely benign; it won’t eat, poison, flood, or otherwise disturb its human inhabitants. Rather, it can be truly Edenic, the ultimate garden, in fact, finally under complete control.

Mitchell Whitelaw

Whitelaw’s argument touches on the issues of evoking responsibility to natural environments in Alife art, as he goes on to critique this evocation in Sommerer and Mignonneau’s Alife “interactive environments.” Whitelaw’s critique partly describes Jon McCormack’s practice, as he argues that McCormack “offers one option for addressing this tension,” through his

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365 See p216.
366 See p268.
368 Whitelaw 2004:216. The issues of doing so in their practice are discussed on p104.
“critical reflexivity”\textsuperscript{369} of using optical Alife art to self-reflexively evoke Biophilia for a “poetic and romantic attachment to the sublime, and the biological.”\textsuperscript{370} This distinguishes McCormack from dominant optical Alife art practices, exemplified by Sommerer and Mignonneau, which “model and mirror an idealised nature” by offering interaction with “a benign, controllable, anthropocentric cybernature.”\textsuperscript{371} For Whitelaw, while “the natural remains central” in McCormack’s work “as an aesthetic necessity or an object of poetic reverence,” the “purity and artifice of this cybernature is used reflectively, to draw attention to its culturally grounded process of computational renovation.”\textsuperscript{372} The following discussion focuses on how McCormack addresses this tension to evoke responsibility in his interactive works made between 1994 and 2006, as his endeavours in photography, making short animated films and as a mathematician and computer scientist who writes proprietary software are secondary vehicles for his evocations of environmental responsibility.

As an “electronic media artist and researcher in Artificial Life and Evolutionary Music and Art,”\textsuperscript{373} McCormack shares common concerns with Paine and FoAM. McCormack’s recent interactive artworks, such as Eden (2000-2006), strive for an Artist-Artwork-Audience relationship similar to Paine, involving a “a symbiotic relationship”\textsuperscript{374} between participants and “reactive”\textsuperscript{375} immersive “artificial ecosystems”\textsuperscript{376} that have been staged in America, England, Austria and Australia. Despite the overt environmentalism present in artworks since 1986, McCormack appears fatalistic about quotidian environmental responsibility:

\textsuperscript{369} Whitelaw has also written about McCormack’s artwork, see Whitelaw, Nature by Numbers, Volume 9:38-39. He also undertook a residency at the Centre for Electronic Media Art, Monash University, which McCormack is Co-Director of.
\textsuperscript{370} McCormack 2003:3.
\textsuperscript{371} Whitelaw 2004:99.
\textsuperscript{372} Whitelaw 2004:100.
\textsuperscript{374} McCormack 2003:3.
\textsuperscript{375} McCormack 2003:3.

metaphors.” Before turning to how this plays out in McCormack’s seminal artworks, it is important to discuss how he arrived at such a position.

Central to McCormack’s position is the material substrate and subject of technology. For McCormack, computational processes inextricably shaped his “ideas about the world” by revealing “things about the world that I could not have known, understood or seen any other way.” The result was that “I see and appreciate nature in a fundamentally different way than before.” His connection between this “new nature” and computational process arises from his aims “to adapt, on a metaphoric level, the mechanisms of biological evolution in order to develop new approaches to computational creativity” such that “processes from biological ecosystems serve as inspiration for computational artificial ecosystems.” He arrived at such a position due to his speculations about future human-technology-art relationships:

As our dependence on technology increases, and as the complexity, subtlety and intimacy of the human-machine interface develops it seems that our next major evolutionary steps will involve an interrelationship with our technology. Ideas and techniques being developed now give us some glimpse into the nature, and the future, of ourselves.

How this “new nature” addresses the tension between evoking responsibility to natural environments through Alife is apparent in his core works. Two early works, *Four Imaginary Walls* (1991) and *Wild* (1994), were presented as a “responsive Virtual Environment”/”interactive virtual sculpture” and an “interactive environment” respectively. “Responsive” and “interactive”

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are used interchangeably, referring to Huhtamo’s internalised “System Interaction”\(^\text{189}\) whereby *Four Imaginary Walls* responded to environmental sensors of wind, rain and temperature while *Wild* used these sensors with peripheral sensing of audience behaviour.

The next artwork, *Turbulence: An Interactive Museum of Unnatural History* (1995) (Figure 3-27), was his first involving direct audience interaction. It comprised a data-set of “abstract thoughts, simulations, ideas, information and poetry, all a multiplex of links into an interactive web”\(^\text{390}\) of pre-generated digital animations prosaically described by Gordon Monro as being “fairly short video segments...which the viewer of the installation could call up using a touchscreen”\(^\text{391}\) (Figures 3-28, 3-29, 3-30). McCormack used the term “interact” to describe audience processes of ‘natural selection’ “by pressing on words and symbols” on a touchscreen in front of the projection screen, which triggered projections of “selections from the videodisc”\(^\text{392}\) of the Alife flora (Figures 3-31, 3-32, 3-33, 3-34). This evokes problematic ‘aesthetic evolution,’ as used in Sim’s *Genetic Images* and Sommerer and Mignonneau’s Alife art discussed in Chapter 2,\(^\text{393}\) wherein interactivity with “the evolutionary process” underpinning *Turbulence* “permits ‘survival of the most beautiful or aesthetically interesting’ as opposed to ‘survival of the fittest’ as in evolution on Earth.”\(^\text{394}\) McCormack self-reflexively undermined any notion of ‘progress’ (as conflated with ‘evolution’) as the structure and form had “no start or end to the work” but instead adapted whereby “the software ‘learns’ about which areas the user is exploring and responds with inter-related options” so that it “tries to adapt to the personality and whims of the user.”\(^\text{395}\)

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\(^\text{189}\) Huhtamo 2004:6

\(^\text{390}\) McCormack 1995.

\(^\text{391}\) Monro 2005.


\(^\text{393}\) See p102.

\(^\text{394}\) McCormack 1995.

Figure 3.27: Jon McCormack Turbulence (1995) installation schematic


Figures 3.31, 3.32: Installation views of Turbulence, showing the touchscreen interface on the plinth in front of the projection screen

Figure 3.33: Detail of the Turbulence touchscreen interface

Figure 3.34: Installation view of Turbulence
Within this lies a central conundrum: *Turbulence* expressed “poetic musing on the philosophical implications of evolutionary theory and artificial life” while being a “technological investigation into the possibilities for life-as-it-could-be.”\(^{396}\) Despite depicting “biologically inspired”\(^{397}\) ‘ancient’ Blife in an artwork subtitled an *Interactive Museum of Unnatural History,* the optional title was *The Beauty to Be* as it depicted extinct “futuristic” species to represent “a new and different perspective on nature and our relationship with nature.”\(^{398}\)

The etiquette of museological behavior was conveyed by placing “specimen jars that contain preserved examples of biological life” along the dimly lit walls of the dark room, with Blife forms in the specimen jars that “relate in some way to the video sequences on the disc.” Such etiquette was also evoked through “exhibiting the work in unique and special spaces that relate contextually to the work itself” such as “zoos, herbariums” and “glasshouses.”\(^{399}\)

The one-on-one interactivity in *Turbulence* determined why *Eden,* McCormack’s later interactive artwork, had many-to-many interactivity with greater responsivity. Numerous stagings of *Turbulence* convinced McCormack that one-on-one interactivity impeded the evocation of participant responsibility as it was mostly experienced with one-to-many interactivity, wherein numerous attendees created a social responsibility for the participant to performatively “entertain”\(^{400}\) those unable to interact at that time. McCormack found this created undesired “pressure on the operator” at the expense of time “taken to examine the interface or experiment with its controls.”\(^{401}\) This power differential between singular participant and multitudinous audience resulted in “the crowded touchscreen operator…hurrying from one sequence to the next, with little time for

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\(^{396}\) *Turbulence* credits are: “direction, animation, software, evolution, music and sound design, Jon McCormack” from McCormack 2004a:95. “Evolution” was credited alongside more verifiable authorship of “animation” and “software.”

\(^{397}\) McCormack. 2005b:89.


\(^{399}\) McCormack 1995.

\(^{400}\) Dorin 2004:84-5.

\(^{401}\) Dorin 2004:84-5.
reflection.”\(^{402}\) In contrast, *Eden* strove for “an evolutionary relationship” with co-participants engaging through indeterminate causality and complexity, yet without an “explicit need to learn the language of interactivity of the system.”\(^{403}\) This negotiation between the indeterminacy of participants’ influences and the complexity of *Eden* encapsulates McCormack’s view that participants have a responsibility to “learn the language,” as he terms his artworks’ “reactive systems (as opposed to interactive systems).”\(^{404}\) He finds interactivity “needs a language” to have “any meaning,” which places onerous responsibility on participants to “learn or re-learn a language specific to individual works.” By making his artworks “reactive” McCormack avoids imposing such responsibilities as they contain “no stipulated language or simplistic action-reaction mechanisms.”\(^{405}\)

Nevertheless, *Eden* illustrates co-participant responsibility to the social and physical environment of the artwork which ambiguously evokes Outside responsibility through systematic Alife art. Described as a “Self Generating Ecosystem”\(^{406}\) and “evolutionary sonic ecosystem,”\(^{407}\) *Eden* senses participants’ distance and movement around four projection screens on which are depicted cellular automata animation of microbial-like agents ‘hunting-and-gathering’ for food (Figures 3-35, 3-36, 3-37, 3-38, 3-39, 3-40). The behaviour of the agents generates a corresponding soundscape, which is fed-back to participants in loudspeakers placed around the perimeter of the installation. Responsibility to the natural environment, represented by the agents’ artificial environment, is ambiguously evoked since participants’ proximity to agents’ environment is equated with “a fertile environment” of the depicted population of agents and the correspondingly ‘robust’ sounds. Rather than perturb the health of the agents (as would overwhelmingly be the case in natural environments), *Eden* represents them as benefiting from maximal proximity to humans. McCormack argues the agents “evolve to make complex sounds” to

\(^{402}\) Dorin 2004:84-5.
\(^{403}\) McCormack 2007a:301.
\(^{404}\) McCormack 2007a:303.
\(^{405}\) McCormack 2004b:9.
\(^{406}\) McCormack 2008.
\(^{407}\) McCormack 2004a:102. Interestingly, unlike Turbulence, he does not include a credit for “evolution.” The only credits he gave himself are “software and sound design.”
“produce...interesting, changing sounds,” as keeping participants 'interested' encourages them to move nearer the projection screens, which the agents use in their attempts at “improving chances of survival in the environment.” This occurs since an agents' survival is determined by relative health, power and population, with agents gaining strength by drawing

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participants closer to the screens for longer periods of time. Self-reflexivity was used to comment on how agents “implicitly” evolve “to maintain the interest of the human audience,”\(^\text{410}\) whereby Eden comes to serve participants, as they implicitly use the physical environment (represented by Eden) for their own aesthetic interests. In relation to this tension between evoking responsibility to natural environments through Alife art, his major reflection on Eden, “Evolving for the Audience,” would be more accurately titled ‘Evolving with the Audience,’ as Eden was reactive rather than interactive (as per his classification described above).

McCormack’s use of audience-artwork interactivity to constitute such a “symbiotic ecosystem” is employed to highlight participants’ responsibility. His judgment that ‘evolving’ sounds produced over multiple stagings were due to participants’ behaviour having a “positive effect on the evolution of agent’s genomes”\(^\text{411}\) expresses his stance on evoking participants’ responsibility. Contrary to suggesting a “positive effect” on the physical environment of the artwork, the underlying effect of human presence is expressed in the title denoting an edenic environment. Like “the environment” of Paine’s Ghost in the Machine which also “reverts to a serene state”\(^\text{412}\) without participants, Eden suggests ambivalence about participants’ influence on the environment of the artwork. Indeed, in contrast to the social responsibility explored in Eden, the work was “inspired by time spent in the wilderness of Litchfield National Park, Northern Territory, Australia.”\(^\text{413}\)

McCormack evokes Outside responsibility to natural environments as his ‘muse’ for evoking Inside social and physical responsibility in self-reflexive Alife artworks that ambivalently engage participants. This is conveyed in his summary of how his time spent alone in nature forms the impetus for designing responsivity and responsibility within the complex networks of his artworks:

I spent many days alone at the [Litchfield] park, observing the activities and sounds of a multitude of insects…this time brought to the forefront my concept

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\(^\text{410}\) McCormack 2003:1.

\(^\text{411}\) McCormack 2006.


of an ‘ecosystem’ – of how it describes a vast and complex network between living things, and how this is at odds with the phenomenological experience of being in such an alien environment without human contact.\(^\text{414}\)

McCormack’s approach resonates with my PBR through a mutual inclination to incorporate personal understandings of “ecosystemics”\(^\text{415}\) in artworks which evoke responsibility by conflating Inside with Outside environments. While McCormack approaches these ideas with the training of a mathematician and computer scientist, my PBR approaches similar terrain with more indirect and metaphorical responsivity through the relatively simple technological substrates used. Alongside specific resonances, such as between his *bloom* and *Morphogenesis Series* and my *D\#Generative* (discussed in the following chapter on my practice on p179) I too employ nature as ‘muse,’ having spent many an hour observing the “ecosystemics” of termites and their mounds at Litchfield National Park, which McCormack was likewise attracted to as the mounds in Litchfield are considered some of the finest examples of self-organisation, swarm behaviour and emergent phenomena in eusocial superorganisms.\(^\text{416}\)

To illustrate alternative, but complementary, approaches to addressing the same issues of McCormack and Alife art, the following case study explores Rokeby’s evocation of Inside and Outside environmental responsibility. This takes place with “approaches and technologies used by other kinds of interactive works,” by which he refers to Alife art+science, although he does not seek evolution, emergence or adaptation, the “Holy Grail” of Alife art, in his practice. However he sees his approach to Responsive Environments as complimentary to McCormack’s, as Rokeby finds in Alife art that it is not the individual interactor who is reflected in these works so much as human behaviour itself. In a sense, the Responsive Environment [i.e. Rokeby’s practice] and the Automaton [i.e. Alife art] complement each other, representing both sides of the relationship between man, and the social and natural environment.\(^\text{417}\)

\(^{414}\) McCormack 2004a:102.


\(^{416}\) How these formed the impetus for my Interaction Design for Emergence is discussed on p259.

\(^{417}\) Rokeby 1995b.
3.4 Case Study #3: David Rokeby

Because the computer is purely logical, the language of interaction should strive to be intuitive. Because the computer removes you from your body, the body should be strongly engaged. Because the computer’s activity takes place on the microscopic scale of silicon wafers, the encounter with the computer should take place in human-scaled physical space. And because the computer is objective and disinterested, the experience should be intimate.

David Rokeby

David Rokeby has been staging pioneering interactive installations in “galleries, trade shows, science museums, and public and private spaces” in Austria, Germany, England, Scotland, Italy, Finland, Belgium, Canada, America, Japan, South Korea and China since 1982. The following discussion focuses on his strategies for evoking participants’ responsibility, according to a chronology from explicit (1983-1990) to implicit (1991-2003) audience interactivity (Figures 3-41, 3-42, 3-43, 3-44) to excluding audience interactivity in his System Interactives (2004-present). Reference is made to Rokeby’s theoretical citations I quoted in the two previous chapters. Unlike the other artists discussed in this chapter, analysing Rokeby’s ouvre benefits from significant critical discourse concerning his practice.

Huhtamo considers Rokeby exemplary among interactive artists and extrapolates from his changed stances on interactivity to the wider movement among the “handful of artists” that Huhtamo finds “fully justified” in terming their art ‘interactive.’ This movement is conveyed in a telling anecdote Huhtamo relays about Rokeby’s self reference on his 1988 card as “interactive artist,” which he doubts was the case by 1998.419 Indeed, while Rokeby’s website has not been fully updated since 2000, in 2007 his website title was “Media Installation Artist” and in 2009 just “Installation Artist.” On his website his career is divided into a “first part” which “focussed on interactive” art and

his “expanded” practice into “video, kinetic and static sculpture” since the late 1990s. Rather than ‘expansion,’ the following suggests why ‘replacement’ is more suitable.

Rokeby outlined his ideals for how responsivity and interactivity could remain worthwhile artistic endeavours in a 1996 lecture. Citing the examples of human-human verbal and oxygen-carbon dioxide exchanges in quotidian environments, he decried that “interaction itself is banal.” Using his practice as “an attempt to recover” Interactive Art from “being crushed under the hype surrounding… ‘Interactivity,’” he argued it could be purposeful if “used when appropriate” as “merely another tool in the artistic palette.” He hoped it would resume “its natural role as a tool for exploring and critiquing relationship


\[421\] Rokeby 1996.
itself,” although this would first require that “the hype dies away.” Rokeby’s “change” or “rupture” in moving from “unrestrained enthusiasm as an almost orgiastic celebration of the possibilities of interactivity” in *Very Nervous System (VNS)* (1982-2004), to “discursive explorations” in *Silicon Remembers Carbon (SRC)* (1993-2000), *Measure* (1992-94) and *Watch* (1995) that explored “pessimism or doubt” about the “changing implications of interactivity.” These shifts stemmed largely from Rokeby’s stances on appropriate responsivity and concomitant audience responsibility. In an interview in 2003, Rokeby reflected that interactivity had been “guilty of over-sensationalising and diminishing critical distance,” which he tried to balance with “experiential grounding” in VNS (Figure 3-46). Finding this attempt not “successful,” he skewed his practice to “more consciously create spaces for reflection and distance” within their interactivity. How these strategies were explored is now discussed with reference to his career trajectory.

As well as his foremost artwork, VNS was an ongoing umbrella project which informed subsequent interactive works. This was due to the “artificial perception system” created for VNS involving proprietary software being adapted for later works and extensive iterations of VNS. The following comments draw on my interactive experiences and observations of others’ interactions with the version at curator Kathy Cleland’s “responsive exhibition environment” at *Mirror States* in 2008 (Figure 3-45) and an earlier iteration of VNS on permanent display at Technopolis in Belgium in 2006 (Figures 3-49, 3-50, 3-51, 3-52).

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422 Rokeby 1996.
423 Huhtamo 1998.
426 SoftVNS software is sold commercially, and has been used extensively in the field of interactive art, including by FoAM and Paine.
Chapter 3 – Case Studies: Context and Contextualisation

Figure 3-45: Photographs of participants in David Rokeby VNS (1983-2004)

Figure 3-46: Contrasting computer and video camera assessment of David Rokeby’s movements

Figure 3-47: Rokeby interacting with VNS installed in Potsdam, Germany in 1991

Figure 3-48: Rokeby’s illustration of the cybernetic cycle within VNS

Figures 3-49, 3-50, 3-51, 3-52: One version of VNS that I interacted with at Technopolis in Belgium in 2006. Showing the textual and graphical instructions for participants. Photography by Josh Wodak.
As a work initially inspired by Krueger’s *Videoplace*, like *Videoplace*, VNS used cybernetic cycles between artwork and participants’ behaviour (Figures 3-46, 3-48). However VNS also marks Rokeby’s departure from Krueger’s practice (while continuing to be influenced by his ideas), as VNS was based on sensing subtlety and nuances in participants’ behaviour in contrast to the surveillance of presence/absence that formed Krueger’s Interaction Design. In this sense Huhtamo argues VNS attained “distinctive features of” interactivity relative to *Videoplace* due to “the complexity and the fluidity of the interactions it makes possible”\(^{428}\) as it instantaneously “translated”\(^{429}\) human movements into sounds/music.

VNS was exemplary in evoking responsibility to quotidian environments by interacting via the cybernetic relationship at “the core of the work.” According to Rokeby this evocation of interpenetration between Inside-Outside occurred because interacting with “interfaces leave[s] imprints on our perceptual systems which we carry out into the world,” with this “effect” becoming “stronger” over the course of interaction. Indeed, in *Inside Outside*, his catalogue essay for *Mirror States*, Ross Gibson argues that VNS is outstanding among Rokeby’s ouvre, as it “encourage[s] an understanding of how you and the world are in and of each other, how you and the world are constituent of the other and mutually obliged.”\(^{430}\) Inside-Outside conflation was augmented by unconventionally installing VNS in “public outdoor spaces” as well as galleries and performance spaces\(^{431}\) (Figure 3-48). The “after-effects” of interacting with VNS were an experience that “strongly reinforces a sense of connection with the surrounding environment” which was the immediate physical environment the artwork was experienced in, followed by the residual effects of this experience “which we carry out into the world.” Referring to his desire to situate interactivity in art to “banal” everyday interactivity, Rokeby felt that when “walking down the street afterwards” he was “implicated in every

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\(^{428}\) Huhtamo 2002.

\(^{429}\) Rokeby 1998.


action around me.”

He also perceived participants’ heightened responsibility to quotidian environments following their engagement with VNS. Having observed “thousands of people” interacting with his work Rokeby found those who interacted with VNS for “15 minutes” or more “often feel an afterimage of the experience, [of] feeling directly involved in the random actions of the street.”

Unlike Paine, who used Rokeby’s software to allow participants “to play” and “command” his Ghost in the Machine installation like an “instrument,” Rokeby designed VNS as a means to “learn how to balance control” between participants and the “interactive system.” To achieve these desired “harmonics of the interaction” through “collaboration” between both parties, Rokeby sought to extend this balanced relationship between the Outside responsibility evoked during participants’ Inside responsibility. Based on his experiences with VNS, Huhtamo located this balance as stemming from both parties having roughly equitable influence over one another. However he does not see VNS as being “a model for utopian interactivity” but rather the deliberate outcome of Rokeby “making it often so difficult to tell who is controlling whom during the interaction.” This ‘equality’ expressed Rokeby’s critique of the ubiquity of “domination” in Interactive Art, due to the frequency with which he finds “interaction has come to mean ‘control.’” Consequently his work does not present “interactive technology for ‘empowerment,’” as he finds this leads to “the illusion of power” that manifests “a fantasy of power bereft of responsibility.”

The way in which VNS produced “a complex and resonant relationship” between artwork and audience was such that “the lines

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432 Rokeby 1998.
433 Rokeby 1996.
436 Rokeby 1990.
437 Huhtamo 1998.
438 Rokeby 1995a:147.
439 Rokeby 2008.
between” them “become blurred.”\textsuperscript{441} This blurring was an argument against a dialogical relationship between both parties since “dialogue in its back-and-forthing implies a separation of the functions of perceiving and responding.” Instead the feedback loop in VNS was so tight that “perception and expression are virtually simultaneous.”\textsuperscript{442} In fact, he desired that both parties “interpenetrate, until the notion of control is lost and the relationship becomes encounter and involvement.”\textsuperscript{443} Huhtamo argues this was not to create a “cyborg” or “merger,”\textsuperscript{444} but rather to evoke a shared responsibility, as Rokeby declared that artwork and audience “collaboration” would be “broken when the interactor attempts to take control.”\textsuperscript{445} To encourage more responsible modes of engagement, Rokeby cautioned audiences that the “more intent one is on controlling my installation, the less predictable the response becomes.”\textsuperscript{446}

To understand how VNS evoked such responsibility to the physical environment, it is necessary to examine how its Interaction Design achieved such a delicate balance. This was partly achieved by reconciling the seemingly mutually exclusive properties of complexity and control, as VNS was an “attempt to draw as much of the universe’s complexity into the computer as possible.”\textsuperscript{447} While decrying that artists should “remain humble” to complexity “in designing environments for experience,”\textsuperscript{448} Rokeby compromised his “idealistic notions about what interaction meant (and how it would change the world)”\textsuperscript{449} due to the initial ‘trial-and-error’ iterations of VNS. These versions could not evoke his intended responsibility due to their imbalance between complexity and control. With participant’s every action influencing “as many parameters of the system’s behaviour as possible,” VNS became “interactive

\textsuperscript{442} Rokeby 1990.
\textsuperscript{443} Rokeby 2008.
\textsuperscript{444} Huhtamo 1998.
\textsuperscript{445} Rokeby 1996.
\textsuperscript{446} Rokeby 1985b.
\textsuperscript{447} Rokeby 1998.
\textsuperscript{448} Rokeby 1998.
\textsuperscript{449} Rokeby 1998.
on so many levels that the interaction became indigestible.” Through iterative design, Rokeby produced more intuitive responsivity by limiting what and how participants influenced the sounds. He found this simplicity-complexity and authority-control trade-off “problematic” as participants “empowerment grew” from making it possible for them to “recognise their impact on the system immediately.” His ‘solution’ to this conundrum was the same as FoAM and Paine: to encourage participants to understand the “nuanced levels of interaction” via “repeated exposure,” which would allow them to increase their “expressive power” when interacting with VNS.

A Responsive Environment designed for multiple encounters has to also cater for first time and/or once-only participants managed via what Penny refers to as the “learning curve” of each participant. Huhtamo found his initial interaction with VNS, and observation of others, followed a “peculiar ‘rite of passage’” that Rokeby termed “the ‘First Test of Interactivity’”:

A person makes a gesture, as though asking a question of the space and notes the system’s response. They make a second gesture and a third, again as questions, and both times receive the same response as the first. At this point, they pause, a change comes over their face as if to say ‘Yes I understand I have control,’ and they make a fourth gesture, no longer as a question, but as a statement, almost a command. And they almost invariably get a different sound, the shift in attitude manifesting itself in a subtle but noticeable shift in the carriage of the body and of the instant-to-instant dynamics of the gesture.

This creates a challenge for evoking participants’ responsibility through interacting, as at the other extreme, where participants “allow themselves to respond spontaneously to the music of the system,” Rokeby finds they become “played by the installation.” As the solution lies in participants’ responsibility for their behaviour (as influenced by interacting with VNS), Rokeby advocates a “combination” of the above two extremes, which in his “ideal...are balanced.

450 Rokeby 1998.
452 Rokeby 1998.
453 Penny 2000.
454 Huhtamo 1998.
455 Rokeby 1990.
resulting in a ‘broad bandwidth’ of interaction\(^{456}\) as participants oscillate between being ‘player’ and being ‘played.’

In rejecting dominant interactive modalities, Rokeby advocates that participants’ desire for such “proof” of “predictability” is suited only to “simple” interactive works “with no memory and no ability to adapt.”\(^{457}\) Like Penny and Armstrong, Rokeby also explores participants’ contributions to constructing complex interactivity by implicating “the complexity of sentient human response”\(^ {458}\) into their interaction with his work. Rokeby reasons the indefinable control in the ‘First Test of Interactivity’ occurred due to “the complexity of the participants themselves” rather than “the complexity of the system” as VNS did not “interpret motivation” but instead “merely reflected what it saw.”\(^ {459}\)

Nevertheless, engaging with such interactive artworks often focuses on ‘testing’ their interactivity. Like Rokeby, Penny finds this has “dire aesthetic consequences” for participant engagement with his work. When participants ‘test’ his artwork’s interactivity, Penny finds his artworks become “consumed by intellectual reverse engineering,” whereby participants conflate having “solved” the system\(^ {460}\) of interactivity with engaging with the artwork in toto. Rokeby similarly discourages this “predominantly intellectual approach” that abhors “immediate participation in the feedback” as it constitutes an attempt to “learn to control the system in order to be able to play it like an instrument.”\(^ {461}\)

Consequently, after VNS Rokeby’s core artworks used audience responsibility and interactivity differently, as they began to favour implicit over explicit audience interactivity. The two immediately succeeding artworks, *Watch* and *SRC*, relegated “direct audience interaction” to “a supporting role” in audiences’ overall encounter. Rokeby reasoned that audiences were largely

\(^{456}\) Rokeby 1990.
\(^{457}\) Rokeby 1995b.
\(^{458}\) Rokeby 1996.
\(^{459}\) Rokeby 1995b.
\(^{461}\) Rokeby 1990.
“return[ed] to the role of passive observer” despite his awareness that others might declare this “a complete betrayal of the ‘interactive mandate.’” While continuing to explore “the mode and texture of interaction,” Rokeby reticently termed them “interactive” due to the above mentioned prevalence of audiences to then “verify” their interactivity.

However their interactive modalities purposefully explored ambiguity about audience responsibility. The Inside-Outside relationship was evoked by incorporating ever-growing databases of audiovisual recordings of quotidian environments, which the artwork processed to conflate past with present, documentation with abstraction and observer with observed. In Watch, Rokeby embedded his “carefully designed hidden interactions” between these above states so they would be revealed if audiences would “spend extended quiet time in contemplation of the installation.” However contemplation was not passive: live video of persons outside made them “trigger a cybernetic system” as they could be “(potentially) ‘triggered’” by it, once audiences ascertained how they could ‘interact’ with Watch if they too were recorded by the video cameras (Figures 3-53, 3-54, 3-55). As Watch blended past and present, anyone recorded at any time could feature in this “cybernetic system,” albeit only those who first understood their role would be aware of this. Rokeby openly acknowledged the roles as “the observer/the observed” who were deprived of “a conscious interplay with a cybernetic system” were potentially “antithetical to interactivity.”

These ambiguities were at the forefront of SRC, which explored similar themes to Watch. An array of video cameras, amplifiers and loudspeakers were placed around the periphery of a room, where a video projection onto the floor combined pre-recorded past video, live video and live manipulations of both. Audiences were potentially incorporated into the content, by their body and/or

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462 Rokeby 1996.
463 Rokeby 1996.
466 This was influential in how Emergence conflated pre-recorded past video, live video and live manipulations as discussed on p264.
shadow over the projected area being filmed. Attendees became collectively responsible for SRC as a result of their behaviour, as each left “traces” of their encounter which would “affect the experience of the work for later visitors”\(^\text{467}\) by these resonant traces affecting the behaviour of the audiovisual media in future states of SRC.

SRC used deliberately obtuse ‘rules’ for responsivity to create “subtle” interactivity to the extent that it was “probably invisible to many audience members.” Rokeby found this implicitly encouraged more contemplative and absorbed relationships to SRC, while explicitly discouraging participants “performing to the image.”\(^\text{468}\) Diminished responsibility for interacting was designed to give audiences the reflective space to explore Rokeby’s “ambiguous propositions” about their relationship to SRC, such as “Is that my shadow? Should I step into the image? Have I violated the artwork? Is this real?


\(^{468}\) Rokeby 1996.
Did I help create this?" Because of such indeterminate causality Rokeby found "most interactors are left with the bewildering impression that there is a relationship between their actions and the system’s reactions, but an opaque, impenetrable one." The next work, *Giver of Names (GoN)* is, like VNS, an umbrella project developed over years and successive iterations from 1990 until today when it is still “in progress,” the only one of Rokeby’s 28 artworks with no listed end date. The following discussion draws on my numerous encounters with *GoN* in Germany in 2006 and Australia in 2008 (Figures 3-56, 3-57, 3-58). *GoN* unconventionally uses audience interactivity with “System Interaction,” to explore what Sarah Cook argues is “a critique of machine-made artificial intelligence.” Interactivity involves audiences placing an object (including their body) in front of a camera, which takes a photograph. The computational system analyses this photograph amidst an inexorably complex database of words, to produce a loose and opaque understanding of the object(s) in the photograph according to the computer’s linguistic logic. My encounters were marked by frustration at my limited responsibility from what Ozog described as *GoN*’s “trammeled” interactivity, as it returned distinctly different ‘descriptions’ to miniscule variations in re-positioning the same object for successive photos. This may have been due to my ‘uninformed’ encounter (as I deliberately read little about *GoN* before interacting with it), so I took to

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469 Rokeby 1996.
470 Huhtamo 1998.
475 Some examples of responses to putting just my hand in the ‘photo-frame’ from the installation in Germany: “the prominence will eye that taking eye painfully”; putting my middle finger up: “the depressing person in the centre blazons the previous point” and my face “a next cardinal will soon swarm with the 70 brain.”
comparing my encounters with those of Cook, Dot Tuer476 and Daubner Ernestine who have written critical analyses of GoN.


Rokeby declared the responsivity, as I experienced it, was deliberately “unpredictable” although it had to “never appear to be random”477 so as to encourage ongoing interest to ‘interact.’ Daubner Ernestine had such an experience, as he found “the computer screen continuously presented different arrangements of words and sentences,” leading to all his encounters being “different and unique.”478 In this vein, Cook situates GoN within the discourse surrounding “relational aesthetics”479 as it uses “the ‘discrete object’” (Figure 3-57) that such discourse neglects “and imbues it with the possibility of meaningful interaction.” The qualifier of “meaningful” rests in the eye of the


477 Rokeby 1996.


beholder as Rokeby’s writings on GoN reveal his interest in the arbitrary meaninglessness of language, especially as GoN espouses a critique of artificial intelligence. Nevertheless, Cook uses her above statement to reason that GoN “breaks down the distance between it and its audience, and in breaking down that distance, suggests a new kind of subjectivity, one based on reciprocity.”

As (n)chant (2001) (Figures 3-59, 3-60), Rokeby’s next major interactive work, marks his definitive shift into System Interactives, it is beyond the scope of this dissertation to discuss this work. Nevertheless, it offers a compelling mode of responsivity and interactivity, albeit within “a system that could be characterized as autonomous” as it is “based on the principle of ‘system interaction,’” which Huhtamo argues is “the opposite of user interaction” as it “deliberately marginalizes the active participation of the user, placing the machine and its operations in the centre.” While Rokeby’s artworks since (n)chant have progressively involved less (or no) audience interactivity, his early and middle career artworks possess such novel explorations of responsivity and responsibility as to make his artworks the most cited and influential in the ‘field.’

Figures 3-59, 3-60: Installation views of David Rokeby n-cha(n)t (2001)

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480 Cook 2007.
3.5 Case Study #4: Keith Armstrong and Transmute Collective

Whilst technology can be exclusionary the responsibility of the Ecosophical artist is to make technological work accessible to a broad public, developing interfaces that allow satisfying access to content and its means of generation.

Keith Armstrong

Keith Armstrong is an interdisciplinary artist and academic whose work draws on his training in Electrical Engineering, Information Technology and Visual Arts. His installations have been staged in Austria, England, Scotland, Greece, America, Canada, China and Australia since 1993. The following discussion focuses on the collaborative installations made for his PhD and Intimate Transactions (2006), the first interactive artwork following his PhD. All artworks were made with Transmute Collective, an Australian collective of interdisciplinary artists, technologists, activists and researchers formed in 1998.

Discussion principally concerns Armstrong, as co-founder and Artistic Director of Transmute Collective, but also refers to the members of Transmute Collective who collaboratively created each artwork. The account of Armstrong’s trajectory is, like the above discussion of Rokeby, grounded in Armstrong’s theoretical citations quoted in the two previous chapters.

Armstrong’s art, research and writing reflect his “key concepts” of combining interactivity and responsibility in collaborative installations. His PBR over the course of his PhD underwent a similar “key shift” to Paine’s “journey towards true interactivity” from non-interactive artworks that implicitly evoked environmental responsibility to explicitly addressing environmental responsibility through Artist-Artwork-Audience interaction. Through “iterative development” and “cyclical action and reflection” between each new

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482 Armstrong 2002:36.
484 The principal other members of Transmute Collective are Lisa O’Neil and Guy Webster.
486 Armstrong (2002:44) writes that “the key shift in approach over the course of this study involved the removal of live performers from the work and an increasing emphasis on the complex dynamics of audience interaction within the artwork.” Of note is live performance based #14, the first of the three artworks he made for his PhD.
artwork, collaboration was extended from being between co-creators to encouraging participants to collaborate. To achieve this, Armstrong aimed to offer “interactive experiences that ask participants to reflect upon the implications of individual action and group collaboration within computational, aesthetic systems of which they become an integral part.”

Armstrong’s PhD ruminates over the trade-offs between creating implicitly dialogical engagement and aspiring to evoke environmental responsibility through explicitly dialogical interactivity. These trade-offs arise since his “ecosophical” artworks aspire toward the interactivity of “complex interchanges inherent within face to face conversations,” as such responsivity underpins the “complex sets of reciprocal interchanges that draw focus around networks of reciprocal connections” between humans and their environment. Armstrong’s context-appropriate responsibility is a “stewardship” between Artist-Artwork-Audience that aims to facilitate “reciprocity amongst all parties” through his vantage point of ‘in-betweenness.’ Given this is “epitomised within Intimate Transactions,” the following discusses the development of this stance.

As Armstrong relegates Transit Lounge (2001), one of the three works made for his PhD, to a figurative ‘stepping stone’ toward Intimate Transactions, it is useful to compare both works. Transit Lounge was an “adaptive multimedia space” that presented “evolving performative narratives based upon changing environmental conditions.” In contrast to Armstrong’s other artworks, and the other artworks in this chapter, it was avowedly narrative based, with human characters and multifarious narrative pathways.

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494 Armstrong 2002:244.

that behaved according to combinations of participants’ interactions and “environmental parameters beyond their immediate control”\textsuperscript{496} such as exterior weather conditions.\textsuperscript{497} However the illusory control and interactivity (such as what participants were responsible for relative to the influence of external weather conditions) were not self-reflexive. This arose since the “partially hermetic system” that undermined his desired “system of exchanges” between Artist-Artwork-Audience “functioned essentially outside of the processes of flow and exchange represented by the internal operating mechanisms.”\textsuperscript{498} 

\textit{Transit Lounge} problematically fulfilled Armstrong’s ethos to eschew “any definite sense of command and control or predictability of response”\textsuperscript{499} as it behaved “regardless of any responsibility” of participants’ interaction, which contravened his “Ecosophical approach.”\textsuperscript{500} Participants were unable to exercise responsible behaviour to the physical environment of the artwork as the influence they exerted relative to the influences from the natural environment that were beyond their control or responsibility were not made apparent.

Following from his PhD conclusion about “Interface Design Strategies” in light of the artworks made for his PhD, Armstrong summarised the techniques to be explored in \textit{Intimate Transactions}. This work hinged on a “fine balance” between “degrees of control” affording a “level of predictability [that] allows interactors to connect similar actions with responses.” In conjunction, responsibility derived from a “permeable membrane” between Artist-Artwork-Audience, which hinged on proportionally balancing “bi-directional” passages ‘through’ this membrane. In this scenario environmental responsibility was evoked by audiences being “set within the work’s ecology,”\textsuperscript{501} which, by Armstrong’s description, owes much to Rokeby’s articulation of his similar balancing act between Artist-Artwork-Audience on

\begin{itemize}
\item \textsuperscript{496} Armstrong 2003:93.
\item \textsuperscript{497} Although the other artists in this chapter have used such ‘random’ determinants in their work, \textit{Transit Lounge} conjoined these influences, that participants could implicitly be responsible for, with those stemming from participants real-time behaviour with the installation.
\item \textsuperscript{498} Armstrong 2002:265.
\item \textsuperscript{499} Armstrong 2002:34.
\item \textsuperscript{500} Armstrong 2002:266.
\item \textsuperscript{501} Armstrong 2002:266.
\end{itemize}
To increase audience responsibility, these permeable membranes would become “permeable boundaries” between Artist-Artwork-Audience so “audiences might co-opt the artistic direction of the work and make it their own.” While Armstrong does not conflate artwork with audience, this technique had the “aim of breaking down the separation between audiences and artworks.” He follows this statement regarding Transit Lounge, by declaring that his “stewardship” was, “by the end” of the production process, “the work’s manager.” However authorship and responsibility rested largely with the ‘makers,’ even if in the ‘delivery’ his role was as Graham’s figurative dinner host. This desire of such artists to partially relinquish authorial responsibility to audiences is noted in Edwina Bartleme’s review of Transit Lounge which categorises Armstrong as “‘originator’” and participants as ‘completers.’

Intimate Transactions is a Responsive Environment between two rooms that can be in the same or different buildings or even different cities. Both rooms are identically arranged: both participants stand, facing a video projection screen (Figures 3-61, 3-62) on which they direct their avatar (Figures 3-63, 3-64) through ‘virtual worlds’ symbolising different ecological zones. Both participants engage in “dialogic frameworks of interaction and cooperation” as they negotiate where to go and what to do, by controlling their avatar through moving their body on a large interface called BodyShelf (Figures 3-61, 3-62). Intimate Transactions featured a similar process to FoAM’s trg (2006), with sessions at set booking times and limited numbers, involving pre-immersion ritualistic preparation for the session and a debrief before leaving the artwork. Each 30 minute session was booked in advance, Intimate Transactions being experienced over this fixed duration with another

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502 Regarding Rokeby, Armstrong writes (2002:73): “at the commencement of this study, his words offered an important insight into the type of interactivity that the Ecosophical practitioner might pursue.”

503 Armstrong 2002:52.

504 Armstrong 2002:44.


506 Armstrong 2002:44. Emphasis added.

507 See p55.


live participant present for the same duration. Participants were chaperoned into and out of the installation and literally strapped into *BodyShelf*,\(^{510}\) as its haptic feedback required fitting for each body size so that the vibrating

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\(^{510}\) This was highly influential on my design of the costume for participants in *Emergence*. See p326.
chamber would sit approximately over each participants’ belly button. After each session, both participants saw live video of the heretofore unseen conversant for about one minute. Hand gestures and body language were used to communicate about the ‘success’ or otherwise of their interaction with one another and the artwork.

As *Intimate Transactions* was highly relevant to my work on *Emergence*, I arranged for the Producer and Director of *Emergence* to attend a session in Sydney in 2006. My two sessions and lengthy discussions with Armstrong and his collaborators about *Intimate Transactions* highlighted the rhetoric-reality discrepancy between what artists write about their work and what the work ‘says’ itself, and the crucial role played by the audience in creating this discrepancy, as I likely brought an excessive and ‘over-informed’ expectation to the work. As well as Armstrong’s academic writing on *Intimate Transactions*, his publicity made clear the explicit environmentalist concerns to those who booked in for a session with the installation (Figure 3.65).

My first session was baffling as to what I was ‘meant’ to do to interface with the work.\(^{511}\) While I better appreciated the work during a second session the following day, I didn’t perceive an evocation of responsibility to either the physical environment of the artwork or the natural environment the artwork referred to. I felt I was in a hi-tech computer game orientated toward pummeling the ‘natural’ resources of the ‘virtual’ worlds, with the restrictions being my conscience and that of my anonymous co-participant. I felt responsibility to the social environment via my constant negotiations with my co-participant, after which we directly acknowledged our behaviour to one another in both concluding live video components. Despite key difficulties in evoking responsibility toward the physical environment of the artwork, it highlighted similarities with Graham’s evocation of social responsibility through encouraging interaction between co-participants in her *Individual*  

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\(^{511}\) This appeared to be similar to Liz Baker’s experience. She writes that “when observing others, I realised two things: how much of the experience I missed because I was focusing too much on what the experience was ‘supposed’ to mean; and that the installation experience did not necessarily link back to the underlying concepts the performers/creators explored.” Keith Armstrong. ‘Interview with Liz Baker.’ 2007. http://embodiedmedia.com/projects/intimate_t/bakerconv.htm. Accessed 14 October 2008.
Fancies. Evoking responsibility toward the natural environment referred to by the artwork was hindered by Armstrong not being able to implement his intended iteration that behaved according to cumulative consequences of successive participants’ interactions. While these features would have significantly increased participants' real-time and cumulative responsibilities they were not implemented due to the co-creators’ anticipation that participants would not understand their individual responsibility amidst such collective influences. These notions and their problematic realisation were highly influential to my work on Emergence and are discussed in depth in Chapter 6.

3.6 Case Study #5: FoAM

While FoAM and Transmute Collective are both interdisciplinary, intermedia collectives of artists, researchers and computer scientists exploring responsibility through their artworks, FoAM exemplifies the properties unique to Responsive Environments among contemporary collectives. They describe themselves as

a transdisciplinary laboratory committed to growing inclusive, resilient and abundant worlds. FoAM seeks out and connects people in the interstitial spaces between professional and cultural boundaries. They mix realities of art and science, digital and physical, food and media, gaming and gardening. With it’s motto ‘grow your own worlds’, FoAM encourages its collaborators and audiences to move from wasteful consumption to responsible participation in all aspects of their lives.

The collective was formed in 2000, comprising members from Belgium, Holland, Australia, Croatia and Lithuania and has since staged installations in Belgium, Croatia, Austria, Germany, Italy, England, Slovenia, Canada and

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512 See p268.
513 See p282.
America. After discovering them through my online survey, I met Nik Gaffney and Maya Kuzmanovic, two of the co-founders, at their talk at Canberra University in 2006. Subsequent email exchanges of ideas about our respective practices culminated in my spending a week at their Brussels headquarters in 2006. I had not experienced their artwork in situ, so interviewing the core members and researching their audiovisual archive was instrumental in furthering my understanding of their practice. The following focuses on their works *Tgarden* (2000), *groWorld* (2001-), *txOom* (2002) and *trg* (2006), in light of the reflections from Kuzmanovic and Gaffney, who publish scholarly articles about their practice.

Their Responsive Environments generally involve large immersive spaces (up to medium sized warehouse) where co-participants interact with sonic, visual, haptic, tactile and architectural properties (Figures 3-66, 3-67, 3-68, 3-69, 3-70). Under the heading “Transformation and Responsivity,” they detail their techniques of creating “technologically enhanced spaces, which facilitate playful explorations of physical and digital surroundings as well as fluid dialogues between people, materials and media.” By engineering physical environments as “‘irreal responsive worlds’” they explore relationships between co-participants and their immediate environment to “raise participants’ awareness of their effect on the surroundings.” However they reject Virtual Reality or Augmented Reality approaches in favour of evoking participant responsibility to the social and physical environment, such as *txoom* (Figures 3-71, 3-72), where participants clicking a mouse on a computer screen inside the installation caused crystal glasses to shatter in a neighbouring room within the installation, while participants were not informed that this would be the consequence of them clicking the mouse, other than the distant sound of glass breaking after each click.

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515 This survey is discussed on p56. The names of the other core members are Cynthia Bohner-Vloet, Maja Ozan Cakmakci, Steven Pickles, Cocky Eek, Joel Ryan and Laura Farabough.

516 Maya Kuzmanovic and Nik Gaffney. ‘Foundation for Affordable Mysticism.’ Presentation at Canberra University, Canberra, March 8 2006.

517 Kuzmanovic and Gaffney 2006:1.

518 Kuzmanovic and Gaffney 2006:1. Their neologism “irreal” refers to the constructed and ‘non-real’ or ‘un-real’ nature of their Responsive Environments as “responsive worlds.”


3-41 shows the ritualistic preparation for participants prior to the entry, with a remedial massage.


Figures 3-73, 3-74: Installation views of FoAM groWorld (2001-)
To evoke participants’ responsibility through such means, FoAM use three pivotal interrelated and interdependent criteria. The first is through non-metaphorical “conversational interaction”520 between Artist-Artwork-Audience. The “fluid dialogues” mentioned above partly arise from the “range and subtleties of human gestures and interactions”521 that influence their sensing systems. This derives from their influence by, but departure from, Krueger’s surveillance based presence/absence detection, in favour of artificial perception systems that monitor nuance and subtlety in participant’s moment-by-moment behavior in “continuous (time-based data streams).”522 This Interaction Design harnesses “continuous and unpredictable”523 responsivity which they combine with systematic modeling of Alife processes to invoke evolution and adaptation over each staging. FoAM refer to their works as “entities” which “behave” as if they were “aware of their own presence and that of the people interacting with them” such that ultimately they “should begin to enter into a dialogue (collogue)” with participants.524 In T-Garden this was evoked through dialogical exchange between participants, who influenced “the density of the visual environment while varying the melodic and rhythmic aspects of the sound space” so they “leave traces and ‘converse’ with each other in musical and visual phrases as they weave their way through the room”525 (Figures 3-73, 3-74).

The second criteria stems from using biomimesis to evoke natural environments in their works. In txoom, their “principles of Biomimetics” defined their design ethos according to “biological forms and processes,

520 Kuzmanovic and Gaffney 2005:8.
particularly emergent phenomena.” This ideal hinged on using emergent phenomena to create “a free form, spontaneous space with a consistent aesthetic, yet indeterminate evolution, that people from a range of cultures, ages and backgrounds can experience.” Under their GroWorld initiative, their suite of artworks exploring “evolution and interaction of dynamic systems,” they outline such principles in a pseudo-manifesto:

As an artistic concept, growth is opposed to the notions of artworks as finished products, that can be exhibited and sold for aesthetic enjoyment. Growth implies an element of wilderness, of the untamed and the uncontrollable, of a continuous process responsive to the conditions of its surroundings.

The third criterion concerns distributing authorial responsibility between artist and audience. This arises from the above criteria, as FoAM’s interaction modalities involve raising audience responsibility toward “influence and control, intentionality and co-creation.” Like Armstrong, they distribute such responsibility chronologically, whereby their “significant influence on the initial forms” of each artwork is superseded by the end-realisation ‘evolving’ into open ended processes of “surprise and spontaneity” that transcend their initial control. They use this approach to move “away from producing immutable objects toward becoming dynamic, fluid worlds” wherein attendees shift “from observation to participation.” Accordingly, this requires participants’ “responsibility, communication, as well as the understanding of people’s mutual influence on each other and their surroundings.”

However reality remains within the ephemera of participant engagement. FoAM acknowledge the transient nature of these roles, wherein

529 Kuzmanovic 2001a.
530 Kuzmanovic and Gaffney 2008:1.
531 Kuzmanovic and Gaffney 2006:2.
532 Kuzmanovic and Gaffney 2006:2.
533 Kuzmanovic and Gaffney 2006:5.
“performance dissolves the lines between performer and spectator by creating a social, computational and media architecture that allows the visitor-players to sculpt and shape the overall environment.”534 Whilst the performance may appear to dissolve these lines, the artwork exists beyond the performance alone, where the ephemeral engagement between players-as-visitors and the visitors-as-players highlights their impermanent sculpting of the Responsive Environment. Nevertheless, their negotiations between the rigid and the fluid is highly illuminating with regard to how the real may aspire to the irreal535 over the oeuvre of their practice.

### 3.7 Summary

The above accounts of these artists’ career trajectories demonstrate alternative strategies toward ‘solving’ challenges inherent to evoking environmental responsibility in Responsive Environments. Rather than posit a definitive ‘solution’ through any one artwork, artist or artform, their career trajectories demonstrate “a journey towards true interactivity,”536 with the ‘truth’ lying in combining intuitive, counter-intuitive, satirical, “‘broad bandwidth’”537 or trammeled interactivity in their composed compositions of content, form and Interaction Design. The case studies portray how each artist/collective developed context- and content-appropriate approaches to negotiating between rigidity and fluidity, real and irreal, Inside and Outside, biological and human spatio-temporal scales to “inspire more responsive (and perhaps responsible) forms of design, engineering and social organisation.”538

Their writing, combined with their artworks, demonstrate attempts to balance the binaries of authority-control, determinacy-indeterminacy,

535 “Irreal” is used in the context defined by FoAM (Kuzmanovic and Gaffney 2006:3), where it refers to the purposefully designed and engineered nature of Responsive Environments, in distinction to the designer-less and non-engineered nature of natural physical environments. However, in line with FoAM, the term ‘irreal’ may relate to Mixed Reality or Augment Reality but does not refer to Virtual Reality.
537 Rokeby 1990.
simplicity-complexity, narrativity-interactivity and responsivity-responsibility. Within these attempts and their divergent combinations of content, form and Interaction Design are shared desires to maximise complexity and interactivity, while reducing their authorial authority (and associated responsibility) and increasing audiences' authority (and associated responsibility). The tensions between what responsibility their artworks evoke, versus what they desire their artworks to evoke, arises from the intractable rhetoric-reality disjuncture between ideal and real realms of Alife aspiring ‘‘art-as-it-could-be’’ and art-as-it-actually-is as Blife art.

These same tensions run through the myriad ways my PBR is influenced by these artists, as each artistollective illuminated different aspects of my rationale for my own combinations of content, form and Interaction Design. Armstrong’s earlier artworks, such as #14, were “performactives,” hybrid performance-installations where Transmute Collective interacted with attendees through complex technology. This was highly influential on my approach of retaining human agents within the installation environment of StilmS and Emergence. Participants’ embodied engagement through wearing a harness in Transmute Collective’s Intimate Transactions was highly relevant to my Interaction Design for Emergence v3, which included a theatrical costume for participants to interface them with the physical environment of the artwork through haptic and tactile sensations emitted via the costume. Similarly, StilmS and Emergence drew on chaperoning audiences, as used by Transmute Collective and FoAM, wherein participants are ritualistically prepared before their encounter with the work at specified times for a pre-determined duration and then ‘debriefed’ before they return to the Outside environment.

Balancing between the complexity of interactivity and appropriate numbers of co-participants for Kali Yuga, StilmS and Emergence was informed by the approaches taken by Intimate Transactions, FoAM and Paine in this pursuit. Similarly, McCormack’s progression from one-to-many interactivity in

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539 McCormack 2005a.
540 Of his work, #14 can be seen as representative of his “performactives.” Armstrong 2002:71.
541 See p215.
542 See p260.
Turbulence to the many-to-many interactivity in Eden was a decisive influence on my similar progression from the one-to-many interactivity in KYv2 to the many-to-many interactivity in Emergence. Creating conditions conducive to evoking responsibility by relating the interaction modality to the number of co-participants demonstrates just one among many interrelated approaches, which, on balance, constitute cohesive strategies for evoking environmental responsibility in Responsive Environments. The next three chapters demonstrate in more depth how my own approaches similarly embrace diverse modalities in the attempt to balance contending considerations in creating Responsive Environments.
4.1 Introduction

4.2 Plastic Art Installations
   4.2.1 InvertedPreverted
   4.2.2 D#generative
   4.2.3 Sly Drooler
   4.2.4 Summary

4.3 Tat Avam Asi (Kali Yuga)
   4.3.1 Project Overview
   4.3.2 Content and Subject Matter
   4.3.3 Visual Form
   4.3.4 Audio Form
   4.3.5 KYv1: Prototyping the Installation
   4.3.6 KYv2: Implementing Explicit Interactivity
      4.3.6.1 Sound
      4.3.6.2 Metanarrativty through cyclical repetition
      4.3.6.3 Modularity and Causality
   4.4 Summary
4.1 Introduction

The following accounts of my PBR discuss my reflexive engagement with the key issues of the thesis, according to the suite of artworks I made for this PhD. They are:


2) *Tat Avam Asi (Kali Yuga) v1* (2004) and *v2* (2005-8) (hereafter *KYv1* and *KYv2* respectively)

3) *StilmS v1-v3* (2004-5)


My accounts of these artworks document my “journey towards true interactivity,” which chronologically progressed from control over content creation and execution (in 1 and 2), to control over content with purposefully subjugated control over execution (in 3), to collaborative co-creation amidst dialogical engagement with multiple simultaneous variables (in 4). In parallel, the works progress from Plastic Art (in 1), to non-linear single channel Media Art (in 2), to multi-channel semi-immersive performative-installation (in 3) and to full scale multi-channel immersive installation (in 4). Similarly, my authorial responsibility shifted from a high level of control over singularly created content (in 1) to focusing on creating context through Interaction Design in increasingly collaborative works (in 4).

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The suite purposefully transcends boundaries between mediums and artforms, relative to four broad fields and periods of Interactive Art:

1) Combining ‘analogue interactivity' with painting and sculpture relates (1) to “pre-electronic” precedents to Interactive Art, such as Johns, Ernst and Ascott

2) Combining a dramaturgical cinematic narrative with trammeled interactivity relates (2) to early 1990s narrative based Interactive Art such as Courchesne and Weinbren

3) Combining audience interactivity with organicist audiovisual data-sets relates (3) to Seaman’s “recombinant poetics” and Feingold’s approaches to Responsive Environments

4) Combining instantaneous and cumulative influences as exerted by groups of participants relates (4) to contemporary synthesised evolution and adaptation in Alife and Artificial Natures approaches to Responsive Environments.

Diverse interactivity and responsivity modalities were used, according to artwork-appropriate approaches. Chronologically they progress from:

1) Implicit environmental responsibility in non-responsive but metaphorically interactive works

2) Indirect and metaphorical environmental responsibility for a single-participant in a “reactive environment”

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544 Penny 1997a.
545 See p173.
546 See p190.
547 Seaman 2002:1.
548 See p172.
549 See p259.
3) Direct, literal and instantaneous environmental responsibility for small group interaction in a semi-immersive Responsive Environment

4) Indirect, direct, literal, metaphorical, instantaneous and cumulative environmental responsibility for large group interaction in a highly immersive Responsive Environment

The artwork-specific modes of interactivity were intended to evoke audience responsibility by devising appropriate relations between content, form and Interaction Design. Responsivity and responsibility were designed to be content- and context-appropriate according to the particularities of the disciplines and mediums necessary for each work. Different works focused on different aspects, so the discussion of Kali Yuga focuses on content and form, as interactivity was less relevant for evoking attendees’ environmental responsibility, while interactivity is central to the discussion of how Emergence evoked attendees’ environmental responsibility through its complex Interaction Design. Instead of common aspirations toward the “Holy Grail” of Alife art, these artworks used an “‘under-engineering’ ‘lo-fi’ approach to minimise the steep learning curves required in mastering the technology necessary for Alife type art.

Like the works cited in related PhDs, such as the PhD of Graham, each artwork is discussed as a proof-of-concept rather than globally exhibited works made by professional teams with funding to match. While Graham’s PhD artwork, Individual Fancies, was simple relative to other works discussed in her PhD, it was intended to be a vehicle explored as part of her research as well as art practice that informed this research. My artworks have a similar function.

The accounts that follow chart the chronology of development and implementation. Blocks of italic text, in future tense, are quotations from production diaries made during production. Despite form, content and Interaction Design evolving throughout each project, they are presented first as they relate to the broader aims of my research.

551 Rokeby 1995b. These aspirations are discussed on p98.
552 Penny 1997b.
4.2 Plastic Art Installations

Figure 4-75: D#generative (2004-7)
Figure 4-76: Sly Drooler (2004-5) next to D#generative

Figure 4-77: Inside looking out at Preverted (2004-5) at nighttime
Figure 4-78: Outside looking in at Inverted (2004-5) during day. Photography by Josh Wodak.

InvertedPreverted (Figures 4-77, 4-78), D#generative (Figure 4-75) and Sly Drooler (Figure 4-76) were interrelated site specific responses to an outdoor space fronting onto a suburban Canberra street. Conceived and staged simultaneously, they complement one another in physical proximity, materials, form and content. They formed a “public research laboratory,”

Rokeby 1998.
being produced and exhibited in situ on the ground, veranda railing and window and door adjoining onto this veranda facing the public street. The ideas and sketches were consolidated in 2004, with on-site production in the period 2004-7 ranging from one month for InvertedPreverted to three years for D#generative.

The three installations straddled between the conceptual/theoretical/fine-art practices stemming from Manovich’s “Duchamp-Land” and the technological/scientific/experimental practices stemming from “Turing-Land.”554 This arose since they applied Huhtamo’s “archeology of interactivity”555 to their form, content and material substrate, to explore the “pre-electronic”556 precedents that Responsive Environments draw upon. This created analogue analogies to the form, structure, function and behaviour in interactive electronic art, such as KY, StilmS and Emergence and their digital ‘equivalents’ of the Alife art discussed in Chapter 2.557 As material-led research of painting-as-sculpture, their Blife forms recorded progressive stages of material decomposition over time, rather than any final form. Directed degeneration of paint, canvases and sculpted materials was achieved by subjecting these materials to manipulation and intervention, such as heating, freezing, re-melting, re-mixing, cutting, splicing, molding and re-molding. As layered surfaces of accumulating materials that interacted with one another, they metaphorically evoked an archaeological cross-section of time and space, with successive layers of material representing a figurate ‘pre-history’ of the analogue artforms that Responsive Environments draw upon.

554 Manovich 1996.
555 Huhtamo 2006.
556 Penny 1997.
557 This Alife art is discussed on p98.
4.2.1 InvertedPreverted

![Figure 4-79, 4-80: Inside looking out during day, with Inverted partly visible through Preverted. Photography by Josh Wodak.](image)

The static artwork can be looked at in two opposing ways. It can be seen as authoritarian in its refusal to reflect the presence and actions of the spectator, or it can be seen as giving the spectator complete freedom of reflection and interpretation by not intervening in this process. An interactive artwork can likewise be seen as loosening the authority of the traditional work, or as interfering in the interactor’s subjective process of interpretation.

David Rokeby

InvertedPreverted (Figures 4-77, 4-78, 4-79, 4-80) consists of two 170x206cm paintings in a superimposed relationship resulting from one being hung in front of the other. Inverted is formed by black paint on a white canvas while Preverted is formed by white paint on a black canvas.

The title refers to negotiating boundaries between binaries. ‘Inverted’ refers to black paint on white canvas and white paint on black canvas, to composite inverted background and foreground colours. The colour binaries are mapped onto their form: paint strokes are long/short dashes or small/large circular shapes, as a reference to binary logic of ‘1’s and ‘0’s and Morse code. ‘Preverted’ is a malapropism of reverted and perverted: the work is perverted in the sense of to “alter (something) from its original course,

Rokeby 1995a:141.
meaning, or state to a distortion or corruption of what was first intended. Collectively the title ‘InvertedPreverted’ refers to the play between Inside and Outside, as it connects and separates the room interior with the veranda outside and vice versa. This relationship is evoked by exactly filling the dimensions of the glass window/door to form a permeable membrane between Inside and Outside. Both are hung using slideable hooks on a cylindrical pole so the form is malleable by being retracted horizontally. Fully extended separates Inside from Outside, or diminishing degrees of retraction create partial openings between Inside and Outside by allowing Outside light to enter around canvas borders. Perversions are inverted by reverting the canvas back to its original size when retracted and expanded horizontally.

Participants adjusting the form exert instantaneous and cumulative influences. By engaging directly with the original material substrate, successive expansion and contraction of both canvases causes portions of paint to deteriorate by cracking or stretching, which irreversibly changes the content. Content is also perpetually influenced by environmental conditions of sunlight and wind that are beyond participants’ control or responsibility. ‘InvertedPreverted’ is viewed from Outside looking in (the veranda area) (Figures 4-77, 4-78) and Inside looking out (the interior room) (Figures 4-79, 4-80). Being backlit during daylight and frontlit by interior lights at night varies the opacity between the two paintings, so indeterminable portions constantly have different levels of visibility. Consequently, differing degrees of black paint on the white canvas intermingle with white paint on the black canvas. Such indeterminacy is coupled with the extent of retraction/expansion that participants leave the work in. This influences the content, as retraction creates outer layers of canvas which are more exposed to sunlight and wind, while creating relatively protected inner layers. Retraction/expansion is on a continuum of increments from 100% to around 10% of the stretched canvas size.

In keeping with Rokeby’s definition in quotation at the start of this section, InvertedPreverted is a “static artwork,” which was created to “be looked at in two opposing ways” of exploring conceptual and symbolic time-based interactivity. When in stasis, InvertedPreverted allowed unimpeded

559 New Oxford American Dictionary from Mac OS10.5, s.v. ‘Perverted.’
reflection and interpretation as in Rokeby’s notion of a “traditional work.” When activated by participants modifying its form and content, *InvertedPreverted* produced negative connotations for interpreting its “loosened” authority, due to how Rokeby describes all interactivity as “interfering in the interactor’s subjective process of interpretation.” *InvertedPreverted* exemplifies ambivalence between these states of static and active, to critique the uni-directional ‘traditional’ painting-to-viewer influence while parodying bi-directional communication and exchange in Interactive Art. In this vein, *InvertedPreverted* embodies Graham’s argument that Plastic Arts cannot be interactive “unless the viewer could affect or influence the painting” since “whilst viewers may fervently wish that the painting was different, they can not change it without some physical intervention on their part.”

To evoke responsibility to the physical environmental of the artwork, participants’ minimalist “physical intervention” exerted reversible and irreversible influences. Responsibility for cumulative causality was not communicated, as the intention was for participants to determine their parameters of engagement. The notion of irreversible influences recalls Ernst’s placing of an axe next to an untitled sculpture in the Dada exhibition in Cologne in 1929. In *From Participation to Interaction: Toward the Origins of Interactive Art*, Dinkla cites this as the first artwork to openly invite irreversible audience intervention. However, while it offered audiences a written invitation to hack the sculpture with the axe, “in case they did not like the object,” Ernst’s intention “to provoke the audience into actively stating its opinions, remained an imaginary possibility, since the object elicited the trained response of detached contemplation.” Like Ernst’s sculpture, *InvertedPreverted* can potentially benefit from the irreversible effects of audience interventions, as removing paint by retracting *InvertedPreverted* can be construed as the audience fashioning the work in ‘improved’ directions.

*InvertedPreverted* recalls other seminal precursors to Interactive Art by Johns and Ascott. It invokes qualities in Johns’ *Tango* (1955) and *Target* (1960) (Figure 4-81) that also influenced Feingold’s interactive artworks. In

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561 Dinkla 1996:279.
Target the concentric circles of the outlined target are left blank, while underneath a paintbrush and three open containers of paint are encased behind glass. Authorship is inscribed onto the paper, with two signature spots. The first was signed by Johns, followed by “and,” with the second space left blank. Feingold argues that

the obvious suggestion is that the painting itself is to be physically completed by another, unknown to the artist. In this work, the interaction is conceptual, meta-interactive. The physical interaction is essentially irrelevant, as it is simply the idea of the action, which is enough to carry the meaning of the work.  

Authorial responsibility in InvertedPreverted is similarly ambiguous, as the invitation to intervene suggests unknown others may contribute.

Authorial responsibility in InvertedPreverted is similarly ambiguous, as the invitation to intervene suggests unknown others may contribute.

While Ernst and Johns contributed important “meta-interactive” ideas, interactivity was a tangential interest throughout their careers. In contrast

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Feingold 2002:121.
Ascott’s *Change Paintings* (1959-60) (Figures 4-82, 4-85, 4-86, 4-87) formed his first foray into Interactive Art, an area he continues to work in. Like *InvertedPreverted*, these paintings prioritised non-representational abstract compositions of lines and dashes over colour variation. They were painted on three translucent panels of Plexiglas that could be slid underneath one another, making possible different combinations of form. Shanken argues that this implemented literal audience intervention as “the composition of these interactive constructions...entailed a durational aspect comprised of process, behaviour, and change” from “bringing the image painted on each panel into myriad configurations with regard to the images painted on the others.”

*InvertedPreverted* evoked responsibility for tactile engagement with the irreplaceable material substrate of the painting rather than the “idea of the action” in *Target* and the easily reversible and low likelihood of damage caused by sliding the panels in *Change Paintings*. Incorporating participants’ intentional or unintentional irreversible influences was further explored in the second work of this series: *D#generative*.

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Each of my ‘biotopes’ explores what I call ‘biological time’, which is time manifested throughout the life cycle of a being itself, in vivo (contrary to, say, the frozen time of painting or photography, the montaged time of film or video, or the real time of a telecommunications event).

Eduardo Kac

D#generative (Figures 4-88, 4-89, 4-90) is a triptych of three 110x170cm canvases that are intermediaries between painting and sculpture. Being made without paint, D#generative is an ‘ing’: as ‘painting’ minus ‘paint’

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=‘ing’, “denoting material used for or associated with a process.”

The triptych was put flat on the ground by the veranda used for *Sly Drooler*, to be exposed to elements of rain, soil, wind, native and non-native garden leaves and 'fed' organic materials on average once a week for three years (Figures 4-75, 4-76, 4-86, 4-87). *Presence of Absence* (the left side canvas) (Figure 4-88) was fed globally sourced used coffee and tea from Nicaragua, Ethiopia, Sumatra, East Timor, India, Sri Lanka, Mexico, Honduras and Cuba. *Absence of Presence* (the right side canvas) (Figure 4-90) was fed Australian, but predominantly local ACT+NSW fruit and vegetables. *Whatever Will will be Will will be* (the middle canvas) (Figure 4-89) had Australian bird seed suspended above it, so it received mixed local/global materials, from the freely roaming ‘Australian’ birds and their droppings. After three years, all but the base layer of surface materials was removed and each was sealed with acrylic sealant. The works were then stretched over wooden frames and hung vertically, side-by-side in an outdoor space near where they were produced.

To explore the dominant “desire for surprises” in Alife art, but in Blife art, control and responsibility are ceded to innumerable local and environmental influences. *D#generative* embraced all manner of interactivity, including ‘detrimental’ environmental influences of storms, floods and frost, exploring Blife art in analogy to anarchic Alife art. Sediments, bacterial growths, patterns, colours, shapes and forms occurred in “‘biological time’” (to use Kac’s term regarding “biotopes” in his above quotation): whatever happened left cumulative indelible impressions and indentations which interacted with innumerable other decomposing compositions. Being deliberately non-technological, both *D#generative* and *InvertedPreverted* explore Charles Snow’s “Two Cultures” predicament between form and function posed by computational generative art versus analogue degenerative art. They use Systemic Painting a la Jackson Pollock (Figure 4-91), but anachronistically, as they reference Generative Art, such as that of Jared Tarbell (Figure 4-92) and Casey Reas (Figure 4-93). The title *D#generative*

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567 *New Oxford American Dictionary* from Mac OS10.5, s.v. ‘-ing.’

A protective undercoat of white paint was painted on the non-exposed bottom, while the exposed top was not painted, other than a protective acrylic sealant applied at the end of the production process.

568 Rokeby 1995b.
refers to ‘generative degeneration,’ as this was how the accretions formed. However this is the analogue antithesis to the computational systems used by Tarbell and Reas to create digital analogues to this idea.

Figure 4-91: Jackson Pollock Blue Poles (1952)

Figure 4-92: Jared Tarbell Intersection Aggregate (2004)

Figure 4-93: Casey Reas Process 7 (2005)

*D#generative* explores Huhtamo’s “System Interactions”\(^{569}\) over overt audience interactivity. Animals and humans walked over the canvases numerous times while they lay on the ground ‘evolving,’ in “open interaction”\(^{570}\) with environmental microbiology. In *Presence of Absence* and *Absence of Presence*, a dialogue was formed between my weekly feeding (by selecting ingredients and where and how I placed them on the canvases), and ongoing observation of the interactions between these foodstuffs and the material substrate of the canvas. By contrast, in *Whatever Will will be Will will be* my dialogue was negotiated in selecting and replacing the bird seed when the birds and possums had eaten it all. Despite 2 inch gaffer tape ‘separating’ the canvas into three sections, ‘leakages’ between the arbitrary boundaries of

\(^{569}\) Huhtamo 2006.

\(^{570}\) Willits 2007:2.
global and local foodstuffs inevitably occurred due to wind and rain. Their ‘final’ forms were determined by their progressive decomposition, as the microorganisms, mold and fungus were literally ‘eating’ the actual canvas, forming large holes. Applying the acrylic sealant after three years of this process effectively suffocated the surface, creating a fixed form.

D#generative relates principally to two works produced by two Alife artists: Kac and McCormack. While both concentrate on highly interactive, complex and technological works involving direct audience interaction, they also produce conceptually interactive works that prioritise interactive processes rather than interactive ‘products.’ The quotation from Kac at the start of this section refers to his biotope series Specimen of Secrecy about Marvellous Discoveries (2006) (Figures 4-94, 4-95, 4-96, 4-97, 4-98, 4-99, 4-100). Each biotope is composed of soil, water, air and a multitude of microorganisms interacting with one another. Kac establishes as initial condition the size and shape of the frame and the selection of categories of microorganisms, then he feeds the work nutrients and exposes it to light which affects the overall evolution of the biotope (Figures 4-101, 4-102, 4-103). Curator Christiane Paul sees the responsibilities in this “artist’s process” being in “an orchestration of the organisms’ metabolism...to keep them still or in motion and thus create a living animation.” She describes them as “living painterly objects that appear to be still images, yet are constantly evolving slow-motion animations generating and never repeating themselves.”

They constantly change according to ongoing amounts of light, nutrients and water. If neglected, they die, leaving only remnants and residue of the accretions over the material substrate. Kac invites audiences to engage with such biological time, since the “‘image’ is always evolving into its next transformative state, the perceived ‘stillness’ is more a consequence of the conditions of observation (limits of the human perception, ephemeral presence of the viewer in the gallery) than an internal material property of the biotope.”


572 Paul 2010.
In contrast to the tightly controlled process used in Kac’s biotopes, *D#generative* sought to embrace a high degree of indeterminate registering of the interactions between flora, fauna and natural environment. The biotopes were largely hermetically sealed from ‘birth’ through to their exhibition, with highly controlled dosages of sunlight, water and nutrients. In *D#generative* I ceded such control to whatever the weather was like, in combination with my select feeding described above. Kac’s resultant aesthetic and symbolism are similar to *D#generative*, the major exception being that the canvas and surface material degeneration in *D#generative* was non-reversible, as is the case in the relation of *InvertedPreverted* to *Target* and *Change Paintings*.
**D\#generative** evokes the differences between human and biological time, but is closed to viewers influencing the artwork as presented in static form. It offers an archeological portal or archival photograph through the layers of history of accretions and residue, to downplay any responsiveness between real-time participation and the three year ‘evolution’ of the triptych. This references McCormack’s Alife processes of producing “evolved digital still images based on native Australian flora” for his *Morphogenesis Series* (2001-4) (Figure 4-106) and *bloom* (2006) (Figures 4-104, 4-105). Unlike his real-time interactive works using animated sequences of these evolving ‘flora,’ these still images suggest inalienable processes for audience participation from which an arbitrary decision to ‘freeze’ one-instance of this process was made. McCormack began with *Morphogenesis Series*, which used “selected native Australian species” as the impetus for biomimetic Alife modelling to create digital ‘analogues’ of “strange, yet familiar models of archetypal Australian flora.”

He explored similar tensions in *bloom*, a billboard size digital image of the same process and product that was publicly exhibited in Queensland. He related these still images to his moving-image and interactive works, as *bloom* “forms part of a continuing proposition that synthesised natures are becoming replacements for the real nature lost in urban environments through human development and progress.”

Like McCormack’s still images, *D\#generative* evokes responsibility to what once was (the dynamic production process), as presented by a static representation of the culmination of this process.

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4.2.3 Sly Drooler

Figures 4-107, 4-108: Sly Drooler at sunrise

Figures 4-109, 4-110: Sly Drooler in late afternoon
Photography by Josh Wodak

Figures 4-111, 4-112, 4-113, 4-114: Examples of slide rulers
A painting is an instance of representation. A film is a sequence of representations. Interactive artworks are not instances of representation, they are virtual machines which themselves produce instances of representation based on real time inputs.

Simon Penny

Sly Drooler (Figures 4-76, 4-107, 4-108, 4-109, 4-110) is the last work in this series. It was a sculpture made of parallel lines of 35mm film strips with their multi-channel soundtracks. They were woven through the banister around the veranda, running between InvertedPreverted and D#generative. Progressive degeneration due to wind, rain and sun exposure produced differentiated decomposition between individual slides and between strips of slides.

Sly Drooler anachronistically refers to slide rulers as mechanical analogue computers (with the title a spoonerism of ‘slide rulers’ as shown in Figures 4-111, 4-112, 4-113 and 4-114). It represents a 3D visualization of Intact Syntax, Arpeggiated Hierarchy and Translucinatory Recombinatronix, my techniques of combining form, content and Interaction Design that balanced interactivity and narrativity in KY, StilmS and Emergence. While Sly Drooler used static form to represent the dynamic processes of my techniques, the patterned placement of each row of slides represents the multiple simultaneous interwoven non-linear narrative threads used in narrative-based KY, StilmS and Emergence. Each individual slide forms a primitive, as D#Generative and InvertedPreverted do within Penny’s above definition of a painting as “an instance of representation.” The sequential placement of the slides along individual strands represents cinema, according to Penny’s above definition of a film as “a sequence of representations.” Collectively, the strands form an interwoven audiovisual data-set as the content for an interactive artwork. The audiovisual content in Sly Drooler is accessed via projectors and amplifiers which reproduce the content embedded in the film strips. Such a data-set can then be designed to behave according to Penny’s above definition.

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575 Penny 1996a.
576 How they were applied is discussed in the sections on these three artworks, in Chapter 4.3, 5 and 6 respectively.
of “interactive artworks” as “virtual machines which themselves produce instances of representation based on real-time inputs.”  

The real-time inputs refer to designing how participants may exert influences over the behaviour of the artwork. One such example is in navigating through the multifarious streams represented by the layered arrangement of the film sequences in Sly Drooler. Translucinatory Recombinatronix refers to the process whereby individual audiovisual streams may become translucent, such as images and/or sounds being faded in and out or placed over the top of one another through sound and vision mixing consoles. The recombinant potentiality of how all primitives may be combined in real-time by participants is according to combinatorics as “the branch of mathematics dealing with combinations of objects belonging to a finite set in accordance with certain constraints, such as those of graph theory.” Combining these two modes of interaction refers to participants being able to simultaneously modulate both the translucency of audiovisual streams and their ways of being combined, which I explored in StilmS.

The “certain constraints” explicit in combinatorics refer to the techniques of Intact Syntax and Arpeggiated Hierarchy discussed in Chapter 2. Both concern negotiating influence that engages audiences, while leaving the syntax of the artwork (such as the primitive of individual slides in Sly Drooler) relatively ‘intact’, so responsibility to the artwork may still be evoked via cogent engagement with the narratives. For Interaction Design, Intact Syntax denotes the trade-off between narrativity and interactivity whereby selected components which ‘carry’ the narrativity are non-malleable, while other components entertain greater plasticity. In application to StilmS, this meant that the individual images could only be subject to permutation and combinations of re-arrangement to form the visual narrative, while the continuous stream of sound could be subject to more malleable forms of interactivity, as it does not ‘carry’ the narrativity. Arpeggiated Hierarchy

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577 Penny 1996a.  
578 New Oxford American Dictionary from Mac OS10.5, s.v. ‘Combinatorics.’  
579 See p220.  
580 See p93.  
581 See p222.
concerns the hierarchy of consequence in determining what should be influenced and how. It denotes the form, whereby different ‘layers’ of media, such as sounds and images in *Sly Drooler*, are vertically overlayed as an arpeggio. In application to *Kali Yuga* and *Emergence*, the hierarchy of consequence meant the playback and order of the visual sequences were unalterable while more modular elements such as sound and tactility entertained greater real-time interactivity.

### 4.2.4 Summary

The three works described above explore ideas from three eras of Interactive Art. *InvertedPreverted* relates to Penny’s “pre-electronic”\(^{582}\) precedents of Responsive Environments, *D#generative* relates to contemporary Generative Art and Huhtamo’s “Systems Interactive”\(^{583}\) while *Sly Drooler* anachronistically relates to Expanded Cinema of the 1960s-70s. Within the suite of artworks made for this PhD, the function of these works was to ‘strip away’ the maelstrom of technology-mediated interactivity to explore fundamental form and function in an analogue medium. They were conceived and executed in a similar vein to artists such as Ascott, McCormack and Kac, whose careers have oscillated between complex interactive works and simple analogue works that cannot evoke the same responsivity, but which provide another lenses for exploring the same issues in ‘debased’ mediums. My three works explored divergent approaches to evoking responsibility to the physical environment of the artwork, from the literal, tactile irreversible influences in *InvertedPreverted* to the metaphorical interactivity in *Sly Drooler* and *D#generative*. Collectively they comment upon the nature of human-environment interactivity itself, albeit evoking a relatively more conceptual responsibility compared to the more literal responsibility evoked by the responsivity of *Kali Yuga*, which is the subject of the next section.

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\(^{582}\) Penny 1997.

\(^{583}\) Huhtamo 2006.
4.3 Tat Avam Asi (Kali Yuga)

Figures 4-115, 4-116, 4-117: Video stills from Kali Yuga (2004-5) of some of the natural and urban environments. Cinematography by Josh Wodak.

4.3.1 Project Overview

Film is a technological medium which contains narrative content. It is a technological vehicle. Many of the experiments in digital media are formal explorations in which the manipulation of media components are the work... and if the technological combination is the work, then its ability to carry narrative content is a secondary issue and somewhat superfluous.

Simon Penny

Kali Yuga (KY) was an artwork in two iterations. This following discussion concerns v1 (the first iteration), that existed within Penny’s above definition of film as “a technological medium which contains narrative content,” and v2 (the second iteration), which concerned “formal explorations in which the manipulation of media components are the work.”

The project began as the third in a trilogy of thematically contiguous short films made with the same collective as the artworks discussed in Chapters 5 and 6. As Producer, Writer, Director, Editor, Director-of-Photography, Cinematographer, Sound Designer, Lighting Designer and Costume Designer I initiated and managed v1 and v2 from conception to realisation. While envisaged as an immersive environment, it was subject to

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585 The name of the collective at the time was Splendiferous Productions. This was the name principally used by myself, Bolotin, Cartwright and Wood between 2000-2004, after which the name was changed to Synarcade Collective from 2004-2007. See Appendix B Curriculum Vitae.
586 The credits for the cast and crew are: Starring: Richard Cartwright, Geoff Cartwright, Philip Wood, Dave Ma; Voices: Richard Schweizer, Ian Shoebridge, Dave Watts, Philip Wood; Lighting Operator: Dave Ma; Sound
the limited budget and technology available. The trade-off between technology and scale of presentation was subsequently skewed in favour of large-scale audience immersion for *StilmS*, the next work made, as both works aimed for immersive engagement. Production involved difficult locations, including major Sydney train stations (Figures 4-118, 4-119), moving peak-hour trains (Figure 4-116), busy public domains (Figures 4-124, 4-125) and multiple locations along a 300 metre cliff face in the Blue Mountains (Figures 4-115, 4-117). Permission to film was obtained where possible, but funding could not encompass official permission.\(^{587}\)

*KY* evokes relatively indirect and symbolic responsibility to the natural environment by prioritising the subject of environmental responsibility relative to other ingredients of form and Interaction Design. Balancing interactivity and audience engagement with the narrative involved implementing relatively simple interactivity over two iterations. *KYv1* was metaphorically interactive within narrative based experimental cinema that draws upon video art and expanded cinema. *KYv2* explored Penny’s above mentioned trade-off between “formal explorations” where manipulating audiovisual media “is the work” and “narrative content” consequently becomes “superfluous.” *KYv2* used trammeled responsivity as a “reactive environment”\(^{588}\) that resembles the early narrative based interactive works in Dinkla’s *The Art of Narrative: Towards the Floating Work of Art*.\(^{589}\) *KY* references this period of Interactive Art of the mid 1990s, where members of Huhtamo’s “old school,” such as Weinbren and Courchesne, attempted to balance the narrativity of experimental cinema and literal interaction with the unfolding of their narrative based works. Such interactivity was limited due to the prioritisation of conveying narratives, such that Cameron describes Weinbren’s *Sonata* (1991-3) and *The Erl King* (1983-6) as forms that “demonstrate a tension between repression and freedom, offering

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587 However this proved invaluable for my following artwork *StilmS*, which involved photographing without permission in areas of India where photography is banned due to governmental, military, political and industrial concerns.

588 Dinkla 1996:286.

the reader the illusion of control within a tightly authored set of possibilities.” In a similar vein, KY evoked responsibility through negotiating repression and freedom in low-key interaction with the subject of environmental responsibility. Hence, the following discussion focuses on how the content and form were created to be engaged with.

4.3.2 Content and Subject Matter

A fundamental characteristic of the narrative form in cinema is the inevitability of its fictional resolution. The outcome of the plot is pre-determined and the plot carries its primary significance in the relationship of action to the ultimate resolution. The form of a narrative text itself, in the pre-determination of its resolution, is intrinsically fatalistic. The end (as represented in the text) is already determined. Viewers know it is determined when they start watching the film and the events of the film only have their rationale in their contribution to the ultimate consequence.

Malcolm Le Grice

While situated within the constraints of the medium of film, as Le Grice remarks above, KY intentionally eschews coherent content and subject matter to downplay any such “rationale” or “ultimate consequence” in “the events of the film.” These ideas were suggested in minimal publicity for stagings, which provided only the following evocation:

...a quartet of voices superimposed over a silent film without beginning nor end, to together form a never ending cycle concerning the adventures of a young man dealing with the Powers That Be: The Nicotine and Alcohol Rehabilitation Centre...

The Sanskrit title encapsulates the interpenetration between form and content. The idiom tat avam asi (“that you are”) summarises the Upanishadic philosophy of essentialist self-other identification. It connotes interchangeability between oneself (“you”) and ones’ surroundings (“that”) thereby dissolving differences between binary opposites, such as Inside-Outside, individual-universal, sacred-profane and idealist-materialist. The phrase connotes enlightenment for young adult students, following their

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590 Cameron 1995.
formal training in Vedic theology and philosophy. *Kali Yuga*, the apocalyptic fourth and final epoch in Vedic cosmology and cosmogony, is the current epoch according to Hindu belief. Combining the two title parts encapsulates the work’s Inside-Outside relationship: identifying one’s self in one’s surroundings in a disintegrating age causes a crisis of subjectivity between selfhood that mirrors the (visibly deteriorating) external world.

These subjects are allegorically evoked by the narrative, which charts an archetypal protagonist, *Man*, undergoing a journey of discovery of his relationship to the natural environment, and the State forces which fashion this relationship. *Man’s* environmental responsibilities were not evoked through a didactic fable but rather through obtuse content and form, harnessing enigmatic ambiguity, analogy, symbolism and metaphor. For example, the publicity provided about the title was: “The Sanskrit title translation is: ‘That you are (the Age of Kali).’”

*KYv1* produced a disjuncture between the subjects of non-linearity and indeterminate causality within the form of a linear ‘film’ as “the intended representation is of a non-fatalistic world, the representation is in conflict with the intrinsic form of linear narrative and its experience by the viewer.” The subject of *Man’s* will to seek freedom from the State’s autocratic dominion over the natural environment trapped him in a seemingly fatalistic linear narrative within a never-ending cycle. The classical five part narrative charts *Man’s* crisis-resolution journey within a palindrome structure that is Aristotelian and Freytagian. The five parts represent one *Yuga* each, with the narrative designed to repeat ad infinitum as per the Hindu notion of cyclical time in *Yugas*. *KY* uses “ambiguity in resolution, alternated resolutions, parallel action, branching detours in the plot or multiple viewpoint in the representation of the fiction” as part of what Le Grice terms “attempts…within classical cinema to break both the linearity and tyranny of the singular consequentiality of narrative form.” While these attempts evoke such non-fatalistic structures, “none of these substantially question the structure of linear causal representation.” Realising that the content required a form that

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592 Within Vedic notions cyclical time, whereby the cycle of time begins again with Satya Yuga: ‘The Age of Truth.’

593 Le Grice 1995.

could accommodate such structures, I designed KY to evoke an exploratory encounter with Interactive Art, by unraveling the narrative within a non-linear and cyclical form. This form is outlined in the following two sections which separately describe the visual and audio form of KY.

4.3.3 Visual Form

New media forms pose a fundamental challenge to the principle of narrative coherence...if we explode and open the structure, how can we be sure that the story is being conveyed? Other stories, or non-stories, may become possible.

Mitchell Whitelaw

KY posed “a fundamental challenge to the principle of narrative coherence” by employing a rhizomatic structure within the conventional dramatic format of a film with a notional beginning, middle and end. Referencing Paine and Rokeby’s desire for understanding through repeated engagement, it was designed to be engaged with through multiple encounters. The beginning remains incomprehensible until the multiple simultaneous interwoven non-linear strands coalesce at the finale and then make the cyclical narrative retrospectively comprehensible. End and beginning mirror and feed back into each other, making the interrelated audiovisual layers increasingly understandable through repetition.

Part I (exposition) (Figure 4-124) and Part II (rising action) segue into Pt III (crises) (Figure 4-125), with Part IV (falling action) segueing into Part V (resolution). Actions in Part I are the opposite to actions in Part V, while Part II actions are in opposition to actions in Part IV. As an example of how this was applied to the composition and structure of the scenes, Figure 4-118 is the opposite of 4-119, 4-120 the opposite of 4-121 and 4-122 the opposite of 4-123. My use of an Aristotelian structure that is also palindromic relates to Weinbren’s Sonata and The Erl King. For these artworks, Weinbren, argues “the


596 This is discussed in Paine’s practice on p125 and in Rokeby’s practice on p143.
Figure 4-118: Walking away in Part II

Figure 4-119: Walking towards in Part IV

Figure 4-120: Going up in Part II

Figure 4-121: Coming down in Part IV

Figure 4-122: Climbing up in Part II

Figure 4-123: Climbing down in Part IV

Figure 4-124: Walking the beginning of the Spiral in Part I

Figure 4-125: Walking the middle of the Spiral in Part III

Cinematography by Josh Wodak.
traditional (Aristotelian) notion of narrative must be rethought” when attempting “an interactive narrative cinema” which could “not have the shape of narrative as we have understood it” since “the very idea of user impact opens to question the concepts of end and beginning, of crisis and conflict, of development itself.” Like Sonata and The Erl King, KY employed form inspired by Freudian dream interpretation, as used by Weinbren to explore how strict sequence can be abandoned without losing the narrative thread. Freud’s understanding of dream-structure is an alternative to the Aristotelian model, not only because the components can appear in any order, but also because the story is never over, the analysis is always incomplete, there are always more biographical details to uncover.

Form and content were also inspired by Levi-Strauss’ writing on the narrative structure of myth, as KY resembles an enigmatic and surrealistic fable via the non-linearity of Levi-Strauss’ approach to mythic structures. Levi-Strauss argues “the true constituent units of myth are not the isolated relations but bundles of such relations, and it is only as bundles that these relations can be put to use and combined so as to produce a meaning.” The “constituent units” of KY were each individual shot, which formed the size of the visual primitive described on p92. KY explored both mythic structures and the structure of myth. The meaning of the primitives came about through their individual and combinatorial presentation, as Ricoeur argues that the meaning Levi-Strauss refers to “is not at all what the myth means, in the sense of its philosophical or existential content or intuition, but rather the arrangement or disposition of the mythemes themselves, in short, the structure of the myth.”

This is illustrated in the following description of how each shot formed a primitive.

All shots are static and from a tripod, other than one tilted down interspersed over the montage beginning each of the five parts. The order of all shots is modified in real-time, by each shot played in its entirety and by

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accessing individual frames from within separate shots. As the camera position remains stationary, each shot can be subject to malleability akin to jumping around a succession of photographs where the camera remains still while movement occurs within the frame. This avoids a kaleidoscopic ‘MTV style’ rapid montage while allowing the primitives to be subject to combinatorics. The literal reversibility of actions in the same location, such as ‘Man’ walking toward the camera in Part II (Figure 4-119) or from the camera in Part IV (Figure 4-118), means all can be played forwards and backwards with instantaneous access to any frame in any shot.

Balancing interactivity with narrativity was similar to Weinbren’s negotiation between non-linear structures and narrativity where “the order in which the depicted events are accessed would have to be open to variation.” Weinbren found linearity and narrative causality to be at odds when “a film might try to approximate the structure of Freudian dream analysis in a story structure that step by step unraveled the components of an evocative image.” While he advocated interactivity to “reproduce the minimal significance of sequence” and “the irrelevance of order,” his approach offered minimal choice between multiple narratives (like those represented in Sly Drooler above) at pre-defined points, as he attempted to retain complex yet discernable narratives. This was necessary in Sonata and The Erl King, for “the analogies with fate and determinism are still effectively sealed in this hermetic system, as while ‘things could have been different’ they could only be so in the confined context of other permissible possible paths.” This echoes Whitelaw’s argument, quoted at the beginning of this section, that to “explode and open the structure” undermines “the story” in favour of “other stories, or non-stories.” Like Weinbren, I sought to “open the structure” to “other stories” but not to “non-stories.” In applying my technique of Arpeggiated Hierarchy to KY, the order and presentation of the visual primitives bore the weight for conveying “the story” and “other stories.” Accordingly, I used the relative malleability of the sound to evoke audience interactivity.

603 Weinbren 1995.
4.3.4 Audio Form

Lived experience does not parcel itself into linear, closed structures, though we sometimes represent things in that way in order to tell stories about ourselves... If the interactive cinema is a more faithful rendering of reality, it is precisely because it can bypass some of these criteria of narrative structure. Intermixing and interweaving multiple narrative streams, it can create a metanarrative sum that is greater than its component parts, if the subject-matter is a match for the potential of the medium. What would be an appropriate model for the subject-matter? The ideal is the human mind in operation.

Grahame Weinbren

The images and sounds in KY function independently and interdependently of one another. It is designed to be experienced with images or audio or with both at the same time. Synaesthetic audiovisual relationships were constructed by replacing all the dialogue of the filmed characters' with a compositional collage of four voices in contrapuntal consonance and dissonance with one another and the images. As interrogational interaction, the quartet comprises modular samples from my interviews with four friends/collaborators. To capture “the human mind in operation” in Weinbren’s sense above, each was asked exactly the same questions in exactly the same order, so their responses could be compared and contrasted when superimposed over the images. The questions concerned the project themes and issues. The narratives of their responses were broken into progressively smaller modules, with the primitives being phonemes that were unintelligible in and of themselves. The opposite end of the size spectrum included minute-long multi-clause stream-of-consciousness musings on philosophically dense concepts. The audio was structured according to Intact Syntax and the analogy of re-arranging letters in Alphabet soup as illustrated in Chapter 2. Intact Syntax imposed the constraint that I could not change the order of any words, to reflect Weinbren’s notion of capturing the real-time temporal flow and thought-development of a “human mind in operation.” However, once each

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605 See p92.
module had been determined, it was arranged in fugal counterpoint of repetitions and re-orderings in combinations that formed metanarratives within and between each interviewee, as a reference to Freudian dream interpretation and Levi-Straussian structuralism.

Leitmotif arrangements formed a non-linear matrix between preceding and succeeding speech by the same interviewee and other interviewees. This forms 21 relational 'conversations' throughout:

1) Conversations 1-4:
   Internal dialogues within each interviewee’s responses juxtaposed with their immediately preceding and succeeding modules

2) Conversations 5-10:
   External dialogues between any two interviewee’s simultaneously modules in each channel

3) Conversations 11-16:
   External dialogues between any two interviewee’s modules juxtaposed before or after one another in the same channel

4) Conversations 17-21:
   External dialogues between any two interviewee’s modules juxtaposed before after one another in the other channel

Each of these is also in conversation with the images on screen immediately before, during and after each module.\(^{607}\)

\(^{607}\) In the silent version this relationship is only between images immediately succeeding or preceding what is on screen.
4.3.5 KYv1: Prototyping the Installation

To enable comprehension of concurrent conversations, I specified that both speakers be positioned in line and equidistant to the screen, with the apparati-audience distance proportionate to the screen size. This ensured both sound channels were distinguishable for all audience members. Figure 4-126 shows an example of this ratio for a small-scale presentation of the work.\textsuperscript{608}

This configuration symbolised the ‘conversations’ between media, mediums and interviewees and between audience and artwork. The ‘conversations’ between image and sound were that the actors rendered silent on screen had surrogate invisible replacements (the interviewees), emanating from equidistant sources on opposing sides of the screen. The ‘conversations’ between audience and artwork harnessed this spatial configuration to evoke metaphorical interaction by placing audiences spatially between ‘conversations’ they could not join. Audiences seated on the left were deliberately over-exposed to audio on the left channel and the right side to audio on the right channel. This partitioned audiences along a continuum: from those closest to the left channel, through to those in the middle and onto those closest to the right channel with the aim of generating discussion arising from differing perspectives via the relative prominence of audio channels.

\textsuperscript{608} KY was intentionally unsuitable for domestic viewing or with headphones, since narrow distances between speakers or between speakers and audience rendered it incomprehensible.
However, my specified configurations were often not achieved, as the 2004-5 filmic presentations were amongst heterogeneous screenings onto various sized screens, with various projection devices, speaker arrangements and room sizes. I also re-conceived the work in light of my investigation of audiences’ responses, especially regarding what real-time control would facilitate heightened engagement.

4.3.6 KYv2: Implementing Explicit Interactivity

Reworking audiovisual form and content was in the interrelated areas of interface design, metanarrativity, non-linearity, causality and indeterminacy. The ‘balance challenge’ was to retain the contemplative mode of engagement of KYv1, whereby audiences could engage with the work (which was challenging in and of itself) and not get overwhelmed by complex responsivity. Designs were either realised as experimental proof-of-concepts, used in the more appropriate works of StilmS and Emergence, workshopped during screenings, exhibited in a gallery and staged at the Magical Theatre in Sydney. Magical Theatre was a community performance space co-founded in 2001 by myself, Richard Cartwright and Phillip Wood, two fellow members of an art collective. It was an invaluable production site, sound stage and “public research laboratory” for those I collaborated with on KY, StilmS and Emergence. Many of those associated with Synarcade, the Sydney based multi-arts collective which made Emergence, developed and showcased iterations of their works there.

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609 I sought feedback on some of my proposals for KYv2 after the following screenings: Magical Theatre, Sydney, April 15 2004; ANU Centre for Cross Cultural Research, July 16 2004; National Museum of Australia, DUST, October 8 2005; ANU School of Music Sounds in Translation Conference as part of my presentation ‘Visual-Audio and Audio-Visual: Intermediary Translation of a Motion Picture Soundtrack,’ October 15 2005; Camera Obscura – Lanfranchis Memorial Discothèque, Sydney, June 4 2007; and following the ANU Symposium on Practice-Led Research or Research-Led Practice? The Joys and Challenges of Making Media Art in a University Context as part of the ANU Beginning Middle End festival, September 18 2009.

610 Rokeby 1998.
4.3.6.1 Sound

How do we move from one mental entity to the next?...Switching between streams of mental activity involves responding to hardly perceptible internal and external cues...Except in the least significant cases, we affect things in our lives not by making choices, but by actively responding to situations - with speech acts or in behaviour, and equally by silence or inaction.

Grahame Weinbren611

KYv1 represented ‘conversational’ artwork-audience interaction metaphorically, in a similar vein to Graham’s Individual Fancies.612 KYv2 augmented this with literal ‘conversational’ interaction so audiences could influence the interior conversations of the work. I intended for minimalist intervention to express Weinbren’s contention (quoted above) that we may “affect things” as much by “actively responding to situations” through “silence or inaction” as through supposedly more assertive responses. To create literal intervention with KYv2, I undertook research similar to Turner’s PhD survey of sensing technologies for Interactive Art. As relatively complex sensing technologies were suited to my latter, relatively complex, works, I proceeded with two sensors Turner listed under “Rotation Sensors,” namely the “potentiometers” of volume level dials and “gyroscope sensors to detect changes in angle.”613

The filmic presentations of KYv1 did not facilitate actively selecting between the work’s simultaneous phrases (like tuning a radio). This required physical freedom to filter between the audio channels by moving around, which was unviable in cinematic environments. Physical movement afforded nuanced prioritisation of different sound channels, with correspondingly more nuanced interpretation of the associated images. In his Real Time Arts review of KYv2 in the Dorkbot CBR group exhibition at Canberra Contemporary Art Space in 2008 (Figures 4–131, 4–132), Alistair Riddell commented that “one sensory mode triggers or illuminates the other” of these audiovisual relations, whereby “this synaesthetic experience was interactive in the sense that it is

611 Weinbren 1995.
612 Graham 1997:141.
613 Turner 2007:64.
activated by the position of the viewer in the gallery.” In his catalogue essay for the exhibition, David Broker described KYv2 as a “deceptively interactive mise en scène due to the mixture of metaphorical interactivity and minimalist intervention offered. Within this structured engagement, Broker argued that audiences “can create their own synaesthesia from a limited palette of sound options.” This referred to Riddell’s metaphorical dimension of the interactivity as “activated by the position of the viewer in the gallery” and the trammeled interactivity of inviting attendees to physically manipulate two separate rotation knobs, which each controlled the volume level of the corresponding sound channel (Figures 4-127, 4-128, 4-129, 4-130). Broker described this as highlighting the “synaesthetic audiovisual relation” between sound and image, through “a condition in which one kind of simulation evokes the sensation of another” such as “sound as colour.” The rationale for presenting this with a “limited palette of sound options” is expressed in the following excerpt from my production diary:

Balancing between binary oppositions of left and right audio channels evokes extremist political left and right wings. Such balancing is symptomatic of action versus inaction: not interacting results in passively receiving all voices simultaneously, while interacting allows for the extremes of only left or only right or gradated intermediary positions whereby participants are subject to both in varying degrees. However stereo sound impedes comprehension of the four voices as two voices share both sound channels. Four simultaneous channels allows more nuanced balancing as there is one voice per sound channel and each voice is positioned in one of the four corners. A gyroscopic interface allows for nuanced balancing between quaternaries rather than the binaries available with a rotation sensor. Participants do not choose degrees of ‘either-or’ as they simultaneously modulate between all four volumes by positioning the gyroscopic interface in any position in the four quadrants. While this increases comprehension of the work, it does not embody the binary

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oppositions that are the subject of the work and which are physically symbolised when balancing stereo sound.

For this exhibition I decided against the gyroscopic interface as adjusting the proportional balance between two sound channels was an intuitive interface with sufficient play between audience responsibility and an intact narrative. KYv2 was presented with a stereo amplifier with separate rotation sensors for accentuating or muting left and right audio channels. The program notes (Figure 4-130) informed attendees.

the interviewee’s ‘conversations’ are in counterpoint to encourage actively modifying the balance of power between voices. Controlling the stereo balance between left and right-channels is done by adjusting the amplifier balance knob, to mute and/or amplify particular voices (like tuning a radio). Not interacting results in receiving all voices simultaneously, while interacting permits the extremes of only left or only right or ‘middle ground’ combinations of both.

Figures 4-127, 4-128, 4-129, 4-130: Installation views of KYv2, Canberra Contemporary Art Space, Canberra, 2008. showing the printed work description and invitation to interact in 4-130. Photography by Josh Wodak.

Figures 4-131, 4-132: Publicity for the Dorkbot CBR exhibition that KYv2 was included in. Flyer designed by Icelab.
4.3.6.2 Metanarrativity through Cyclical Repetition

This staging also addressed the requirement of comprehension through multiple encounters:

*Balancing between left and right sound channels is not based on absence or presence, but on a continuum between these extremes, with a balance knob raising or lowering volume across a continuum. It can switch any voice ‘off’, or reduce any voice to any volume level relative to the other voices. However to make full use of this control requires participants to know what is on the other sound channel. If they do not know, they are in a responsive position of suppressing the voice they do not want after it has already started (which means they do not know what is said when that same segment re-appears on the next cycle). To be ‘pre-emptive,’ they must first encounter the work with the balance knob in the middle, to learn what the options are at each point, and then may progressively exert more control over the work. Although this interactivity may appear to be basic, because of the relationship to the narrativity and form it is subliminally more complex that it appears.*

To shift focus back and forth between visual and audio narratives, slow incremental changes in sound density accentuate the multi-layered image-sound construction. The cyclical narrative and structure are highlighted through repeating the image track with the following changing sound layers:

1<sup>st</sup> cycle:  Non-Verbal Soundscape (NVS) only
2<sup>nd</sup> cycle:  NVS with 1<sup>st</sup> voice on front left channel
3<sup>rd</sup> cycle:  NVS with 1<sup>st</sup> voice on front left channel, 2<sup>nd</sup> voice on front right channel
4<sup>th</sup> cycle:  NVS with 1<sup>st</sup> voice on front left channel, 2<sup>nd</sup> voice on front right channel, 3<sup>rd</sup> voice on rear right channel
5<sup>th</sup> cycle:  NVS with 1<sup>st</sup> voice on front left channel, 2<sup>nd</sup> voice on front right channel, 3<sup>rd</sup> voice on rear right channel, 4<sup>th</sup> voice on rear left channel
6<sup>th</sup> cycle:  NVS only

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617 As KY is 14min59 seconds, these six cycles parody the conventional 90 minute Hollywood feature length.
While using two rather than four channels, KYv2 was presented in alternations between silent/passive and audible/interactive. The program notes informed audiences that end and beginning mirror and feedback into each other, making the interrelated audiovisual layers increasingly understandable through repetition. The non-linear narrative is designed to be started at any scene, although it is advised to experience one complete cycle, being 15 minutes between the re-appearance of the same shot in successive cycles. The work alternates between the silent and audiovisual versions: it is silent for the first 15 minutes of each hour, then with sound for the next 15 minutes, then silent, then with sound.

4.3.6.3 Modularity and Causality

KYv2 involved deconstructing the visual narrative into the non-linear modules described above on p181. I used the modules frequently in experiments at the Magical Theatre and when VJing in 2004-5 to determine preliminary rule sets for reconfiguring the visual narrative for recombinant interactivity. These performances demonstrated how differently the visual stories could be told. However, expecting participants to exercise such fluidity with the source material created further responsibility through the above mentioned requirement for multiple encounters. Improvisational adjustment of other parameters such as duration and inflexion of shots, scenes and sequences created an imbalance with the audio, visual and audiovisual narratives. In addition to real-time responsivity, I researched how to evaluate patterns of cumulative interaction where responsivity was derived from each successive interaction relative to discernable behaviour patterns arising over entire installation stagings. This would encourage participants’ deductive responsibility toward the real-time behaviour, combined with inductive responsibility from anticipating such actions’ consequences for future participants, in a similar manner to Feingold’s The Surprising Spiral. However, I decided that the subsequent artworks of StilmS and Emergence were better

15 minutes is the most common criteria for a ‘short’ film in festival circuits.

618 See Appendix B: Curriculum Vitae.
suited to incorporating such cumulative interactivity patterns, as for KY they would be problematically reflected if any of the narrativity was to be retained.

4.4 Summary

In her “development of a taxonomy” of interactivity, Graham found “the ‘most interactive’ category of ‘Real Conversation’ was deemed not to be possible between an interactive computer based artwork and its audience.” Instead she found “an interesting site for study” in “‘Real Conversation’ (of a verbal or other variety)...between members of the audience.”$^{619}$ She found that one-on-many interactivity, denoting an artwork where one person may interact at a time while all remaining attendees are excluded from interacting at that point in time, places undue duress on the sole participant, as they become responsible for shaping the experiences of fellow attendees. Like McCormack$^{620}$ and Feingold,$^{621}$ I also found this to be the case with KYv2. In response, I sought to devise an interactive artwork that would encourage “‘Real Conversation’ (of a verbal or other variety)” between participants. I decided a new work with an intrinsically non-linear and malleable structure would be more appropriate for evoking social and physical responsibility between multiple simultaneous participants interacting with one another in non-verbal ‘Real Conversation.’ This led directly to the conception and realisation of StilmS, which are the subject of the following chapter.

$^{619}$ Graham 1997:144. Emphasis in original.

$^{620}$ See p132.

$^{621}$ See p84.
Chapter 5: StilmS

5.1 Project Overview

SteilmS were electro-mechanical hybrids between Stills and films. They were staged as live events of projected 35mm photographic slides in three side-by-side slide projectors with an accompanying improvisational soundscape. The three separate works are referred to as Steilm I, Steilm II and Steilm III while v1, v2, v3 and v4 refer to the iterations of SteilmS. They were incrementally implemented via increasingly complex technology used between
*StilmS v1-v4.* Iterations also workshopped interaction modalities appropriate to different performance venues. While volunteer participants interacted in their staging, I was solely responsible for content, as Photographer, Producer, Editor, Sound Designer, Interface Designer and Installation Designer. They were staged 19 times in variegated venues and modalities in March, July, September, October and November 2004 (Figures 5-145, 5-146, 5-147, 5-148, 5-149, 5-150, 5-151, 5-152). Video documentation of a staging of *StilmS v3* is included in Appendix A.

*StilmS* form a bridge between the PBR I conducted during the original and current PhD topics. They related to my past, present and future PBR between March 2004 and July 2005.\(^{622}\)

1) *Stilm I* continued the themes explored in my Anthropology Honors thesis and *Kali Yuga*, my immediately preceding artwork\(^ {623}\)

2) *Stilm II* concerned my PhD topic and its documentary film at that time\(^{624}\)

3) *Stilm III* resembled the abstract-experimental interactive installations pursued after I was prevented from doing fieldwork in India in March 2005.\(^{625}\)

Responsivity and responsibility were investigated between:

1) Each *Stilm* and simultaneous co-participants
2) Simultaneous co-participants and myself (as co-performer)
3) Simultaneous co-participants and audience members
4) Myself and audience members.

This is further explained in excerpts from my production diary which outline the work and Interaction Design#1, *Remote control* (hereafter Design#1).

‘*StilmS*’ are an interactive installation that interfaces divergent audiovisual narratives with representation determined by degrees of divergent and convergent interaction between participants and the work. As a semi-

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\(^{622}\) Although I began researching the topic in 2002, including conducting preparatory fieldwork in India for six months in 2003.

\(^{623}\) *Kali Yuga* is the subject of Section 4.3.

\(^{624}\) This is described on p214.

\(^{625}\) These are the subject of Chapter 6 and Appendix E.
immersive Responsive Environment, they spatially and experientially envelop audiences. Three screens are 60 degrees from one another, to partially wrap around the audience and fill their field-of-view (Figures 5-133, 5-135). The installation is pitch black, except for the projected images and ambient light emitted by the hardware used.
Narratives are made of data-sets of projected slides and associated soundscapes. Each ‘Stilm’ features multifarious narratives presented within each screen and between the three screens and between the three ‘StilmS,’ to form a metanarrative of the three ‘StilmS’ as a collective entity. The network of relationships between images and sounds forms a complex non-linear narrative of multitudinous timeframes, screens, sound sources, plots and sub-plots. Photographs include sequences showing long processes and movement from multiple perspectives, so while a time-lapse sunrise appears on Screen Left, then Screen Centre, then Screen Right, a series showing someone walking appears on Screen Right, then Screen Centre, then Screen Left (Figure 5-134). Active analysis of ‘seeing the bigger picture’ is encouraged by ‘connecting the dots’ between how each image forms a totality with all others from the same ‘Stilm,’ with leitmotifs connecting between ‘StilmS.’

Interactivity is trammeled to dispel any illusion of control over events other than their re-playing: original analogue photographs are ‘authentic’ moments in time. Even chronological sequences are not relived like video/cinema as there is no ‘real-time’ to be replayed in ‘real-time.’ The recombinant possibilities grow exponentially by presenting each image as a self-contained primitive which may be combined with other self-contained images within a larger structure that each refers to. Analogue rather than digital projectors are appropriate, as fading in and out between images can be removed with digital sequencing, which creates illusions of continuity. The artifice of cinematic illusion is undermined by the black interval between slides so every transition breaks the spell of continuity between images. There are also small gaps between the projected area of each screen, so images on different screens do not overlap. These caesuras take audiences in and out of the artwork-as-Environment, to emphasize its constructed nature. Placing all the technology and audiovisual media between audiences and the screens rather than conventional concealment in a silenced projection booth behind audiences accentuates the mechanics as an arsenal between the constructed Environment and the area occupied by the audience.

The projectors are amplified and each sound of changing slides is subject to Digital Signal Processing. Image transitions may instigate a series of enveloping repercussive sounds. Four volunteers from the audience are invited to participate in each staging. Three operate one projector each while another
controls all sound via a multi-channel mixing desk, including the auditory rhythms of the amplified projectors. This alleviates the ‘pressure problem’ of one-on-many interactivity, as used in ‘Kali Yuga’, by making it up to volunteers to participate. It is my responsibility to create an Environment conducive to participants wanting and feeling comfortable to volunteer. This also embraces ‘the uncertainty principle’ as I will not know who I am co-performing with until a few minutes before the start of the staging.

By controlling relatively few parameters amidst intuitive interfaces, participants can simultaneously engage with the narratives while co-determining the real-time behaviour of the audiovisual media. Visual sequencing and ensuing audiovisual rhythms arise from interaction between co-participants. Participants navigate their way at any rate they choose, although the intention is for each to collaboratively determine the behaviour of the audiovisual media through non-verbal dialogue with their co-participants, such as learning to navigate by observing the audio and visual effects of co-participants’ navigations. Collages, collisions and montages produced by participants have repercussions back and forth between audio and visual mediums. Complexity is brought to the interactivity by the synaesthetic repercussions between multiple simultaneous sounds and images, exemplified by polyrhythmic audio repercussions they create when changing images. Through consonance and dissonance the live improvisational soundscape forms synaesthetic relations to the images. This creates cybernetic feedback between visual rhythms and audio rhythms, in reference to complex causation and consequence, as a repercussion denotes an echo or reverberation. Such interactivity encourages participants’ investigation into cybernetic repercussions and ramifications of their interaction. Spontaneously choreographing their movements with one another may prioritise the visual sequencing they create and/or the audio rhythms that emerge from their movements. This produces a trade-off for participants to negotiate, as one may be at the deficit of the other. Timed choreographed movements requiring waiting for another participant to ‘go first’ may slow the pace and lead to relatively uninteresting audio rhythms, while moving very quickly may make relatively complex polyrhythms, but at the trade-off of having sufficient time to absorb individual images and their structured relationships with other appearing images. As well as moving forwards or backwards in single
increments, keeping the remote control pressed makes the carousel spin quickly, only projecting an image when the button is released. Such ‘random’ navigation encourages explorations back and forth across indeterminate numbers of images. Images can also be presented in a staccato or legato like manner, as pressing the remote control in quick succession makes each image appear for a fraction of a second with such rapid fading in and out that each leaves an afterimage, whereas pressing the remote control in distinctly separate intervals leaves corresponding images for enough time to absorb the content and with slower fading in and out that does not cause an afterimage. I do not mention such interaction modalities to them, as they decide the manner of interactivity. I provide minimal instructions and stress there is no ‘right’ or ‘wrong’ interactivity. This explores the ability of interaction between participants to create spontaneous and relatively non-structured forms of interaction. Superseding my imparted parameters impedes the narrative cogency, but raises participants’ responsibility in exerting more control over the behaviour of the artwork. Through these techniques ‘StilmS’ evoke literal social and physical responsibility to the artwork through the intrinsic responsivity and metaphorical responsibility to quotidian and/or natural environments as represented in the subject matter of each ‘Stilm’ and engaged with through this Interaction Design.

5.2 Form: Structure and Function

The narrative universe becomes reversible and no longer reflects the psychology of cause and effect. Repetitions, the suspension of linear time, temporal and spatial asynchrony blast classical chronology apart. Multiple screens function as fields in which scenes are depicted from multiple perspectives, their narrative thread broken.

Peter Weibel⁶²⁶

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Form and content were in-between retrospective and prospective. Their silent images with live assemblages of non-synchronous sounds evoked pre-talkie cinema, while their form referenced Expanded Cinema of the 1960s-70s, as described by Weibel above. The content and form of StilmS I-III traversed such pre-cinema precedents as Muybridge and the Zoetrope, through to contemporary interactive electromechanical installation art in light of Weibel’s “goal” of “asynchronous, non-linear, non-chronological, seemingly illogical, parallel, multiple narrative approaches from multiple perspectives projected onto multiple screens” which occur when “linearity and chronology, as classical parameters of narration, fall victim to multiple perspectives projected onto multiple screens.”

Evoking both pre-cinema and Responsive Environments required organicist deconstruction of cinema into modular and malleable primitives. My techniques of Intact Syntax, Arpeggiated Hierarchy and Translucinatory Recombinatronix were applied to determine the context- and content-appropriate relationship between form, content and Interaction Design. Narrativity was the limiting factor in the balance of trade-offs with interactivity, as the cogent narratives were amenable to corresponding interaction modalities. Visual primitives were whole slides, so they were fully formed ‘words’ in the recombinant analogy on p92. Through the technique of Translucinatory Recombinatronix, which is described in relation to my artwork Sly Drooler, individual audiovisual streams could become translucent, such as images and/or sounds being faded in and out or placed over the top of one another through sound and vision mixing consoles.

The recombinant potentiality for combining all visual primitives in real-time was determined by the combinatorics of participants’ sequencing of the images. In applying Intact Syntax, recombinant possibilities and their associated degree of interactivity were relatively limited, due to the trade-off between interactivity and narrativity. All slides could be shown alongside all slides on the other two screens at the expense of the careful cross-referencing between images on different screens (Figure 5-134). Increasing the fineness of

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627 Weibel 2002:50.
628 Or a 1000 words in the proverb of what a picture is ‘worth.’
629 See p181.
the granularity by deconstructing primitives to be equivalent to a syllable, phoneme or a graphical component forming part of a letter would facilitate exponentially more fine grained responsiveness in the work. I decided against primitives that were smaller than single whole slides, such as segments of slides, as whole slides balanced granularity with the flexibility of their form due to the relations between images. Skewing the "balance of specificity"\textsuperscript{630} in favour of interactivity over narrativity would only have been appropriate in v4.\textsuperscript{631}

The improvised sequencing by participants between each carousel as a ‘memory bank’ of photographs paralleled “the flexibility of the relations between data in programmable sequences offered by computers” as “a consequence of technology offering random access memory to whatever is defined as data.”\textsuperscript{632} Le Grice argues this is useful in Interactive Art where random access memory “has the potential to radically undermine the linearity of narrative sequence” as it “places instances of data into a structure which may be considered as a matrix (three- or multi-dimensional grid) no longer confining presentational sequence nor connective principle to the conventions of narrative causality.”\textsuperscript{633}

The use of anachronistic analogue visual technology, in combination with digital sound technology, came out of the relationship between the content of the \textit{StilmS} and their form. Sound was distinctly different in each iteration, as each technological platform afforded variable form and content. As images had a relatively inflexible form, I used my technique of \textit{Arpeggiated Hierarchy} to prioritise the non-linear malleability of digitally controlled soundscapes. Through \textit{Arpeggiated Hierarchy} the soundscapes conjoined the indeterminacy of live improvised content that was initiated by the three participants and shaped by the fourth participant. This permitted a high degree of interactivity in the medium of sound, while the hermetically sealed, and thus less-interactive, data-sets of images ‘carried’ the narrativity. I

\footnotesize

\textsuperscript{631} Discussed below on p234.

\textsuperscript{632} Le Grice 1995.

\textsuperscript{633} Le Grice 1995.
approached the complex interactivity of the acoustic dimension with the
“under-engineering” approach Penny used in creating his interactive robotic
sculpture Petit Mal. Penny found that “the very fallibility of the system would
generate unpredictability, behaviour, personality”\textsuperscript{634} which was also the case for
the sonic dimension of StilmS. The innumerable variables and open parameters
for participants’ interaction harnessed glitch approaches to Generative Art and
Kim Cascone’s \textit{Aesthetics of Failure}.\textsuperscript{635} Such cybernetic cycles produced
“emergent interactive behavior” that was not “derived from a set of pre-
determined alternatives” but “through a contingent and unconnected chain of
triggers”\textsuperscript{636} as the complex sonic polyrhythms were created and shaped in real-
time, without any prescribed design or pre-created audio content.

By applying \textit{Arpeggiated Hierarchy} I determined the basic constraints
required to underpin such variability. Each Stilm had its own backing track that
provided the foundation of the Information Architecture: a pre-recorded, pre-
mixed soundscape played at a relatively low volume to the dominant
improvised soundscape. Each backing track provided rough indications for
different sections and anticipated overall duration of each Stilm. On top of this
base structure, improvised soundscapes were composed using a data-set of 27
samples, (being 1/3 of the 81 rows of images in the carousels). Samples were
principally non-language based location sounds I recorded in India, supplemented by others from various albums and films and excerpts of my
instrumental compositions.\textsuperscript{637} Samples were principally subject to three means
of manipulation: direction (forwards-backwards), inflection (pitch and timbre
modulation) and projection (panning). Samples varied between 0.5 and 50
seconds, to form a sonic vocabulary with the equivalent flexibility of 0.5
second phoneme through to a 50 second sentence. All but the longest samples
were cyclically looped to create contrapuntal relationships with images and

\textsuperscript{634} Penny 1997b.

\textsuperscript{635} Kim Cascone. ‘The Aesthetics of Failure: ‘Post-Digital’ Tendencies in Contemporary Computer Music.’

\textsuperscript{636} Penny 1996b. Emphasis in original.

\textsuperscript{637} I recorded location sounds in India between June - September 2000 and April - October 2003. Most of the
other samples came from my music composed between 1999-2004 and Robert Gardner’s film \textit{Forest of Bliss}. Massachutes: Harvard University Film Study Center. 1986.
other looping sounds. Looping connected the cyclical sound structures with cyclical reiterations of visual leitmotifs amidst the cyclical narratives. Samples were indeterminately assembled to each other and image subsets, according to the specificities of each staging. Arpeggiated Hierarchy was also applied to the structure of the audio data-set, with longer samples constituting 'base notes,' upon which more malleable arpeggiated 'treble' like shorter samples were laid. The longer samples carried the weight of establishing larger acoustic themes that played out while a sequence of images was shown, while the quicker samples could be interspersed without destabilising the underlying acoustic themes. Controlling this was exceedingly difficult. Without separate volume control for individual samples, I anticipated stopping each sample based on partial fade outs that were pre-mixed into all but the longest samples. Sound was highly malleable as the same Stilm varied between 8-15 minutes in different stagings.

5.3 Content and Subject Matter

StilmS I-II formed a “public research laboratory”638 examining audience relationships with two documentaries about pilgrimage, conservation and development in India. Each of the three cylinders for each Stilm represented a self-contained memory repository of photographs I took while traveling in India, Nepal and Australia. StilmS I-II images were taken in 2003 during preliminary PhD fieldwork from the source of the Ganga in the Himalayas to where it meets the ocean in the Bay of Bengal.639 They are thematically, culturally and geographically connected: Stilm I concerns the same issues as Stilm II, with Stilm II depicting the Himalayan Ganga and Stilm I the plains Ganga in North India. They were deliberately temporal and anachronistic while Stilm III was self-contradictorily atemporal.

638 Rokeby 1998.
639 I took some of the photographs in Banaras in February 2000. Insight was intended to feed into subsequent research and production of the film, during fieldwork scheduled for 2005.
5.3.1 Stilm I: A Day in the Life of the City of Death

*Stilm I* concerns the central subjects of the ethnographic film *Forest of Bliss* and my Honors thesis\(^{640}\): the omnipresence of death in daily life in the Hindu pilgrimage city of Banaras on the Ganga. These subjects are explored via interrelationships between binary oppositions, such as creation-destruction, conservation-development, sacred-profane and idealist-materialist perspectives on the interplay between life-death. The relationship between my Honours thesis and *Stilm I* is indicated below by their respective titles, with Figure 5-136 a photograph of the three projected screens:

![A Day in the Life of the City of Death](image)

**The interrelationship between Life-Death in Banaras in Robert Gardner's *Forest of Bliss***

![Figure 5-136: Stilm I title, taken during a staging at the CCR, ANU. Photograph by Josh Wodak.](image)

5.3.2 Stilm II: Down to Earth Up in the Himalayas

*Stilm II* concerned my then current PhD project on pilgrimage amidst rural industrialisation in the revered Himalayan landscape around the source of the Ganga. Each section addressed the following themes:

Section 1 | Section 2 | Section 3
---|---|---
Power of Place | People or Place | Paradoxes of Pilgrimage
Power over People | Problems of Progress | Purity or Pollution

The relationship between my PhD topic and *Stilm II* is indicated by their respective titles (Figure 5-137):

The Idea of North:
Pilgrimage and Progress
in the Garhwal Himalayas

Each title encouraged reading vertically between words onto the same screen and horizontally and diagonally between screens. Placing complimentary and contrasting words within each screen – ‘Down/Up’ and ‘Earth/Himalayas’ – referred to the continued exploration of binary oppositions and also connected individual *Stilm* titles with the overarching themes of the work. This is illustrated in discussing *Stilm III*.

5.3.3 *Stilm III: ABACADABA (AKA grin repercussions)*

Following the themes developed in *Stilm I-II*, *Stilm III* completes the cyclical metanarrative. *grin repercussions* refers to grim repercussions of humans upon the natural environment and ‘grim reaper’ to death and regeneration. These themes are central to all *StilmS*, but are especially prominent in *Stilm III*. There are no people, signs or animals in *Stilm III*. It represents passing through a ‘ghost world’, where humans’ effects are shown,
### Figures

#### Figure 5.138: Stilm III title, taken during a staging at the CCR, ANU. Photograph by Josh Wodak.

#### Table: Narrative structure and subject matter

<table>
<thead>
<tr>
<th>Section+ Slide Number</th>
<th>Narrative structure and subject matter</th>
<th>Time of Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 (S1-9)</td>
<td>Combined abstract macrocosmic and microcosmic environments, indeterminable scale and subject</td>
<td>Daylight (unspecified)</td>
</tr>
<tr>
<td>B1 (S10-18)</td>
<td>Segue into macro photos of biomimetic gates, bricks and building adornments (e.g. floral cast iron and marble inlays)</td>
<td>Early morning</td>
</tr>
<tr>
<td>A2 (S19-27)</td>
<td>'Zoom out' from abstract micro of nature - bark, leaves, flowers- to identifiable forms: branches, shrubs, then trees</td>
<td>Midday</td>
</tr>
<tr>
<td>C (S28-35)</td>
<td>Movement from detail of parts of larger architectural forms - building facades, corridors- to revealing the whole</td>
<td>Mid afternoon</td>
</tr>
<tr>
<td>A3 (S37-45)</td>
<td>Beginning with tree parts, then whole trees, then whole forests</td>
<td>Dusk to dark</td>
</tr>
<tr>
<td>D (S45-54)</td>
<td>Massive architectural forms (bridges, large buildings) through to experimental time lapse photos of cities at night</td>
<td>Late night</td>
</tr>
<tr>
<td>A3 (S55-53)</td>
<td>Larger scale environments: wide angle landscapes and mountains</td>
<td>First light</td>
</tr>
<tr>
<td>B2 (S54-72)</td>
<td>The beginning of the end: reversing of scale in reverse structure to B1: long shots of urban decay and destruction, through to macro shots of unidentifiable scale</td>
<td>Early morning</td>
</tr>
<tr>
<td>A4 (S73-81)</td>
<td>The reverse of the structure of A1: nature in decay, examined in increasingly closeness, ending with the different perspectives on the same images shown in A1</td>
<td>Daylight (unspecified)</td>
</tr>
</tbody>
</table>

#### Figure 5.139: Schematic of the narrative structure of ABACADABA
but depicting humans is restricted to the culturally specific relationships in the quotidien and natural environments depicted in StilmS I-II.

ABACADABA refers to the form and structure of all StilmS, but in particular to Stilm III (Figure 5-138). The nine letters of ABACADABA refer to the order of the 9 Scenes (Figure 5-139). A sections denote not-so-built natural environments while B, C, D, B form an arch of not-so-natural built environments from India, Nepal, Tasmania, NSW and Canberra. Combined, they form interweaving patterns of collages, collisions and montages which are disclosed over progressive shifts back and forth between microscopic to macroscopic images. This is explained in the above schematic (Figure 5-139), which details how they were arranged into the nine scenes. The same organisational principle was used for Stilm I and Stilm II.

5.4 Metanarrative Structure

The narrativity-interactivity balancing in KYv2 was incorporated into the interrelated form, content and function of StilmS. Both works concern obtaining, maintaining and retaining balance between binaries. Balance is impossible between two points, as an intermediary pivot point is required, like a middle-ground balance for a see saw. In KYv1 balancing within a ternary system was created by the physical position of the intermediary silent screen between the two audible loudspeakers. In KYv2 this was extended to participants adjusting the balance knob of the two audio channels. In StilmS the triptych physically embodied a ternary system, such as Screen Left depicting something overtly sacred, Screen Right depicting something overtly profane while the content and spatial position of Screen Centre depicted something between sacred and profane. Accompanying sounds reified these ternary relationships by complementing, contrasting or being ‘neutral’ relative to any number of images being shown. Ternary logic was also used in the structure of each Stilm, as described in relation to ABACADABA above.
The role of ternaries in forming balance was also reflected across their form and content. \textit{StilmS} I-III were collectively titled \textit{3forkthree},\footnote{3forkthree was the first in a trilogy of interactive installations. The second being 3forfour (what's the point of balance) and the third being 4forfour (four on the floor). 3forfour and 4forfour were not staged as I opted to work on Emergence. Instead, elements of them were used in StilmS v4, and Emergence (see p259). Photographs of the scale model of 3forfour are on the cover of this thesis. As an example of the relationship between these works, 4forfour involved four consecutive performative installations, which each use 4 projectors, 4 projector screens, 4 laptops, 4 microphones, 4 amplifiers and 4 loudspeakers, each of which has 4 drivers.} as they were composed of:

3 \textit{StilmS}, each in 3 sections,  
each section of 3 scenes, each scene of 3 parts; 
3 slide projectors each using 3 carousels each containing  
3x3x3x3 slides projected onto 3 screens;  
3 amplifiers, 3 loudspeakers for  
3x3x3 location sound samples and 3x3 spoken words,  
which are all delivered together in  
3 mediums: image, location sound and speech 

The metatitle of all three \textit{StilmS} as a collective entity is: 
\textit{3forkthree/hATriok of Triple Tryptichs}  
\textit{(F@Fire u donut secede Tri Trie Try Again\textsuperscript{13})} 

The word play, alliteration, onomatopoeia and malapropisms reflect \textit{StilmS}' manipulation of form and content through ‘manguage’, which stands for \textit{mang}led language. It contains three sections. As all three \textit{StilmS} were triptychs, part two reads as \textit{A Trio} or \textit{A haTrick} of three triptychs. \textit{Triple Tryptichs} also refers to \textit{TripleTriplet}, the linguistic component of the soundscape. Letters ‘y’ and ‘i’ in \textit{Tryptichs} are reversed to denote a noun, despite being a neologism derived from the adjective ‘tryptic’ which describes the quality of “a digestive enzyme that breaks down proteins in the small intestine.”\footnote{New Oxford American Dictionary on Mac OS10.5, s.v. ‘Tryptic.’} This references the ‘debased’ material substrate of 35mm film emulsion disintegrating and dissolving over time, as used in my \textit{Sly Drooler}.\footnote{See p191.}
This was also referenced in debasing the materiality of the medium by scratching the title of each *Stilm* onto emulsion film. Part three comments on the proverb “if at first you do not succeed, try, try, try again.” *First* and *Again* suffixes are raised, to refer to a version or number, such as “3rd time lucky.” *Trie* refers to the computer science term for an ordered tree data structure, which influenced the design of the data-sets.

*Slides are structured as spatio-temporal expressions of ternary relationships.* Each ‘Stilm’ has three sections. Each section has three scenes. Each scene has 3 parts. Each part has 3 rows of slides. All 720 images are arranged into shots, scenes and sequences according to consonance and dissonance with images they may be shown simultaneously alongside and those immediately preceding and succeeding. This forms subset sequences of 3 images in 3 neighbouring rows: each image with that immediately preceding and immediately succeeding, in relation to each immediately preceding and immediately succeeding images on the other screens. While ‘ABACADABA’ spells out this anagrammatical and palindronic structure, all ‘StilmS’ use this cross-referencing system and structure.

The following two diagrams (Figures 5-140, 5-141) illustrated this for audiences before *StilmS v2 and v3*:

![Figure 5-140: Diagram projected before Stilm 1 v2 and v3 to explain the narrative and structure](image1)

![Figure 5-141: Diagram projected before Stilm 1 v2 and v3 to explain the narrative and structure](image2)

Diagrams by Josh Wodak.
As the carousels had 80 Rows and the narrative required 81 Rows (9 scenes each with 9 rows), each Stilm concludes with a repeat of Row#1 (the Stilm title). This embodied the self-perpetuating cyclical narrative in the circular form of the carousels. Each was structured to be experienced forwards (Row#1-through-Row#81) or in reverse (Row#81-through-Row#1), or for one full cycle between any two Rows (such as Row#55 of Cycle A through to Row#54 of Cycle B). This built on the same narrative and structure as KY, except that StilmS’ interactivity allowed random access to any image in any row at any time, which was appropriate to the narrativity of StilmS but not to the narrativity of KY.

*TripleTriplet* expresses the metanarrativity of all StilmS combined. *TripleTriplet* involved a 2nd Sound Participant controlling three arrangements of three words. They would be controlled on a separate laptop, so this fifth participant would be in dialogue with Sound Participant #1, who mixed all sounds together and subjected the amplified projectors to Digital Signal Processing. Manipulation would be similar to the polyrhythms from the repercussive projector sounds, as Sound Participant #2 subjected each triplet to revolving permutations and combinations that became progressively enveloping spoken word collages, in reference to sound works such as Steve Reich’s *It’s Gonna Rain* (1965) and *Come Out* (1966) and Glenn Gould’s *The Idea of North* (1967) (which my PhD title was named after). To illustrate the relationship between each *TripleTriplet*, they are described according to each Stilm they accompany:

*Stilm I* words and their arrangements were:

- dog eat dog
- dog eat god
- god eat dog

It concerns a central tenant of Vedic philosophy, where creation perpetually begets destruction, which perpetually begets creation. Given the prominence of death in Banaras and *Stilm I*, it also concerns the acrimony of a city where dogs feed off the semi-cremated remains of pilgrims who travel to Banaras to die.
For *Stilm II* they were:

this is bliss
bliss this is
is this bliss?

This concerns the Hindu identification of the Himalayas as a *tirthastan*: a place of transcendence and bliss. Such cultural constructions of landscape impute immaterial experiences onto material places. However, ‘this is bliss’ and ‘bliss this is’ are questioned by rearranging the terms to ‘is this bliss?’ Oscillating between these states is explored by depicting repercussions of pilgrimage on the Himalayas while the *TripleTriplet* fluctuates between consonance and dissonance with the images.

For *Stilm III* they were:

this is that
that is this
is this that?

This refers to the polemic of mutual interchangeability. This *TripleTriplet* critiques ubiquitous, didactic, prescriptive and authoritative voice-overs that reductively ‘explain’ images by discussing entities in terms of one another (such as a documentary voice over of “This is village X...that is village Y...this is the issue...that is the solution”). In *Stilm III* scenes are structured whereby *this* is *this* and *that* is *that*: leakages between types of environment (such as natural and physical) may go from drips to floods as the slides and sounds represent imbalance by progressively shifting their phrasing and phasing. Enveloping waves of sound gather momentum throughout, to progressively undermine any binary partition of the world into *this* and *that*, or into a unified whole where *this* is *that*. In relation to *Intact Syntax* and the Alphabet soup analogy in Chapter 2, their “balance of specification” involved re-ordering

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644 See p92.
whole words rather than the higher responsibility of re-ordering individual letters, although the net effect resembled re-ordering letters due to phonetic similarities between the words.

5.5 From Implicit to Explicit Interactivity

The above ideas and intentions were incrementally implemented in progressively more interactive iterations. Progressing from implicit interactivity in *StilmS* v1 and v2 to explicit interactivity in *StilmS* v3 was through workshopping further developments to the form, content and Interaction Design at each stage and staging. During all *StilmS* I interpreted audiences’ real-time body language and non-verbal auditory responses to modify the performance:

*Like an actor during a theatrical performance, subtle adjustments of tempo, intensity and atmosphere can instigate further adjustments in the roles of artist, artwork and audience by incorporating audiences’ real-time responses. To do so, modify the duration and tempo of images and sounds, consonance and dissonance between them, the selection of audio samples and their volume according to any perceived waxing and waning of audiences’ interest and attention.*

While this made *Stilm I* and *Stilm II* implicitly interactive, they could not offer intuited responses to audience behaviour, other than in Design#1 (Figure 5-133). Human perception is incalculably inferior to computationally sensing interest and attention to create correlations between cause and affect. In keeping with ‘the theme of threes’ I conceived three Interaction Designs, with Design#2 and Design#3 to be implemented in *StilmS* v4 after the phase of critical reflection following *StilmS* v3.

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*Willis 2005:17.*
5.6 StilmS v1: Prototyping the Installation

Before staging Stilm I it was necessary to stage Still Philm, a ‘pre-prototype’ detailed in Appendix D. Both premiered at the Magical Theatre in Sydney, with Still Philm on January 25 2004 and Stilm I on March 21 2004. Stilm I proved invaluable for workshopping with a public audience that gave candid feedback as they were mostly artists, collaborators and/or friends. I conducted follow up discussions with select audience members as Magical Theatre occurred fortnightly with regular attendees. Discussions concerned their experiences and perspectives on the narrative and subjects and my proposed interactive iteration.

As the first staging of the first Stilm, my image sequencing requirements lead me to recruit close collaborators for the audio. Audio comprised live sitar by Cartwright, amplification of the slide projectors and a data-set of samples from Forest of Bliss. All were fed through a multi-track hard disk recorder and subjected to Digital Signal Processing by Richard Schweizer. The polyrhythms from the amplified projectors were an anachronistic mechanical supersession of tabla’s traditional accompaniment to sitar in Hindustani classical music. I directed Schweizer and Cartwright to accentuate audience input into the cybernetic Artist-Artwork-Audience network through the implicit interactivity discussed on p220 above. As the carousels were not circular, I indicated a hand signal to Schweizer and Cartwright when to fade out their performances when the final row of slides was reached. To elicit intuitive improvisational responses I did not show Cartwright or Schweizer Stilm I prior to the staging.

5.7 StilmS v2: Developing and Refining the Installation

v1 could not demonstrate the cyclical narrativity since the obtainable projectors used cylindrical cartridges. v2 overhauled the narrative and

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646 Cartwright and I studied sitar and tabla respectively in India together and have collaborated on a range of film, music, performance art and installation projects, including Kali Yuga and Emergence.
structure given newfound access to light boxes and cyclical cartridges. Mapping out *Stilm I* in its entirety refined the interwoven image sequencing between simultaneous narrative threads (Figure 5-142). The following is one ‘script’ I used when performing v2.

To stage v2 unaccompanied I simultaneously controlled the three projectors and all the sound.\(^{647}\) I programmed an *Arkaos* software patch of the data-set of 27 samples, which allowed up to five simultaneous samples to be played (one by each right hand finger). Samples were arranged in four broad colour coded categories to assist in identifying which keyboard letters triggered corresponding samples (Figures 5-143, 5-144):

\(^{647}\) I researched a range of software for non-linear computerised control of sound. The requirements made selection easier, as the software had to be operable with one hand as my right hand was singularly devoted to controlling three slide projectors. The software also needed to trigger video with the audio, so that text graphics triggered by the audio would identify which sounds corresponded to keyboard keys. As a result, the software used was *Arkaos*. 
The research-practice relationship was reified by an academic staging in a small cinema at the ANU Centre for Cross-Cultural Research (CCR) on July 15 2004 (Figure 5-145). It seated 40 people and was near capacity for the event. Publicity was circulated around fine arts, social sciences and humanities departments, as StilmS drew principally from these disciplines. How StilmS relate to KY was demonstrated by beginning with KYv1 followed by Stilm I. The relationship was explained in an introduction about my PBR and through the publicity, which stated I would present two works in which...the relationship between image and sound generates a new context for elements commemorating Robert Gardner’s film Forest of Bliss, about death and regeneration in the Indian city of Banaras.

*Stilm I v2* was comprehensively contextualised to facilitate audience engagement and interpretation. Publicity informed attendees that

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648 The event demonstrated the relationship between my research and practice, as I presented *Forest of Bliss* in the same venue in April 2004.
the second work is a Stilm, a cross between a slide show and a film. It involves three side-by-side slide projectors and a simultaneous soundscape of samples taken from the film *Forest of Bliss*. The slides were taken in 2000 and 2003, in an attempt to represent the omnipresence of death in daily life in the most sacred Hindu pilgrimage city of Banaras.

The audience was informed that *Stilm I* was the first of the trilogy and I was seeking critical feedback for iteratively developing *Stilm II* and *Stilm III* in the discussion following the staging. The audience was largely unknown to me as I had moved to Canberra and begun the PhD at the CCR four months before. The audience offered insightful feedback about what was communicated from perspectives that were largely unfamiliar with Indian culture, expanded cinema, installation art or electronic art. These discussions occurred over ensuing months as I came into increasing contact with many who attended. This also kept discussants informed about staging all *StilmS I-III* in direct succession in the same venue three months later.

After *Stilm I v1* and *v2* I completed post-production of *Stilm II* and *Stilm III* and then staged *StilmS v3* in its entirety with Design#1. *TripleTriplet* was slated for *StilmS v4* as it could not be included in *v3* due to the logistics of an additional participant controlling pre-existing verbal sounds.

### 5.8 StilmS v3: Implementing Explicit Interactivity

Like the *StilmS* themselves, managing participants’ “learning curve”\(^\text{649}\) was in light of Penny’s approach to ‘training’ participants in his interactive artworks. This entailed designing *StilmS* to be intelligible through repeated engagement or, for audiences who may only experience the work once, to demonstrate the interactivity modalities in *Stilm I* then *Stilm II*, to make the modalities familiar before volunteers were invited to participate in *Stilm III*. Staging all *StilmS* in succession also demonstrated the interconnected form and themes between all three *StilmS*, so that those participating in *Stilm III* may have an understanding of what to expect given they would not know what any of the audiovisual content was. This process of familiarisation was crucial.

\(^\text{649}\) Penny 2000. Penny’s technique of managing participants’ “learning curve” is described on p107 of Chapter 2.
to creating an atmosphere conducive to four volunteers desiring and feeling comfortable to participate, given they did so amidst fellow ‘passive’ participants. As their participation was integral for evoking social and physical responsibility between audiences and the work, the challenge was to create suitable conditions for such across four vastly different stagings. The differences between these stagings determined such variables as whether any verbal or textual contextualisation was appropriate. The second staging, discussed below, contextualised and demonstrated the narrativity and interactivity, the third staging explored the ability of the work itself to communicate how it functioned with no contextualisation provided while the fourth staging provided absolutely minimal contextualisation.

5.8.1 Design#1: Remote Control

Remote Control is the Interaction Design that was described in the introduction to this chapter. When staged, my control was relegated to emphasizing consonance or dissonance between images and their audio repercussions, by improvising a natural and/or industrial soundscape that was fed into the mixer controlled by Sound Participant #1. This referred to how musicians played ‘second fiddle’ to images they had no control over in pre-talkie cinema and how VJays play ‘second fiddle’ images for live musicians. Influencing participants’ navigation through the images was non-verbally negotiated with Sound Participant #1’s control of sounds produced by myself and participants. For example, if feedback delay descended into entropy in an ‘industrial’ scene while I provided sounds of birds and waterfalls, Sound Participant #1 could reduce the volume and Digital Signal Processing of the projectors to juxtapose nature sounds with industrial images.

The subject of responsibility to the natural environment was evoked by how participants collectively oscillated between the different states of the work, as represented by pre-arranged shifts back and forth between natural and urban scenes in Stilm III. Due to the structural arrangement of pre-recorded sounds and images, these oscillations occurred as repercussions of a
fugue, where they refer to “the return of the theme after an episode”\textsuperscript{650} and the definition of “response” in music which is “the answer to the subject in a fugue.”\textsuperscript{651} Repercussions are also between scenes, as the amplified sounds of transitions during a scene could produce frenetic polyrhythms that carry over such accumulating acoustic ‘residue’ into the next scene. This evokes permeable membranes between natural/human and audio/visual environments which ‘spill over’ into one another. Furthermore, participants’ navigation was likely to subjugate the narratives within the cross-referencing system between images, to highlight entropic interpenetration between ‘natural’ and ‘urban’ scenes. Retaining or undermining the arrangement of each scene as self-contained required spontaneous and unscripted “‘Real Conversation’...between members of the audience”\textsuperscript{652} to navigate through images in dialogue with co-participants.

\textit{5.8.2 Staging}

\textbf{5.8.2.1 Amnesty International Freedom Festival (AIFF)}

Before staging \textit{StilmS I-III} in succession I decided to stage \textit{Stilm II} or \textit{Stilm III} to garner responses, as neither had been staged. I chose \textit{Stilm III} as it required little or no formal explanation, being without socio-cultural references. The images of \textit{Stilm III} were staged at the AIFF on September 25 2004 at Tilleys in Canberra (Figures 5-151, 5-152). AIFF is important in Canberra’s cultural calendar and had over 140 attendees. I collaborated with Somaya Langley, who performed live electronic sound-art while I performed the visuals. Computer-controlling the slide projectors was researched, to facilitate greater responsivity between sound and vision. This was appropriate to v4,

\textsuperscript{650} \textit{New Oxford American Dictionary} on Mac OS\textsuperscript{10.4}, s.v. ‘Fugue.’


\textsuperscript{652} Graham 1997:144.
Chapter 5 – StilmS

Figure 5-145: Old Canberra House, venue for StilmS v2+v3

Figure 5-146: Balmain Town Hall, venue for StilmS v3

Figures 5-147, 5-148: The rooftop courtyard at ANU School of Art, venue for StilmS v3

Figures 5-149, 5-150: The downstairs courtyard and exterior of ANU School of Art

Figure 5-151: Tilley’s stage area, venue for StilmS v3

Figure 5-152: Somaya Langley performing during StilmS v3
with anachronistic analogue technology appropriate to the “media archeology” approach to \textit{v1-3}. The staging was useful to workshop \textit{Stilm III} with a public audience, however it was not highly relevant to the following stagings, which intended to cede greater control to participants over images and sound.

\subsection*{5.8.2.2 ANU CCR}

The premiere of all \textit{StilmS} was at the CCR on October 8 2004 (Figure 5-145).\footnote{Huhtamo 2004.} It was publicised more extensively than \textit{v1}, resulting in an audience exceeding the 40 fixed seats, so I placed 10 extra chairs behind the back row. Attendees were faced with a deliberate bind as they entered the space, since the volume of equipment blocked the main entrance and thoroughfare.\footnote{This was the same venue used for \textit{Stilm 1 v2}.} I stuck two arrows to the floor at the entrance: one pointing left and one right. Choosing right required squeezing through a narrow thoroughfare between a chair and a wall or choosing left required navigating between all the equipment. The physical and symbolic dominance of technology became a source of disagreement between attendees during the feedback session, as the disjuncture between representing ‘nature’ via the arsenal of equipment provoked debate.\footnote{The equipment used were: 3 slide projectors, 3 remote controls, 3 projector screens, 2 microphones, 1 laptop, 1 sound mixing console with built in effects, 1 overhead projector, 1 video projector, 1 stereo amplifier, 2 loudspeakers, 1 video camera and all associated cabling.}

A symbolic montage of \textit{StilmS}' form played on loop on the video projector while attendees settled in. As an academic staging, I introduced the socio-cultural basis of each \textit{Stilm} and the issues I was investigating through them. Explication of \textit{Stilm II} expanded on the limited publicity:

This \textit{Stilm} is about pilgrimage in a landscape revered for its sacredness: the Himalayan mountains at the source of the river Ganga. Organised around three related themes, \textit{Paradoxes of Pilgrimage, Problems of Progress and Purity or Emergence}.\footnote{Asking audiences to express preferences through movement became instrumental in \textit{Emergence} (see p268).}
Pollution, the work concerns the performance of pilgrimage amidst a backdrop of rural industrialisation. Audiences were informed that StilmS I-II were relevant to the explicit interactivity in Stilm III. This encouraged active analysis of StilmS I-II for anyone to decide if they wanted to interact in Stilm III. The publicity was also used to communicate about the interactivity:

ABACADABA is an experiment in interactive audiovisual installations. The slide projectors are amplified, and their operation is offered to three volunteers from the audience (which makes them part-performers in the work). A varied audiovisual environment is constructed, out of collages, collisions, contrasts and montages between not-so-natural built and not-so-built natural environments in India, Nepal, Tasmania, Blue Mountains, Sydney and Canberra. Shots, scenes and sequences pre-loaded into the projectors are jammed with: between different volunteer operators and between each operator and their own projector, as every slide change is amplified and sent through a series of delays, to create audio rhythms which spring from the visual rhythms. In response to image combinations created, I play a stereo soundscape from a laptop. The sound sources are mixed by another audience member, who may shape the balance of the soundscape in tune with their own response to the images.

Participants’ interaction was marked by some trepidation at the beginning. This was understandable given it was the first staging of all StilmS and the first involving explicit interactivity and that this spontaneous collaboration between five people occurred in an academic setting without prior arrangement of who would participate.

5.8.2.3 ANU School of Art Ball

On the following night, October 9 2004, I staged all StilmS in the radically different context of the ANU School of Art Ball (Figures 5-149, 5-150). They were part of a night long festival of simultaneous performances, exhibitions and installations occupying the entire School of Art. StilmS were staged on a flat outdoor rooftop designated for electronic performance and installation art (Figure 5-148). In pre-production I identified a long white painted wall as appropriate due to the frequent images of walls, bricks, and

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657 Video documentation is included in Appendix A.
building sites (Figure 5-147). There were no seats so attendees dispersed themselves throughout the space. Presaging v4, participants controlled all projectors and Digital Signal Processing of all projectors in all StilmS. As I did not control any images, I concentrated on my contributions to the soundscape, by developing new audio patches of different samples. Warwick Lynch, who I did extensive audiovisual collaborative performances with, was Sound Participant #1.

The festive atmosphere, minimal contextualisation and expanded parameters of interactivity resulted in greater experimentation. In this context participants discovered the above mentioned random access from holding down the navigation button to move any number of images forwards or backwards in one go. As no program identified when the beginning or end was, some people came and went while StilmS were being staged while others interacted or sat, stood and walked around. For Stilm III I invited three dancers to dance with firesticks between the projectors and the wall. Images were partially projected onto their bodies and through the flames before they reached the wall.

5.8.2.4 Balmain Hybrid Happenings Festival (BHHF)

The last format StilmS were staged in was BHHF at Balmain Town Hall, from November 24-26 2004 (Figure 5-146). BHHF was promoted as “immersing the audience into a high-tech realm of interactive sensory wonders” which would be “beyond a bums-on-seats film festival experience”658 (Figures 5-153, 5-154). Each Stilm was staged consecutively on three consecutive nights as a 40 minute event within the program (Figures 5-155, 5-156). My solo practice and collaboration with Synarcade featured heavily, as each night we staged the first iteration of Emergence659 and VJayed for the bands, many of whom were affiliated with Synarcade. I devised appropriate technical specifications for the screens, projectors, microphones and PA to facilitate immersive engagement in

The website does not exist as of October 23 2009.

659 This iteration and staging of Emergence v1 is the subject of Appendix C.
the massive open-plan hall. This research was also used for *Emergence v1*, as it required most of the equipment used for *StilmS* in a similar configuration.

As “Hybrid Happenings,” the artists were invited to engage audiences in various modalities. I decided against any verbal introduction, contextualisation or formal feedback sessions. To publicise the interactivity, I used the prosaic title of *Still Films: Interactive AudioVisual Installations* and used the same summaries from v3 at the CCR. The following Figures (5-157 and 5-158) were digitally projected onto the centre screen for 30 seconds before respective *StilmS*:

![Figures 5-153, 5-154: Screengrabs of the BHHF website](image)

![Figures 5-155, 5-156: Excerpts from the BHHF program, showing the order of *StilmS* and *Demophobic* each night](image)
Stilm III presented a different challenge to encourage audience interaction. I projected the following invitation (Figure 5-159) and instruction while waiting for volunteers:

However the publicity also established the parameters:

The operation of the slide projectors is offered to three volunteers from the audience, who shape collages, collisions, and montages between not-so-natural built and not-so-built natural environments in India, Nepal, Tasmania, Blue
Mountains, Sydney and Canberra. A soundscape is mixed by another audience member in tune with their own response to the images, as an experiment in interactive performance.

BHHF did not have the cordial atmosphere of the above stagings. *StilmS* were the first interactive event each evening, being preceded and succeeded by passive spectaATION of bands and films playing. They required improvised collaboration between heterogeneous audiences. Despite *StilmS I-II* displaying their operational logic, the invitation to interact with *Stilm III* surprised the audience on each night. Many of the volunteers who approached asked about the parameters of acceptable interaction, to determine whether their responsibility would be burdensome. Although I answered with candor and endeavoured to reassure them there was no ‘right’ or ‘wrong’ interaction, prospective volunteers expressed their inhibition of performing unknown material with co-performers they did not know. Although three volunteers interacted each night, interaction was initially cautious between them, as the five performers negotiated rapport with one another and the work. The amplified sound projectors were ominous relative to previous stagings, due to the ambient acoustics of the massive hall. The festival’s sound operator was Sound Participant#1 for each night.

### 5.9 *StilmS v4: The Definitive Designs*

*StilmS v1-v3* were successful relative to the means, resources and time I could devote to the project. However they were limited in their subjugation of my authorial responsibility and elevation of participants’ control. They were also designed to become intelligible by attending multiple times, as it was difficult for participants to know what was on other screens during their first time observing or participating. This related to the same principle in *KYv2*, where adjusting the audio balance knob allowed a greater sense of engagement if a participant first knew what was on both audio channels, so they could make informed decisions about what voices they wanted to highlight and which they wanted to suppress. Similarly in *StilmS*, participants needed to use inductive logic to anticipate what may be appearing on other participants screens, based on the deductive logic of organising each *Stilm*
into nine scenes with nine images in each scene. Scene transitions formed figurative ‘anchor points,’ where if a participant felt bewildered, they could find their place within the meta-structure when they reached scene transitions in their own carousel and/or observed their co-participants doing likewise. Alongside the related developments discussed below, v4 sought to present StilmS so that participants could attend multiple times so as to discover their nuances of interactivity and narrativity.

The anachronistic ‘purity’ of original slides suited v1-v3 but v4 does not highlight disjuncture between ‘ancient cultures,’ ‘timeless nature’ and the electro-mechanical installation. Rather, all slides are digitised and computationally controlled digital projections. This creates much greater spatial and temporal interactivity by the relative flexibility of digital image files over 35mm analogue slides. This expands the malleable and modular form of v1-v3 through ‘modular malleability’ and ‘malleable modularity.’ The visual primitives are still whole individual photos, but there are more means of moving between them, according to variable speed, duration, direction and transitions (such as cross-dissolving and fading in-and-out). Each ‘Stilm’ is retained as a separate artwork. For instance, images from ‘Stilm I’ would not appear in ‘Stilm II.’ The data-set of sounds is substantially expanded, both by adding new samples and by making the sound primitives substantially smaller, through granular synthesis and a wider array of Digital Signal Processing than used in ‘StilmS v1-v3.’ Through Design#2, my performative agency is literally the collective interactions of all participants. Design#3 supersedes my performance in place of perpetually self-perpetuating semi-autonomous networks derived from collaborative and collective interaction. Artificial perception systems used to analyse participants’ behaviour provide a rich interpretative field for exploring the behavioral properties of indeterminate causality and emergent behaviour. All behaviour of the work is digitally controlled in real-time, subject only to the artificial perception system and not to any prescribed order or sequencing.
5.9.1 Design#2: NoPainNoGain

Design#2 (Figure 5-160) explored biofeedback in interactive art, such as groups administering electric shocks in Stelarc’s Ping Body (1995-98). It was heavily influenced by my experiences of interacting with Khut’s Drawing Breath (2005) and Cardiomorphologies (2004-8) and my encounter with Parr’s Kingdom Come and/or Punch Holes In The Body Politic (2005) as described on p42 of Chapter 1.

Only a portion of audiences can interact in Design#1 and Design#3. Design #2 levels the playing field between ‘players’ and ‘sideline sitters’ whereby everyone exerts equal influences, as even opting to not interact exerts influences. Select muscles on my arms, hands and fingers are connected to electrodes. Participants determine the volume of electrical charges which involuntarily move these separate body parts (Figure 5-161, 5-162, 5-163, 5-164, 5-165). A 3D Motion Sensor system, such as Rokeby’s ‘Very Nervous System’ or Penny’s ‘Tracer,’ analyses the speed, direction and gestures to
produce corresponding inflections of the modules of audiovisual media. The performer does not control the work, but their puppeteered movements conduct the work. This is analogous to how conductors’ gestures in Western classical music communicate the parameters of how to play the score. As in Design#1, movements from the left arm, hand and finger control audio while right side movements control visuals. For example, moving the right arm away from the body at distance A and speed B causes effect C, such as changing images forward at rate D. Participants are divided into thirds, with each third connected to separate body parts. The left third controls location sounds according to left arm left-right movements. The middle third controls the 'TripleTriplet' according to left arm forward-backward movement. The right third controls the visuals according to right arm forward-backward and left-right movement. A circular dial is attached to each seat as a parody of the following electronic voting mechanisms in Figure 5-161 and 5-162.

The dial numbers range from -5 to +5. Turning the dial left, in increments of -1, -2, -3, -4, or -5, attributes a corresponding voltage to move a body part left and/or backwards, depending on which audience sector and which muscles the charge is mapped to. Positive values (+1, +2, +3, +4, or +5) produce corresponding shifts to the right and/or front with the same contingency (Figures 5-163, 5-164, 5-165). Deciding not to move the dial forms implicit interaction, as it allows those explicitly interacting (by moving the dial) to have greater control in the execution of the work.

While data from participants' dials could interface directly with the work, the performer is still integral. Interacting via a mechanised human heightens attendees’ responsibility toward one another, to the performer and the Responsive Environment. The puppeteered body movements determine the sights and sounds attendees respond to. This produces cybernetic feedback loops between causes-consequences and Artist-Artwork-Audience, to temper haphazard dial adjustments, as the performer's pain and frenetic bodily movement is in full view of attendees, with more frenetic bodily movement accordingly destabilising the behaviour of all audiovisual media. While the performer behaves involuntarily like a machine, the human body still behaves unpredictably, like a ‘ghost in the machine.’ After being tensed and flexed by electrical charges, the central nervous system can make the same muscles spontaneously recoil. This residue of agency in the Human Computer
Interaction allows for a margin of error in the responsiveness. Consequently, while participants may exact punitive control over the performer, this cannot be extended onto the behaviour of the work.

Figures 5-161, 5-162: Examples of some of the IRDA based systems for administering electric currents for Design#2

Figures 5-163, 5-164, 5-165: Electronic voting mechanisms for Design#2, whereby participants could decide on the extent of the positive or negative electric charge administered by moving the slider or dial. Of note is the name of the devices: “Interactive Response” and “Interactive Participation”.

These voting devices were also considered for my Interaction Design for Emergence (see p268).
5.9.2 Design#3: Emote Control

‘Emote Control’ (Figure 5.166) re-conceives ‘Remote Control’ to allow multiple spontaneously self-forming and self-organising groups of participants to collectively interact with the work. It is a stand-alone installation that runs without any operator intervention or human performers. Content alternates every hour between ‘StilmS I-III’: i.e. ‘Stilm I’ from 9-10am, ‘Stilm II’ from 10-11am and so on. It encourages individuals within groups to collaborate and for groups to collaborate with other groups. Participants’ movement around the space collaboratively determines the selection, sequencing, inflexion, manipulation and Digital Signal Processing of all audiovisual media, which cybernetically determines how they navigate through the narrative.661 It is

661 These principles were utilised in Demophobic and Emergence.
“beyond a bums on seats” installation where all are encouraged to roam within the perimeter of the screens. Given the “‘broad bandwidth’ of interaction” it is designed for 9-18 simultaneous participants, depending on how many move within range of the sensors versus how many do not. Infrared and sonar sensors assess the edges along which images are projected so crossing a sensors’ path induces corresponding influences on the audiovisual media. These paths are represented by triangles of intersecting coloured lines (Figure 5-166). The space in front of the screens has no hardware obstacles as the screens are rear-projected.

Sensor paths along the green lines corresponds to images, blue to non-verbal sounds and brown to ‘TripleTriplet.’ Images, sounds and words are influenced by where and when sensor paths are intercepted and whether three sensor paths from the same triangle are simultaneously intercepted. When three related sensor paths of the same colour are intercepted, the sensors calculate the distance between these three people. Subtlety and nuance are exerted by these networks of spatial relations between these three people which respond by highlighting correspondingly ‘cohesive’ pre-authored image-sound-text arrangements.

Data mapping does not equate collaboration with order and individuality with chaos. The behavioral responses to collective interaction are revealed through participants investigating control within the spectrum of indeterminate consequences. It encourages participants to learn how to collectively and interdependently engage with each other and the work, if they desire to reduce any entropic propensity of the media modules’ behaviour. Doing so reveals the cogent narrative(s) by sequencing the images such that the cross-referencing system becomes readily apparent. Participants may identify which image groups are associated, so if Screen Left is ‘three images ahead’ of Screen Right, participants may try to move through three Screen Right images to align both sequences. Any alignment is likely to be temporary, as it encourages ongoing negotiation between participants to collectively determine the behaviour of the work.

663 Rokeby 1990.
5.10 Summary

I developed StilmS to the extent possible while preparing to do fieldwork in India in 2005, with v4 to be implemented post completion of the original PhD topic. The period between staging StilmS v3 with Emergence v1 in November 2004 and Emergence v2 in October 2005 was rife with uncertainty from waiting nine months for a research visa for India. Finding out in March 2005 it would not be issued made it impossible to continue the original PhD topic. Throughout this period I continued StilmS v4 alongside burgeoning roles as a key creative for Emergence v2. I worked on both while determining which aligned better with the formal commencement of this PhD topic in July 2005. I presented my proposed StilmS v4 in a talk called Sound Samples, Slides and Audience Interactivity in Anthropology at the ANU Data-Sets Interdisciplinary Colloquium at the ANU School of Art on October 29 2004. As this preceded the final staging at BHHF, I analysed audience interaction during BHHF to assess the viability of v4. While v4 was not staged it provides an overview of “life-as-it-could-have-been” since it concluded the iterative development of StilmS and heavily influenced my contributions to Emergence. v4 also demonstrates the continuity between my research and practice between StilmS not being staged and the making of Emergence.

Opting for Emergence over StilmS concerned my practice stemming from my research trajectories. StilmS evoked environmental responsibility by combining environmentalist subject matter and interactivity that encouraged awareness of the influences of participants’ behaviour on the artwork-as-Environment. While they did not posses the one-to-many interactivity of KY, the observer-participant ratio appeared to create a performative burden in specific contexts, such as the BHHF staging. The decisive criteria for deciding on Emergence v2 over StilmS v4 stemmed from one of Armstrong’s techniques for

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664 “Data Set” was defined by Martyn Jolly, the Symposium Convener, as: “a named collection of logically related data items arranged in a prescribed manner.” ANU Data-Sets Interdisciplinary Colloquium, ANU School of Art, Canberra, October 29 2004.

evoking environmental responsibility in Responsive Environments, according to whether participants [are] becoming 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.666

As the following chapter discusses, *Emergence* was a more appropriate means through which to engage all participants to one another and to the artwork-as-Environment.

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6.1 Project Overview

Audience interaction... has been an increasingly important part of entertainment over the past decade. But there’s been nothing quite as mind-bending as Emergence, a production blending science, visual arts and performance in a way that takes audience interaction to the edge. It challenges us to decide what human behaviours we most value, and, in doing so, raises questions about the ethics of science and technology.

Phillip O’Brien

Emergence was a large-scale three year collaboration in disparate media and mediums, which I worked on consistently from September 2004 until May 2007. The commercial, high-profile Responsive Environment was created over three iterations: v1 was staged three times over three nights in 2004 at the Balmain Hybrid Happenings Festival (Figures 5-153, 5-154, 5-155, 5-156), v2 was staged three times over two nights in 2005 at Sydney Opera

House (SOH) Studio (Figures 6-194, 6-195, 6-196, 6-197) and v3 was staged 22 times over 20 nights in 2007 at SOH Studio; Street Theatre, Canberra (Figures 6-198, 6-199); and Arts House, North Melbourne Town Hall (Figures 6-200, 6-201). v1 and v2 were intermediary iterations, which formed a "public research laboratory" for the definitive v3. This chapter primarily concerns v2 and secondarily v3; v1 (a prototype of the concept staged alongside my StilmS) and v3 are discussed respectively in Appendix C and Appendix E. Discussion refers to a documentary film about v2 and an entire v3 staging documented in Appendix A.

The chapter begins by describing the staging of v2 from beginning to end. It then outlines my contributions and collaboration, before contextualising the art-historical framework of the work. The conclusion of the chapter evaluates v2 in light of completely overhauling Emergence in the 18 months spent making v3.

Emergence was set in 2028. It portrayed an Australian Government experiment in genetically engineered human evolution through a technologically mediated immersive environment. In the theatrical component of the experiment, which was run by the Department of Biological Sciences (DBS), attendees were invited as collective 'Parents' to shape the socio-cultural evolution of 'human values' in the biologically engineered post-human Being, called Ram (Figures 6-167, 6-168). DBS consulted the attendees en masse as the last human generation before they finalised mass-scale production of their post-human Beings.

Audiences of 150-220 people experienced entire stagings together. They were chaperoned into Room Womb: an agora-like parliamentary chamber in which the stage floor became Ram’s 3D interior ‘womb’ (Figures 6-169, 6-170, 6-171, 6-172). Here they interfaced with Screen Womb, a 2D exterior

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668 Rokeby 1998.
669 Staging StilmS with Emergence v1 is discussed on p241.
670 The theatrical component was preceded and succeeded by two different online components in v3. They are discussed in Appendix E on p318.
671 ‘Attendee’ refers to everyone who attended, while ‘participant’ refers to those who voluntarily interacted with the work as a ‘Parent.’
672 This was similar to FoAM’s trg and Transmute Collective’s Intimate Transactions although they were designed for far fewer co-participants. These artworks are discussed on pages 153 and 157 respectively.
‘womb’ represented on screen (Figures 6-175, 6-176, 6-180). Together, Room Womb and Screen Womb comprised an encircling cube of projection screens flush on all four walls, loudspeakers in each of the four corners, responsive multi-directional lighting, a 2x2 metre raised platform in the centre of the stage (Podium), a two metre puppet face suspended from the ceiling and fog machines (Figures 6-184, 6-185). Each screen was a portal to a corresponding filmic room in sterilised Screen Womb where Ram incubated while participants’ votes genetically engineered him during voting sessions (Sessions) from Room Womb (Figures 6-177, 6-178). Screen Womb and Room Womb spaces and dimensions were conflated during certain scenes as the filmic space was on the far side of each screen. For example, Parents could literally interface with Ram by tickling the screen in the scene Nurturing (Figure 6-179) and Room Womb was incorporated into the work by such means as being the intermediary area when Ram on Screen North conversed with Engineer on Screen South and when Ram directly addressed attendees from Screen Womb.

Production involved five actors and over 15 people running the staging from behind-the-scenes. The DBS Government Head (Head), played by Richard Cartwright, was filmed and projected onto the puppet head suspended from the ceiling (Figures 6-184, 6-185). Head and Ram used live video camera feeds to see attendees from hidden film sets located outside Room Womb (Figures 6-181, 6-182, 6-183). Two Hoster-Drones functioned like Graham’s “dinner party host” role in Interactive Art, as they shepherded and steered audience participation in Room Womb (Figure 6-186). Engineer was a different ‘breed’ of post-human Being representing the ‘arms’ of the Government that shepherd and steer Ram in Screen Womb (Figure 6-188). Engineer appeared solely in Screen Womb in pre-recorded scenes. Ram, the protagonist, was depicted through a multitude of pre-recorded and live scenes projected onto all four

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673 As an example of how this was conveyed, an attendee’s Feedback Form (FF42) described that this “atmosphere...felt like I walked into a womb.” The number after ‘FF’ denotes the number on the FF. FF responses were limited by the size of the form and their expeditious collection before attendees left SOH.

674 This was modelled on my installation design 4for4 (Figure 6-174) as described on p285.

675 This referred to techniques of conflating artifice and actuality in Mixed Reality and Augmented Reality approaches to creating Responsive Environments.

676 Graham 1997:145.
screens. Live projections were achieved by actor Nick Curnow being present at the staging in the same costume in front of the same backdrop as the pre-recorded sequences. Blending live and pre-recorded scenes created ambiguity as to what was live and what was pre-recorded when participants interacted with Ram (Figure 6-179).677

Audience etiquette, consent and social and physical responsibility were articulated through hand-outs issued on arrival, including a four page program, a Feedback Form and the following mock waiver:

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Figure 6-202: The waiver issued to each attendee as they arrived

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677 The rationale of doing so is discussed below on p264.
Emergence began passively by presenting the socio-cultural setting, the background story of the experiment and the DBS rationale in soliciting attendees to engage with their experiment “to build a responsible moral citizen fit for our new society.”

Raising a Being pre-disposed to seek autonomy required Parents to make a series of choices about aspects of his ‘personality’ or ‘character’ over the course of the staging. In one such instance Parents had to vote for Ram to have free will (including being disobedient) or for conditioning him to be more obedient. Voting to respect Ram’s desire for free will meant accepting unknown consequences, while controlling him imposed nurture over his nature.

As Ram became increasingly socially conditioned, attendee’s interaction with him and with Head increased proportionally, as participants became progressively involved with the work and one another. This structure mapped passive-to-interactive attendee involvement to Ram’s emergence from nascent embryo to socialized adult. In so doing, attendees’ influences’ became more multifaceted through diverse interactivity, commencing with individualised, nuanced and intimate interaction (referred to as Qualitative Interactivity) which was then combined with voting interactivity (referred to as Quantitative Interactivity). Artwork-Audience interaction was progressively more technologically mediated until the climax (Finale) returned to ‘naked’ intimacy, when Ram literally emerged through a slitted projection screen and walked onto Podium (Figures 6-203, 6-204, 6-205). His emergence from the illusory (Screen Womb) into the physical realm (Room Womb) confronted attendees with ‘here-and-now’ responsibility for their creation, with attendees’ last interaction being to decide if he lived (by being released into society) or was reset by the DBS (as a euphemism for being killed) (Figures 6-206, 6-207, 6-208). Concluding with live unmediated human-human interactivity.

Mark Bolotin and Josh Wodak. ‘Synarcade Collective Application to Australia Council for the Arts.’ 2005:11.

These conundrums also expressed the internal structure of the work, regarding the balance between its indeterminate form (as ‘nature’) and the determinate form as controlled by Parents (as ‘nurture’).

Qualitative and Quantitative denote the basis of the interactivity, as there were quantitative and qualitative dimensions to all interactivity. As an example, voting was principally quantitative although qualitative assessment of voters’ behaviour also affected the vote tallying.

Resetting (i.e. killing) Ram and Punishment referred to Mike Parr’s Kingdom Come and/or Punch Holes In The Body Politic. Bolotin was at my encounter with this artwork described on p42.
represented attendees’ shared humanity converged with the emergent humanity of their Being.

Figures 6-203, 6-204, 6-205: Ram emerging through a projection screen (v3). Photography by Jess Klingelfuss.

Figures 6-206, 6-207: Voting to Release or Reset Ram (v3). Photography by Jess Klingelfuss.

Figure 6-208: Ram emerging onto Podium (v2). Photograph by Zoltan Deak.
6.2 Contributions and Collaboration

Six key members of *Synarcade*, a Sydney based multi-arts collective, had responsibility for concept, content and context. Members of *Synarcade* had collaborated since 2000, including on *Kali Yuga v1* and *StilmS v1*, however *Emergence* was unprecedented for *Synarcade* in scale, complexity and interactivity. More than 70 people worked on the three iterations, although over 50 had minor roles, such as assisting with production and staging. As one of only four key creatives involved in the entire timeline of *Emergence*, my contributions were second only to Bolotin, the Director and principal Writer.

In collaboratively created Responsive Environments particular personnel may focus on the ‘in-between’ of the content and context. With Interaction and Interface Design my main *v2* and *v3* contributions, I was intermediary between all departments and between co-creators and audiences. As Interaction and Interface Design connected all project parts together and the attendees, I collaborated and contributed to all departments, with my Designs incorporating such areas as Music, Costume Design and Production Design in the specific areas listed below. As an example of how this influenced my other contributions, my concept and writing contributions focused on balancing large group interaction while retaining discernable narratives that

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682 See p185.
683 See p210.
684 The credits for the *v2* cast and crew are: Director: Mark Bolotin; Producer: Michelle Tabone; Associate Producers: Sarah Muirhead & Alex Weltinger; Assistant Director: Philip Wood; Written by: Mark Bolotin, Josh Wodak, Richard Cartwright, Ian Shoebridge, Philip Wood; Director of Interaction and Interface Design: Josh Wodak; Director of the AudioVisual Media System Design: Josh Wodak, Multimedia Coordinator and Lead Audiovisual Operator: Josh Wodak; Audiovisual Operators: Harriet Birks, Heidi Cox, Talbet Fulthorpe, David Watts, Richard Schweizer; Live Cameras: Philip Wood; Film Documenter: Zoltan Deak; Graphic Designers: Breanne Squires & Sarah Muirhead; Publicist: Geoff Sirmai; Starring: Nick Curnow, Gary Boulter, Richard Cartwright, Madeleine Boyd & Leah, Romy Bartz; Art Director: Mark Bolotin; Production Designer Film: Madeleine Boyd; Production Designer Theatre: Ana Deak; Costume Design: Madeleine Boyd & Ana Deak; Prop Makers: Madeleine Boyd, Ana Deak, Zoltan Deak, Martin Donaldson, Monique Donaldson, Mila Gisbert, Marty Hallinan, Elaine Lee, David Mills, Angie Orrego, Richard Schweizer, Carlos Santos, Charlie Shelley, Janna Smoliar, Troy Zarb; Make-up: Kerrie Allott & Raizel Carringal; Film Assistants: Greg Bigelow & Sibylle Meder; Music Composition: Alon Ilsar (Foley) and Gauche; Continuity: Michelle Bagtas; Sound Recordist: Richard Schweizer; Scientific Animations: Stephen Hicks; Flash Animation: Harriet Birks.
engaged audiences in the complex form and content. This related to my technique of creating with audience perspectives in mind, as used by Rokeby, Penny, Willis and Feingold. Of the following contributions, the first four were v2 and v3 Pre-Production roles and the fifth was my v2 Production roles.

6.2.1 Project Development, Concept and Script Writing

For the key creatives pre-production was ongoing since v1 in November 2004, due to the continuity with v2. Concept and script writing throughout 2005-2007 was through extensive collaboration between Bolotin, Cartwright, Wood, Ian Shoebridge and myself. Having collaboratively written film, theatre and performance scripts together since 2000 we were all were cognisant of one another’s respective strengths and interests. As Bolotin and I were the only writers who had previously made interactive artworks, we concentrated on writing the narrativity with inseperable interactivity. We wrote individually, in pairs and all together, co-developing the concept and subject matter and co-writing themes, stories, subjects, characters and narratives. In contrast, the following were all areas I directed and largely authored myself as they were outside the experience of all collaborators other than Bolotin.

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685 See p136.
686 See p107.
687 See p82.
688 See p84.
689 Considerable contributions were also made to project management (grants, financing, budgets, organising personnel) and all the technical dimensions, but these are only touched upon as they are outside the scope of this dissertation.
690 These artworks and roles and responsibilities are listed on Appendix B: Curriculum Vitae.
6.2.2 Directing Interaction and Interface Design

In this area I directed:

1) The concepts, methods, and procedures for immaterial audience interaction and material audience interfacing
2) The mechanical, computational, spatial, temporal, logistical and physical features of interaction and interfaces
3) The communication protocols for translating all audience interaction for the purposes of designing the procedures for cast and crew to run the work.

Realising my Designs required a cohesive team with highly specific skills and a lot of available time. While Bolotin declared each Department would have a Director leading a team in April 2005, he and the Producer, Michelle Tabone, drastically reduced Interaction and Audiovisual Media System (AVMS) budgets in June 2005. Consequently I could not offer financial remuneration to recruit personnel or implement my nominated Designs, so I postponed them till v3. Between May and October 2005 I received informal feedback from Keir Smith, Somaya Langley and Mark Havraliv as Interface Design Consultants, owing to their experience staging similar artworks. Their invaluable feedback was limited by not formally being in the project and their available time. Consequently, I only used production personnel recruited a month before v2 was staged, rather than a pre-production team.

6.3.2 Directing the AVMS Design

The AVMS controlled all pre-recorded, live, pre-sequenced and live-sequenced multi-channel speech, music and video through personnel operating six laptops running Arkaos software, six projectors, two live cameras, two microphones and a sound mixing desk.\textsuperscript{691} As an example, it seamlessly blended pre-recorded speech and music with unscripted

\textsuperscript{691} For v3 I designed a considerably more complex and sophisticated AVMS based in Isadora. It required 2 operators, rather than the 6 required for the v2 AVMS so was suitable for national touring.
conversations between participants, Head and Ram. The AVMS incorporated elements of the Interaction Design, such as fading in and out coloured lights to indicate which quadrants were active during Sessions.

In this area I directed:

1) Translating all media types into a format operated by the minimum of people
2) The mechanisms and protocols of software and hardware infrastructure and technology for sequencing, running, triggering and manipulating all audiovisual media, including the platforms and configurations of all associated equipment
3) Researching all available computer platforms to produce the most suitable software and hardware configurations and the software programming by which audiovisual media is sequenced and controlled within the software and hardware infrastructure
4) The mechanical, computational, spatial, temporal, logistical and physical procedures for installing, operating, transporting and running the AVMS
5) The Information Architecture by which the work is structured, organised and operated
6) The methods and processes of communicating between the Interfaces and the AVMS.

6.2.3 Technical Director

In this area I:

1) Determined the overall technical design, configurations, requirements and technical operation of the work
2) Established the communication protocols, working methodology, technical requirements and schedules for everyone in the Technical Department, AVMS Department and Interface Department.

As v2 was produced with the forethought of touring v3 around Australia, Technical Direction incorporated all the logistics for making the work so it could be toured, including automating the behaviour of the work so
the Interface System was programmed to directly control the AVMS, which in turn controlled all pre-recorded media through *Isadora* software in real-time.

### 6.2.4 Multimedia Coordinator and Lead Audiovisual (AV) Operator

As Lead AV Operator during production, I directed a tightly functioning unit of humans mimicking what machines would have done in my proposed Interaction Design. I coordinated all audiovisual media in dialogue with changes in props, stage actions and costumes throughout each staging by giving frequent instructions via a CAM System to: three assistant AV Operators, Head Camera Operator, Ram Camera Operator, Head, Ram, Projector Operator; SOH Stage Manager; Synarcade Stage Manager; Lighting Operator and Sound Operator (Figures 6-209, 6-210, 6-211).

![Figure 6-209: AV Operators and Head (v2)](image1)

![Figure 6-210: AV Operators and Head Camera Operator (v2). Photography by Zoltan Deak.](image2)

![Figure 6-211: The Arkaos patch I programmed for v2. The right hand column shows some of the shots & scenes. The keyboard layout shows their arrangement via the corresponding keys which controlled them.](image3)

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692 See p268.
6.3 Content and Contextualisation

In a world where the idea of living out your days as an avatar in Second Life... is not so out of this world, the traditional play may be a dying art form. Synarcade Audio-Visuals is embracing the new while taking cues from the old with Emergence, a theatrical choose-your-own adventure for the future.

Kat Harley

Being a hybrid performance, installation, theatre, and social-scientific experiment, Emergence drew from diverse artforms and mediums as it embraced “the new while taking cues from the old.” As an example of this ‘in-betweenness,’ science-fiction, surveillance and political dimensions referred to such literary works as Aldous Huxley’s Brave New World, George Orwell’s 1984 and Anthony Burgess’ A Clockwork Orange while the game-like qualities of Emergence satirised and parodied futuristic dystopias. The range of artforms drawn upon included narrative-based interactive installations, interactive artworks involving RFID/Barcoding/IRDA, and Alife science+art regarding emergence and evolution in biology and Complexity Sciences. The following only briefly contextualises Interaction Design, as the entire art-historical contextualisation would occupy a whole dissertation. Resonances


694 As per FoAM’s lamentation of the problematic classification and understanding of Responsive Environments, discussed on p41.


700 These include the Alife artworks described in Chapters 2 and 3 on pages 89 and 117.
with artworks in this dissertation, such as the relationship between the character *Head* and Stelarc’s *Prosthetic Head* and the *Punishment* modality with Parr’s *Kingdom Come* and/or *Punch Holes In The Body Politic* are interspersed throughout.

In relation to Alife science+art, *Emergence* used theatrical mimesis of self-organising and self-perpetuating Alife art, via actors and crew manually running all technical and non-technical aspects. In contrast to general Alife and Generative Art where the only humans in artworks about biological and/or computational evolution are the audience, *Emergence* did not forego ‘the human’ as it was about humans with flesh-and-blood humans. As all the characters were ‘post-human,’ inter- and intra-species responsibility were evoked by mutualistic attendee-artwork relationships and cooperative attendee-attendee relationships (in biological terminology). Alife techniques of ceding control to semi-autonomous artworks that manifest uncontrollable properties were employed in principle, as the large number of simultaneous participants prevented employing them in form so as to retain cogent narrativity. This stemmed from ‘simplifying’ emergent and swarm behaviour as a critique of the lowest common denominator basis of democracy, since attendees were less likely to understand their myriad influences on the work if it responded with complex indeterminate behaviour. Accordingly, balance was achieved through facilitating engaging and accessible interactivity for the maximum number of attendees, with more complex voluntary influences offered through Qualitative Interactivity. As an example, Ram attempted to take control over the experiment from his creator, the DBS, subject to whether Parents voted to grant him this power or not. Such Quantitative Interactivity was augmented by the Qualitative Interactivity of *Interrogation*, when any participant could engage Ram in one-on-one dialogue, including interrogating him about his request to be granted the power to take control over the experiment.

*Interrogation* highlights the Alife inspired Inside-Outside conflation, with attendee and artwork interacting over the permeable interface membrane between *Room Womb* and *Screen Womb*. To evoke responsibility across these membranes I applied Weibel’s principles of “collective interaction” and causal relations between these worlds, whereby an audience
does not stay external observer as with film but as internal observer he is going to take part in the image-worlds and thereby is going to change them. His entry into the image-world is going to trigger reactions in the sense of the covariant model not only in multiple parallel image-worlds but also in the real world. The relation between image world and reality is going to be multiple and reversible. The observer himself becomes the interface between an artificial virtual world and the real world. The events in the real world, controlled by the internal observer, are going to affect the virtual world, and the events in the virtual world, also controlled by him, are going to affect the real world and parallel virtual worlds...interactions by the observer between himself and the image world will become bi-directional. A cause in the real world will have an effect in the virtual world and, reversibly, a cause in the virtual world will have an effect in another parallel virtual world or in the real world.\textsuperscript{701}

As an example of embodying these ideas, participants caused cumulative ‘virtual’ influences on Ram in Screen Womb, but were confronted by Ram emerging into Room Womb in Finale when they voted to kill or release Ram. This exemplified how Emergence theatrically applied Alife ideas, such as those of Peter Cariani, a founding Alife scientist, who argues “the key features of an emergence-capable device are openness to the environment – the ability to measure or effect changes in the outside world – and a capacity for adaptive self-alteration.”\textsuperscript{702} These features were explored in Ram’s awareness of Room Womb and his adaptive self-alteration in persuading his Parents to make him more like them to fit in with this “outside world.”

My techniques of Intact Syntax and Arpeggiated Hierarchy, which were introduced in Chapter 2,\textsuperscript{703} were used to combine content, form and Interaction Design to balance the binaries of authority-control, determinacy-indeterminacy, simplicity-complexity and narrativity-interactivity. As an example of how Intact Syntax was applied, the narrative-interactivity trade-off required relatively large primitives in a predominantly pre-determined structure for Emergence, as Blife art, to denote emergent processes being theatrically enacted rather than embodied in the form (Figures 6-212, 6-213). This modeled Jorge Luis Borges

\textsuperscript{701} Weibel 2002:43.
\textsuperscript{703} See p93.
The Garden of Forking Paths rather than Espen Aarseth’s ergodic and hypertext approaches to interactivity-narrativity relationships as their readability is not suited for so many participants (Figures 6-214, 6-215, 6-216). A structure built on forking paths also formed the solution to interactivity-narrativity trade-offs as Cameron argues:

To write not... a whole series of ‘what-ifs’ increases both the volume and complexity of an author’s task exponentially. Interactivity implies forking paths and each pathway must be written and fitted together. The greater the number of pathways, the greater the sense of textual play for the reader, and the greater the amount of work for the writer. The volume of story web increases exponentially with additional points of interaction. An author is faced with an inevitable and depressing tradeoff - sacrificing time spent on the texture of the narrative, its literary or cinematic qualities, for an enhanced interactive complexity. The result can be interactive but schematic, resembling the outline of a story rather than the story itself.

With 150-220 simultaneous ‘readers,’ excessive choice of pathways increased the probability of getting lost in the “volume of story web.” The solution to embracing Cameron’s “interactive complexity” and “the cinematic qualities” of the narrativity was evinced in the tagline. 'Build Your Own Being' referred to how Emergence employed a similar structure to the Choose Your Own Adventure book series, with Ram’s genetic alterations as narrative bifurcations occurring at pre-determined junctures (Figure 6-212).

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706 Cameron 1995b.

707 The solo readership format of Choose Your Own Adventure was only loosely applied to the group readership of Emergence as the ownership of ‘your own being’ was rhetorical: How can you choose your own adventure when everyone is sharing the same adventure? How can you build your own being when everyone is building the same being?

708 Based on attendees’ responses to the v2 binary structure, v3 harnessed my ternary and quaternary narrative structures designed for v2 which were then used in some v3 Sessions. These can be seen on Part 8 and Part 11 of the documentation of v3 in Appendix E.
Figure 6-212: The structure of *Emergence*, showing the bifurcating strands where attendees could vote for different pathways.

Figure 6-213: An example of how bifurcating pathways were symbolically expressed: Ram’s mobile above his cot represented his intertwined fate and determinism. Photograph by Alex Weltlinger.

Figure 6-214: Examples of bifurcating structures that *Emergence* drew from.

Figure 6-215: Biomorphs from Richard Dawkin’s Alife software described in his *The Blind Watchmaker*.

Figure 6-216: The Hexstat probability device, which represented the bifurcating pathways in *Emergence* and the probability for different pathways to be selected over successive stagings.

Despite employing Cameron’s above model, *Emergence* significantly departed from his conclusion about this “apparent disjuncture between the nature of interactivity and that of narrative.” Cameron reasoned that the moment the reader intervenes to change the story (at the nodes of multi-linear narrative or at every moment in a spatio-temporal simulator) is the moment when
the story changes from being an account of events which have already taken place
to the experience of events which are taking place in the present. Story time
becomes real time, an account becomes an experience, the spectator or reader
becomes a participant or player, and the narrative begins to look like a game.\footnote{Cameron 1995b.}

This challenge was surmounted by using multifarious interactive modalities
which incorporated \textit{Emergence} as a game and through conflating moments
when \textit{Ram} was pre-recorded and live, so attendees were unsure if they were
participating in Cameron’s “story time” or “real time.” Such conflation was
exemplified by invoking Kac’s “dialogic principle” in the scenes \textit{Interrogation},
\textit{Punishment}, and \textit{Finale}\footnote{Described below on p282.} which “requires the use of bidirectional or
multidirectional media and the creation of situations that can actually promote
intersubjective experiences that engage two or more individuals in real
dialogic exchanges.”\footnote{Kac 2004.} As an example, \textit{Ram}’s responses in \textit{Interrogation}, while
all live, were intermittently cryptic and unrelated to the questions, which
attendees found ambiguous and confusing as to whether a large data-set of
pre-recorded responses was being selected in real-time response to the
questions (Figures 6-217, 6-218). This responsivity modelled the Turing Test in
Artificial Intelligence, regarding convincing humans they are conversing with
another human when they are actually ‘conversing’ with a machine, and to
‘dialogical’ Interactive Art, such as Stelarc’s \textit{Prosthetic Head}\footnote{As discussed on p69.} and
Courchesne’s \textit{Portrait One} (1990). Unlike machine-simulated responsivity in
\textit{Prosthetic Head} and \textit{Portrait One}, responsibility in \textit{Interrogation} was to a live
performer, who, unbeknownst to attendees, would continue responding to
them when he emerged from \textit{Outside} into \textit{Inside} during \textit{Finale}.

Inside-Outside relationships also evoked the socio-political dimensions
manifested in \textit{Sessions}, which explored democracy-technology relationships in
anonymous versus monitored electronic voting (Figure 6-77).\footnote{This was informed by my research into diverse historical and contemporary democracies internationally, historical and contemporary methods and technologies for analogue, electro-mechanical, electronic and digital democratic voting and by my experience as an election official at Australian Local, State and Federal Elections and Referendums since 1998 and as an Australian Census Officer in 2001.} Conflict and
resolution in society-at-large were expressed within the work’s microcosm of “a technically feasible experiment in synthetic sociality”\footnote{Penny 1996a.} which created “imagined communities”\footnote{Benedict Anderson. \textit{Imagined Communities: Reflections on the Origin and Spread Of Nationalism}. London: Verso. 1983.} between allied voters. Spatio-temporally partitioning the parliamentary floor agora during and between Sessions created porous boundaries between public versus private space, such as the participants in Figures 6-217 and 6-218 below who performed on the spotlit \textit{Podium} before returning to the ‘anonymity’ of the shadowed crowd. This was achieved by my Designs involving Parents as politicians debating in the future (police) state parliament while reifying consumer choice rhetoric inherent in the DBS’ market research like manner of soliciting votes.\footnote{I drew on Interactive Art that addresses surveillance and democratic participation, including \textit{Track-The-Trackers} (2003) by Bigbrother Awards (www.t-t-trackers.net), Accessed 13 March 2007, and the artworks mentioned in Footnotes 677 and 678 above.}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{images/figure6-217-218.png}
\caption{Figures 6-217, 6-218: \textit{Interrogation} with Ram and Head (v3). Photography by Jess Klingelfuss.}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{images/figure6-77.png}
\caption{Figure 6-77: Elizabeth Bentley’s \textit{Drum Media} review, 28 August 2007.}
\end{figure}

\textbf{In this regard, \textit{Emergence} was contrary to dominant approaches taken by Interactive Art which are not reflexive about (arguably) intrusive and}
unsolicited surveillance. Soliciting voting was self-reflexively incorporated into the futuristic police state running the experiment, to acknowledge and parody the DBS’ intrusion into voters’ privacy. Head informed attendees the DBS was conducting a form of ‘market research’ into their values on the Governmental rationale of protecting citizens by spying on them. Requiring information about attendees was presented under the pretence of ‘the more you tell us about yourself, the more we can tell you about yourself.’

Head and AV Operators surveyed and assessed participants’ behaviour during anonymous Qualitative and Quantitative Interactivity, as a complex system was not warranted for the three stagings of v2.

Emergence related to, but was also contrary to, voting-based “interactive movies,” such as Raduz Cincera’s Kino-Automat (1967) (Figures 6-219, 6-220, 6-221). This work, which was “a satire of democracy” like Emergence, was particularly relevant, as in it

the audience can decide - at certain moments - the way in which the story is to proceed by a majority vote, using push-buttons connected to an electronic voting system. Unfortunately, the voting takes place only at certain crucial points, which are over-determined by multiple forms of direct address.

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217 This referred to then current debates about the Howard Government introducing Sedition Laws and a national SmartCard system. However resonances with Government Industrial Relations and Sedition reforms were subliminal, so as to not temporise the futuristic setting.


219 Huhtamo 1995c.
In contrast to Cincera’s work, which “proceeds from a traditional narrative position which does not acknowledge the presence of the audience,” interactivity in *Emergence* was intrinsic rather than extrinsic, such as *Ram* directly addressing attendees to persuade them to alter him to have more free will. Nevertheless, Interaction Design still faced the challenges in “more recent systems” to Cincera’s, where “audience participation’ still depends on majority decisions” despite having “achieved more developed interfaces, a wider variety of alternative storylines and branching points, and a more seamless experience.” Huhtamo reasons this occurs since “it is difficult to introduce intelligent multi-person interactivity into a situation in which a traditional audience sits in an auditorium.” The way in which *Emergence* avoided combining such “multi-person interactive cinema...with a 19th century idea of public spectacle and the audience” was by avoiding Cincera’s stationary and remote electronic voting and instead encouraging attendees to move around the seatless stage floor to vote.

*Emergence* was unique relative to the artworks and interactivity discussed in this dissertation, due to the responsivity and responsibility evoked in such numbers of participants. The quantity-quality trade-off in Interactive Art is between smaller numbers of participants permitting “‘broad bandwidth’ of interaction” while larger groups generally engage through trammeled interactivity (such as multiple choice voting to trigger predetermined sequences) if narrativity is retained. In this regard, *Cinematrix - Interactive Audience Participation Technology* exemplifies the trade-off that *Emergence* sought to avoid: this binary vision recognition system reduces all participants to absence/presence, by which various computer games or electronic voting can be undertaken. How *Emergence* augmented such binary voting and structures with wide bandwidth interactivity that balanced multifarious narratives for 150+ simultaneous participants is discussed in the following section on Interaction and Interface Design.

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220 Huhtamo 1995c.
221 Huhtamo 1995c.
222 Huhtamo 1995c.
223 Rokeby 1990.
6.4 Interaction and Interface Design

What is not a common phenomenon is interaction between strangers...It may be that in aiming to encourage interaction between people in general, interaction between strangers is rendered more possible. It might be interesting to examine any interactive computer based artwork which has a stated aim of interaction between strangers...to see if this phenomenon can be achieved more frequently by certain tactics.

Beryl Graham

My 16 diverse Interaction Designs used “certain tactics” to encourage “interaction between strangers” and the artwork through diverse modalities and mediums. As discussing all Designs would occupy an entire dissertation, the following only briefly outlines my criteria and contextualisation for Designs and the v2 implemented Design. The following aspects of Interaction Designs were conceived for v2, before comprehensively overhauling Interaction Design for v3. Three examples from my v3 Designs in Appendix E demonstrate this aspect of project development and response to evaluating v2.

Over 2006-7 a national tour was organised for v3. 22 regional, remote and metropolitan venues around Australia nominated to host Emergence for full theatrical seasons. This was organised through the competitive rounds of applying for assistance from Playing Australia, a national Government body that assists in national tours of Australian performance arts, and Performing Lines, an Australian NGO that produces national tours of Australian performance arts. While Emergence was short-listed, it was not eventually selected, so three theatrical v3 seasons were organised independently. v3 Designs were conceived and developed in the context of the variable funding that would become available through the number of venues toured to. In this context, v3 Designs sought sophisticated, detailed, robust and accurate biometric, Demographic and Psychographic (DaP) information in an automated system that analysed every vote from every voter from every staging to reflect back cumulative patterns of different peoples’ preferences, whereby “as the show travels across Australia, the choices the audience makes are collected to

examine the difference between audiences and demographics.” DaP information was discussed in the free public forums following the last staging in the v3 seasons in Canberra, Sydney and Melbourne and on the web component of Emergence. These forums discussed the meta-patterns of attendees’ votes and Beings built within and between each staging and each season.

All Designs concerned context- and content-appropriate interactivity for evoking indirect, direct, literal, metaphorical, instantaneous and cumulative responsibility to the social and physical environment of the artwork. To do so, I conceived interactivity as a vast cybernetic network of inputs and outputs connecting 150+ participants interacting via diverse interfaces that exerted multifarious influences (Figures 6-179, 6-180, 6-181, 6-182, 6-222, 6-223). Inputs included all attendees’ interactions with one another and the artwork via direct, one-on-one, instantaneous, delayed, cumulative and group interactivity. Outputs included all responses from live actors, live and pre-recorded audiovisual media and responsive lighting. Cybernetic loops ranged from direct one-on-one dialogical interactivity, such as Interrogation and Punishment, through to mass voting for relatively deterministic AV sequences. Functionality was through the Interface System of electrical engineering and computer programming to translate volumetric, tactile, spatial movement and auditory data that flexibly influenced Outputs. Interface Design concerned the form: the architectural structures of mounting the AVMS and Interface. Functionality and form were designed in tandem, as they required one another.

Designs collectively formed a combinatorial matrix with Interaction Design as the Rules of the game and Interface Designs as the Tools by which it could be played. The following only lists voting procedures, as my Tools for Qualitative Interactivity are beyond the scope of this dissertation. Having been iteratively designed, each Tool was then assessed by professional computer scientists, mechanical engineers and electrical engineers. Comprehensive


727 For v3 I Directed the following crew members as part of Directing Technical, Interface and AVMS Departments: Technical Touring Manager (Kallum Wilkinson); Interface System - Electrical Engineering,
assessment, which is also beyond the scope of this dissertation, included how to ensure each method was safe, intuitive and expedient; limit cheating; accurately assess and process voting numbers; and facilitate movement of voters during Sessions. The following Designs denote voters’ voting methods in ascending order of sophistication, technological complexity and cost: \(^{728}\)

1) Depositing plastic tokens in an abacus like kinetic sculpture/ballot box protruding from ‘Podium.’ Attendees are assigned one token per ‘Session.’ The weighing scale arms reflect which quadrant has the most tokens.

2) Manually inserting cardboard punch-cards into terminuses, creating ‘score card’ like records of each voters’ votes. Anachronistic electromechanical devices calculate the number of cards punched.

3) Depositing magnetic tokens in floor and/or ceiling mounted terminuses that emanate out from ‘Podium’ and/or projection screens. Computers assess quantity of tokens according to strength of magnetic charge on each terminus.

4) Holding colour coded glow sticks in corresponding quadrants. Video cameras mounted in the ceiling give a visual feed to computers which assess quantities of corresponding colours in corresponding quadrants.

5) Sending votes via Bluetooth on mobile phones or PDAs to sensors positioned in respective quadrants.

6) Measuring electric charges in bodies by voters wearing hardware sensors on their hands which they connected to one another by holding hands.

7) Biometric retinal or fingerprint scanning in floor and/or ceiling mounted terminuses that emanate out from ‘Podium’ and/or projection screens.

\(^{728}\) I designed these for v2 but they became slated for v3. My extensive designs of Tools, Rules, Interface Systems and Interface Designs are discussed in Appendix E as their specificities are beyond the scope of this dissertation.
8) Wearing a theatrical costume as a bracelet, necklace, sash or vest with Barcode, SmartCard, RFID, Magnetic Electronic ID Tag or IRDA embedded in the costume. Voting involves bringing the costume into range of readers embedded in floor or ceiling mounted terminuses that emanate out from ‘Podium’ and/or projection screens.

The cost and complexity of these Tools were considered in light of the above mentioned tour. As these venues had highly different interior idiosyncrasies, 3) and 8) required the following Centrifugal Architectural Sculpture (CAS) (Figures 6-222, 6-223).

CAS, which also stands for Complex Adaptive System, is a literal and symbolic centerpiece that embodies the DBS’ ‘Central Data Processing Centre.’ The self-contained structure performs vital functions of mounting and suspending all projectors, loudspeakers, amplifiers, lighting and Interface hardware. The spatial and visual form is as unobtrusive as possible, while leaving all floor space unobstructed so attendees move around unencumbered. Voting terminuses collate data centrifugally, from periphery-to-centre. This draws on politico-economic centripetal distribution, such as translating voting and referendums into centrally emanating laws and policies. Such information flows from periphery-to-centre when soliciting votes. This data is physically and metaphorically collated in the centre and translated into media broadcast back to the periphery as speech, music, video and lighting. This mockingly responds to preferences, since the possibilities are largely predetermined. Such a “vending machine” overtone parodies the relationships between Pavlovian Interactive Art and the capitalist worship of consumer ‘freedom’ via multiple choice.

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729 Feingold 2002.
In tandem with these Tools, Rules for Quantitative Interactivity included:

1) Limited versus unlimited voting:
   Limited voting restricts the number of times participants vote, for instance allowing voting in four of the seven ‘Sessions,’ to encourage strategising about using ones’ votes. Automated systems, such as Tool 2) (listed above) are programmed to restrict voting in particular ‘Sessions’ of categories of voters, while the other manual systems use surveillance from ‘Head,’ ‘Hoster-Drones’ and AV Operators.

2) Anonymous versus monitored voting:
   In anonymous voting nothing connects voters’ identity and their votes, while monitored voting assigns everyone a Unique Voting Identification (UVI) through Tools 7) or 8) (listed above).

3) Using Rule 2) to vote according to DaP profiles and categories:
   Significantly increases the range of Rules, such as allowing voting by DaP categories in different ‘Sessions’ and having people in the same DaP category vote against one another for different options.

4) Bartering votes:
   Within limited voting, voters exchange their ‘voting rights’ with other voters to vote for particular sessions. Allotments of votes are electronically administered in Rule 3) while other manual systems use such techniques as exchanging physical voting tokens.

5) Privileges and hierarchical power differentials between voters:
preferential systems allow people returning to have different privileges, such as votes which count for more and voting more often than those attending for the first time. This encourages multi-faceted engagement by participating in successive stagings.

6) Gradations of voting strength:

votes count as numerical values between 1 and 10 according to degrees of agreement-disagreement, where 10 = maximum and 1 = minimum strength of vote. ‘Room Womb’ is spatially categorised by voting strength, such as terminuses nearer ‘Podium’ are 10 points while terminuses nearer projection screens are 1 point. This system can be further used to vote for degrees of change of ‘Ram’s’ genetic alteration, so rather than being “Logical” or “Creative” he becomes a mix of both depending on the strength to which voters’ vote for both options.

7) Proportional representation versus might-is-right:

proportional splits influence sound and lighting to represent consonance or dissonance. Close margins create turbulent influences (to reflect such disagreement between voters) and landslides create harmonious influences (to reflect overwhelming majority consensus). In keeping with ‘Intact Syntax,’ these influences do not affect the narrative functions of pre-filmed scenes.

8) Multi-tiered and multi-platform Sessions:

‘Sessions’ contain multi-tiered options to control more subtle and influential decisions. For example:

Session 2, Decision 1: Option A or B? (B wins).
Session 2, Decision 2: Option B or C? (C wins).
Session 2, Decision 3: Decide between the winner from Session 2 Decision 1 and Session 2 Decision 2: B with C (‘Ram’ receives proportional combination of both modifications) or just B or just C.

730 This was inspired by Karl Sims, an Alife artist who is discussed on p102. His article ‘Second Choice Voting’ recommends to “create a cycle of preferences, such as: A defeats B, B defeats C, but C defeats A. This should not happen often in practice, but in case it does, another method is needed to select the winner from the subset of candidates in that cycle.” Karl Sims. ‘Second Choice Voting,’ Karl Sims Website. www.karlsims.com/second-choice-voting.html. 1999. Accessed March 17 2005.
As discussing each of these Tools or Rules in detail is beyond the scope of this dissertation, the following summarises my rationale for applying any of the above Tools or Rules to a ternary structure, which was implemented in v3:

Two-party-preferred voting polarises voters into two parties. While analogous to male-female parenting and two-party democracy, it detracts from the appeal of voting and limits engagement with ‘Ram’ since less choice means less chance voters develop stronger inclinations for any one option. This encourages interaction by implicating participants more in voting. Having three or four simultaneous options counteracts the rigid binary structure by exploring subtlety, nuance and indecision between more diverse options. This is evoked by deciding between trajectories with multifarious repercussions: a voter likes Implication B that stems from Option A but vehemently disagrees about Implication C (which also stems from Option A) so they ‘choose not to choose’ or vote for another option. Invoking agreement with some elements within the one option evokes subtlety within binaries. Such decision making encourages internal conflict within individuals and between groups.

In tandem, a wide spectrum of possibilities allows greater identification with the work, as offered options may resonate more with attendees’ values. Ternary systems can produce complex tripartite interplay without a balance of power. Using game theory, each decision has relative superiority over the others, avoiding unequivocally favourable options, like Paper-Scissors-Rock, so voters debate relative merits while negotiating ‘Yes’, ‘No’ or ‘Maybe’. As an example, when presented with “All Freedom-No External Control” or “No Freedom-All External Control” for ‘Ram,’ the ‘middle-ground’ option is “Some freedom, subject to external control.” ‘Protest’ options destabilise the balance of power between the ‘dominant parties.’ In this example of free will versus determinism, Option Three can veto the vote by instilling ‘Ram’ with neither. This leads to a different path altogether where ‘Ram’ is subject to neither free will or determinism. This offers less predictable narrativity derived from unanticipated consequences from rejecting the dominant options. This models the dynamic between the Liberal Party, Labour and the Greens in Australian Parliament. The Greens, rather than expecting victory, counteract the polarised options of Labour and the Liberals.
This tripartite system highlights the symbolic layout of the quadrants. With polarised options in North and South quadrants, East and/or West quadrants offer a physical and symbolic ‘half way’ in-between and off to one side of North and South quadrants. East or West are not ‘stuck in the middle,’ as they lie on a different spectrum to the North-South binary. This is illustrated in the following graph, where North, South and East quadrants are offered (Figure 6-224). The dotted purple line represents the voting axis for North and South. The red arrow represents the voting barometer as proportional popularity. The direction it points reflects the most popular quadrant. The red arrow pointing East reflects this quadrant’s ‘balance of power.’

![Diagram](image)

Figure 6-224: A way to symbolically embody ternary voting within the layout of Room Womb, Josh Wodak

Having outlined the expansive terrain Tools and Rules were formulated in, the following contextualises the Tools and Rules implemented in v2. Staged video documentation of all the following are on Appendix A.

### 6.4.1 Criteria

Interaction modalities are often unrelated to form and content in Responsive Environments, such as using a touchscreen or mouse to influence ‘evolving’ Alife forms. In contrast, Interaction Design was intertwined with co-creating the concepts as interactivity evoked the subjects and processes by which Emergence functioned. Bolotin expressed the extent to which this occurs:

> The focus of the work: that we can actively modify and engage with our genetic makeup through technology, also translates really well into how the audience can interact with the actual artwork...that is: the degree to which they embrace or
He desired my Interaction Design highlight the “subject matter and themes of the work” being “cyber engineering, mutation, human rights [and] emergent behaviour” through “a cyber-organic political paradigm of the future” which “reflects/parodies the political press and voting system that may happen in say 50 years time.” To do so, he requested a balance between technological sophistication and intuitive interactivity, since Designs “should seek to include as many audience members as possible, not be intimidating, obscure or discouraging of voting.” Designs had to “preserve an element of physicality and movement, for example the physical pushing, pulling of audience members from one area to another.” All Designs anticipated “150-300 people” and the proportion of attendees likely to actively participate within the 15x15 metre square between screens in all venues. Ternary or quaternary structures allowed for more engaging voting as more active quadrants reduced spatio-temporal pressure by distributing voters over a greater area. While distribution across quadrants was likely to be fairly even, as the options were intentionally divisive and conducive to debate, the interface had to accommodate up to 100% of attendees voting for any option in any Session irrespective of whether more than two options were simultaneously presented.

In response, I devised additional criteria for Interaction Design to determine how my technique of *Arpeggiated Hierarchy* could balance responsivity and responsibility so that participants exerted discernable influences while not being burdened with excessive responsibility. The criteria also formed a combinatorial matrix, as some were mutually exclusive depending on which combination of the above Tools and Rules were used:

1) *Facilitate intuitive interaction between: actors and attendees, attendees to each other; all to technology and the artwork-as-Environment.*

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731 Mark Bolotin. E-mail message to author, June 28 2005.
732 Bolotin recognised this tenuous balance, since he included framing questions for my Designs, such as “how does this work in relation to a technological model?” Bolotin. E-mail message to author, June 28 2005.
733 Bolotin. E-mail message to author, June 28 2005.
2) Encourage rather than enforce participation so attendees embrace different interaction modalities. To do so, offer multifarious layers of engagement in exploring the multifaceted ‘levels.’

3) Voting augments rather than interrupts narrativity,\textsuperscript{734} as theatrical interludes of attendee-artwork and attendee-attendee interaction. ‘Session’ format and duration flexibly allow for the suppression of individuality in the binary structure to be countered by individuals’ verbal and behavioral expression during ‘Sessions.’

4) Encompass the maximum range of physical agility or intellectual ability, in accordance with how democratic voting subsumes all differences to ‘one person: one vote.’

5) In light of 4), highlight how democratic voting suppresses individuality.

6) Encourage physical ‘voting with your feet’ and voicing opinions across the floor. Wireless or unencumbered interfaces still require moving to vote to avoid voting from afar: i.e. ‘you’ve got to be in it to win it.’

7) Balance meaningful spatial partition of the Parliamentary floor with not obstructing movement throughout the space.

8) Clearly inform when areas are active and inactive, such as climbing onto ‘Podium’ from the wrong side during ‘Sessions.’

9) Create an ‘aura of sanctity’ around ‘Podium’ to draw participants in when interacting. This brings participants into closer contact with one another and allows observers to stay ‘out of the action’ nearer the screens.

10) Coax voters to expeditiously and intuitively move into their chosen quadrant, vote and move out.

11) Clearly communicate participants’ individual, collective and cumulative influences through live graphics, video, sound, tactile and haptic feedback.

Additional criteria stemmed from presenting Emergence as a humorous and satirical “surreal social experiment.”\textsuperscript{735} This analogy is used by

\textsuperscript{734} This relates to the discussion of narrativity-interactivity trade-offs and in particular to the discussion of caesura in narrative based interactive art on p113.

\textsuperscript{735} Bolotin. E-mail message to author, June 28 2005.
Time’s Up, FoAM and Graham, who approach Responsive Environments as “serious games.” Game-like qualities assisted Parents’ role-playing, including:

1) **Playful goal orientated behaviour within the ‘Emergence’ tagline ‘Build Your Own Being.’**

2) **Competitiveness between Parents-as-players when voting.**

3) **Combining luck, chance, fate, skill in a ternary network, like Snakes and Ladders: positive (Ladders), negative (Snakes) and neutral consequences of actions that cause unpredictable results, such as narrative bifurcations that lead ‘backwards’ instead of ‘forwards.’**

All criteria informed how Interaction Design combined the following modalities, listed according to their position along a continuum from inert-active through to dialogical interactivity. My techniques of Intact Syntax and Arpeggiated Hierarchy were used to weight modalities against one another to balance simplicity-complexity and determinacy-indeterminacy of participants’ interactions with the work. Balancing was between deterministic Quantitative Interactivity which impeded engagement through such simplicity and indeterministic Qualitative Interactivity which impeded engagement through too great a responsibility when interacting. The following sections discuss Modalities 2) to 6) according to their position:

1) **Inflexible and pre-determined:** audiovisual sequences that ‘carried’ the narrative.

2) **Structured improvisation of pre-determined:** manipulating media modules according to Qualitative Interactivity, such as Ram’s responses during Heart Starting and Nurturing.

3) **Live pre-determined:** strictly scripted actions of actors, such as Ram’s responses during Punishment.

4) **Live undetermined:** loosely scripted actions of actors, such as Ram’s responses during Interrogation.

5) **Live improvised:** unscripted attendee-actor interaction, such as Finale.

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237 This also referred to FoAM’s mandate for participants to ‘Grow Your Own Worlds’ in engaging with their artworks and to the Choose-Your-Own-Adventure book series.
6) Live improvised: unscripted participant-participant interaction, such as Sessions.
The following first discusses Qualitative then Quantitative Interactivity, as it follows the approximate order of these interactive modalities’ introduction over the staging.

6.4.2 Design of Qualitative Interactivity

Of the five scripted components involving qualitative interactivity, the first two, Heart Starting and Nurturing, occurred in every staging as they took place before any voting determined optional pathways. They were followed by Punishment and/or Interrogating if pathways with these options were selected. Each Finale was different, as it was the culmination of the pathways selected in that staging.

6.4.2.1 Modality 2): Heart Starting

The first interactive scene was starting Ram’s heart. He was presented motionless on Screen North, unconscious in his cot (Figures 6-225, 6-226). Head declared there had been a glitch in his biological birth and so asked attendees to clap together, with the BPM of their clapping creating Ram’s corresponding average heart BPM (Figure 6-227). Head informed them that the extent to which they clapped together also determined whether he would have a steady or erratic heartbeat in later life and that this had repercussions for Ram’s future health. The automated audio-analysis I designed was slated for v3, so v2 used AV Operators manually modifying audiovisual BPM of a CGI animation of Ram’s heart to synchronise with participants’ clapping.
6.4.2.2 Modality 2): Nurturing

Nurturing occurred immediately after Heart Starting. Ram awoke crying after his heart started. Head advised attendees they could comfort him by walking up and stroking his projected image (Figure 6-228). Head stressed this had ramifications for Ram’s later evolution, as attendees could ignore his crying to make him more resilient and self-reliant. It was left for attendees to negotiate their responses with one another, as individuals’ actions affected all other Parents. The automated RFID and sonar sensing I designed were slated for v3, so in v2 I visually analysed the volume of participants approaching Ram’s screen and their tickling and/or retreating from this screen. Video of Ram was accordingly manually manipulated in real-time between different states and intensities of crying and/or laughter.
6.4.2.3 Modality 3): Punishment

Figures 6-229, 6-230: Dialogical interaction with Ram and Head in Punishment and Interrogation in v3.
Photography by Jess Klingelfuss.

In Punishment, attendees could punish Ram one-on-one in response to him attempting to deceive his Parents. Volunteers stepped onto Podium and whistled into the microphone, with the strength and type of whistle inflicting corresponding amounts of pain on Ram (Figure 6-229). Punishment seamlessly combined pre-recorded scenes of Ram wincing with pain and the actor projected live, doing specific responses, such as cumulative shrieks in response to a quick succession of whistles.

6.4.2.4 Modality 4): Interrogation

In Interrogation, volunteers again climbed onto the Podium to ask Ram questions about any topic they liked (Figure 6-230). Interrogation and Punishment made dialogical interactivity highly performative, as unique contributions required standing on Podium surrounded by all fellow attendees.738 Conversing with live actors embraced emergent behaviour, as volunteers’ influences were unforeseeable to the creators. As these scenes embraced participants’ unpredictable behaviour, Head and Hoster-Drones

738 As an example of audience Feedback Forms that remarked on this: “Loved the open question component – would have been brave enough to participate if there were more of these (and not specified amount e.g. “3 parents”) but really enjoyed it!” (FF86. Emphasis in original). Another felt “comfortable” performatively standing on Podium but “wanted to stay on top of stage but robot didn’t let me (how rude!)” (FF36).
shepherded participants to minimise caesura’s in the flow of the staging. Such literally conversational interactivity related to the Artist-Audience-Artwork interaction in forums after each staging, where the creators themselves were interrogated.

6.4.2.5 Modality 5): Finale

*Finale,* where attendees decided to kill *Ram* or release him into society, highlighted attendees’ responsibility to mould a Being that carried the consequences of their actions into successive stagings. *Ram,* as Random Access Memory, referred to whether each *Ram* was unique, or a composite of the ‘nurture’ characteristics instilled within the pre-defined confines of his ‘nature.’ To evoke the concept of the Ghost in the Machine, *Ram* also stood for ‘ramifications.’ This occurred since each *Ram* was a socio-psychological ‘newborn’ undergoing his first rearing if he was ‘released’ during the previous staging, or a ‘newborn’ with an erased mind in a body with cumulative embodied experience if he was ‘reset’ during the previous staging. This was highlighted by *Ram* being a composite of instilled socio-cultural conditioning whereby the ‘residue’ of prior *Rams* exerted seemingly unpredictable responses when combined with successive socio-cultural conditioning from each staging. *Finale* challenged attendees’ to assess him against multifaceted criteria, such as whether they wanted Parents in the next staging to inherit their influences if they ‘reset’ him, or to allow the outside world to be subject to their Being by ‘releasing’ him. Such interactivity critiqued the ubiquitous *tabula rasa* in Interactive Art, where artworks do not respond, evolve, adapt or incorporate the meta-consequences of all interactions. Instead, participants in *Emergence* were responsible for the outcome of their own staging and also the influence of their staging on successive stagings.

739 I proposed judgment be according to what *Ram* expressed his desired life vocation to be, so participants could interrogate his appropriateness to live out his own long term desires. This was used in v3.

740 Cumulative development of *Ram’s* character over successive stagings was inappropriate as v2 was only for three stagings, but Bolotin and I deemed it essential for the 22 stagings of v3.


6.4.3 Modality 6): Design of Quantitative Interactivity

It’s not just a play but an experiment about us as human beings, working to create a desired being and in doing so, creating a desired society. By challenging the workings of modern society it makes us realise exactly who and what make up the Australian public. The audience’s responsibility is then to build this prototype and give it a human dimension – this is done through a voting system. The personality traits that the majority of the audience votes for is then implemented into the prototype. The audience gets really fired up at times and that’s when the real fun begins. For example, some want the prototype to have more evil traits and some just want to it be a nice sincere guy. The voting results shape the prototype and the audience are able to view the positive and negative repercussions of the human they’re creating. In doing so, Emergence places a social analysis on the kind of human beings we want to be living next door to.

Shivana Das

Das’ review highlights how Sessions were theatrical interludes between media modules, when voters physically and aurally expressed their preferences for Ram’s genetic modification. During Sessions, attendee-attendee and attendee-artwork interaction was encouraged according to:

1) The group dynamics of different attendees
2) Decisions being made
3) The Rules and Tools for voting
4) Flexible pacing, structure and duration of Sessions
5) Live unscripted audiovisual media and improvisational acting.

Head, Hoster-Drones and directional coloured lighting instructed when, where and how to vote, by standing in a corresponding quadrant next to Podium (Figures 6-173, 6-231, 6-232). The quadrants were part of a four metre diameter circular parquet (Figures 6-233, 6-234). Each quadrant faced the screen/option it related to, to attach voters spatially to their preference so like-minded groups formed a critical mass. Four rope barriers partitioned the

parquet into four sections at waist height. The rope barriers were suspended between the four Podium corners and the parquet edge. The ropes partitioned the quadrants, so voters had to exit the voting area to walk around the circle perimeter, to increase the likelihood of engaging with the opposition who had to do likewise to ‘cross the parliamentary’ floor. When a quadrant was an option, a corresponding colour of overhead light shone directly onto it, illuminating the boundaries of the quadrant. One colour of light was used for each quadrant. The colour of each screen’s text, background and voting tally matched the light of its’ quadrant.

All AV Operators studied a live video feed of the entire Room Womb from a camera pointing directly down from the ceiling. All AV Operators monitored quantitative and qualitative dimensions of voters’ interaction and instructed Head to steer the dynamic of Sessions, such as prompting him to give a live verbal tally or to indicate an imminent closure of a Session. The AV Operators gave real-time measurements of the number in each quadrant by adjusting an animated scale as voters entered or left quadrants. Scales highlighted how each voter changed the margins, so the scales could persuade undecided voters to tip the binary balance. Sessions ended after approximately two minutes, depending on how actively voters were debating the options. All AV Operators conferred on which quadrant had the most voters when the Session closed, and once the winner was determined, all lights dimmed and that option was activated, which segued to the corresponding media module depicting that genetic alteration for Ram.

References to a parliamentary floor appeared to be understood by participants in their Feedback Forms. As an example, in Part 6 of the documentary video of v2 in Appendix A a large group chants “Cross the floor! Cross the floor!” to persuade opposing voters to change their preference.
Figures 6-231, 6-232: Voting by moving to stand in areas corresponding to the different options in v3. Photography by Jess Klingelfuss.

Figures 6-233, 6-234: The parquet floor area and quadrants divided by the ropes, with Podium in the middle in v2. Photography by Zoltan Deak.

Figures 6-235, 6-236: QnA sessions, with attendees seated around Podium in v2. Photography by Zoltan Deak.
6.5 Implementation and Presentation

Emergence is an explosive performance of curiosity, science and in-depth thought about what the ‘perfect’ human could possibly be if we ever really had the choice to decide.

Emma Nesbitt

Over 500 people attended the three stagings of v2, with two sold out and one 90% full. Print and web posters, flyers, articles, interviews and advertisements highlighted attendees’ roles and responsibilities (Figures 6-189, 6-190, 6-191, 6-192, 6-193). As an example, The Australia Council for the Arts’ (OzCo) The Program stated that “by making collective choices and chatting directly with the giant characters on the screens the audience can determine the makeup of their ‘creation.’” It then mentioned the responsibility evoked:

But look out! With this power comes responsibility. In this mind-blowing experiment, some paths could lead to disaster: a lawless monster or a mechanised drone. The ultimate power is also the ultimate ethical experiment: will audiences be willing to discard human ‘weaknesses’ at the expense of inherent humanity?

SOH publicity was instrumental in establishing attendees’ expectation:

Our popular series of new experimental projects returns with an even more interactive twist. Not only do you get to have coffee and conversation with the cast and crew after the show, but – strap yourselves in – this time you get to call the shots during it!... In traditional film, the director controls the narrative and the audience takes a back seat. But what happens if these roles are reversed? How would you react if you were suddenly in control of the narrative? What decisions would you make? How would you interact with the work and the other audience members? Emergence asks these questions, you answer them! We encourage you


to attend more than one show to experience how the different narratives unfold.\textsuperscript{746}

SOH policy was that \textit{Scratch Nights} were one staging only and could not be full theatrical seasons as they “are an opportunity for artists to showcase their ideas and works at their earliest stages of research and development and are works in progress.”\textsuperscript{747} However SOH granted three stagings to accommodate the different forms of \textit{Emergence}. This suited the iterative design methodology of \textit{Emergence} as “public laboratory”\textsuperscript{748} as SOH forewarned audiences that v2 was “designed to get audiences talking about the production and provide their feedback to the creators.”\textsuperscript{749} Feedback sessions began immediately after all stagings with the majority of attendees present (Figures 6-235, 6-236).

6.6 Evaluation and Conclusion

\textbf{Figures 6-237, 6-238: Titles of The Sydney Morning Herald reviews\textsuperscript{750}}

\textbf{Figure 6-239: Title of The Daily Telegraph review\textsuperscript{751}}

\textbf{Figure 6-240: Title of The Sun Herald review\textsuperscript{752}}


\textsuperscript{747} Van 2005a.

\textsuperscript{748} Rokeby 1998.

\textsuperscript{749} Van 2005a.

\textsuperscript{750} Alice Wasley. \textit{Twisting the Gene Pool review. Sydney Morning Herald, August 17 2007, and Clare Morgan, Playing God is a Serious Game on the Dawn of a New Creation review. Sydney Morning Herald, August 18 2007.}

\textsuperscript{751} Jennie Jones. \textit{Theory of Creation review. The Daily Telegraph, August 18 2007.}
It is hard to do justice to just how successful Synarcade have been in merging the trappings of technology with the concerns of a theatrical experience. The ethical quandaries that are thrown up in the course of the evening are real and their effects on the audience are palpable, resulting in some quite heated debates occurring within the space. The result is an experience that is both cerebral and visceral, with a genuine emotional attachment possible between parent and offspring. As a work of participatory theatre it is well-conceived, and as a social experiment it is an intelligent approach to concerns that will no doubt attain even greater significance in the years to come. Despite the choices presented feeling somewhat reductionist at times, the net result is a powerful and sometimes chilling work of interactive art.

Brendam MaCallum

v3 drew on evaluations of v2 according to co-creators, SOH Studio staff, reviews (Figures 6-237, 6-238, 6-239, 6-240), observation and participation in the feedback sessions and patterns of responses from over 400 Feedback Forms (FF). Soon Van’s review discussed the core features, being “an experiment in social interaction, governance and human development.” He found it “a fascinating exploration into what a group believes makes for a human being” due to how every show of Emergence is as individual as the mix of people standing around the theatre as they move the narrative to what they believe to be in the best interests of their creation and the story at large.

Alana Maclean’s review expanded on the role of the group dynamic in engaging with the work:

The audience themselves are clearly performers and the nature of any given performance is going to depend on their choices. If, like I did, you go in with a pretty tame and genial one, nothing too drastic will happen. You’ll receive a gentle reminder of the power of ethics and the final being will chat quietly with his “parents.” But I wonder what might happen with a fiercer audience, one where people know each other and are braver about jumping into debate. I’d like to see

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754 For researching audience experiences, I drew most heavily on Question 3, followed by Question 1 and 2.
755 Van 2005b.
this show done in front of a bunch of 13 year olds... the intensity of your theatrical experience may very well depend on who comes in with you.  

Ethan Switch’s review similarly highlighted how attendees were the subjects, as he found it “a fun and fascinating exploration into the minds of people” through “a subtle commentary on a microcosm of social and political inclinations.” Van found the conflation between pre-determined and live modalities was a “wonderfully deceptive achievement” that was “seamless in the overlap” to the extent that “the VJammers keep the audience guessing at which is which and [audiences] are never really certain either way.” Switch also praised this technique, as he found

Sy narcade’s VJammers create a seamless blend of pre-recorded and live action segments that the difference between is nigh indistinguishable. Many moments throw themselves up on the screens with deception of reality a constant. Switch and Van agreed participants’ responsibilities were successfully communicated, with Van finding “the Head outlines the rules of the game with simple and straightforward instructions.” While Switch also found “from the very start Emergence breaks in the hint that the movement and participation of the audience is vital to the enjoyment and running of the production” and that “directions are simple and straightforward,” he located this in the deterministic binary structure, since “of all the possible streams for permutation, the limit is down on two choices for every decision.” For Switch, this rigid structure was offset by participant-participant debates provoked when “people start confronting each other and questioning their motives and reasons” whereby the “majority wins and all those without a bone of conviction lose as they watch the numbers sway back and forth.”

756 Alanna Maclean. Choose to be Intense or Tame in ‘Emergence’ review. Canberra Times, August 6 2007.
758 Van 2005a.
759 Feedback Forms expressed a similar response, with FF89 remarking that what they found was most interesting in the work was “the fact that I was so unsure of whether it was in real time.”
760 Switch 2005.
761 Switch 2005.
762 Switch 2005.
Van and the majority of FFs found the deterministic structure undermined the subject of indeterminacy. Although Van lamented the binary structure as “a limitation on the calculation of story probability and possibly as a way to limit the need to have the story makers [i.e. attendees] overthink as they’re being entertained,” FFs overwhelmingly suggested non-binary structures would not have placed too great an onus on participants as “story makers.” FFs asked:

- What did you find interesting in the show?
- What meaning did you interpret from the show?
- How did you feel about the use of interactive multimedia and audience participation?
- What developments would you like to see in the show?
- Do you have any other Comments?
- Have you seen these performers before?
- How did you hear about this show?

FF8 found the binary structure concerned “how we react to black or white questions when we want grey” in terms of “how we choose our government and the way we react to laws and restrictions on our choice and decision making options.” Remedying this called for “more choices” with “smaller decisions at times” including “the four option idea occasionally” since this would “help build the story.” FF6 found they “would like to see more choices if technically feasible with possibly more subtleties” as for FF6 this created a conundrum:

> It was a little bit frustrating as there wasn’t really time to talk the decisions through and some of the decisions didn’t have any good options – I could understand about the time factor and having to have a decision so that show could progress etc. but as an audience we couldn’t really adjust the question if it was inadequate, for example never tell a lie or never feel pain – both would really disable his life experience.

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763 FF8.
764 FF34.
Despite embodying “chaos theory in action” and “diplomacy in action”\textsuperscript{767} FF20 and FF21 also required “complexity to reflect more than 2 sides of the coin”\textsuperscript{768} with “more complexity if possible” as “we were often stuck with only bad choices.”\textsuperscript{769} The interrelated lack of “complexity” and “only bad choices” stemmed from offering the illusion of choice amongst trajectories that were both similar and overly-deterministic. FF63 linked this with inadequate voting processes, remarking “how difficult and unsatisfactory choosing is (or choosing out of those choices at least).”\textsuperscript{770} This detrimentally affected their experience:

I get the sense I would never be happy with my choice – was that the point? There was a negative overtone that I wasn’t sure was just a product of audience choosing, but felt like a ‘comment on society.’\textsuperscript{771}

The “negative overtone” stemmed from limited variation between different Rams. Some believed this was their responsibility, since ‘successful’ or ‘unsuccessful’ interactivity produced similarly disturbed Rams: “it made me realise how so many people do not communicate. If we had spoken and not thought separately we may have had a nice Ram, not an evil one.”\textsuperscript{772} Those who attended multiple times resented how Ram evolved into a malevolent creature, no matter what options were selected.\textsuperscript{773}

The multifarious and voluntary interactivity attempted to offset this structure of limitations by creating conditions conducive to engagement “in a way as to encourage audience participation rather than make the audience feel silly about taking part”\textsuperscript{774} where “the audience participation was pitched at the

\textsuperscript{767} FF20.
\textsuperscript{768} FF20.
\textsuperscript{769} FF21.
\textsuperscript{770} FF63.
\textsuperscript{771} FF63.
\textsuperscript{772} FF82.
\textsuperscript{774} FF66.
right level with people not bullied to take part."\textsuperscript{775} In contrast, FF59 found attendees’ responsibility excessive, calling for “perhaps more explanation to the audience as to what they should be expecting; they need to be made aware of how they are expected to react.”\textsuperscript{776} FF2 and FF5 also recommended more obvious communication of their responsibilities in the exposition\textsuperscript{777} to let “them know from the beginning how involved they will be and therefore they will be prepared for this”\textsuperscript{778} via “more info[r]mation at the beginning about the requirements of the audience.”\textsuperscript{779} Both cited ambiguous responsivity-responsibility relationships, as “we didn’t know that our participation actually changed anything so were less inclined to move [to vote].”\textsuperscript{780} They were adamant “this would have been changed had we been assured that our collective decisions altered the outcome.”\textsuperscript{781} Similarly, FF33 required “better understanding of the implications of the decisions made” to understand “cause and effect regarding large group decision making.”\textsuperscript{782} This would placate requests for “more clarity in the choices” as FF13 “wasn’t absolutely clear about” whether “the actions of Ram [were] the direct response to the majority vote.”\textsuperscript{783}

Despite recommendations for tighter responsivity-responsibility relationships, causality needed to retain some indeterminacy to provoke interest in responses with varying predictability. FF84 found the meaning in “how an unexpected consequence would always result from a decision made” regarding “the way the audience was allowed to participate and make decisions about how the story would develop.”\textsuperscript{784} They found this interplay stimulating in

\textsuperscript{775} FF36.  
\textsuperscript{776} FF59.  
\textsuperscript{777} As an example of this response, FF56 recommended “a little more substance in the booklet, a few questions to start conversations beforehand – more to encourage discussion. Some useful links (www) to further material – perhaps on the website.”  
\textsuperscript{778} FF2.  
\textsuperscript{779} FF5.  
\textsuperscript{780} FF2.  
\textsuperscript{781} FF5.  
\textsuperscript{782} FF33.  
\textsuperscript{783} FF13.  
\textsuperscript{784} FF84.
“that all decisions have consequences and that it is impossible to create a ‘being’ and have it turn out exactly the way you intended.” This bind was partly evoked by the “dilemma of being a socio-engineer and a parent” which FF56 found was a “great idea because we not only participate but also have to face the consequences of the group decisions taken to develop Ram.” Dissonance between these roles was explored via “the interactive nature” being tied to “the ethical questions raised.” As such, FF31 found the meaning in how “we are responsible for our interactions with others and how it effects them and that we need to consider what it means to be human especially in relation to human genome projects.”

Responsibility in unpredictable participant-participant interaction was “challenging [to] peoples responsibility” since “choices you make can influence everyone but ultimately it is the individual who takes responsibility.” Sessions displayed emergent forms of spontaneous responsibility when Parents defended and/or criticised strangers in what FF89 “thought…was a big social experiment to start feuds.” For example, in the documentary video in Appendix A a man calls to an undecided group “Don’t sit on the fence! C’mon we need you here. Don’t sit on the fence!” Soon after a lady says to everyone: “C’mon we’ve got to be responsible parents now.” In the same option from another staging, a man calls to the opposition: “Would you guys like to give complete control over the experiment? Come

785 FF84.
786 FF56.
787 FF56.
788 FF31.
789 FF52.
790 Other responses on this topic include: “Let audience know choice option is for rest of show not just one option enhancement.” (FF58), “That every decision has many unforeseen consequences – and therefore too much control is not always a good thing.” (FF24), “One of the areas that I felt that show could consider is actually creating consequences for the audience for their choices.” (FF11), “The realisation that choices I make can really affect others – whether realising it or not” such that “what one person decides can affect another and we never understand the full impact until it is too late.” (FF82), and “Everyone is accountable for their actions and decisions even in regards to strangers.” (FF61).
791 FF89.
quickly!
while motioning for them to cross the floor. During Punishment some participants reasoned with volunteers who punished Ram. After four men had punished Ram, a lady rhetorically asked “Why is it that it’s only guys who whistle?” Shortly afterwards another lady rhetorically asked a male ‘punisher’ “Are you happy?” after Ram repeatedly pleaded for him to stop hurting him. In this instance, Punishment ceased when participants protested enough to persuade everyone to stop.

Such Qualitative Interactivity complimented the Quantitative Interactivity, with FF68 finding they “really felt involved in the experiment” and “got very attached to Ram” despite being caught up in the “passionate” and “very interesting...arguments between audience members.” FF26 found such interaction was not alienating since “its what I loved the most. I really enjoyed how it drew people out and also brought the audience together as a group, rather that the usual segregation.” While FF80 found it “a coherent concept of assumed consequences of socialisation” for FF58 it highlighted solipsistic sociality where “society doesn’t even know what it wants or how choices affect others. We are sheep.” Sheep references appeared often in FFs since Ram desired a sheep-shepherd relationship to his Parents, such as when he tested if attendees would bleat like sheep after he pleaded with them to do so (Ram also referred to Dolly the cloned sheep). FF95 found it “confronting that some people did it” and suggested “more confrontation of the audience” to raise awareness of attendees’ agency. While finding the work “an excellent idea” FF96 remarked on sheep as a metaphor for coerced conformity as they “felt like a sheep being herded.”

Alongside this role, being Parents also presented participants with the dual persona of observing a process they simultaneously participated in:

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793 See Part 7 on Section 5 of the DVD on Appendix A.
794 Host-Drones also assisted in ending Punishment once it became apparent that many attendees wanted Ram’s punishment to cease.
795 FF68.
796 FF26. “The usual segregation” may refer to Interactive Art in general and/or in society-at-large.
797 FF80.
798 FF58. Emphasis in original.
799 FF95.
800 FF96.
I was torn between wanting to witness the evolution of the character and my need to be fully engaged in the choices that we were presented with.\textsuperscript{801} FF40 found that “rather than creating Ram, I felt we were re-creating ourselves, making changes or affirmations about our own ideas and values”\textsuperscript{802} while FF51 did not “know whether to take more away from Ram’s experiences or from the choices the audiences made themselves and what that says about society” and asked the creators “Do we learn from the piece or from the audience?”\textsuperscript{803} This conflation intrigued attendees about what Emergence reflected about them:\textsuperscript{804}

At first we thought we were doing an experiment on Ram but then we realised...
you were finding out what kind of people we were - so the experiment was on us.\textsuperscript{805}

Being the subject stimulated desire for accurate and substantial information about attendees’ individual and comparative values and perspectives.\textsuperscript{806}

The ways that v3 Design meaningfully analysed relationships between participants’ DaP profile and their votes accorded with many FFs, such as FF53, who was interested in the choices people made: “were people more likely to choose creativity upfront [in ‘Creativity versus Logic,’ the first option] – because people who come to a show like this are interested in fostering creativity? I want to examine the results and see if there is a pattern in the way people make choices” such as whether people “follow the crowd.”\textsuperscript{807} They also suggested “recording of results and [an] examination of the choices people made” and more variation in the Rules, such as “a situation where people are

\textsuperscript{801} FF50.
\textsuperscript{802} FF40.
\textsuperscript{803} FF51.
\textsuperscript{804} Other responses on this topic include: “How the audience reacted to the options. It saws a lot about our opinions as a society and a certain demographic.” (FF8), “I liked the production with the audience as the players.” (FF46), “An experiment on us – not just the being.” (FF61), “The audience was a big part of the performance...therefore the opportunity and encouragement offered to the audience.” (FF14), “Force the audience to make tough (tougher) decisions” and “audience penalised for their choices.” (FF41), “More of an insight into the audience than Ram.” (FF9), “It was a study of the audience.” (FF8t), and “[I] felt it was equally an experiment on us! Why was logic/creativity thought black and white?” (FF68).
\textsuperscript{805} FF22.
\textsuperscript{806} This was specifically addressed in Design\#15 as discussed on p333.
\textsuperscript{807} FF53.
forced to reach a consensus” even if it “could take a long time.” FF62 suggested “research into whether different colours [of the Interface lighting] can influence peoples decisions” to examine “the difference between choices made by specific age groups, religious and work backgrounds.” Similarly, FF83 advised to “learn from the audience” by “ask[ing] the audience questions on what made them decide was Ram’s best direction.”

Finding the meaning to be “the importance of the choices we make in life and what outcomes are created,” FF35 found Emergence “really made you think about why we choose certain things, what influences those choices” so they suggested we “really get the audience to discuss and explore their choices, to find out why we have made these choices.” Similarly, FF24 suggested “more audience debate” amidst “more difficult moral questions with higher stakes” to dissolve the binary structure through using “less bias in some word choices” such as “logical or creative” in favour of qualitatively assessing “enthusiasm as well as majority in the decisions.” FF14 argued for “people saying the reason for their decisions to convince others” while FF40 suggested “more encouragement to audience members…to be daring – yell out etc, and [to] encourage others to move” since they found “there could have been more verbal interaction and freedom.” FF65’s strategy in the “encouragement of argument” involved expanding the Rules to include factions electing their “colour or choice spokesperson” while FF9 requested “different

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808 FF53.
809 FF62.
810 FF83. This absence was remarked upon when a woman asked Bolotin during a Q-and-A session “have you actually gone across to the audience and asked them why they made their decisions?” and FF66 which commented that “For the Q and As I would have liked Mark (Bolotin) to have elaborated on the theory behind the work, the inspiration and his own personal views in context with current questions surrounding genetic engineering and democracy/polyarchy.”
811 FF35.
812 FF24.
813 FF68.
814 FF14.
815 FF40.
816 FF65.
types of crowd interaction (other than movement/clapping)” in tandem with “forcing the audience to justify decisions.”

v2 exceeded SOH expectations, as a loose group of non-professional artists successfully staged a complex, vulnerable and unrehearsed work that made unprecedented use of the SOH Studio and interactivity at SOH. The responses from co-creators, SOH Studio staff, FFs, reviews, and observation and participation in the feedback sessions affirmed that v2 evoked multi-faceted indirect, direct, literal, metaphorical, instantaneous and cumulative environmental responsibility amongst participants. Diverse individualised, nuanced and intimate Qualitative interactivity alongside Quantitative voting interactivity created an environment in which participants voluntarily engaged through multi-faceted levels of responsibility, while still being immersed in the multifarious narrativity. Based on the v2 staging SOH became Co-Producer and assisted our successful OzCo grant application for v3. While v3 was required to implement my more sophisticated and responsive Interaction Design, v2 was successful in its use of “certain tactics” with the “stated aim of interaction between strangers.” Both v2 and v3 manifested such emergent and swarm behaviour through the en masse interactions between attendees, many of whom engaged passionately with one another through the work’s “synthetic sociality” and “imagined communities.” How I developed my exploration of such evocations is discussed in re-conceiving the work for v3 in Appendix E.

817 FF9.
819 Penny 1996b.
820 Anderson 1983.
Chapter 7: Conclusion and Future Directions

The unity of which digital narratives speak (harmonious digital communities, immersion in cyberspace, holistic lifelike systems, the unity of the animate and the inanimate) reside in the future. Digital narratives commonly emphasize what will be accomplished while downplaying current achievements, which are inevitably more modest than the predictions. The grand narrative in this romantic teleology is of time-dependent progress, a surplus of expectation.

Richard Coyne 821

This thesis has investigated the ways in which Responsive Environments have been used to evoke environmental responsibility through interactions between artist, artwork and audience. The investigation was broken into its constituent parts: How may A (creating Responsive Environments) be attempted so that B (Artist-Artwork-Audience interaction) may occur according to criteria C (the Responsive Environment evokes audience responsibility). In this formulation, the problem was seen to lie in C (negotiating between binaries inherent to Responsive Environments); the context for the investigation was B (Artist-Artwork-Audience interaction) and attempted solutions were explored in A (examples from my own and others’ art practices).

In this thesis, I addressed two related gaps in contemporary scholarship. One has to do with the negligible critical analysis on Responsive Environments. The second is the lack of scholarly research on the relationship between Responsive Environments and environmental responsibility. In attempting to address these gaps, my thesis contributes to understanding the challenges of negotiating a balance between binaries such as authority-control, determinacy-indeterminacy, simplicity-complexity and narrativity-interactivity when creating Responsive Environments. While comprehensive solutions have been beyond the scope of this project, the suite of artworks and accounting for the process of their creation may be useful to similar practitioner-theorists and curators, critics and academics working in these fields of practice. In doing so, it contributes to the small, but growing, body of interest in bridging the gulf

821 Coyne 2001:19.
between art, science and technology, analogue and digital art, and environmentalism and Interactive Art.

Negotiating a balance between the above binaries determines the competing and contending relationship between all elements in a Responsive Environment. Evoking environmental responsibility through the interaction between artist, artwork and audience was found to be determined by three principal ingredients - content, form and Interaction Design. How these ingredients are combined in the attempt to balance authority-control, determinacy-indeterminacy, simplicity-complexity and narrativity-interactivity and the ratio between responsivity and responsibility was found to be the pivotal challenge to evoking environmental responsibility in Responsive Environments.

Chapters 1 and 2 of this thesis identified and clarified the recipes and ingredients for creating Responsive Environments by situating them within their broader art historical and cultural frameworks and through analysis of practitioner-theorists’ attempts to balance ingredients to create Responsive Environments (Chapter 2). Contrasting perspectives of ‘external’ reaction and ‘internal’ creation were used to conceptualise Responsive Environments according to the heterogeneous artforms, mediums and disciplines they incorporate.

Chapters 2 and 3 focused on the novel attempts of artists and artworks to evoke environmental responsibility when creating Responsive Environments. The five case studies in Chapter 3 explored these attempts through the careers of five significant artists/collectives. These studies illustrate various strategies to ‘solve’ challenges inherent to evoking environmental responsibility in Responsive Environments. The discussion considered how and why related artists use divergent combinations of content, form and Interaction Design to maximise complexity and interactivity, while reducing their authorial authority (and associated responsibility) and increasing audience authority (and associated responsibility).

Rather than posit a definitive ‘solution’ through any one artwork, artist or artform, my discussion of these several careers was able to demonstrate “a journey towards true interactivity” with ‘truth’ lying in specific combinations

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of intuitive, counter-intuitive, satirical, “‘broad bandwidth’”\textsuperscript{823} or trammeled interactivity. The case studies portrayed how each artist/collective developed context- and content-appropriate approaches to negotiating perceived polarities between rigidity and fluidity, real and irreal, Inside and Outside, and biological and human spatio-temporal scales to “inspire more responsive (and perhaps responsible) forms of design, engineering and social organisation.”\textsuperscript{824}

This thesis was concerned with explicit and implicit responsibility to the social and physical environment of the artwork rather than efficacy of Responsive Environments to instill responsibility to quotidian and natural environments. Rather than ‘test’ if artworks ‘successfully’ evoked environmental responsibility, the thesis was concerned with potential evocation through combining content, form and Interaction Design, in creating rather than receiving art. The tensions between what responsibility artworks evoke, versus what artists desire their artworks to evoke, arises from the intractable rhetoric-reality disjuncture between ideal and real realms of Alife aspirations to “‘art-as-it-could-be’”\textsuperscript{825} according to “life-as-it-could-be”\textsuperscript{826} and Blife aspirations for art-as-it-actually-is according to “life-as-we-know-it.”\textsuperscript{827} These tensions were discussed in Chapters 4, 5 and 6, which demonstrated the myriad ways the rationale for the content, form and Interaction Design of my own PBR has been influenced by these artists.

The dissertation of this PhD also includes my negotiation between the realms of real and ideal in the conception and execution of my own suite of artworks, where interactivity and responsivity were but two (albeit major) elements in the totality of creation and production. Chronologically, they are:

\textsuperscript{823} Rokeby 1990.
\textsuperscript{824} Kuzmanovic and Gaffney 2006:4.
\textsuperscript{825} McCormack 2005а.
\textsuperscript{826} Braeckman 1995:3.
\textsuperscript{827} Helmreich 2000:224.

2) *Tat Avam Asi (Kali Yuga) v1* (2004) and *v2* (2005-8) (hereafter *KYv1* and *KYv2* respectively)

3) *StilmS v1-v3* (2004-5)


The accounts of the iterative development of these artworks in Chapters 4, 5 and 6 demonstrated content and context-appropriate strategies to address the problems inherent in interactivity and responsivity when these were major elements in creation and production. These accounts were provided to document my “journey towards true interactivity,” which chronologically progressed from control over content creation and execution (in 1 and 2), to control over content with purposefully subjugated control over execution (in 3), to collaborative co-creation amidst dialogical engagement with multiple simultaneous variables (in 4). This development was shown to relate to four broad epochs in the development of Responsive Environments, as my suite of artworks were mapped to show the progression from Plastic Art (in 1), to non-linear single channel Media Art (in 2) to multi-channel semi-immersive performative-installation (in 3) to full scale multi-channel immersive installation (in 4). Similarly, my authorial responsibility shifted from a high level of control over singularly created content (in 1) to focusing on creating context through Interaction Design in increasingly collaborative works (in 4).

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Diverse interactivity and responsivity modalities were used, according to artwork-appropriate approaches. Chronologically they progressed from:

1) Implicit environmental responsibility in non-responsive but metaphorically interactive works

2) Indirect and metaphorical environmental responsibility for a single-participant in a “reactive environment”

3) Direct, literal and instantaneous environmental responsibility for small group interaction in a semi-immersive Responsive Environment

4) Indirect, direct, literal, metaphorical, instantaneous and cumulative environmental responsibility for large group interaction in a highly immersive Responsive Environment.

My approach to evoking environmental responsibility was contrary to many of the artists discussed in Chapters 2 and 3, as I located narrativity and engaging audiences in corresponding interaction modalities as an indispensable means for evoking responsibility. To do so, I developed and refined the techniques of Translucinatory Recombinatronix, Intact Syntax and Arpeggiated Hierarchy in the electronic works made for this PhD. These techniques denoted strategies for balancing interactivity and narrativity through negotiating tensions between discernable narratives through which ‘stories’ could be shared, and in so doing embracing context- and content-appropriate modes of interactive engagement.

Prioritising the negotiation between interactivity-narrativity and responsivity-responsibility over the trade-offs between simplicity-complexity and determinacy-indeterminacy delimited highly complex “open interactions” as used in Alife and dialogical artworks, which offer greater scope for evoking responsibility through awareness of complex and indeterminate causality than narrative forms. However, over the course of this PhD I identified a future

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direction for my PBR that could embrace both my narrative based approach to Responsive Environments and elements drawing from Alife art and complexity sciences.

The future direction for PBR is discussed firstly with regard to current discourse about the direction practice appears to be taking and secondly, given that balance is always so elusive, in light of practices that anticipate imminent advances in Alife science, Artificial Intelligence and Complexity Sciences. Discussion then proceeds along the lines of Richard Coyne's appraisal, quoted at the beginning of this chapter, that “digital narratives commonly emphasize what will be accomplished.” However this is only arguable by “downplaying current achievements,” as evinced by the discussion of the artists and artworks cited throughout this dissertation.

Speculation about the future directions for Responsive Environments posits the possibility of balanced positions between artworks, artists and audiences, through artworks that operate along frail, fertile, porous and oscillating boundaries at the edge of chaos. The following conjectures about future directions consider ‘evolving’ artworks using ‘dialogical’ interactivity to evoke environmental responsibility in harmony with the myriad mutually exclusive considerations of aesthetics, form, function, medium and subject matter. In the conclusion of her PhD, Graham argued that “the use of the common language metaphor of ‘conversation’ encourages a very critical view of interactive computer-based artwork” as she found “none of the artworks examined was judged to have achieved ‘Real Conversation’” which she reasoned was “a possibly unobtainable end point” despite being “a possible future aim.”831 The aim in this trajectory is to collapse “the boundary of ‘real conversation’ which currently cannot occur between programmed artwork and audience, but could occur between members of the audience.” Graham speculates the matter may be not if this is theoretically possible but when it may become possible, as “any interchange approximating a real extended conversation of words would demand real artificial intelligence from a computer - an attribute which, despite the hype, has yet to be arrived at.”832

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831 Graham 1997:137.
832 Graham 1996a.
Collapsing this “boundary of ‘real conversation’” would concomitantly collapse Inside and Outside environments, whereby interactivity in art would biomimetically model Rokeby’s quotidian examples of human-human verbal and oxygen-carbon dioxide exchanges, so that Inside interactivity would mirror the ubiquitous Outside where “interaction itself is banal.”833 Like Graham, Rokeby sees this as leading from a dialogical basis toward artist-audience relations, which he, like Graham, sees as requiring forms of Alife and Artificial Intelligence within Coyne’s “grand narrative in this romantic teleology...of time-dependent progress” and “a surplus of expectation.”834 Rokeby argues that to constitute “significant interaction” between artwork and audience would necessitate both being “permanently changed or enriched by the exchange.” The apotheosis in this regard would be artists occupying “the extreme position” of interactive artworks manifesting “learning and evolving systems” that utilise an “adaptive mechanism...for accumulating and interpreting its experience.” Rokeby acknowledges this is a largely unattainable ideal, the reality being a mimetic “form of evolution” through extrinsic “refinements and adjustments made by their creators” in lieu of their “responses to observations made of interactions between the work and the audience.”835

Such ‘evolution’ perpetuates the ‘omniscient observer’ status of the surveying and interrogating artist, who implements teleological “refinements” based on observations external to the artwork. ‘Evolution’ is through such means as producing entire re-iterations based on such observations, or modifying the work by night while it is open to the public by day. ‘Mutations’ in the emergent behaviour of such works do not evolve from within but at the discretion of “their creators,”836 as Whitelaw argues that “many of the systems we think of as ‘evolutionary’ or adaptive begin to seem non-emergent” as “the system is open to its environment, through the tiny portal of Boolean logic opened by interface decision-making, but neither the rules of its computation nor the semantics of its mapping of environmental input are subject to

833 Rokeby 1996.
834 Coyne 2001:19.
835 Rokeby 1995a:137.
836 Rokeby 1995a:137.
mutation.” Nonetheless Rokeby saw such aspirations as driving the future direction of practice, writing in 1995 that “learning mechanisms in interactive works will no doubt become increasingly common,” even if, 15 years after this speculation and a year before the speculation by Graham quoted above, this remains a largely unobtainable ideal. McCormack similarly speculated, in 2004, about the “rich” potential for these endeavours to explore the possibilities of “art-as-it-could-be, artworks that are autonomous, genuinely novel, emergent, active, self-renewing and never-ending.” However he also remarks on the discrepancy between ideal and real realms for while he has seen artworks that “have given us glimpses into these possibilities, such lofty goals remain intangible at present, and with no guarantee of success. It remains for future generations of generative artists to determine if any of these goals will be achieved.”

Like Graham and Rokeby, McCormack sees future directions as contingent on imminent scientific advances. He argues that “if you’re going to create systems that have any claim on being called living, then a lot more needs to be done, and that just doesn’t seem possible at the moment.” Similarly, Armstrong argues that “significant interaction might be achieved if a work were able to learn, and hence evolve, throughout the experience.” He concurs that while “this might seem an impossible task with existing computer tools, it is worth remembering that much of the complexity of response and operation can be brought to the work by the audiences themselves.”

In the light of these writers’ reflections which were expanded on throughout this dissertation, this thesis concludes with, and has made possible, my own formulation for the development of a framework for research and practice towards heightened evocation of environmental responsibility in the creation of Responsive Environments. It is beyond the scope of this

838 Rokeby 1995a:137.
841 Armstrong 2002:265.
dissertation to describe the specificities of this framework, however the
following outlines my first principles for further development.

re.al

will be the name of the artwork, as the acronym ‘real’ stands for Responsive
Environments of Artificial Life.

er.re

will denote the subject of the artwork: environmental responsibility in the
Responsive Environment. Phonetically the acronym reads as “error,” signifying
the impossibility of balance and inevitability of error as the modus operandi
for the conditions by which the work ‘evolves,’ ‘learns’ and ‘adapts,’ according
to the error threshold which precedes first principles in the mechanisms of
biological evolution.

5e

‘5e’ will stand for the five keywords which describe the intertwined approach
and subject matter of the project. They are:

1) error
2) evolution
3) ecosystemics
4) emergence
5) ethics

Identified through the process of practice and research undertaken for
this PhD, this future direction will continue to develop and refine the evocation
of environmental responsibility in the creation of Responsive Environments,
according to the foundation stones laid thus far.
Appendix B: Josh Wodak Curriculum Vitae


Education
2004–2010 Doctor of Philosophy, Humanities Research Centre, Research School of Humanities and Arts, ANU.
2002 Honours in Anthropology (1st Class), Sydney University (SU).
1998-2001 Bachelor of Arts (Double Major in Anthropology and Philosophy), SU.
1998-1999 Bachelor of Law, SU.

Select Awards, Residencies and Grants
2009 Spanish Cultural Cooperation Program between ANU and Ministry of Culture, Spain awarded for Sketches of Spain photography project.
2008 ANU Centre for European Studies (CES) Art Prize for CES photography exhibition.
2004-2008 ANU College of Arts & Social Sciences PhD Scholarship.
2006 Australian Film and Television Radio School artist residency grant for Laboratory for Advanced Media Production residential workshop on Hawskbury Island.
2006 Australia Council for the Arts New Media Arts Board (group recipient) for New Work: Development & Presentation of Emergence with The Synarcade Collective.
2006 ANU Travel Grant for fieldwork research at electronic art festivals, symposia and conferences in Germany, Austria, Switzerland, Italy, England and Holland.
2004 ANU Visiting Scholars Program scholarship to attend Thinking with a Video Camera workshop.
2002 SU Film Society (FS) and SU Broadcasting Services (BS) granted equipment sponsorship of Kali Yuga.
2002 SU Union (SUU) Cultural Grant for Kali Yuga.
2001 SUFS and SUBS granted equipment sponsorship of Dawn Of Ham.
2001 SUU Cultural Grant for Dawn Of Ham.
2001 SUFS and SUBS granted equipment sponsorship of Corkscrewed.
2001 SUU Cultural Grant for Corkscrewed.
Appendix C: Emergence v1

*Emergence v1*, which was called *Demophobic*, was staged three times at Balmain Town Hall Hybrid Happenings Festival from November 24-26 2004. *Demophobic* was staged after each staging of my *StilmS* and marked the transition between my solo and collaborative practice of making Responsive Environments.\(^{842}\) *v1* is an Appendix as it was a prototypical proof-of-concept which was staged so we could use the insight to completely overhaul *v1* to make *v2* and *v3*.\(^{843}\)

*v1* was a collaboration between key members of *Synarcade*, many of whom were integrally involved in *v2* and *v3*. Although technically simple and economical, it was more sophisticated and demanding than previous *Synarcade* productions. *v1* was initiated and Directed by Mark Bolotin. My pre-production roles were Associate Producer and co-contributing to the concepts and narratives with Bolotin. My production roles were Multimedia Coordinator and AV Operator.

*v1* concerned a protagonist, *Karkus* (played by Richard Cartwright) dealing with demophobia. Demophobia and agoraphobia have particular relevance for Responsive Environments with multiple co-participants, as they denote social anxiety of groups and public spaces. This was embodied in *v1* as Artist-Artwork-Audience interactivity resembled an agora. *Karkus* had become a reclusive musician, which preventing fulfilling his desire to perform in public places. The narratives concerned his reluctant interaction with *Sinray*, the only other character (played by Rhys Turner). *Sinray* was a psychotherapist who attempted to treat him. Attendees were presented with a series of decisions between encouraging the psychotherapist’s treatment or letting the patient deal with his disorder himself.

The installation design interrelated form and content, partly by using my *4forfour* installation design.\(^{844}\) *3forthree* (a.k.a *StilmS*) formed a semi-immersive triptych with screens at 60 degrees from one another. After staging

\(^{842}\) The reasons for moving from *StilmS* to *Emergence* are discussed in the conclusion of Chapter 5 on p241.

\(^{843}\) This is the subject of Chapter 6 and Appendix E.

\(^{844}\) This design is shown on p244 of Chapter 6.
3forthree Bolotin and I moved the screens into their 4forfour configuration to form a cube enclosing attendees. This ambiguityiously immersive/claustrophobic environment connected the layout with the agora-like interactivity and subject matter of demophobia. Participants chose between successively bifurcating narrative pathways which developed different narratives. As a parody of Pavlovian interactivity, options were selected by the first participant to ring a bell in front of each screen during the intervals when options were presented.

v1 involved participant-participant, participant-actor and participant-artwork interactivity. It used two live actors with two microphones and a stereo PA, while four AV Operators on four laptops controlled all AV media that was projected on four screens by four projectors. All pre-filmed scenes had pre-determined paths, with the only variable being whether they were selected. A minority of scenes were manipulated in real-time by all four AV Operators responding to observational analysis of participant interaction. These ‘dialogical’ scenes provided a countervailing force against the rigid interactivity of selecting pathways by ringing a bell.

Deliberating or debating options was impossible due to the ‘first in best dressed’ and ‘might-is-right’ approach that allowed impulsive and/or dominant people to unilaterally determine decisions. As the work itself lacked measures to hold decision makers accountable, this created burdensome responsibility for fellow participants to do so. This exacerbated power disparities between participants, as those unable to register their preferences were further disadvantaged if desiring to negotiate with those who spoke on their behalf.

In our reflective analysis following v1, Bolotin conceded his Interaction Design impeded artwork-audience interactivity. He then asked me to direct Interaction Design for v2 as an entirely new work.\textsuperscript{845} This was fortuitous for both, as I sought to lessen control over content co-creation in favour of creating contexts which maximised Artist-Artwork-Audience interaction. This benefitted Bolotin, who was inundated with directing the non-interactive components of v2. The ensuing work, Emergence, is the subject of Chapter 6 and Appendix E.

\textsuperscript{845} Even by early 2005, Emergence was collaboratively conceived as an artwork that would require two iterations.
**Conference and Seminar Presentations**


2006  ‘Interrogating Interactive Interfaces: Power, Politics, Performance in Electronic Installation Art.’ ANU Centre for Cross-Cultural Research (CCR) Seminar Series.

2005  ‘Interrogating Interactive Interfaces: Power, Politics, Performance in New Media Art.’ CCR Postgraduate Conference.


2005  ‘Interrogating Interactive Interfaces: Power, Politics, Performance in New Media Art.’ ANU Centre for New Media Arts Postgraduate Conference.


2004  ‘Sound Samples, Slides and Interactivity In Anthropology.’ Data Sets Colloquium, ANU School of Art.

**Select Exhibitions and Screenings**

2010  Access All Areas. Group photography exhibition at PhotoAccess, ACT.


2009  *The Idea of [NT+FNQ].* Solo photography exhibition at Photospace, ANU SoA.

2009  Access All Areas. Group photography exhibition at PhotoAccess, ACT.

2009  *Hang It Yourself.* Group photography exhibition at PhotoAccess, ACT.

2009  Above US Only Sky's *the Limit.* Group photography exhibition at Freilich Foundation Summer School in Religion and Bigotry at RSH, ANU.

2008-2009  *The Rights to Which we are All Entitled.* Commissioned acquisitive solo photography exhibition at ANU CES.

2008  *Kali Yuga V2.* Group exhibition with Dorkbot CBR at Canberra Contemporary Art Space, ACT.

Interactive Audiovisual Installations

2007  
*Emergence* (full version) with *Synarcade* at The Sydney Opera House Studio; The Street Theatre, Canberra; and Arts House, North Melbourne Town Hall.

2005  
*Emergence* (prototype) with *Synarcade* at The Sydney Opera House Studio.

2005  
*Reflection* with *Synarcade* at Cockatoo Island Festival, Sydney. Roles: Project Coordinator, Cinematographer.

2004  
*Demophobic* with *Synarcade* at Balmain Hybrid Happenings (BHH) Festival. Roles: Associate Producer, Multimedia Coordinator and Audiovisual Operator.

2004-2005  
*Grim Repercussions; Down to Earth Up in the Himalayas; and A Day in the Life of the City of Death*. Three interactive audiovisual installations at BHH Festival, Sydney; The Magical Theatre, Sydney; RSHA, ANU; and ANU School of Art. Roles: Director, Producer, Photographer, Editor, Sound Engineer, Sound Designer, Interface Designer, Performer.

Select Films

2004-5  
*Kali Yuga* (15mins). Roles: Producer, Director, Writer, Editor, Cinematographer, Sound Designer.

2001  
*Dawn of Ham* (10mins). Roles: Producer, Director, Co-writer, Editor, Music Producer, Sound Engineer, Co-Composer, Co-Performer (music).

2001  
*Corkscrewed* (13mins). Roles: Producer, Director, Editor, Cinematographer, Co-writer, Music Producer, Sound Engineer, Co-Composer, Co-Performer (music).

Select Audiovisual Performances

2007  
Live video art performance with *Synarcade* in AV performance for *FBI 94.5FM Night* at Becks Festival Bar, Sydney Festival.

2006  
Live video art performance with *Synarcade* in AV performance for *Jamie Lidell* at Becks Festival Bar, Sydney Festival.

2005  
Live video art in *Gadget: Experimental Sound+Vision* AV performance with Warwick Lynch and Alex Thorogood (audio) at The Australian Choreography Centre, ACT.

2005  
Live video art in *Free Radicals* AV performance with Warwick Lynch and Alex Thorogood (audio), at *Dust: The ANU Centre for New Media Arts Annual Showcase*, National Museum of Australia.
2005  Live video art in *Free Association* AV performance with Warwick Lynch and Alex Thorogood (audio) at Toast Nightclub, ACT.
2005  Live video art in *Free Association* AV performance with Warwick Lynch and Alex Thorogood (audio) at Electrofringe Festival, Newcastle.


**Select Music+Sound Art Composition and Performance**

2008  *Psychedelicatessence* (45mins). Solo LP album released on Experimedia label. Roles: Principal Writer, Principal Performer, Producer, Editor, Sound Engineer and Sound Mixer.

**Novels**

1999-2007  *come 2 o‘angin I I quiet desperation (‘alf an ‘age of dibbled pine)*: LANOVELLA IN 1789 PARTS.
2000-2004  *From C2R: The Big Boom Theory.*
2003-2005  *To See the Source: Don’t Look Back.*
Appendix D: Still Philm

Still Philm is representative of the audiovisual performance art I practiced in, before I began the shift, documented in this dissertation, to performative-installations and installations.

Still Philm was an experimental performance-installation staged on January 25 2004 at Magical Theatre in Sydney. I was Writer, Producer, Director, Sound Designer, Lighting Designer and AV Operator. Phillip Wood was the sole Performer. Like StilmS it had three parts, with Part 1 beginning the evening, Part 2 the first act following intermission and Part 3 ending the evening. Part 1 involved two slide projectors facing each other from opposite stage sides. Wood performed choreographed martial arts around the middle of the stage. Both sides of his body had different images projected onto his costume of all white cloth. The images moved in and out of focus as the projection length changed between him and the projectors. The corresponding images on the side walls appeared to change size due to the changing size of his shadow. This technique was subsequently developed during Stilm III v3 at the ANU School of Art.846

I performed with both slide projectors and live Digital Signal Processing of both projectors amplified through a PA. This created a prompt-response dialogue with Wood’s movement. We communicated through the visual rhythms from sequencing the images and the audio rhythms from both projectors. Subjecting both audio signals to unpredictable rhythms from Digital Signal Processing created an open cybernetic feedback loop with Wood’s choreography. This technique was subsequently developed for StilmS III v3. Part 1 ended when both carousels reached the last slide.

Part 2 involved Wood sitting in stage middle on the floor typing on a 50 year old manual typewriter. Each keystroke was amplified alongside the recorded sounds from Part 1 being played back. I directed Wood to observe the relationship between the typewriter rhythms and the recorded rhythms from Part 1. This created an open cybernetic feedback loop between Wood’s live typing which reciprocally influenced the soundscape as I intermittently

846 See p240.
processed his typing. I projected the same abstract/impressionist/expressionist slides onto two screens at stage rear, facing the audience. These were all in focus, so the previously abstracted images were now ‘representational.’ Part 2 ended when both carousels reached the last slide.

Part 3 involved no technology: Wood read aloud the ‘free-association’ verse he typed during Part 2. The content of all three parts carried over into one another, creating a performance based installation that pivoted upon synaesthetic audiovisual relationships.
Appendix E: Emergence v3

E.1 Introduction

As the definitive version, v3 pre-production used triple the pre-production time for v2. This appendix discusses three of my Interaction Designs for Quantitative Interactivity in v3 to demonstrate the project development and response from evaluating v2. These Designs are contextualised via a brief overview of creating v3 as companion to Chapter 6, as aspects of creating and implementing v3 are incorporated into the discussion of v2 in Chapter 6. My 13 other Interaction Designs for Quantitative Interactivity, extensive Designs for Qualitative Interactivity, and re-conceiving and re-writing the form and content are not recounted as they are beyond the scope of this dissertation.

Following the success of v2, v3 was Co-Produced by Sydney Opera House (SOH) Studio and awarded a grant from Australia Council for the Arts (OzCo) for “the creation and implementation of a nuanced and interactive system”\(^{847}\) including extensive “revision of the script, scenes, shooting procedures etc. via integration into the work”\(^{848}\) which would “vastly expand the

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\(^{847}\) Bolotin and Wodak 2005:16.

\(^{848}\) Bolotin and Wodak 2005:14.
amount of narrative possibilities (almost double) and increase the interactive options of the work.”\textsuperscript{849} Bolotin and I submitted to OzCo in October 2005 that “audience[s] will be able to control the work...through a number of different quantitative and qualitative interfaces” related to “the nature of the subject matter – biotechnology, group psychology, democratic decision making” such that Interaction Design explored “these themes via technologies central to these fields of practice and the merging age of ‘the post-human.’”\textsuperscript{850} Interactivity was distinctly developed from v2, which “primarily involved triggering areas of coloured light” whereas v3 would “significantly rework the interfaces with the support of this New Media Grant.”\textsuperscript{851} The following concentrates on these aspects, as the majority of my work on v3 was in these areas.

\textbf{E.2 Contributions and Collaboration}

Alongside continuing all my roles and responsibilities outlined on p253 of Chapter 6, my v3 contributions increased substantially in:

1) Overhauling, re-writing, expanding and developing the concepts, themes, narratives and structure
2) Logistical, administrative and technical domains of co-organising a prospective 2007 tour to 22 regional, remote and metropolitan venues around Australia
3) Recruiting and training pre-production computer scientists, mechanical engineers, electrical engineers and technologists to build my Interaction and Interface Design and AVMS
4) Recruiting and training production personnel to operate and tour my Interaction and Interface Design and AVMS as well as all other technical aspects of staging and touring v3.

\textsuperscript{849} Bolotin and Wodak 2005:11.
\textsuperscript{850} Bolotin and Wodak 2005:12.
\textsuperscript{851} Bolotin and Wodak 2005:15.
E.3 Project Development

Work on the performance component chiefly concerned whether to re-write the work from scratch in light of attendees’ and reviewers’ criticisms of the overly deterministic binary structure and limited options in v2, or to develop the v2 format further. When Nick Curnow, who played *Ram*, opted to leave the project in December 2006, it appeared all pre-recorded v2 materials could not be re-used. In Bolotin’s solution, Curnow’s *Ram* transmogrified into a ‘more-human’ male or female *Ram* after which the live actors playing *Ram* engaged attendees in dialogical interaction like *Punishment* and *Interrogation* from v2. Bolotin’s premise for transmogrifying was that *Ram* required further ‘humanisation’ of his volition or imposed by Parents according to pre-determined paths for this scenario. The ‘humanised’ *Rams* were one male and two females, each impersonating Curnow’s mannerisms. Curnow temporarily returned to film the intermediary scenes explaining his transmogrification. Other narrative and structural aspects of the implemented v3 were substantially the same as those discussed in relation to v2, with the exception of periodically employing the ternary structure I designed for v2.852

I undertook an additional role as Cross-Media and Multi Platform Narrative Designer, involving co-developing the meta-narrative across pre-performance, performance and post-performance components. The same writers who wrote v2 all wrote for the performance component of v3, while Bolotin and I also wrote extensively on pre- and post-performance components. Pre- and post-performance components were substantially developed when Bolotin, Tabone and I attended a Laboratory for Advanced Media Production (LAMP) residency with the Australian Film and Television Radio School (AFTRS) in June 2006. LAMP consisted of eight days of intensive production on an island in NSW, along with other selected groups from around Australia. We developed our ideas under the tutelage of AFTRS staff, culminating in presenting the rapid prototype of pre- and post-performance components to national and international figureheads from media, industry,
Universities, Governmental Cultural Institutions and NGOs on the last day.\footnote{317} The following two screen grabs illustrate a proof-of-concept in partially incorporating the online environment of Second Life into a Mixed Reality version of the performance:

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figures_E-241_E-242.png}
\caption{Figures E-241, E-242: Proof-of-concept constructed during LAMP}
\end{figure}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figures_E-243.png}
\caption{Figure E-243: Screen grab of the online pre-performance component, where participants could begin to vote for the ‘pre-birth’ genetic modification of their Being}
\end{figure}

\footnote{317} Chris Winter and Tim Kobin were the moderators for this presentation and for the feedback offered by the audience. People in the presentation included Justin Viles (Google Content Acquisition Manager), Ben Goldsmith (AFTRS Acting Head of Department - Centre for Screen Studies and Research), Chris Simon (Executive Creative Director Global Networks), Jennifer Wilson (HWW Managing Director), Geof Heydon (Alcatel, Director of Market Development and Innovation), Malcolm Long (AFTRS Director), Teresa Rizzo (AFTRS Lecturer, Centre for Screen Studies and Research), Timothy Kobin (AFTRS Design Lecturer), Adrian Norman (AFTRS Educational Designer), Tory Epworth (Telstra BigPond Manager, Mobile Content), Guy Gadney (Telstra Bigpond Director, Content Production), John Buchanan (Carnegie Mellon University Professor), Sally Browning (NSW FTO, Head of Development & Investment), Graeme Uhd (Nine Network, Client Strategy Unit Manager), Paul Whybrow (Foxtel General Manager, Interactive TV Services), Chris Oliver (Film Finance Corporation Australia, Investment Manager), Chris Winter (ABC Manager, Digital Interactive TV/Channel Manager ABC2).
LAMP was "to realise the cross-platform interactivity of the work so that it expands the scope and subject matter of the performative component most effectively." Bolotin maintained “this cross-platform expansion of the work would not only reflect the increased interactivity of the work but perfectly suit the subject matter” regarding real-world pre-birth genetic screening and audiences “setting preconditions for the ‘building of the being’ online before
the actual show" (Figure E-243). He maintained such cross-platform expansion addressed “one of the underlying aims of the work,” being “to give audiences, who might be traditionally adverse to technology and ‘interactivity,’ the opportunity to shape and control the story in an engaging and exciting way.” One of the “main goals for the LAMP residence” was “to make this interactive technology accessible to a broad public audience.”

Elizabeth Bentley’s review summarised how this was implemented:

As Interaction Designer for pre- and post-performance components as well, the following outlines how I constructed consistent Artist-Artwork-Audience relations across the disparate domains of the online and theatrical components:

*Contextualising the staging by interacting with pre- and post-performance components encourages sustained and meaningful interaction with the meta-work.* The cross-platform interaction modalities complement one-another, despite disparities between solo-online versus group-theatrical interaction. The meta-story constructs continuous interactivity and responsibility connecting all three components. In pre-performance, Pre-Parents collaboratively determine base personality and behavioral predispositions of their Being to be built during the staging (Figure E-243). These fundamentals affect evolutionary trajectories for each Being. To inform

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855 Bolotin 2006:2. As an example, Andrew Taylor’s review, *Try Your Hand at Creating an Ideal Human Being*, described his pre-performance activity as having “chosen to have a son who will be screened for ‘genetic abnormalities’ like diabetes, autism, sarcasm and romanticism so he can live a long, but not too exciting life and hopefully care for me in my old age.” *Sydney Morning Herald*, August 13 2007.


857 ‘Story’ refers to the performance narrative. ‘Meta-story’ refers to performance with pre- and post-performance components, collating cumulative audience DaP data and cumulative Beings from each staging.
Parents of their responsibilities, the website offers serious and satirical analysis of the topical issues within ‘Emergence.’ It also illustrates some parameters of the staging via allusions to different political platforms, voting, forms of government and more backstory about the DBS and the rationale for the experiment. This aims for Parents to inform one another about the ‘Outside’ world when they are ‘Inside’ the artwork-as-Environment, as those who participated in the pre-performance component may take it upon themselves to enlighten fellow Parents who did not engage with the pre-performance component. Pre-performance establishes interest in the cross-media nature as it continues post-performance in the same medium (the internet) as it began.

Online interactivity disallows one-on-one interaction between a Pre-Parent and an embryonic ‘Ram,’ to avoid Parents interacting without the collective responsibility required during the staging. Pre- and post-performances allow individual input in collaboration with other Parents. Pre-birth influences are exerted by Parents’ aggregate interactions, subject to self-organising and self-administering by other Parents, such as determining ‘Ram’s’ gender and related psycho-physiological attributes. This presages their ‘coerced cooperation’ during the staging, so 10 Pre-Parents advocating adjustment A but 20 advocating adjustment B results in adjustment B subject to the variable Rules.

In Post-performance, Parents continue raising their Being by interacting with it online. Each ‘Ram’ released during its’ staging is sent to the online environment of the post-performance component (Figures E-244, E-245). For consistent Interaction Design, interaction is collaboratively moderated with fellow Parents from the same performance, subject to the semi-autonomous behaviour of their Being. The Being continues to report back on their state of socialisation in the ‘Outside’ environment, which is subject to what genetic

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858 In numerous pitches, workshops, grant applications, sponsorship requests and applications to venues, a high proportion of people responded negatively about the gender of the Being being male and that this was fixed and unalterable by the audience. In v3, attendees could vote through the pre-performance website on the gender of their being. According to their votes, the Being transmogrified from the embryonic male Ram into a male or female Ram during the staging.
modifications they received from Parents during the staging in which they were built.\textsuperscript{859}

E.4 Interaction and Interface Design

In April 2006 Bolotin supplied his only design brief for Interaction and Interface Design and the AVMS. It re-affirmed the same requirements regarding developing interactivity and interfaces as those we submitted in our OzCo grant provided primarily for this area. Bolotin’s brief desired “evaluation [of DaP profiles] during the performance and post-performance on the website” which “will require some more developed technology” such as “evaluation consoles, psychological test consoles, PDAs” or “mobile phone technology.”\textsuperscript{860}

Before discussing how my Designs embodied these criteria, the following briefly illustrates my production and collaborative process.

Designs were made in three distinct groupings. In Phase#1 (October 2005 - August 2006) and Phase #2 (September 2006 - January 2007) I was the only person in Interface, AVMS and Technical Departments. Recruiting was not possible during Phases#1 and #2 as Tabone was not able to provide a budget, production schedule or touring dates, due to variations in the premiere season as part of organising a national tour. In February 2007 the last postponement confirmed the premiere to be August 2007 and Tabone confirmed a ballpark budget for my areas. I was then able to recruit the personnel by the beginning of Phase#3 (February 2007 - May 2007). Phase#1 (Designs#1-4) were relatively simple due to the premiere being scheduled for August 2006. Phase #2 (Designs#5-10) were facilitated by extending the premiere till February 2007. Phase#3 (Designs#11-16) completed all Interaction Design and completed all my other pre-production from securing all appropriate personnel to implement my Interface and AVMS. All Designs incrementally built on previous Designs, with recourse to differing combinations of the Tools and Rules outlined in

\textsuperscript{859} The implementation of this, including the post-performance component, can be seen on the website for the project at http://buildyourownbeing.com/lab/1.html.

\textsuperscript{860} Mark Bolotin. 'Draft Interface Criteria for Josh Wodak.' April 14 2006.
Chapter 6. The following briefly outlines Phase#3 production, as these Designs benefited from having the full production team on board.

Between February and May 2007 I conducted intensive group sessions with recruited computer scientists, electrical engineers, mechanical engineers and technologists. I also obtained frequent feedback from other relevant Departments, as well as from external consultants. Determining the Tools and Rules had to be finalised by May. To obtain feedback on my nominated Designs, in March I gave a 90 minute presentation on ‘Politics of Interaction and Interface Design in Emergence’ to all key personnel, key creatives and external consultants. Their diverse backgrounds and knowledge about Emergence tested the intelligibility of my nominated Designs for people ‘Inside’ and ‘Outside’ the project. I presented the critical issues of Interaction and Interface Design in Emergence to solicit opinions about interacting with these Designs. Feedback was in person, phone conversations, email and in the internal online forums of the project’s Wiki. Having incorporated this feedback, I gave a public presentation at the Sydney Dorkbot Seminar Series in April. Feedback was highly insightful, as Dorkbot discusses works-in-progress at the intersection of art, science and technology and is attended by eclectic people working in-between these fields. This presentation critically evaluated the following three Designs.

Design#13 and Design#15 were my two nominated Designs for the national tour. They were two of the most complex and sophisticated Designs which most comprehensively responded to the evaluation of v2. Although well received by co-creators and audiences at the above two presentations, they could not be implemented as the national tour did not eventuate. My Design#11 was implemented as it was the best fit between available resources and the funding derived for the three seasons it was built for. Design#11 is discussed in the context of being staged in the three 2007 theatrical seasons and is also demonstrated in the video documentation of an entire v3 staging.

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861 See p268.
862 I informally but regularly consulted friends and collaborators Somaya Langley, Keir Smith, Warwick Lynch, Alex Thorogood, Benjamin Forster and James Sheridan.
863 It was also instrumental to the project, as Andrew Goodman-Jones, an electrical engineer in the Interface and Technical Departments, was recruited through a prior Dorkbot event, as was Aras Vaichas, an External Consultant for RFID based Designs.
on Appendix E. The following first discusses the shared properties of Design#13 (Figure E-249, E-250) and Design#15 (Figure E-253) before discussing them individually.

*Design#13 and Design#15 heighten the depiction of the experiment taking place in a futuristic police state. Each voter has a Unique Voting Identification (UVI) coded into RFID tags they are issued with. An automated system records every vote from every voter from every staging to reflect back cumulative patterns of different peoples’ preferences. Design#13 assigns everyone a UVI but cannot obtain Demographic and Psychographic (DaP) profiles. Design#15 constructs UVIs with attached DaP profiles via an additional process that commences each staging.*

*The RFID readers are embedded in floor-mounted terminuses which emanate from ‘Podium.’ Terminuses do not obstruct voters’ mobility or views of the projection screens and are quickly and easily assembled and disassembled within the skills, resources, time and ability of all co-creators. Voters choose which voting area to enter and which terminus to queue at, wherein they can expediently vote by bringing their RFID tag to within 5cm of voting terminuses. RFID only needs to pass within range for a fraction of a second to be read. As voters queue they can watch those in front vote to learn from them if they are unsure about the process. This information transmission creates another avenue for voters to interact with one another. Terminuses throb red and fade in and out (referring to heartbeat and blood pumping) to indicate when voting is possible. To know their vote has counted, the area immediately surrounding the terminus exterior turns green for two seconds, with red indicating an active state without any registered presence of RFID.*

*UV lights embedded inside the terminuses also illuminate the RFID tag when it is brought within range of the RFID reader. A tally projected onto the screen corresponding to that voting option provides a live update of each vote as it is counted. Having voted, they can exit the voting area so they do not have to remain in the voting area for the duration as in ‘v2.’ This facilitates movement around ‘Room Womb’ before and after voting to increase contact between opposing voters.*

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864 This green and red colour scheme was called watermelon/melonwater, in reference to Ecosocialist political symbolism. The voting system used by Raduz and Cinematrix also used red and green colours for voting.
RFID tags are embedded in a Hardware Audience Voting Identification Costume (HAVIC), a hybrid between a sash, necktie, harness and stethoscope that is made of cotton, Velcro and plastic (Figures E-247, E-248). HAVIC is easy and quick to put on and take off. The information pamphlet issued on arrival.

Figure E-247: A preliminary sketch for HAVIC, showing the two Velcro straps around the neck, the vertical strip going down towards the belly button and embrIO sticking out over the belly button, Josh Wodak

Figure E-248: Sash, harness and vest versions of HAVIC and embrIO, Josh Wodak

Taking other peoples’ HAVIC or swapping HAVIC’s during the staging would be unlikely as Velcro makes a very loud noise when separated, which would attract the attention of fellow Parents and/or Hoster-Drones and/or Head.
instructs how to wear it. One ‘Hoster-Drone’ roams the male area and another the female area to assist attendees. HAVIC is a metre long piece of flexible yet durable material shaped like a stethoscope. The top has two 30cm long bifurcating sections with Velcro on one side and cotton on the other. Attendees wear the top as a collar by connecting the Velcro sections around their neck (Figure E-247). Velcro components are first attached at the front of the neck, where the knot in a neck tie goes. HAVIC is then rotated 180 degrees so the cotton component travels down the chest area, finishing where the belly button is on men and women of average height, depending on how tight attendees wear the collar. The collar size is adjustable for different body sizes, according to where the Velcro sections intersect. At the bottom is ‘embrIO,’ a 3x3x3cm red Perspex cube with the embedded RFID tag. ‘embrIO’ faces away from the body. To vote attendees pick up ‘embrIO’ and bring it to a terminus, as described in the paragraph above.

HAVIC and ‘embrIO’ evoke the following themes of the artwork:

1) Attendees wear a similar ‘controlling’ device to ‘Ram’s’ harness and circular dial, as ‘embrIO’ resembles the position and form of ‘Ram’s’ circular dial and harness (Figure E-247).

2) ‘embrIO’ positioned over the belly button refers to ‘Ram’s’ umbilical cord, a woman’s womb and fetus ultrasounds when ‘embrIO’ is scanned.

3) ‘Imprisoning’ attendees by physically connecting them to the interface ironically provides close and faithful information back to attendees about themselves. This heightens awareness of monitoring attendees, as analysing everyone’s ‘genetic footprint’ indicates everyone is being tracked.

4) Representing attendees by a code mirrors how government bureaucracy classifies citizens according to numbers, such as Social Security and Medicare. Ironically, reducing attendees to codes makes it possible to offer qualitative information about attendees.

5) HAVIC evokes a cross between jewellery/aesthetic decoration and being branded and labeled like an animal in reference to the sheep-shepherd motif. Branding and tagging attendees plays on the interplay between branding people and people
banding together regarding flock mentality, swarm behaviour and pigeon-holing people while critiquing consumerism, military Dog Tags and prisoner foot bracelets, especially for house-arrest prisoners. 866

The following discusses the application of this technology, protocols and processes in the different configurations and methods for Design#13 and Design#15.

E.4.1 Design#13

Design#13 constructs the above described voting process in 16 bollard-like terminuses distributed across ‘Room Womb’. 867 Male attendees are issued male HAVICs and females are issued female HAVICs by ‘Hoster-Drones’ as they enter ‘Room Womb.’ Each HAVIC has a UVI, but no DaP information is obtained from voters.

The RFID readers are embedded in vertical Perspex cylinders placed along both diagonal axes, marking each quadrant boundary (Figures E-249, E-250, E-251, E-252). At the top of each cylinder is an open cube where attendees bring their ‘embrIO’ to vote. This section is lined inside with red carpet so when voters put their hands in to be scanned, they feel the texture and form of the red Turkish carpets depicted on the projection screens. Each cylinder is hollow, 5mm thick, 25cm wide, 120cm tall and 100cm apart. This thickness allows the internal glowing red and green lights to shine through the translucent Perspex and out the open top.

Power, lighting and data cables run between each bollard under a 16 metre long curved flat bar steel platform running diagonally along the floor.

866 The animal motif is also important for the political overtones inspired by George Orwell’s Animal Farm and Pink Floyd’s Animals which frequently mention sheep, as both were major influences on the socio-political tone of the work.

867 Previous Designs included terminuses within rectangular boxes, cubic boxes, triangular boxes, within an arch, positioned parallel and beneath the screens, perpendicular and next to the screen and as vertical totem poles.
Figure E-249: Design#13 with the cylindrical bollards emanating from Podium, Josh Wodak. The two film sets are to the right of the diagram, next of which is where the two AVMS Operators and Interface Operators sat. The wall between them and Room Womb is invisible in this diagram.

Figure E-250: Design#13 showing a closer view of the open area at the top of each terminus, Josh Wodak. The colours of the quadrants show what colours they were lit up and where during Sessions.
under ‘Podium’ (Figure E-251, E-252). This platform is 5cm wide and 2cm high and protects the cables from being stood on. The underside of the steel bars are covered in carpet, to prevent any damage to the stage floor. This platform cannot be tripped over because there are no straight edges or hooks to get
caught on when stepping over the platform. All bollards are structurally reinforced by being fixed to the platform, to ensure they cannot be tipped over if attendees lean against them. Each bollard is made of two vertical halves so for transport each is divided into two components which slot into one another. The structure is modular, lightweight and portable, so assembly is a straightforward process of screwing together the sections of each terminus, then each terminus to each platform segment, then all platform segments to one another. Disassembly is the exact opposite. All components stack into one another when in transit.

Attendees vote by funneling into the ‘open’ end of their chosen quadrant, that is the terminus closest to the screens. In walking past a terminus to vote, attendees move from the crowded quadrant interior to relatively empty neighbouring quadrants, as the two active quadrants are always opposite each other. Bollards form temporary walls during ‘Sessions.’ They are only accessed from inside an active quadrant as voters cannot vote from the exit side due to the steady stream of voters exiting through the spaces between bollards.

Returning HAVICs is an instrumental part of ‘Finale,’ where voters take off their HAVIC to hang on a left or right arm of either ‘Hoster-Drones,’ who stand on opposite sides next to ‘Podium,’ with the Being standing inside ‘Podium,’ awaiting its’ judgment. As voters have to approach the Being to hang their HAVIC on their preferred ‘Hoster-Drone,’ they literally face their Being, even if voting to kill it. Both ‘Hoster-Drones’ act as manual balance scales, as they tip (semi-humorously) in the direction of their arm with the most HAVICs hanging off it. ‘Head’ declares the winner by visually observing which arm of which ‘Hoster-Drone’ has the most HAVICs. Everyone being likely to vote in ‘Finale’ maximises the proportion of HAVICs returned before the staging ends, which is essential for evenings when the work is staged twice in succession. It also symbolically ends their embodied involvement, as they arrive unencumbered and begin by ‘strapping themselves in for the ride’ and unstrap themselves to finish.

Design#13 has the following meanings and references:

1) The cube at the top, deep red lighting and deep red carpeted walls resemble a scaled micro-model of ‘Room Womb’ that attendees stand in.
2) ‘Fishing around’ with a hand inside when voting refers to mixing chemicals in analogue photography development rooms, where images are ‘born’ from interactions between the chemicals and the paper.

3) When it is off, the cube refers to a ‘black box’ as “any complex piece of equipment, typically a unit in an electronic system, with contents that are mysterious to the user” and magicians’ ‘black magic’ regarding Parents and the DBS ‘playing god’ in genetically engineering the Being.

4) When it is off, the cube refers to a foreboding sense of probing the unknown, such as museums which have static objects (stuffed lizards, rocks and so on) inside black boxes which they get children to put their hands in to describe the object via touch. This asks voters to physically and intimately connect with a strange box that emits strange lights and sounds.

5) Such tactile and haptic nurturing via the interface is surrogate for caressing their Being in ‘Screen Womb.’ This comments on how human-human relationships are increasingly technologically mediated so that literal and metaphorical distances between humans can seem to be ‘diminished’ by technological intimacy and immediacy, such as screening ‘impure’ parents from insulated sick babies that require development time in plastic boxes and can only be touched through plastic gloves.

6) Placing a naked hand on a surface can register every persons’ unique biometric data. Obtaining data by RFID reinforces how the DBS wants detached and depersonalised Government census type data, rather than in intimate, physiological data such as DNA from contact with a naked hand.

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New Oxford American Dictionary. Mac OS10.4, s.v. ‘Black Box.’
E.4.2 Design#15

Figure E-253: Design#15, showing the projections of the bifurcating questions along the purple rectangles, and the arrows they used to direct attendees, Josh Wodak. Question one is on the right of the diagram at the North-East entrance and the last questions are on the left at the opposite walls. The voting terminuses are shown emanating from Podium. The four blue and green circles represent the places to stand to swipe one’s embrIO.

As Design#13 could not incorporate DaP profiles, Design#15 re-conceived the spatial use of Room Womb to create a process by which DaP profiles were established and incorporated at the beginning of each staging.

DaP profiles are instrumental for individual and cumulative stagings as they allow for comparisons during and between stagings. Given the logistical and ethical issues involved, DaP profiles are obtained and analysed without offering trite and tokenistic understandings of attendees’ values and opinions. This relates to re-conceiving the form and content via the Tools and Rules, as establishing majority versus minority in binary decisions at fixed pre-defined points does not reflect the complex relationship between attendees’ DaP profile and their preferences for the Being.

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869 Described on p268.
As DaP profiles cannot be reliably established prior to the staging (by internet registration, telephone booking, or asking attendees to fill in their information at computer kiosks in the foyer), Design#15 comprehensively solves the challenges of obtaining DaP profiles while developing attendee engagement. Everyone is matched to their corresponding DaP profile by physically navigating bifurcating questions that shepherd attendees when they enter. Asking everyone the same questions as they enter symbolically levels the ‘playing field’ between all Parents. The process informs everyone of their parameters of interactivity and responsibility irrespective of having interacted with the pre-performance component, attended before, or having spontaneously walked-in off the street. The process chaperones attendees while they become acquainted with the ‘Room Womb’ atmosphere. To minimise distraction during this scene, ‘Room Womb’ is in a restive state with dim deep red light throughout and a projected mosaic red texture on the screens that expands and contracts in time with the sound of ‘Ram’ breathing while he and ‘Head’ sleep (Figure 6-180). Each successive answer filters them into progressively refined categories which lead on to their corresponding HAVIC.

The purple rectangles in Figure E-253 show where the questions are placed. Questions are written in LED lights on right-angled signs hanging from the ceiling at 1.5 metres height. The signs are automatically winched into the ceiling once all attendees have finished answering the questions so they do not obstruct ‘Room Womb’ for the remainder of the staging. Removing the signs completes the scene, after which the filmic exposition begins. Three metres from the entrance the first sign says: “Are you male?” on the right side of the sign, with an arrow pointing right, indicating to walk right to the next sign if that attendee is male. “Are you female?” is written on the left side of the sign, with an arrow pointing left. Each question directs attendees from the entrance to areas along the opposite walls that correspond to the cumulative combination of their answers.

Roaming the tree shaped narrative structure by answering the DaP questions spatialises the narrative by mapping the structure to the floor. Everyone starts at the entrance as the same homogenous embryo (represented physically by the entrance as ‘trunk’) and ‘evolves’ down bifurcating ‘life paths’ as an analogy to the work’s progression. This hexstat probability model evokes the mobile hanging over ‘Ram’s’ cot, which shows the sum of all
possible paths, past and futures as a 3D kinetic sculpture of fate and determinism (Figures 6-212, 6-213, 6-214, 6-215, 6-216). Everyone roams the narrative structure in two opposing ways: no co-operation is required when answering DaP questions, but in ‘Session’ questions voters negotiate as groups navigating pathways together. Temporarily separating attendees from those they attend with explores the extent to which those who come together vote similarly. The DaP questions show how to exert influence by moving through ‘Room Womb,’ which presages the crowd control protocols for moving around during ‘Sessions.’ Attendees’ collective predicaments are also presaged due to posing DaP questions that, like the collective questions, do not have clear cut answers. As an example, one DaP question is: “Do you have free will?” – with an arrow pointing left if you do, and right if you do not. Everyone exercises ‘free will’ in responding to these forking paths, depending on if they exercise their free will to lie and take ‘incorrect’ paths to construct a different identity, given attendees’ role playing as Parents. This yields patterns of emergent behaviour according to the variable probability of responses demonstrating bell curve propensities according to the proportion who voluntarily/truthfully answer each DaP question versus those who selectively lie versus those who abstain.

The last question leads them directly to the perimeter of ‘Room Womb’ where a thin 1.5 metre high horizontal wire stretches around the perimeter at waist height. One HAVIC for each attendee hangs from the wire. All male HAVICs are along the wall from SW to NW to NE. All female HAVICs are from NE to SE to SW. Each HAVIC has a pre-coded DaP. So if someone responds “Male>18-35 years old>Resides in Sydney>Public Servant>First time attending ‘Emergence’>Possesses Free Will>Opposed to genetically modifying humans” they would be lead to the corresponding spot on the perimeter where a HAVIC has this DaP encoded into its’ RFID tag. HAVICs are organised in colour coded DaP categories so they are easily placed in their corresponding locations after each staging. There is a surplus of HAVICs for each DaP category as it is impossible to predict how many of each category are required for each staging. Questions and DaP categories are adapted to stagings to adjust the micro and macro criteria according to specific ranges, such as schoolchildren
only stagings.\footnote{One of the first stagings in the Canberra season was for High School students only.} Having donned their HAVIC attendees may roam around, including recongregating with the people they came with.

Voting in Design#15 uses substantially less equipment, less costs, quicker assembly and disassembly and easier portability as it only uses infrastructure embedded in and emanating from ‘Podium.’ This gives the widest and least encumbered space to move around in. It achieves this by embedding 16 terminuses on moveable two metre horizontal rods that run between the metre high vertical poles at each ‘Podium’ corner. Each terminus on each rod is used in each ‘Session’ as the rods pivot 90 degrees (Figure E-253). The 10cm wide solid wrought iron vertical poles are fixed and immovable. The 5cm thick transparent Perspex horizontal poles are relatively light. Both are extremely strong, being structurally reinforced by a connecting X grid under ‘Podium’ (Figure E-252). As each rod only moves 90 degrees there is no cable slack. Cabling distances are extremely short, as all voting terminuses are near ‘Podium.’ One bundle of data, power and lighting cables runs vertically from the top of the NW pole through a clear 6cm diameter hollow Perspex tube to the roof and then to computers which process all votes. This cable bundle forms part of the set as the microphone participants use when interrogating and punishing the Being is mounted onto the vertical Perspex tube.

In-between ‘Sessions’ all rods are closed so there are no protruding rods. This square border around ‘Podium’ indicates that the focus in-between ‘Sessions’ is on the audiovisual media on the screens and PA, although necessary rods are opened and closed during ‘Punishment,’ ‘Interrogating’ and ‘Finale’ to allow climbing onto ‘Podium.’ When each ‘Session’ begins, ‘Hoster-Drones’ manually open the necessary rods. The manual cogs require ‘Hoster-Drones’ to insert a key to unlock each rod so they can push it into place. Rods are locked open or closed so they do not buckle even if leaned on, to prevent any rod movement other than by ‘Hoster-Drones.’

Locking and unlocking rods to move them into their active position symbolically and theatrically creates walls and corridors between opposing sides. This refers to opening and closing a polling station on an election day. When options are in North-South quadrants the rods pivot so the terminuses
run East-West, with the terminuses parallel to the screens they correspond to. When options are in East-West quadrants, the poles pivot so terminuses run North-South. Each rod has two embedded coloured lights which match the two Screens that rod corresponds to. When it belongs to Screen North it lights up with the colour of Screen North and is parallel to Screen North. When it belongs to Screen East it lights up with the colour of Screen East and is parallel to Screen East (and the same for Screen South and West).

During ‘Sessions’ flat terminus rows divide ‘Room Womb’ into halves, affording the largest possible voting area for both halves. Eight terminuses face outward for each option. The number of terminuses can be doubled by placing them on the inside and outside of the poles, so voters access them from inside and outside of ‘Podium.’ This brings voters into close contact with their opposition as there is no separation between those voting from inside the ‘Podium.’ Voters move into their chosen area and join a queue leading to one of the terminuses. For crowd control, coloured spotlights indicate where to queue. ‘Head’ and ‘Hoster-Drones’ also shepherd voters to form four parallel queues (like a school assembly). Attendees vote by bringing ‘embrIO’ to within 5cm of the terminus. The same visual and graphic feedback as in Design#13 indicates their vote has been counted. With one metre between each terminus there are sufficient corridors for voters to exit after having voted.

The ‘Finale’ is the same as for Design#13, except their final vote involves placing their HAVIC on the rod corresponding to their preference. This automates the voting count for the last round. It also symbolises their spatial journey from being separated after all entering along the same entranceway ‘tree trunk,’ before branching out to their allotted spot along the room perimeters at the beginning and by the end congregating around ‘Podium.’
E.5 Implementation and Presentation: Design#11

Figures E-254, E-255: The Interface Operator observing the computer monitor which calculated the number of votes according to the volume of green and red halo light in active areas during Sessions. E-254 is taken during the strobe flashes that immediately preceded the assessment, which is the instant captured in E-255.

Figure E-256: The Interface Operator observing the computer monitor which shows the overhead perspective of Room Womb and the proportion of red and green halos in the different sectors

Figure E-257: The live projection of the voting tally is shown to the left of the photo. This tally showed the results for each Session and all Sessions combined, throughout the staging.

Figure E-258: Screenshot of the Isadora patch used to run the v3 AVMS, Nev Black.

Figure E-259: Circuit diagram of the v3 AVMS, Nev Black.
Winters’ review describes the voting design as used in v3 stagings. Over 1700 people attended the full theatrical seasons at The Sydney Opera House Studio; The Street Theatre, Canberra; and Arts House, North Melbourne Town Hall in 2007. In Design#11, the implemented design, Hoster-Drones assigned thin cylindrical red glow sticks to men and green sticks to women as they entered Room Womb. The glow sticks were worn as halos for the duration of the staging. Participants voted by moving into their chosen area and standing during a Session they wanted to vote in. Voters remained in respective areas as it was not specified when the tally would be taken. As it was impossible to simultaneously fit more than 50 people per quadrant, voting areas occupied half of Room Womb when there were two simultaneous options. When there were three options, a ‘Swinging Vote’ or ‘Undecided’ sector was created in-between the two active quadrants (Figure 6-177, 6-178, 6-232, 6-233). The computer did not count the light emitted from the halos in these sections, as they were ‘donkey votes.’ A strobe light flashed in the three seconds before an arbitrary still frame was taken from cameras positioned above (Figure E-254), from which computers assessed the total amount of both

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glow stick colours in all active area (Figures E-255, E-256). A live graphical tally indicated the number of votes for each session, as well as the results of each Session, so attendees could better judge Ram according to the genetic alterations they made over the course of the staging (Figure E-257).

Design#11 did not establish any UVI or DaP information, although gender proportions were obtained by calculating the amount of green and red halo light in active areas. The following are some examples of the quantitative data it produced for all 22 v3 stagings:

1) “71% of Melbournians wanted their being to be more critical as well - this is compared to only 50% of Sydneysiders.
2) Sydneysiders chose their ideal being to be more empathetic (54%) whilst people in Canberra overwhelmingly preferred their being to be more critical (61%).
3) Sydneysiders very strongly wanted their ideal being to be an explorer (71%) whilst Canberrans strongly preferred a life-path of 'questioner.'
4) 67% of Canberrans, when given the choice, wanted their being to be more independent. However, for young people under the age of 17, this was only 55%.”

E.6 Summary

As v3 was not a work-in-progress, it did not solicit responses from attendees as v2 had done. However the pre- and post-performance components on the website solicited hundreds of comments and postings from Parents’ to their Beings, as each Being from each staging kept communicating with its parents in the online post-performance component. While not providing evaluative feedback, these comments indicate sustained engagement and empathy between many attendees, who desired to continue their experience online after their staging had finished.873

As it was much more widely publicised than v2, v3 was reviewed in premiere Australian newspapers such as *The Sydney Morning Herald, The Age* and *The Australian*. As v3 was so similar to v2, these reviews are interspersed in evaluating v2 in Chapter 6, as the work-in-progress nature of v2 was more amenable to comprehensive evaluation via the multiple sources of co-creators, SOH Studio staff, reviews, observation and participation in the feedback sessions and patterns of responses from over 400 Feedback Forms.

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