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Aesthetically Potent Environments

An exploration of technology, meaning and embodied interaction.

A thesis presented in partial fulfillment of the requirements for the postgraduate degree of

Master of Fine Arts

at Massey University, Wellington campus, New Zealand.

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2011

Abstract

When an artistic or aesthetic experience no longer relies on an audience to “passively” consume it, but rather entices the viewer to become an active participant in the artwork, how is the perception of the work and, subsequently, the audience affected? How does the audience encounter and make meaningful these types of experience? Squidsoup have, for the past 10 years, been exploring these questions through their practice-based research. Their interactive artworks engage the audience as part of a sociotechnical network, as both a component of the overall aesthetic experience and as a catalyst for compositional change within the artwork.

In our everyday lives we experience the world as a physical and social space. In order to elicit the greatest action and interaction from an audience Squidsoup attempt to make the intangible tangible, and create works where social interaction between the participants is encouraged. As computing becomes more ubiquitous, moves away from the desktop and starts to occupy the “physical” spaces around us, the ways in which people engage with technology, and each other, will change. Squidsoup’s most recent work – *Ocean of Light: Surface* – seeks to explore the interrelationship between people, technology and space and how this could manifest as a potential aesthetic experience. *Ocean of Light: Surface* looks to bring digital interactive artworks into the physical and spatial realm of the audience in order to explore the effect this has on the way they interact with, and consequently understand, the work.

This research will draw on my current and previous practice as part of Squidsoup and locate it within a wider historic, artistic and theoretical context. The thesis will detail the development of the concepts underpinning our artistic practice by relating case study examples to historic and contemporary art practice and relevant theoretical literature. *Ocean of Light: Surface* will be the physical and practical manifestation of this research embodied within an artwork.

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Preface

For the past 10 years I have had the privilege to work as part of the digital arts collective Squidsoup. Squidsoup is a loose interdisciplinary group of designers, musicians and artists who focus on constructing engaging digital “spaces” through which meaningful and creative interaction can take place as part of a social and collaborative experience. A central theme to all of the artworks produced by Squidsoup is the notion of creating interactive, user friendly and relational works that provide the audience with a means of generating relationships with (and through) both the technological and human elements of the artwork in order to create an aesthetic experience (Bourriaud, 2002). Squidsoup is not concerned with the creation of artifacts that represent the world, but concentrate more on providing opportunities for what French writer Nicolas Bourriaud (2002) has called “relational interaction” within it.

Squidsoup’s work requires the audience to share their individual experiences as an externalized intersubjective experience, as opposed to a private internal moment so that they may engage with the artwork in a powerful and dynamic manner. That is to say that engaged participants experience the artwork not only on an individual basis, but also collectively as part of a shared conscious experience with other members of the audience. The enjoyment of each piece comes from a physical and collective elaboration of meaning that integrates the viewer as part of the artwork.

As with most interactive art, Squidsoup’s work is characterised by the audience participating physically with the artwork in order to change not only the work itself, but also their understanding of the work. As Muller and Edmonds (2006) note, participants “achieve” meaning in their encounters with interactive artifacts through action. The historical precedent for audience involvement within artworks in this way was set in the 1960s and 1970s through an attitude in art known as Fluxus. Fluxus artists attempted to integrate their audiences into their artwork through the use of event scores for performance artworks and so-called happenings. What Fluxus brought to art was the concept that an audience could be involved in the creation of a piece of work by “doing it”, a concept congruent with Duchamp’s theory of the viewer completing the artwork¹ (Rush, 2005). The work of the Fluxus artists looked to blur the boundary between artist and performer. Among the early Fluxus pioneers were Nam June Paik, Dick Higgins, Joseph Beuys, Wolf Vostell, La Monte Young, Joseph Byrd, and Yoko Ono, all of who worked in a diverse range of media from performance to poetry.

¹ Duchamp’s theory was that the viewer is as important as the artist in the creative process. It is only through the viewer’s active participation in interpreting the work that the creative process is completed.

The concept of using an audience in an artwork, or using them as an artwork, is extensively documented in Bourriaud's (2002) writings on relational aesthetics. He notes that the 1990s onwards saw a significant shift in the focus of contemporary artists. This period is exemplified by a proliferation of artists seeking to explore inter-human relationships as the subject of their artworks². Temporality and intersubjectivity are key elements of these types of work. Bourriaud states that they provide a specific "arena of exchange" and only exist in the encounter and dynamic relationship formed between the audience, artwork and artist. "Otherwise put, the role of the artworks is no longer to form imaginary and utopian realities, but to actually be ways of living and models of action within the existing real, whatever the scale chosen by the artist" (Bourriaud, 2002). Artists cited by Bourriaud include Carsten Holler, Felix Gonzalez-Torres, Gabriel Orozco and Pierre Huyghe.

Phenomenology provides an important theoretical parallel to both of these artistic genres. A philosophical movement founded early in the 20th century by Edmund Husserl, Phenomenology contends that the social interactions we encounter everyday are the means by which we understand the world. Phenomenology posits that the way in which we experience and understand the world is intrinsically linked to us physically "being" in it. The influential German philosopher, Martin Heidegger, hypothesised that the meaningfulness of everyday experience lies *not* in the head, but in the world around us. Phenomenology takes a diametrically opposed view to Cartesian Dualism, Descartes famous line "I think therefore I am" is turned around by Heidegger who proposes that one needed to *be* in order to *think*. Being comes first; thinking is derived from being. (Heidegger, 1962).

This is congruent with a more contemporary area of theory that emanates from the social sciences known as Activity Theory. Kaptelinin and Nardi (2006) define Activity Theory as "an approach in psychology and other social sciences that aims to understand individual human beings, as well as the social entities they compose, in their natural everyday life circumstances, through an analysis of the genesis, structure, and process of their activities." The concept of activity is unsurprisingly at the heart of activity theory, but not just human activity, the activity of subjects in the world generally. Activity theory supports the notion of a mutual transformation between audience and artwork through purposeful interaction (Kaptelinin and Nardi, 2006) that lies at the heart of Squidsoup's work.

The scope of this essay does not allow for extensive exploration or explanation of any of these areas individually, however they all present us with two unifying factors. Firstly, we encounter the world as a physical place in which we act. It is the way in which we act – the tangible tasks in which we are engaged, and how they are accommodated into the world – that makes the world meaningful for us (Dourish, 2001). Secondly, that the creation of meaning needs to be intersubjective in order

² Bourriaud states that the Italian Renaissance opened up the relational arena within art through its focus on Humankind's relation with deity. Cubism changed the relational aspect of artworks by focusing on Humankind's relation with the object.

for there to be a shared understanding of the world. Using examples from Fluxus, Relational Aesthetics, Phenomenology and Activity Theory as supporting arguments, this essay will seek to illustrate how physical and social activity can be manifested as a meaningful aesthetic experience. It will further demonstrate that technology has an important role to play in the mediation and facilitation of frameworks that allow for the possibility of such action and interaction.

Acknowledgments

All of the Squidsoup projects mentioned in this essay are the result of collaborations with a talented array of artists, programmers, musicians and designers. These artworks have only come to fruition over the years due to the tireless energy and enthusiasm that Squidsoup co-founder Anthony Rowe has poured into them. Anthony remains the driving, organisational force behind Squidsoup and is a constant inspiration in terms of his leadership, dedication and belief in what he is creating as an artist. I would like to thank Anthony firstly for giving me a job all those years ago, but more importantly acknowledge his ongoing commitment and vision for Squidsoup. Anthony's management of the Squidsoup venture has resulted in our work being exhibited internationally at some of the most prestigious galleries and festivals in our field.

Gareth Bushell is the other long-serving member of Squidsoup whose ability to visualise ideas through code always amazes me. Gareth is the creative programming force behind nearly all of the Squidsoup projects. He is an immensely talented programmer and artist, without whom many of the Squidsoup visions would not have been brought to life.

The latest addition to Squidsoup, Liam Birtles, was responsible for some of the initial ideas and technical solutions behind *Glowing Pathfinder Bugs*. As our artworks are becoming more "physical" and spatial, Liam's skills and knowledge will be an invaluable addition to the group.

I would also like to thank Dr. David Cross and Dr. Martin Patrick for their guidance, direction and advice with the writing of the thesis and Sadie Hawker for her patience and proof reading it. Lastly, I would also like to acknowledge the contributions of Squidsoup co-founder James Lane who worked on *altzero*, and musician Ollie Bown for creating the audio component for *Ocean of Light: Surface*.

Introduction

Since 1997 Squidsoup have been engaged in creating commercial and artistic projects that have existed, not as finished artifacts or designs in their own right, but as processual environments or “spaces” that exist to be made and remade by audiences. These artworks have become manifested in many different forms, ranging from multiuser online games to interactive artworks in galleries, but they have all had one thing in common – they are systems that have the capability to function autonomously, but which only come alive through user intervention. This means that the viewer becomes a participant in the work, and that the work behaves in response to the participant’s actions. The work relies on the audience behaving as both an observer of the work, but also as part of the overall spectacle (Brouwer and Mulder, 2007).

Drawing on the writing of Ascott (2008) who describes interactive artworks as “a system arising from a process, that includes the artist, the artwork, and the observer, coupled in a semantic relationship, where the aesthetic experience emerges from the interaction of these three elements”, Squidsoup seeks to take on the role as facilitators of a creative process. As with many of the Fluxus artists, we define frameworks and systems within which the audience and their relation to the work becomes as much of the final spectacle as the artwork itself.

When artworks are created in this way it requires the artist (or artists in our case) to relinquish creative control of the final outcome and pass some of that responsibility to the audience. The role of the artist, as Fernandez (2008) explains, shifts to being a controller or manager of a system – providing a set of constraints or guidelines to allow specific forms of outcomes without over determining these goals. Our work does not simply seek to present itself as a final product through which we can influence the viewer; rather it attempts to further still the process of mutual change between the viewer and the artwork. (Brouwer and Mulder, 2007).

In terms of art history, this reformulation of the artistic experience is relatively young, first appearing in the early 1960s; but still this fifty-year history is a rich and increasingly complex one. The English cybernetician and psychologist Gordon Pask was one of the pioneers and a theorist of what he termed “self organising systems”. His seminal work titled *The Colloquy of Mobiles* was shown in 1968 as part of the *Cybernetic Serendipity*³ exhibition in the ICA, London. *The Colloquy of Mobiles* alluded to an ecosystem in which five creatures, both “male” and “female”, could interact

³ Cybernetic Serendipity was the first large international exhibition of electronic, cybernetic, and computer art. It took place at the Institute of Contemporary Arts (ICA) in London, UK, from 2 August to 20 October 1968 and was curated by Jasja Reichardt.

with each other both directly and also indirectly through an installation environment via the use of flashlights and mirrors. The audience was able to join this conversation with the machines by interrupting the flow of information in the ecosystem (Media Art Net, 2008). This type of idea, an interactive and networked programmed ecosystem, recurs often in interactive artworks, not least in seminal works such as those produced by Christa Sommerer and Laurent Mignonneau in the 1980s and 1990s (Network Research, 2008).

For Pask (1961), “self organising systems” were “systems that we regard as though they have elements in them that make decisions”. They consisted of “elements, automata, players, decision makers, ‘neurons’ or the like”. This idea of creating a dispersed cognitive system that forms a shared circuit of creativity within and between the living and the technological elements of a system is very much at the heart of the artworks that Squidsoup produce.

In these systems human activity and behaviour are extremely important and the work prefaces the importance of shaping, observing, and understanding behavioural patterns. As Ascott (1998) states “To discuss what one is doing rather than the artwork that results, to attempt to unravel the loops of creativity, is, in many ways, a behavioural problem. It leads to consideration of our total relationship to a work of art, in which physical moves may lead to conceptual moves, in which Behaviour relates to Idea.”

Trying to predict and shape audience behaviour, to achieve what Pask (1971) refers to as an, “aesthetically potent environment”, has been a key factor that has driven the development of much of Squidsoup’s artwork. Ideas for our works of art are based as much on the types of activity that can be elicited from an audience through the work, as what the work itself looks like. Pask describes an “aesthetically potent environment” as having sufficient variety to provide the potential for it to be controlled, containing forms that can be interpreted, providing clues as to how it may be controlled and finally it may also be responsive to human presence in order to engage the occupant in “conversation” (Pask, 1971).

This body of writing seeks to investigate the creation of aesthetically and conceptually potent environments as interactive artworks. It will illustrate how activity and behaviour can be perceived as an aesthetic experience and how the creation of meaning within such an experience is intrinsically linked to both social and tangible activities. It will argue that sociability and tangibility are both part of what is known as embodied interaction, and it will draw a parallel between this mode of interaction and Phenomenological theories. The argument will be exemplified through three case studies of work that I have created with Squidsoup over the past ten years.

Chapter 1 looks at the importance of activity and interactivity within artworks. It will set the scene by giving a brief history of interactive art and discussing some of the core concepts behind interactivity within art. It will differentiate interactive artworks from more traditional forms of art,

but also note similarities that exist in contemporary relational works of art. The chapter will then go on to elaborate further on the important role that the viewer has in activating interactive artworks as co-actor rather than spectator (Huhtamo, 2008). It will investigate the notion of acting “with” technology and the concept that the aesthetics of interactive artworks are formed as much in the activity and behaviour of the audience as they are in the artwork as object or artefact. The chapter uses *altzero* as a case study to ground these concepts. *altzero* was Squidsoup’s first interactive art project, created between 1999 and 2000, and still provides the group with many of the core concepts evident in our work today.

Chapter 2 examines the notion of “art as a living system” (Sommerer and Mignonneau, 1998). It explores artworks as complex systems involving autonomous agents, as well as the viewer in dispersed cognitive systems. It builds on the concept of viewer participation laid out in Chapter 1 and explores the new dynamic that is created in the artwork/network through the addition of autonomous agents. The addition of autonomous agents into an artwork means that intervention from the audience is no longer the only way the artwork is set up to change. The intelligent agents can affect change themselves from within the artwork, but they are also prone to external influences from the user. What results is a complex relationship between the user, the agents and the artwork (Brouwer and Mulder, 2007).

The chapter introduces social and tangible interaction and looks at how these two activities help in the creation of meaning. It looks at tactile interfaces within the context of liminal interaction and augmented reality and the overlapping of virtual and real environments. *Glowing Pathfinder Bugs* provides the case study for Chapter 2. This project was created by the group in 2008 and exemplifies a move not to virtual reality, but in the opposite direction: an attempt to bring the digital world into the physical realm and enable tangible interaction with digital artworks.

Chapter 3 considers the notions of immersion and embodiment within artworks. It looks at past examples of immersive environments throughout art history in the form of frescoes and panoramas and compares the key components of these illusory environments to contemporary immersive technologies like Virtual Reality. The chapter then goes on to discuss Squidsoup’s most recent project - *Ocean of Light: Surface* - and contrasts it with other contemporary, technologically sophisticated immersive art “environments”.

Ocean of Light: Surface (2010) represents a significant step in the development of Squidsoup’s work – moving from the creation of interactive objects into interactive environments. This chapter reflects on the difference in activity and behaviour that results from the shift to a more spatial, but lower resolution experience for the audience. In particular it focuses on whether moving from creating an object to an environment can help to draw in the less engaged, harder to reach outer circle of the audience into being more active participants (Brouwer and Mulder, 2007).

The hardware created for the *Ocean of Light* project currently only permits the visualisation of low-resolution imagery, which in itself provides an interesting challenge in terms of how an audience perceives and understands the work. The chapter looks at immersion within interactive artworks and particularly the attainment of immersion through work – such as *Ocean of Light* - that presents the user with a low-resolution experience.

The chapter returns to the notion of tangible and social computing, as discussed in Chapter 2, and briefly outlines their relevance within so-called embodied interaction. It goes on to relate theories of embodied interaction to Phenomenological views of consciousness and human experience. Lastly, the essay translates these theories into the practical embodiment of an artwork, looking at the contemporary artist Olafur Eliasson's work and the final manifestation of *Ocean of Light: Surface*.

1

Activity

Setting the Scene

The field of interactive art has a relatively short history that encapsulates not only art history, but also an eclectic mix of science and technology due to its close relationship with developments in both of these fields (Sakane, 2009). It could be argued that all artwork requires some form of “interaction” with its audience - however work that prefaced interaction as a cornerstone didn’t really make an appearance until the 1960s, when technology had evolved to such a point that it enabled users to personally take an active role in, and create actual change to, the artwork.

The distinction between interacting with art and interactive art should be elaborated at this point. The important function of art traditionally has been to have an artist transfer their concepts or message to an audience by touching their emotions or senses. It is only once the artist has presented their work to an audience and the audience has responded, that one can say that the work of art has been fully realised. This relies on a form of interaction between the artwork and the audience, but is more about how an audience visually perceives and understands the work. Interactive art moves interaction with the artwork beyond a purely psychological activity and allows the audience to physically navigate, assemble and reconstitute the work in some way (Christiane, 2003).

The fundamental difference between interactive art and discrete art objects is that the viewer actually plays a part in the creation of the artwork – not only mentally, but they actually leave a trace or change the work in some way. This significantly alters the dynamic between the artwork and viewer. Due to the participant’s integral involvement in the creation of the work, the viewer is constantly shifting between identifying and reacting to the action being demanded by the artwork and a reflection on this activity or action. Although this wavering between identification and reflection is evident in traditional artworks, it only really becomes observable within interactive and participatory art. This is simply because engagement with the artwork requires bodily action. As Kwastek (2008) suggests, there are interesting side effects to this with engaged audience members serving as exemplary participants for others, and a heightened awareness by all audience members as to how they are being observed by others.

Setting aside the history of interactivity within art and looking at interactive artworks, the first truly interactive artworks were the happenings of the late 1950s and 1960s. Allan Kaprow’s piece -

18 Happenings in 6 Parts (1959) - is commonly acknowledged as the first of these types of events. Although limited in their interaction, these works did emphasise an interaction between the performer and the audience. The first pieces of work to be exhibited that started to employ some form of technological component were the likes of *Soundings* in 1968 by Robert Rauschenberg, the previously mentioned *Colloquy of Mobiles* by Gordon Pask, also shown in 1968, and Myron Krueger's *Glowflow* exhibited in 1969. Although these were extremely rudimentary pieces of work they were still driven by the artists desire to make them responsive to an audience, and have had a profound effect not only on the development of the current interactive arts movement, but on advances in computer technology in general.

The 1970s and 1980s saw a shift in the media being used by interactive artists with video becoming more available. This resulted in works where artists could experiment with live performances and real-time interaction with video imagery, evident in Myron Krueger's *Video Place* exhibited in 1974. The discourse around interactive art also moved from interaction to participation through artworks like Jeffrey Shaw's 1983 piece titled *Points of View*. This shift was thanks to Shaw transferring his participational concept of art, developed in the 1960s, to his computer art. He introduced the notion of performance to interactive artworks – as well as the participants' interaction with the work, their performance becomes a spectacle or theatre for other spectators. This was accompanied by a more spatial approach to the artworks as exemplified in David Rokeby's 1983 work – *Very Nervous System*.

The 1990s saw interactive art coming into its own with the so-called second-generation of interactive artists and the advent of computer-based interactivity. The increasing power and accessibility of computers and programming languages meant that the content of these second-generation works focused less on traditional narrative and more on the complexity of the interaction, making the design of interfaces increasingly important (Ken Feingold, 1994). This, coupled with the rise of the internet, resulted in a plethora of seminal works including *A-Volve* (1994-1995) by Christa Sommerer and Laurent Mignonneau, *Osmose* by Charlotte Davies in 1995 and Paul Sermon's 1991 piece titled *Think About the People Now*. This proliferation in activity by artists was accompanied by a wider acceptance of interactive art as a legitimate art form with museums and galleries increasingly incorporating this form of art into their shows. Some, like the prestigious Ars Electronica Centre, set up a prize specifically for interactive art in 1990.

Art as Activity - A New Aesthetic

It is at the end of the 1990s that Squidsoup's journey into interactive art begins. *altzero* was Squidsoup's first venture into the world of interactive art, and drew on a lot of the technological know-how that we had developed through commercial projects undertaken at the time – primarily the creation of multiuser spaces using Macromedia Director's Multiuser Server. Squidsoup had been using this software to create online multiuser gaming and chat room spaces for clients such as

Universal Records and Playstation, and it seemed a logical development to implement these within our artistic projects.

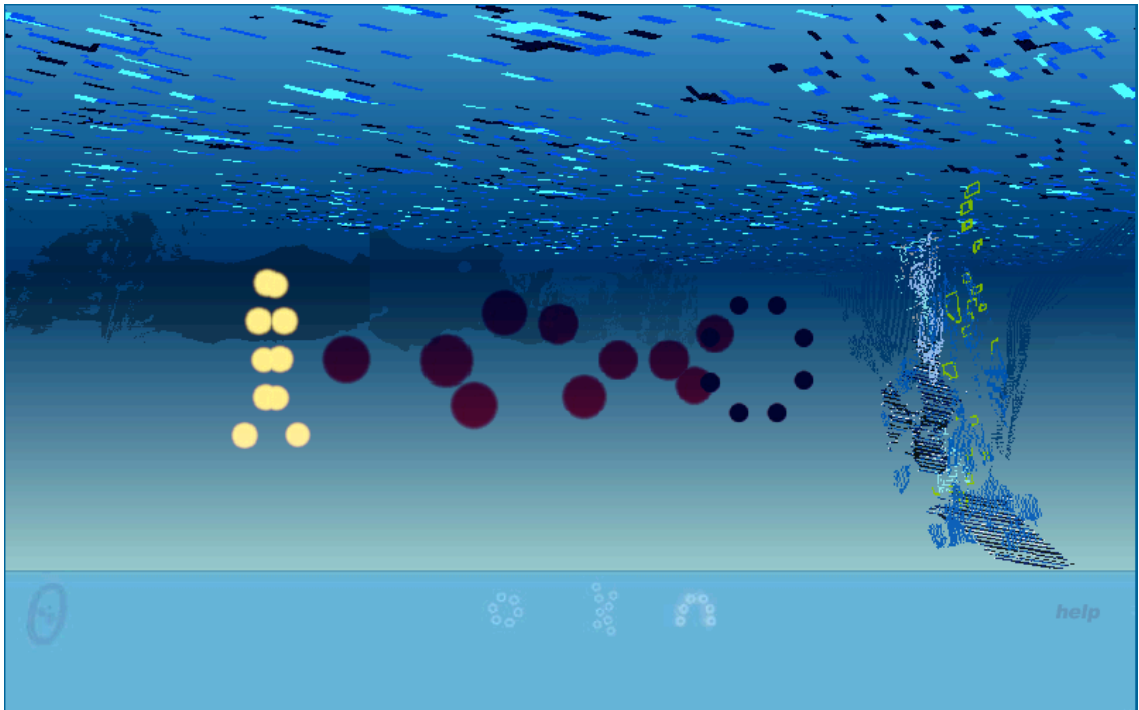


Figure 1. Screenshot from *altzero* demonstrating the interface at the bottom of the screen and the navigable audio environment at the top. The coloured blobs represent sounds that have been placed in the space by the audience.

altzero is an engine for creating digital, multiuser, 3 dimensional sound-scapes that can be explored and manipulated by individual or multiple users simultaneously. It allows the audience to add and position their own sounds in a virtual sonic world in order to create a form of navigable audio CD or a fly-through orchestra. These sounds can then interact with sounds around them resulting in a carefully crafted experience, even if the participant's interaction is minimal. *altzero* makes a link between games technologies, where navigable sound-scapes are the norm (but not the focus), and musical composition. In a sense, it envisages a gaming environment where everything is stripped out except the sound and the user's ability to move around freely in the digital space. The visuals then become a reference for the sounds, another means of deconstructing and understanding the structure of what is being listened to.

An extremely simple interface allows four simultaneous users to add, delete and move sounds around a shared sound-scape. Each participant can see, and more importantly hear, what the others are doing and can choose to collaborate with them or act independently within the space. Each sound has a distinct visual "shape", so that as the participants build and re-shape the sonic environment they are also re-forming the visual landscape. Each user has their own terminal with which to interact with the artwork and this offers a means of adding to and viewing the environment from their "first person" perspective. In addition to this view of the environment a

projected worldview is shown for audience members who are not centrally engaged in the creation of the piece, to be able to see what is going on. A computer controlled autonomous camera controls this view.

Although the technology that was employed in *altzero* remained relatively similar to the commercial work Squidsoup had been undertaking at the time, a major shift had occurred in terms of how the work was conceptualised and “created”. We had to move away from designing predetermined spaces and characters, and move into designing objects that could potentially be combined by the audience to create an audio and visual experience. As much as the participant could make aesthetic decisions around the design of individual elements within the world, we were very conscious of the inability to be able to control how these would be positioned, combined or even viewed by the audience.

Further to this challenge we had to accept that, within interactive art, an object is merely a component of the overall artwork. If all the audience does is look at it, as they are used to doing with other forms of visual art, then they will in all likelihood be disappointed. It is, as Bouwer and Mulder (2007) have argued, action and activity that truly brings the work to life.

These two issues changed the way that Squidsoup thought about creating *altzero* – we were no longer looking for the aesthetic experience of the work to be in a finished artefact or space, but rather in the potential activity and engagement from and with the audience. Our challenge was to create a space and the elements that would occupy it that could be sufficiently flexible enough to allow the unknown activity of the audience to be a meaningful and dynamic experience. We had to fundamentally re-think what would constitute an aesthetic experience and how they could somehow control or aid this in a completely open system.

altzero also forced us to consider the issue of aesthetic distance as part of an aesthetic experience. Aesthetic distance is the space and time given to an audience to reflect on the work of art they are looking at: think of people pondering in galleries, staring for an age at an individual painting. This space and time is critical within interactive artworks as the participant is expected not only to visually perceive the work, but also to actively engage in it in order to realise it. This meant that an audience was required to explore, realise and reflect on *altzero* all at the same time (Kwastek, 2008).

The result of this reconfiguration was that the audience activity became as much a part of the aesthetic experience, not only for the individual participant, but also for anyone observing the work as a non-participant in the outer circle⁴. As Pask (1968) describes - "Our internal representation of an image, our active perception, answers and begins an internal dialogue with that part of our

⁴ The outer circle are those audience members who are not directly involved in interacting with the work, but who survey the scene from the peripheries deciding whether, and how, to engage with the artwork.

psyche responsible for producing our immediate attention." He goes on to say, "an adaptive or reactive environment allows us to externalize this discourse", consequently the "conversation between the viewer and the work becomes observable".

What we experienced with *altzero* was that the artwork became a system that arose from the activity and relationship that existed between us, as the artists, the artwork itself, and the audience. The interaction and activity between these three elements of the system were an intrinsic part of the aesthetic experience (Ascott, 2008). The perception of the work by the audience demanded action from them that resulted in new elements being added to the work and further imbuing the aesthetic and aural experience (Brouwer and Mulder, 2007).

Acting with Technology

What we had created as an interactional experience through *altzero* was not a fixed and pre-determined interaction between the audience and technology, but rather something that more resembled what Dourish (2001) has referred to as an eco-system. A self organising system in which several different "cognisant" elements – some technological, some human – were able to act and interact with each other at will.

This idea of creating a dispersed cognitive system that forms a shared circuit of creativity within and between the living and the technological elements of a system became a consistent theme in all of Squidsoup's artworks that were to follow *altzero*. Through all of our subsequent work we always sought to foster relationships where people acted intentionally in specific ways with technology as part of distributed cognitive systems, in an attempt to create an aesthetic and idea-based experience (Kaptelinin and Nardi, 2006).

Within the sociotechnical networks that constitute the artworks, the potential for the participants to act with the technology is controlled by what are known as affordances, a term originally introduced by psychologist James J. Gibson in his 1977 article "The Theory of Affordances". Affordances are "the possibilities for action provided by the environment" (Kaptelinin and Nardi, 2006) and they "exist relative to the action capabilities of a particular actor" (McGrenere and Ho, 2000). To put that in context of Squidsoup's artworks - affordances are the possibilities given to the audience by us to change or affect the artwork.

What *altzero* revealed to the group was that when creating interactive artworks of this nature the primary concern is not what the art "object" looks like, but actually what sort of affordances are necessary in an environment, and the activity they are likely to elicit from an audience. How they would allow the audience to act with the technology became their primary concern. By firstly thinking about activity it was then possible to understand the attributes of both the artwork and the audience. (Kaptelinin and Nardi, 2006).

Kaptelinin and Nardi's (2006) work on Activity Theory goes to great lengths to explain that without activity in a system neither subject nor object possesses any properties. Their properties are not manifest in various circumstances, but only truly exist when being enacted through activity. Most importantly, that activity is the key source of development of both the object and the subject – in the case of *altzero* the participants in the artwork and the artwork itself.

altzero provided the audience with an opportunity to act *with* technology in a fairly abstract manner. The technological component of the *altzero* ecosystem was acting more as a mediator than an intelligent and identifiable node. As the artworks Squidsoup produced became more sophisticated over time, the ability for the audience to truly act with intelligent agents was developed. The addition of what are known as autonomous agents into the ecosystems that Squidsoup create, and the consequent effect this has on the activity within these systems, is one of the subjects covered in Chapter 2.

2 Social and Tangible

Social

In Chapter 1 I demonstrated that it is possible for activity to form the basis of an aesthetic experience. This chapter extends this notion of activity to look at how creating a more sociable and tactile environment as part of an artwork impacts on the artistic experience. As we saw from Chapter 1, there is a relationship that exists between the artist and the audience through the technologically mediated experience of the artwork. The artist needs to structure the artwork so that it can be understood and at the same time partly made by the audience - a process of shared construction. There is consequently already an implication of sociability and “a necessity for this activity to take place against a backdrop of commonly held social understandings.” (Dourish, 2001.) This chapter however, seeks to elucidate more on how an audience collectively creates meaning through interacting not only with the technological aspect of the artwork, but also with each other.

Aside from interactive arts, the most evident examples of artworks as moments of sociability or objects that produce sociability are to be found in the work of artists working post 1990 in a field that Bourriaud (2002) refers to as “relational aesthetics”. This generation of artists placed interaction and inter-subjectivity at the heart of their art practice. They created events, games and meetings or set up social environments in order to bring people together in shared social activities that manifest themselves as an aesthetic experience (Bourriaud, 2002). Works like Carsten Holler’s *Test Site* (2006), Rikrit Tiravanija’s *Untitled (Tomorrow can shut up and go away)* (1999), Ernesto Neto’s *The Edges of the World* (2010) and *Untitled (Portrait of Ross in LA)* (1991) by Felix Gonzales – Torres, all preface interactivity and relational engagement. As Rikrit Tiravanija states - “It is not what you see that is important but what takes place between people.” (Art + Culture, 2009.)

It is no coincidence that at the same time in the 1990s there was a rise in artists working in the field of interactive art. This parallel movement brings another dimension to “relational aesthetics” – one of a technological component. Interactive artworks are attempting to create the same social interactive spaces that relational aesthetic artists are, but they do it through the use of interactive objects or spaces that promote this form of activity. Brouwer and Mulder (2007) tell us that “[Interactive art] recognises that there is no ‘I’, that we are all products of each other and that we are created by objects as much as we create them. Since interaction means changing each other, and only that which interacts with us is alive for us, we are changing everything around us as much as we are being changed by it.”

Squidsoup's *Glowing Pathfinder Bugs* (2008) recognises that meaning is something that users create through the ways in which they interact with both the technological component of the artwork and with each other. In this piece virtual creatures are controlled by, and appear in, a physical landscape. *Glowing Pathfinder Bugs* uses projection to visualise virtual bugs on a real sandpit. The bugs are aware of their surroundings and respond to its form in their vicinity. By changing the shapes and forms in the sand, the bugs' environment is altered in real time, creating a direct form of communication between virtual bugs and real people. As the bugs' decisions are based on their surroundings, which are controlled by participants, there is a strong sense of communication between bugs and people. Interaction with, and through, the artwork opens up the opportunity for the viewer to explore and negotiate meaning as a social experience (Dourish, 2001). *Glowing Pathfinder Bugs* resulted from a period of research and experimentation into interaction in three physical dimensions. It uses equipment originally designed to track human gestures and movement, and as with much of our work, tries to blur or dissolve the boundaries between the real world and virtual space.



Figure 2. *Glowing Pathfinder Bugs* at onedotzero in 2010

Christa Sommerer (2009) has pointed to the value of using autonomous agents in her own work – *A-Volve* (1994) – “By creating creatures, observing them in the pool and influencing their behaviour, the visitors tend to identify with their creatures and often ‘communicate’ with each other by supporting their creatures in the pool”. Similarly, the creatures in *Glowing Pathfinder Bugs* form an important part of the social network that is created by the artwork; as the bugs do indeed cause

people to communicate with each other – either to pass on the story of what’s happening in the artwork or to argue about whether the bugs should be cared for or destroyed!

Autonomy and agency within interactive artworks has been an important factor in numerous seminal projects such as the previously mentioned *A-Volve* by Sommerer and Mignonneau (1994), Ulrich Gabriel's *Terrain* (1994), Toshio Iwai's *Music Insects* (1992) and *Electroplankton* (2006) and Chris Sugrue's piece *Delicate Boundaries* (2007). These are what are known as multi-agent ant based systems, whereby the “creatures” all exhibit autonomy, social ability, reactivity and pro-activeness (Weichhart, 2008). Within the context of the artwork, the social ability of the autonomous agent is important, as it is this that elicits a connection between human beings and the bugs and also between the audience members themselves.

As Aristotle claims in *Poetics*- empathy with a character is a necessary pre-condition for catharsis or pleasurable experience (Aristotle, 1997). In *altzero* we saw that the audience was interacting with the technological system, but nowhere was the system really represented. All the visible “nodes” within the network were human - albeit that the virtual representations of them in 3-dimensional space didn't look human. What the bugs in *Glowing Pathfinder Bugs* do is to crystallise the system into a recognisable and familiar form, to make it more tangible and allow people to associate to it, with it and through it. The audience anthropomorphise the bugs in *Glowing Pathfinder Bugs*, as indeed they do with all the other artworks referenced here. It is this process of imbuing the creatures with character and feelings for them that creates the social space and, ultimately, the aesthetic for the piece.

Because the audience can make a connection with the artwork through the bugs, they can be drawn into driving activity within the space. This further enhances the social experience by creating what ethno methodologists refer to as “accountability”. “The analytical concept of accountability emphasizes that the organization of action, as it arises in situ, provides others with the means to understand what it is and how to respond in a mutually constructed sequence of action. It turns our attention away from simply the perceived result or outcome of an action, to include how that result was achieved. We pay attention to the destination, but also the route taken to get there”(Dourish, 2001). To put it another way, *Glowing Pathfinder Bugs* embodies not only methods of social exchange for the creation of an aesthetic experience, but also the tools with which to learn how to achieve this.

Tangible

Huhtamo (2008) writes that the academic art of the nineteenth century might be characterized as having a certain untouchable quality about it; in fact it would be fair to say that the aesthetic experience itself is reliant on the audience keeping their distance. The early twentieth century avant-garde artists, however, started to attempt to break down the barrier separating “art” from “life”. This is manifest in well-known works such as Duchamp's *Bicycle Wheel* (1913), Meret

Oppenheim's *Breakfast in Fur/Fur teacup* (1936) and particularly in Man Ray's *Object to be Destroyed* (1923 – 32). "Tactile art was called for by the futurists and anticipated by Dadaist and surrealist actions, as well as by the experimental exhibition designs of Fredrick Kiesler and others." (Huhtamo, 2008.)

There were further indications in the 1960s and 1970s of a move to a more tactile relationship between the artist, the artwork and the audience through the Fluxus happenings and the performance works of artists such as Valie Export. Her *Tapp und Tast Kino* (1968) invited the audience to physically touch her during the performance. Further examples include Marina Abramovich's notorious and dangerous *Rhythm 0* (1974) in which she invites the audience to inflict pleasure and pain upon her for six hours, and Orlan's *The Artist's Kiss* (1977) where upon inserting a coin into a life-size photo of Orlan's torso the audience would receive a kiss from the artist (Huhtamo, 2008). It has however been left to interactive art to redefine the artwork's relationship to the viewer in a more controlled and nuanced manner (Huhtamo, 2009).

The process of engaging with interactive art is often tactile – the user actually physically touches the work and experiences its response. In some cases the interface not only feels material but also provides haptic feedback – for example *Interactive Plant Growing* (1992) by Sommerer and Mignonneau. That being said, not all interactive art is tactile in this literal sense. The interaction is sometimes a little more "distant" and doesn't require a physical touching of the artwork. Actions like movement, sound and proximity can all be used to affect the artwork. A perfect example of this is Golan Levin's *Messa di Voce* (2003) in which any vocal noises being made by the two performers in the piece are translated in real time into beautiful abstract visualisations that appear to emanate from the performers mouths.

The importance of haptic interaction within interactive arts was recognized last year when Siggraph⁵ dedicated their 2010 Art Gallery section to artworks employing unique physical interfaces. The exhibition was called *TouchPoint: Haptic Exchange Between Digits* and exhibited work that was, as Siggraph themselves describe, "investigating the polysensory nature of human experience in a technologically enhanced environment. The exhibition explored the permeable membrane of the techno-human interface, where we engage an array of tools to materialize and visualize artifacts of creative expression".

⁵ Siggraph is the Association for Computing Machinery's Special Interest Group on Computer Graphics and Interactive Techniques. It is one of the largest conferences in its field. *Glowing Pathfinder Bugs* featured as part of this exhibition.

Glowing Pathfinder Bugs employs tactility as a means for the audience to experience and understand the work by using sand as a tangible interface⁶. The illusion of having a tactile connection with the digital bugs is what draws the audience into the interaction in the first place. The sandpit then acts as a mediator between the environment and the activity that unfolds in it – the audience’s connection with the bugs and each other occurs through their physical and tactile activity within the pit (Dourish, 2001).

What we see with *Glowing Pathfinder Bugs* is that the sandpit offers the audience an arena and material through which discussion and understanding of the work can take place. The size of the pit means that when people are using it they are in close proximity to others and placed in a social environment where it is very difficult not to talk to anyone. In this instance the sandpit is a perfect interface as it already has connotations of play and collaborative social behaviour, and so the audience doesn’t really question engaging with the work in this way. The sand enables people to explore interaction with the artwork and learn about the “interface” in a very natural way. The social setting allows the audience to see other people engaging with the work and learn from either watching other people or even talking to them across the pit. This is what is known as “shared feedback” within the world of Human Computer Interaction, whereby all users of an artifact are able to see the transformation of that artifact through their own actions and that of others (Dourish, 2001).

Most interactive artworks rely on both sociability and tangibility in order to bring meaning to the work. The technology within the artwork mediates and facilitates both these activities and normally keeps some form of visual record of this activity as part of the artwork (temporarily) at least. Social and physical activities become manifest in the works as visual elements – as can be seen clearly in Daniel Rozin’s *Mechanical Mirror* series (1999 – 2008). However, the very physical nature of the sand as an interface within *Glowing Pathfinder Bugs* brings another element to the artwork. Not only does the sandpit act as a method through which an audience can interact with the work, but it also becomes an embodiment of the physical activity that has been happening in the work (Dourish, 2001). It tells a story about the sort of activity that has been occurring in the space and also serves as a visual clue for audience members approaching the work when no one is already using it.

Glowing Pathfinder Bugs allows the audience to explore the artwork externally and socially before internalising any meaning. Activity Theory supports this notion and posits that “our understanding of the world and subsequent psychological developments normally occur through a process of being able to internalize functions that start off as being external” and that “the acquisition of

⁶ Tangible interfaces and tangible computing are an attempt to move interaction with computers into the more familiar physical realm. Tangible interfaces normally take the form of a physical object that can be used to control and manipulate digital information. It is an attempt to unify the physical and electronic worlds. (Dourish, 2001.)

psychological functions is subordinated to a universal law of psychological development; new psychological functions do not directly appear as functions of the individual.” (Kaptelinin and Nardi, 2006.)

Both the tactile and social natures of the artworks discussed in this chapter are key to an audience being able to derive meaning from them. *Glowing Pathfinder Bugs* is able to achieve this through the use of a sandpit as a tangible interface. It would seem that the more an artwork can move the site of its interaction into the real world of the user, and not the world of the system, the more likely it is to elicit engaging social behaviour from the audience. As Coyne (2010) notes, the challenge for tangible media is in connecting virtual space with real space. This “physical virtuality” (Dourish, 2001) or augmented reality will be part of the discussion surrounding immersion and embodiment in the Chapter 3.

3

Embodiment

Frescoes, Panoramas and VR

In Chapter 2 it was explained that both tangible and social interaction are key to deriving meaning from the interactive works that Squidsoup create. This chapter explores these notions further and sets them within the context of a spatial interactive experience – one that seeks to immerse and surround the viewer with the artwork rather than presenting it as an object to be viewed from the outside. The ability to put an audience “in the picture” in both a metaphorical and non-metaphorical sense has been a long held aspiration for artists throughout history. Immersive image spaces that employ illusory and mimetic techniques can be found as far back as wall paintings from the late Roman Republic ca. 60 B.C., but are more prevalent in the fresco works of the 15th century. Italian artists, such as Brunelleschi, Masaccio and Ghiberti managed to open up the depth of space through their mastery of perspective (Grau, 2003).

This attempt at creating an image space that could be “entered”, continued with the Baroque ceiling panoramas in the 16th century and the Italian panoramas of the 17th and 18th century. These artworks relied on the maximisation of realism and illusionistic techniques such as scale and the faux terrain in order to entrap the viewer in a simulation of the real. The 19th century panoramas saw the introduction of poly-sensory elements such as sound effects, artificial wind and smoke in a continued move to a suspension of the real by addressing all of the senses (Grau, 2003).

The application of technological, psychological and physiological knowledge may have been crude in the frescoes and panoramas of centuries past, but they still aimed at producing maximum illusion with the means at hand and their influence is evident in today’s more technologically advanced artworks. These ancient images surround the viewer and fill their field of vision, creating the illusion of being in the picture. They move into and across the space that the viewer occupies through the clever use of mimetic imagery and suggested dialogic communication between figures on opposite walls.

Technological developments such as cinema, stereoscopic 3D glasses, Head Mounted Displays and Virtual Reality have further pushed these illusory and immersive spaces, continually striving to install the observer in an hermetically closed off image space of illusion. Virtual Reality in particular allows the audience to actually “enter” the work, to immerse themselves in the image space, moving and interacting there in real time (Grau, 2003). Contemporary artists such as Luc Courchesne,

Charlotte Davies and Maurice Benayoun have all produced works of art that employ technology to enhance the immersive experience for the audience, not only by surrounding them in an image space, but by actually allowing them to control and navigate the environment.

In his works – *The Visitor: Living by Numbers* (2001) and *Where are You?* (2005) – Luc Courchesne surrounds the viewer with a 360 degree projected, navigable panorama. Through research into image projection techniques, Courchesne has created what he calls the *Panoscope 360°*, a device that allows a 360-degree panoramic image to be projected using only one video channel. The system has clear links back to the panorama invented and patented in 1787 by the Irish painter-Robert Barker⁷. As Courchesne says - "Like a sculptor, I am interested in form. The means I am using – computers, video, space – allow me to take upon the challenges associated with giving form in novel ways as I am also trying to include the visitors' existence into the work's inner structures." (La Fondation Daniel Langlois, 2005.)

Canadian artist Charlotte Davies' seminal work *Osmose* (1995) broke new ground when she used Virtual Reality to create beautiful virtual worlds that an audience could navigate simply by controlling their breathing and balance. Davies own website Immersence (2008) describes the work as "Integrating 3-dimensional digital imagery and spatially-localized sound with full-body immersion and interaction—and multiple levels of transparency", it goes on to say that "*Osmose* has been internationally acclaimed as a landmark in new media art. Unprecedented in its experiential effect on participants."

The problem with the frescoes and panoramas, although very convincing in their time, was that they relied on extremely realistic painting techniques in order to accomplish their illusion. This mimetic form of painting left the artists of the time with very little creative license. The visualisation potential of the technologies that comprise these new virtual artworks now allow for more expressive treatments to be applied to an immersive experience.

Abstraction and the Outer Circle

The most recent work created by Squidsoup – *Ocean of Light* (2010) - moves away from the idea of artwork being presented as an object, as with *Glowing Pathfinder Bugs*, and more into the spatial realm of immersive environments. The *Ocean of Light* project sets out to explore the creative and immersive possibilities of light-based visualisation in physical space. *Ocean of Light* refers to the bespoke hardware, created by Squidsoup, to bring to life dynamic, interactive and 3-dimensional sculptures from light. The hardware consists of a grid of 12 x 12 x 24 individually addressable LEDs that allow Squidsoup to visualise low-resolution imagery in 3-dimensional physical space.

⁷ On June 17, 1787, Robert Barker patented a process under the name of "la nature a coup d'oeil", by which means a panoramic view could be depicted on a completely circular canvas in correct perspective. Using empirical methods, he developed a system of curves on the concave surface of a picture so that the landscape, when viewed from a central platform at a certain elevation, appeared to be true and undistorted.

The grid presents the opportunity for artworks to be “projected” into physical space and actually allows the audience to immerse themselves in the image space as well as to observe it from the outside. LED grids of this nature are not unique in the art world and several other artists have developed similar systems using varying technologies. Jim Campbell's *Scattered Light* (2010), rAndom international's *Swarm Light* (2010) and Brazilian artist Multi Randolph's *Deep Screen* (2010) all employ the same technologies and techniques to a greater or lesser degree.

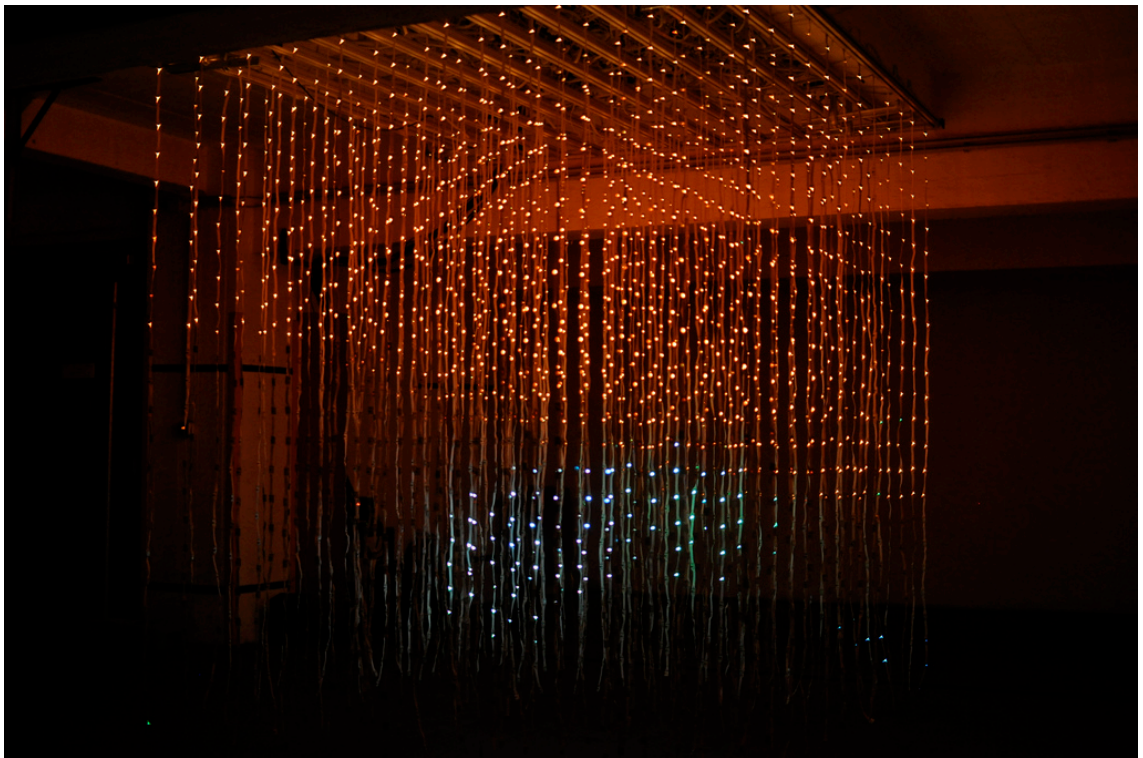


Figure 3. *Ocean of Light: Surface* at Ars Electronica 2010

Although the grid is intrinsic to the aesthetic experience produced by the artwork, it is essentially a display device: the spatial visualizations that are programmed and shown through it are in-fact the real core of the artworks. Squidsoup's first work to be shown on the grid – *Surface* (2010) - uses minimal visuals and sound to evoke an essence of character and movement through a number of autonomous agents that occupy the space. As in *Glowing Pathfinder Bugs*, these autonomous entities create a tangible representation of the software that comprises the artwork and become a conduit for the relational interaction that the work elicits.

As with *The Visitor* and *Osmose*, *Ocean of Light: Surface* employs new technologies to surround the audience with a controllable digital environment that reacts to their movements and sounds. The difference, however, is that rather than trying to pull the viewer into an all-encompassing virtual space, *Ocean of Light: Surface* brings the digital content into being in the physical realm. This creates two distinctly different factors in the audience's experience of the work.

Firstly, artists working with Virtual Reality, or even their own bespoke form of immersive technology, isolate the individual audience member from other audience members and their physical surroundings. The very nature of the technology means that part of what creates the immersive experience is isolation and removal from the real world space. Consequently there is no opportunity for the experience to be a social or collaborative one as the viewers are hermetically sealed off from the “real world” and other audience members. By creating a means of projecting the digital space into the spatial environment, the *Ocean of Light* project manages to not only present the audience with an immersive and controllable image space, but also still allows for the experience to be a collaborative and social one.

In previous works created by Squidsoup, and a common trait in most interactive artworks, is the phenomenon of the so-called outer circle of the audience. This is the circle of viewers watching the interactive installation in action. Not those directly involved in the artistic system of human machine interaction, but the more cautious audience members who survey the scene before deciding whether to enter or not (Brouwer and Mulder, 2007). They are viewing the artwork in a more traditional way and not fully experiencing the work.

Ocean of Light doesn't afford this opportunity for audience members - it immediately pulls the outer circle in to participate in the work as it occupies most of the viewing space available. The outer circle are immediately drawn into the artwork and become involved with it because there is no possibility for them to “hide” and watch from the observation deck. Rafael Lozano-Hemmer's artwork - *Body Movies, Relational Architecture #6* (2002) – uses similar spatial mechanisms to pull the outer circle immediately into the interaction that is taking place. Even passers by in this artwork can't help but be involved as the shadows that their presence cast cause a change and reaction within the work. (Brouwer and Mulder, 2007.)

Secondly, environments like *Osmose* and *The Visitor* still rely on what Marshall McLuhan refers to as Hot Media (Gordon, 2003). That is to say, that the media being employed – three rendered landscapes and video – are very “rich” and require little effort from the user in terms of interpreting the image or filling in the gaps. McLuhan claims that “cool media” requires more effort on the part of the viewer to determine meaning. “Cool media” requires much more of a conscious participation by the audience in order to render meaning. Due to the current limitations of the technology, the *Ocean of Light* hardware only has the ability to “project” into space extremely low-resolution imagery and would definitely be regarded as “cool media”. The artwork relies on the audience to interpret the perceptual and visual clues offered and close the semantic/aesthetic loop them selves (Vague Terrain, 2010). Much like the paintings of the impressionists and neo impressionists, participation from the audience is required in order to close the semantic gap.

Artists have taken these low-resolution immersive environments to extremes in recent years with works by Kurt Hentschlager – *Zee* (2010), Olafur Eliasson and Ma YanSong's - *Feelings are Facts*

(2010) and James Turrell's *The Wolfsburg Project* (2010). These pieces all blur the boundaries between what is being created by the mind and what is actually external stimuli. As Hentshlagger notes – “What the brain synthesizes out of this is a kaleidoscopic, three-dimensional spatial impression, which really is not present in the space but inside your cortex. If you put a camera in the room you can't record anything other than a flat, rather uninteresting flickering image.” (MotherBoard, 2009.)

This low-resolution approach to creating immersive environments seeks to diminish the critical distance to what is being shown, and increase the emotional involvement in what is happening (Grau, 2003). The more “real” or “hot” a media is, the less the audience needs to use our imagination in order to complete the picture and consequently become more critical towards the subject matter (Vague Terrain, 2010).

Embodied Interaction

The *Ocean of Light* project confronts the audience with a low resolution, tangible and social environment through which they need to act and react with both the technology and other audience members in order to elicit meaning from the work. The work requires the audience to orient and reorient themselves within the space in order to make sense of the visuals and the narrative being played out. The artwork is set up to draw on the audience's physical and spatial skills and extends its interface into an arena where these skills can be brought to bear. The consequence of this more naturalistic form of interaction between the audience and the technology is known as embodied interaction. Dourish (2001) notes - “In contrast to Cartesian approaches that separate mind from body and thought from action, embodied interaction emphasizes their duality. We act in a world that is suffused with social meaning, which both makes our activities meaningful and is itself transformed by them. Our actions cannot be separated from the meanings that others and we ascribe to them. Embodiment is about engaged action rather than the disembodied cognition.”

Embodiment is the phenomenon that pulls together the ideas of both social and tangible computing discussed in Chapter 2. Embodied interaction echoes the way in which we encounter the everyday world through both social and physical activity with tangible rather than abstract phenomena. The successfulness of embodied interaction is due to the fact that we, and our actions, are embodied elements of the everyday world. (Dourish, 2001.)

In his writings, Martin Heidegger posits that our experience of the world or the way we generate meaning is dependent on how we “are” in the world, because our understanding of the world is essentially an understanding of how we exist in it. He argued that thinking and being are fundamentally intertwined. From his perspective, the meaningfulness of everyday experience lies not in the head, but in the world. The world has meaning for us in the ways in which we encounter

it and the way that it makes itself available to us – primarily through practical and social encounters (Heidegger, 1962).

Danish artist Olafur Eliasson sums up this notion with the question he attempts to answer through his artworks - “how do we configure the relationship between our body and the space, how do we then re-configure it, how do we know that being in a space makes a difference?” (Ted, 2009.) Much of his work looks at creating spaces that contain natural physical phenomena such as fog, rainbows, waterfalls, the sun and rain. By introducing ‘natural’ phenomena, such as water, mist or light, into the gallery environment Eliasson says he is attempting to “make the space tangible” (Ted, 2009), to allow the audience to reflect upon their understanding and perception of the physical world that surrounds them.

Eliasson is also interested in the social dimension of artworks, creating spaces that explore “the whole idea of sharing, the whole idea of constituting reality by overlapping what I say and what you say.” (Ted, 2009.) In this way his artworks are embodied experiences that become accessible to the audience through their tangibility and sociability. *Ocean of Light: Surface* similarly exploits our familiarity with the everyday world - a world of social and physical interaction – but unlike Eliasson’s work the audience’s presence within the space has direct consequences on the form the digital artwork takes. Whereas Eliasson has pushed spectacle to the point that interaction is actually diminished and the wow factor has overwhelmed the work, within our work there is a very real and obvious casual affect to their activities. This brings us back full circle to the notion of aesthetically potent environments as defined by Pask.

Ocean of Light: Surface realises many of the ideas proposed by Pask⁸. It puts forward a responsive space, one that only becomes meaningful as an interactive human environment. The artwork is set up to “serve” the audience as a pleasurable experience, and in addition it regulates their behaviour and ultimately only makes sense as part of a larger system that includes both human and technological components. This larger system is what Squidsoup, as artists, are ultimately responsible for creating, not just the physical/digital artefact that constitutes the artwork (Fernandez, 2008). These mutualistic environments rely on the fact that it is the audience, not the artist, that creates and communicates meaning through their embodied engagement with the work (Dourish, 2001).

⁸ Pask’s theories were more focused on designing more cybernetically oriented architecture, he named the interdependence and constant communication of architecture, humans and societies “architectural mutualism”.

Conclusion

This paper sought to demonstrate that activity and interactivity can, in themselves, be perceived as aesthetic and artistic experiences; that social and tangible activities are essential in the creation of meaning within the artworks created by Squidsoup; and, finally, that the combined experience of social and tangible interaction (embodied interaction) can be used to create immersive interactive spaces akin to Gordon Pask's notion of aesthetically potent environments. This was illustrated through the use of three case study examples of Squidsoup's work over the past 10 years and supported by arguments and examples from historical artistic precedents such as Fluxus, Activity Theory, Phenomenology and Relational Aesthetics.

Chapter 1 gave a brief introduction to the history of art and artworks that require some form of interaction from an audience. It showed historic precedents for artworks that preface interaction and interactivity as key in an audience's understanding and enjoyment of the work. The chapter went on to discuss the audience's role within these types of artwork as part of the overall visual spectacle and as a catalyst for compositional alterations – a node in a complex sociotechnical network that involves both the subject and object undergoing visible mutual change and exchange.

Chapter 1 introduced the concept that through interactive artworks like *altzero* the creative process is changed, as Olafur Eliasson says, these relational types of work “move the border of who's the author and who's the receiver. Who's the consumer and who has the responsibility for what one sees.” (Ted, 2009.) The artist no longer has overall control of what the final work will look like, instead they are responsible for setting up a framework for interaction. Rather than “solving” a problem through a creative process they create another one for an audience to enjoy. Squidsoup shares the creative process of creating an artwork, by transposing part of the problem-solving process into audience's domain.

Pask (1971) tells us - “man is always trying to achieve some goal and he is always looking for new goals. Commonly, he deals with goals at several levels of an hierarchical structure in which some members are freshly formulated and some are in the process of formulation.” His contention was that “man enjoys performing these jointly innovative and cohesive operations. Together, they represent an essentially human and an inherently pleasurable mode of activity.” What becomes pleasurable within Squidsoup's work, for an audience, is not merely the perception of an object, but the active involvement in the creation of the work through the translation of action into meaning as part of a larger shared social experience (Dourish, 2001).

Chapter 2 detailed two of the activities essential to this meaning making process. Firstly, sociability - this chapter showed that in interactive art, meaning lies outside the visible work (Brouwer and Mulder, 2007), and is created as part of a negotiated social experience. Interactive artworks demand action from an audience - normally to solve the problem of what the work is doing or what it allows one to do. As an active participant interacts with the artwork, even if they don't engage in active conversation as part of meaning making process, they still externalise their thought processes through their action and interactions. They may not mean to express their thoughts, but their interaction inevitably contributes to the larger social interpretation of the work.

Squidsoup's work sets up social systems that not only promote interactivity between the audience members themselves or between participants and the artwork, but more importantly it allows for indirect social interaction between audience members via the technology that constitutes the artwork. Meaning does not exist in the computational abilities or aesthetic qualities of the artworks presented, but rather in the totality of the potential of such works realised through various modes of social interaction (Kaptelinin and Nardi, 2006).

Secondly this chapter outlined the importance of physical and tactile interaction as key components in the comprehension of interactive artwork. As Dourish (2001) tells us - "in tangible computing, there is no single point of control or interaction. Traditional interactive systems have a single centre of interaction or at least a small number." Dourish goes on to explain what this means is that tangible interfaces distribute computation through an environment allowing an audience to interact with an artwork at multiple distributed points in parallel, rather than sequentially moving through a problem at one focused point. Tangible interfaces therefore emulate the more naturalistic forms of interaction that we employ in our everyday lives as a means of exploring and understanding the world as we encounter it.

Although extremely technical in their nature, the works created by Squidsoup employ tangible interfaces as a means by which an audience can easily orient themselves towards our artworks. As human beings we are engaged in physical and tactile activities on a daily basis as a means of solving problems or exploring situations. Creating interfaces that connect both physical and digital domains allows audiences to explore and decipher an artwork much as they would any other day-to-day situation. As Grudin (1990) foretold over two decades ago, the more the computer reaches out into the physical domain more familiar to us as human beings, the more it becomes part of our social environment. The tactility of artworks such as Squidsoup's *Glowing Pathfinder Bugs* often begets sociability and it is the combination of these two modes of interaction, known as embodied interaction, which formed the basis for discussion in Chapter 3.

Chapter 3 started by looking at artworks as immersive experiences, reviewing the historical precedents of the frescoes and panoramas through to the more technologically sophisticated artworks of contemporary artists such as Luc Courchesne and Charlotte Davies. This chapter

identified common traits between modern immersive environments and their historic predecessors, but also noted the ability for contemporary artists to be far more creative and imaginative in the execution of their artworks without the constraints of traditional mimetic and illusory techniques.

The chapter proceeded to compare contemporary immersive interactive works that looked to encase the viewer in high-resolution virtual but solitary experiences, with the current immersive works being created by Squidsoup. *Ocean of Light: Surface* takes a very different approach to immersion and brings the digital content into the physical realm of the audience rather than trying to pull the audience into an artificial virtual reality. The overlaying of the physical and digital realms in this way allows us to create an immersive environment that creates a true connection between physical and virtual life. The advantage being that we can create an immersive digital space that responds to the physicality of the human body, but still allows physical and social interaction within it (Christiane, 2009).

The creation of such immersive spaces allows for both social and tactile interaction to combine and manifest as embodied interaction, defined by Dourish (2001) as “the creation, manipulation, and sharing of meaning through engaged interaction with artefacts.” Chapter 3 concluded by comparing this notion of embodied interaction with theories of Phenomenology. The writings of philosophers such as Heidegger and Husserl support the contention that meaning does not lie dormant in interactive artworks, but exists in the ways in which an audience interacts with the artwork both physically and socially. As Heidegger posits - we understand the world through the way we exist in it – the world, or an artwork, does not represent meaning – meaning is generated through action and interaction (Brouwer and Mulder, 2007).

Looking Forward

This essay has outlined how over the past 10 years Squidsoup’s work has increasingly embodied the theories and concepts discussed here. Our work has made a gradual progression to a point now where the digital ecosystems we create can occupy, and be aware of, the same physical space as the audiences they interact with. What *Ocean of Light: Surface* currently manages to do very successfully is make physical space tangible by overlaying it with an interactive virtual layer. This digital augmentation is both responsive to and interconnected with the real 3-dimensional space it occupies; real and virtual are thus aware of each other and exist in a symbiotic relationship that presents us with the possibility of turning any “space” that the grid occupies into a “place”. Dourish (2001) describes the distinction between space and place as a distinction between the physical and the social. So while “space” refers to the physical organisation of the environment, “place” relates to the sorts of behaviour supported by different spatial framings. Unlike previous works created by Squidsoup, the very spatial nature of the *Ocean of Light* project allows a creation of “place” that can suffuse an entire room.

The ability to control a sense of “place” through the manipulation of the digital content that constitutes the artwork affords us the opportunity of what Coyne (2010) terms as “a tuning of place”. What this means is that by changing the social context and affordances offered to an audience through adjustments in the digital content of the artwork, we are able to tune their social relations – we can dynamically change the relational context of the artwork. The very scale and spatial nature of *Ocean of Light: Surface* means that the audience’s calibration and recalibration with the artwork is a full body experience – an embodied experience that incorporates both physical and social activity mediated by the technological component of the artwork.

Ocean of Light: Surface is less successful however in providing convincing tangible interaction with and through the artwork – something that *Glowing Pathfinder Bugs* achieves exceptionally well. The use of audio to interact with the digital content currently feels slightly counter intuitive. Having now experienced the completed work, it is evident that it exerts a powerful physical effect on the viewer – it almost feels as though the light coming from the grid is pushing against you. A more physical and gestural interface with the work would seem to be a more instinctive response to what almost feels like a physical pressure. Further research on this subject will undoubtedly constitute part of Squidsoup’s ongoing journey as well as our continued exploration into the relational and automated aesthetic possibilities of fusing real and virtual space.

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