

# Interaction Theory and the Artwork

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This study looks at interaction at a fundamental structural level, elucidating basic elements of how interaction works among adaptive organisms. This understanding then points to how to develop suitable interfaces for interaction among people and intelligent-adaptive-machines or artworks. I first consider how sensory processes derive from basic biological needs for energy, and that communications, and thereby interaction, develop from reciprocal behaviours of organisms in their environment. I then consider how we might think about the quality of an immersive interaction. Finally I illustrate these considerations in discussing the interfaces used in a range of interactive artworks.

**I**n Human-Computer Interaction (HCI) studies the focus is on the quality of the relations between a person and the computer applications they use. However, without an understanding of how interaction develops at the most fundamental levels of biology we may fail to develop a useful understanding of what is required when it comes to the ultimate goal of HCI: which is to develop a comfortable and conversational means of communicating with machines as they become intelligent and adaptive, and approach the degree of organisation of an organism. In this, the analysis of interaction among organisms applies in deeply similar ways to the analysis of interaction in HCI, Artificial Life and Art.

Apart from self-reproduction there is one thing that characterises a living organism and that is its capacity to interact with, and through that

interaction, adapt to its environment. As I argue here, interaction, when seen at its most basic level, is fundamental to life. So, in this paper I will establish the structural relations among organismic processes that underlie interaction and which must be understood if we are going to produce satisfying interactive artworks.

## **1. Organisms**

An organism is any thing which metabolises energy to maintain its integrity (its organisation) within an environment, to gather and process information about its environment, and to permit its reproduction. I refer to the single-celled organism as the lowest level of organisation that is worth considering here. Everything that is in some sense other to (*ie*, not) the organism is its environment.

An organism's capacity to adapt to changes in its environment is essential to its maintenance and its reproduction. Thus its adaptive capacity is tested by its capacity to *use* the resources in its DNA and its stored experience to handle day-to-day changes. But to "know", in any sense, about those changes it must be able to sense its environment and effect internal changes that accommodate those sensed changes. It will also effect changes *to* its environment through excreting the waste products of its metabolism and otherwise secreting chemical and behavioural signals. Structurally, these processes are fundamental to interaction.

The capacity to adapt both requires and supports autonomy, so that an organism can behave independently of other organisms, survive on its own and enact its own decisions. An organism's autonomy requires internal feedback relations in which aspects of the internal system can emphasise the regulation of their local environment in intentional ways. When this spreads outside the organism's boundaries you get social environments in which organisms communicate, sense and have intentionality and from this comes interaction. (Jones, 2000a)

## **2. Environment**

An environment is the container in which an organism operates. There will generally be a number of organisms of varying types operating in an environment. An environment carries other contents such as food and metabolic products, or the cultural productions of organisms living in it. Thus an environment is all other organisms and the physical, social, and cultural context that constitute the experiential space of an organism for any interval. Only the most sterile of environments are entirely passive or neutral; thus interaction, and its corollary: adaptability, are necessary for any entity that has to survive in an environment. To any organism its environment is "active" when other organisms interact with it by competing with it for resources, or generating outputs into the environment which may or may not be useful to it. This is what happens within biological ecosystems. Thus for an adaptive organism, an active environment causes changes in the organism.

## **3. Behaviours**

At an abstract level there are two modes of action that organisms and adaptive devices exhibit. The first mode is uni-directional, where the action is either from the entity onto its environment or from the environment onto the entity - we might think of this as using something in the environment for some purpose particular to the organism, or of being used by the environment for some purpose particular to it. From the point of view of the organism this might be described as inputting or ingesting something and outputting or excreting something. The second mode is bi-directional, in which the action is from the entity onto its environment and back from the environment onto the entity as a continuous chain of process. From the point of view of the entity, the outputting begets an inputting. In this case we would normally think of the environment as responding to the entity's output, or that there is an *interaction* between what are really two entities in an environment.

The difference between these two modes is that in the uni-directional the

environment doesn't actively respond. It is the bi-directional mode of reciprocal actions which is usually defined as interaction, and it is the nature of this reciprocal action that I consider here. Nevertheless there are conditions when the environment doesn't respond which are also interactions.

Distinct from the directional modes of action, there are two types of actions possible between the environment and an organism residing in that environment. These are:

**1. Outputs:** anything produced by an organism into its environment, such as biochemical by-products of "metabolic" processes excreted as waste, or chemicals and behaviours that function as signals actively secreted for purposes of probing the environment for useful information or for the development of communications with another entity. Effectively, molecular processes are a very low-level layer of behavioural processes.

**2. Inputs:** organisms of any autonomy will need food and energy resources which they will intake upon recognition. If they have any sensory input then they will input information of some sort from, and thereby *about*, their environment. This may be information about food, other organisms in the environment or any other environmental content that the organism has the wherewithal to sense. Again these inputs may be entirely behavioural as well as molecular.

Thus the most basic form of behaviour is a uni-directional process which is either an outputting or an inputting where there is no immediate link between the two. It is when the output becomes an input for some other entity that bi-directional processes become possible. Now as outputting (*eg*, waste excretion) and inputting (*eg*, feeding) are both necessary functions for any system that is organised they are also necessary to maintain the organisation of the entity when that is in even a little-way-from-equilibrium condition (which it must be by virtue of being organised). So it is obvious that an entity is going to naturally be in an interacting mode

at all times. Should it cease to be so then it joins the ranks of the non-living. Interaction is what we do. It is the means by which we are in the world.

#### **4. Information and Sensing**

Ultimately, for the purposes of any autonomous organism it is the processing of information that is the primary motive in sensing the organism's context and in the organism's engaging in communication. Information can be defined in several ways

- as difference relations (or syntactical information, Shannon, 1949)
- as significance (or meaning, Mackay, 1969), or
- as the difference that is significant (Bateson, 1973).

For my purposes here, information is what is carried in those physically embodied difference relations recognised by an organism or any organised, adaptive device within the context of some environment (Jones 2000b). In other words I refer to information that is experienced. This concept of information is derived from Bateson where, in the environment of the "organism", it is news of a difference (Shannon information) and within the "living" system it is the difference which makes a difference (Bateson, 1973). I suggest meaning has its basis in the *biological significance* of an item of information.

The primary action by which an organism develops any experience of, information about or knowledge regarding its environment is through a sensory process and the primary way of having any effect on the environment is through the output of some kind of (by)product. These are basic steps in interaction between the organism and its environment. When other organisms in the environment respond to that output as though it were a signal then communication starts. Sensing, communication and the appearance of intentionality are basic abstract processes which all organisms engage when they have any relations whatsoever to their environs, and they are the basic mechanisms of Interaction. I define sensing and communications as follows:

**1. Sensing** amounts to an organism's capacity to absorb difference relations from its context and to carry out such transforms of those differences as to make them available as usable information about that context.

**2. Communication** begins with putting a probe into the context in order to elicit a sensible response from that context. When sensible to another entity, which may or may not respond, a communication between organisms can occur.

**3. Intentionality** may be said to appear when the sensory or communicative act is produced in the "direction" of an object in the environment for the specific purpose of eliciting information from or about that object.

Intentional communication brings with it a common focus of attention, and can be thought of as effective when it establishes a useful transfer of meaning between organisms. In the process, supposing the initial outputting was more than simply artefactual, the intentionality that was initially an enaction of search, transforms into the intentionality that is the enaction of communication and here lie the acts that generate an interaction.

## **5. Communication /Interaction**

Now there are two kinds of model interactions that I will consider here.

1. is the conversation model in which two entities engage in the constructive exchange of signals through reciprocal loops of feedback, and
2. is an adaptive model by which an organism or a device is enabled to adapt to its environment so that its interaction with that environment is appropriate to its needs under varying environmental conditions.

That conversation consists in a *constructive* sequence of signals simply means that at each turn of the exchange there is some addition of meaning-value. A "signal" is any output from an entity which is a function of the

behaviour of that entity in the world. The signal has to be expressed into the environment and if any interaction is going to occur it has to remain there long enough for it to have some effect on the environment. If the signal has some sort of significance to another entity in the environment then it may be perceived and interpreted as some kind of meaningful expression being made by the initiating entity. If this other entity then responds with a signal expressed in a similar sensory form then presumably the first entity will recognise it and may then construct a further response that refers not only to the returned response but also to the initial expression. If neither of these - the possession of significance and the "sensible" response - happens then the interaction cannot be considered a conversation.

## **6. Immersion**

For all organisms and, of course people, immersion is our condition in the world. We are immersed in it and, at all times, our extraction from that condition is intractable (barring death). Our knowledge of the world in which we are immersed is a construction based on our sensor-mediated interaction with whatever is actually out there. What we know of the world is virtual, an accumulation of all the constructions of all the experiencing minds that have endured in the world and shaped its cultures, which in turn, by our interaction with the world, feeds into our knowledge (our internal constructions resulting from experience) of the world. It is in this way the worlds of Virtual Reality (VR) and the constructed worlds of our day-to-day experience can be seen to be structurally similar despite the layers of separation wrought by the technology of VR. Immersion in VR, particularly when using a Head-Mounted Display (HMD), represents a second order immersion - into a fully constructed world in which we are, mostly, utterly privately experiencing. Although, accepting a certain lessening of immersivity, the CAVE system does allow for a very much more socially mutual interaction with a virtual space, but that is because the enveloping display is on the walls and not within the HMD. Seeing the stereography of the display requires stereo glasses which do not exclude seeing others in the CAVE environment.

In our day-to-day activity in the world we often become fully immersed in some process, forgetting the time, or that there are others waiting for us, or such-like. That is, the space of our experience becomes the *entire* space of our existence for the duration of that experience in which we are immersed. Immersion is also what happens to us in the cinema when we are carried away by the film. Thus, immersion is about forgetting ourselves and becoming a part of something bigger. Interaction becomes immersive when we *forget* that we are "interfacing" with someone or something.

High fidelity experience is necessary; anything that interferes or "breaks the spell" (eg, equipment failure) lessens the fidelity of the immersion. The experiential quality of the interaction for each of the entities involved is a function of the extent to which they become absorbed by the actual interaction and lose their awareness of the outside world. The fidelity and appropriateness of the actual channel through the environment, whether it is, for example, sound waves or "knobs and switches", leads to the question of the contributory value of the interface that is that channel. So for the rest of the paper I will consider interfaces, their structural kinds, and their use and implementation in actual examples of interactive artworks.

## **7. Interface**

Peter Weibel reminds us that:

The world interpreted as observer relative and as interface ... changes as our interfaces do. The boundaries of the world are the boundaries of our interface.

We do not interact with the world - only with the interface to the world."

(Weibel, 1996)

An interface is the medium of the communication. It is, from one view, that part of the environment which forms the *channel* that carries information between the "current state" indicating surfaces of the entities engaged in the interaction. From another view the channel is the combination of the actors, the environment and the coding of meaning engendered by the actors in the process. In the former view we speak of a channel for Shannon



information, in the latter we speak of MacKay information or meaning.

The interface channel is activated between two surfaces, which may be the faces of the people involved in a conversation or the control surfaces of pieces of equipment that one might be using. It is the medium by which one's intentions towards another are presented, or the means by which one controls a piece of equipment. The finite limitations of a channel act as a filter placing constraints (perhaps in signal-to-noise ratio, perhaps in range of signification) on the information flow through it. So an interface is

- that which operates between us and the object of our intentions,
- the medium by which we convey those intentions, and most importantly it is
- the means by which we gain feedback from the object of our intentions so that we can continue to operate successfully with it.

From our point of view, the function of the interface is to *immerse* the organism, interacting with some object to which the interface belongs, into a context defined by the object's functions, thus giving the object *presence* for its user. This also applies particularly in the discussion of artworks that follows. An "object" here simply means some "object of perception" because people also carry interfaces, as the very word itself implies.

## **8. Types of Interface**

Interfacing, being the channel between at least two entities, occurs in a number of differing ways.

### **8.1 Person <--> Person**

The interface here consists in the face and facial gesture, bodily gesture, language and the manner in which each of these depend upon and reinforce each other. It also consists in the degree of commonality of culture and language, interest, willingness and other factors that modulate engagement. Essentially this is the conversation, or any of the similar modes of interaction we adopt when engaging with each other. I use the conversation as a paradigm because it covers several important points in

interaction and its interfacing.

- It is a mediated process of exchanging information and intention between individuals,
- It is mediated by sequences of signs (language) and signals (gesture) by which the exchange takes place,
- It is guided by feedback governed by turn-taking, and
- It can be pretty immersive, supposing both sides retain interest in the interaction.

These characteristics mostly apply to the one-to-one situation. In the one-to-many situation the interaction is probably not balanced for each direction. In lectures, for example, the lecturer will give a lot of information but may not receive much more than that most of the audience are paying attention (or not). A one-to-many situation is really a large number of one-to-one interactions occurring in parallel.

## **8.2 Person --> Machine**

An interface here would be the control surface of a machine that enables its use. In any number of situations: driving a car, working with a computer, one needs to be able to direct that process so that it continues doing what we need it to do as fluently as possible. This type of interface is, again

- A mediated process but here we are telling the machine what we want it to do,
- It is mediated by a set of signs on a control surface or panel.
- Control of the process is again by feedback not solely from the machine but also from other persons and events within the operating environment.
- It may or may not be immersive.

This points us to a criterion for evaluating the success of a machine and its interface, particularly where it is an artwork or a performance instrument. Since immersion, being about forgetting, becomes a matter of losing oneself in the process, if the process of the work doesn't deeply involve the user then one has to wonder to what extent the work has succeeded. For

example, personally I feel that the mouse-keyboard-screen (MKS) type of interface, although it works very well for writing letters or editing video, is hardly an involving, immersive, interface. It has long seemed to me that one of the biggest obstacles to a wide acceptance of CD-Rom based interactive art has been the fact that clicking the mouse button and watching the screen does not assist the viewers' becoming deeply involved in the artwork as an installation work can. Perhaps it is the small size of the screen but one's exposure to whatever else is happening in the locale of the screen reduces the opportunity to *forget* one's separation from the experience of the represented space.

### **8.3 Person <-- Machine**

This version of the interfacing process is probably limited, presently, to the function of feedback from the machine. It may well be that in the longer-term future machines actively engaging us in conversation that would pass the Turing test will not be as astonishing as it might seem nowadays, always supposing that we don't end up with a complement of subservient coffee-makers with brains as big as a planet (Adams, 1979). The intentional presentation of behaviour by a machine effectively becomes bi-directional Machine<-->Person interaction, and thus would be like any Person<-->Person interaction that we might engage in these days.

### **8.4 Machine <--> Machine**

Machine<-->Machine interaction is fairly recent and mainly comes with the interconnections between machines that we think of as data networks and that have become the Internet. When, and if, Artificial Intelligence surfaces then we will no doubt see Machine<-->Machine interaction of a similar type to that covered under Person<-->Person interaction. That is, the machine will initiate, and provide adaptive conversational responses to signals, reciprocally sharing the input/output exchange sequencing.

## **9. Regarding interactive art**

Regarding the artwork, Burnham comments, in his *Beyond Modern*

*Sculpture*, that “the attempt is to try to make communication between the work of art and the observer a sustained two-way experience” (Burnham, 1968) which implies an artwork that requires active participation in its function. This is no longer passive viewing but active interaction with the appearance and behaviour of the work such that it depends in some way on the behaviour of the viewer for its full completion as a work. That is, the artwork itself is no longer passive. As such, interactive art offers an excellent test bed for HCI studies as Edmonds and Candy note in many of their articles (eg, Candy and Edmonds, 2002). Both in studies of “the interface to the world” (Weibel, 1996) and HCI, any interactivity requires a combination of analogue and digital technologies to translate what for all practical purposes is an analogue world of continuous changes in its qualities into the digital world of the computer.

The viewer's sense of the success of any interaction with an artwork is possibly best measured in terms of the *immersion* they experience while in the presence of the artwork. This might be thought of as the sense of involvement in the process of the work. One can easily forget where one is when involved in a stimulating conversation. It is this same sense of forgetting where one is that is immersion within the functional space of the artwork. While immersed all the experience that one is engaged in comes from within the artwork-functional space itself and not from outside. It is when some event intrudes from outside (eg, shouting voices) that the spell is broken and one is jerked out of that state of immersion back into the “real world”.

In interactive art two things need to be thought about:

1. the experience of the viewer in terms of the appropriateness of any responses the computer makes to their actions, and
2. an interface that is of adequate fidelity in the modes of interaction made available.

It is also important that, where the interaction is to be conversational, any signals emitted by entities in the environment are clearly responses to acts

of the viewer. Where the interaction is deliberately opaque (*eg*, in the game *Myst*) then there needs to be meta-clarity as to the internal framework of the interaction space.

I am going to illustrate a range of physically immersive interfaces, which have been produced over the last 30 years to augment the performer's or the audience's interaction with instruments or artworks. Essentially I am going to talk about the hardware interface between a person, be they performer or audience, and the machines that are being used in that work. I will look at several technical means for interfacing people to performance-instruments and new-media artworks which range from analogue to digital technology, from the personal to the large-scale public, from performance instrumentation to sensitive environments.

The MKS interface, although interactive, is about as exciting as knives and forks. It produces a private, rather mundane interaction and often leaves an audience cold when exploring new-media artworks. So, for the universal machines, humans and computers, we explore new forms of interaction spaces and interfaces in the arts in a world of intuitive experiment. A major early figure in interactive art, Myron Kruger, wrote regarding his explorations of interactivity:

If interactivity is to be the focus, it is achieved first by understanding participants' behaviour in as much detail as possible. ... At the moment, full-body interactivity is rewarding in itself. The participants have a new relationship between their body and their senses. While moving, they understand how they are affecting what they see. Participants must try to anticipate the consequences of future actions, formulate the intent to execute those actions, coordinate the actions as they are being performed, and then react to any surprises that occur. This experience can be extremely engrossing. Just as an intense conversation tends to create its own environment, making its physical context unimportant, the scenery in an interactive experience is not the central issue. (Kruger, 1992)

I will now look more closely at some varieties of Person<-->Machine

interaction produced by artists, and the interfaces by which they are interactive.

## **10. Body-scale interfaces - the Theremin**

One of the earliest tools for interaction was the Theremin, designed in 1919 by the Russian radio researcher Leon Theremin (Martin, 1993). A theremin circuit was published in *Electronics Australia* in 1969 (Simpson, 1969) and this triggered a couple of interesting approaches to interactive art and performance works in Australia. The first I shall mention is the theremin based installation that Optronic Kinetics (David Smith, Jim McDonnell and Kaz Kondziolka) built at the Fine Arts Workshop at Sydney University in 1969. It consisted in a theremin with a long wire antenna strung around the walls of one of the sheds. The theremin produced its classic sounds and its output was also used to generate a Lissajous pattern on a TV set. A spinning colour-wheel in front of the screen, synchronised to the theremin oscillator, produced a coloured display. As viewers walked around the room moving closer to or further from the aerial both the sound and the Lissajous pattern changed.

### **10.1 Philippa Cullen**

Philippa Cullen, a dancer, saw the Optronic Kinetics installation and realised that she could use the theremin in her exploration of means by which the dancer could make her own music. With David Smith's help she experimented with the theremin using the long wire aerial and choreographed a ballet called *Electronic Aspects* which was performed in 1970 at Sydney University.

She produced at least two other works that are significant here. First was a sequel to *Electronic Aspects*. Cullen brought together a group of dancers and other students to further develop the performance aspects of this interactive system. With architecture student Manuel Nobleza she designed a range of aerials [Fig.1], an electrical engineering student, Phil Connor, designed a theremin output which could give voltage signals that were proportional to the audio frequency output, and composition student Greg



Fig.1: Philippa Cullen working with the Theremin aerials designed by Manuel Nobleza. (c) Lillian Kristal.

Schiemer used these control voltages to control the sounds produced by a VCS3 synthesiser. They produced the ballet *Homage to Theremin II* in July 1972.

In 1974, Cullen had a set of pressure sensitive floors built for her which were used in performance at the *Computers and Electronics in the Arts* exhibition at Australia 75 in Canberra, March 1975. There were four triangular floor sections designed to give a changing voltage as one moved towards one apex of each triangle. They could be arranged as suited the dancers. The

voltage outputs from the floors could then be used to control an audio synthesiser [Fig.2]. At the exhibition in Canberra the connection to the synthesiser failed so several computer scientists there decided that they could use the voltages with their PDP-11 computer. They had an A-to-D and a newly built framestore available for it, and used the voltages from the floors to build up a map of the history of the dancers' movements across the floors as a video image. Thus the dancers were directly controlling the creation of the video image. (Jones, 2004)

In using these interactive interfaces the dancers had to learn the very fine movements that it took to control the sound. Here it is as though they are learning to converse with the machine. Their behaviours elicit a response from the machine but in an unfamiliar language. At first it is just squeaks and shrill tones but as the machine becomes more sophisticated (through the intervention of the engineers and composer) its language (the range and quality of its feedback) evolves and the interaction becomes more predictable, more productive and more interesting. As the dancers learn to

control their movements with greater precision the spectrum of responses from the machine also becomes more articulate. Each side of the interaction has to learn, in its own way, how to bring out the best in the other.

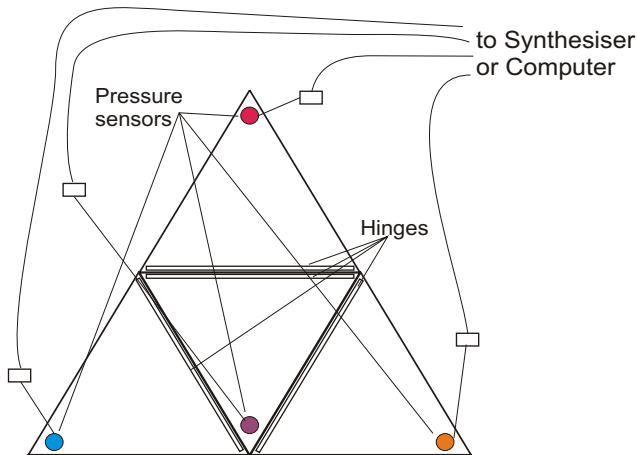


Fig.2: The arrangement of the pressure sensitive floors (designed by Arthur Spring, 1974)

### 10.2 Body-scale interfaces - *Haze Express, Riding the Net*

In 1999 and again in 2001, I worked in Japan for Christa Sommerer and Laurent Mignonneau. I built two versions of a large touch-screen device [Fig.3] with which the viewer could interact with their Artificial Life artworks. Used first in *Haze Express*, (Sommerer and Mignonneau, 1999) the screen represented a window in a train running through the night. "Outside" flowed all sorts of curious dream-like images that you could blow around the screen with a wave of the hand as if the train was flying through a cloud of dandelion seeds. Locating the hand was done with a grid of infrared emitters and receivers. Where the presence of a hand broke the transmission, this indicated its X and Y location in the screen. In *Riding the Net* (Sommerer and Mignonneau, 2000) we rethought the interface slightly so that the polling of the screen area became faster through using a statistical scan technique. In this version you could almost grab and corral images flowing into the display from the Internet.



The size of the screen as a window on an imaginary world of the night, or on the content of the Internet, is in itself something to fall into, as though gazing out a window to the sea. With the motions of the hand being tracked this sea becomes yours to control and conjure with. I am told by one person who saw *Haze Express* at *Ars Electronica* in 1999 that it was quite physically involving, as though you were trying to catch glimpses of the countryside while rushing through a stormy night, enveloped in the comfortable train seats in the installation. (Rackham, 2000).

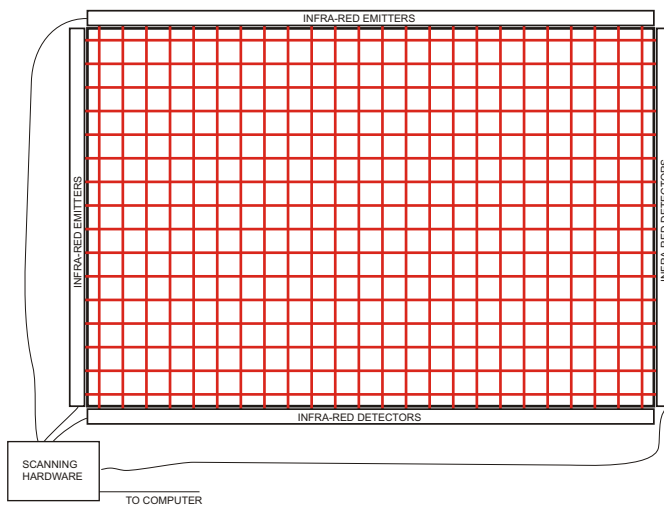


Figure 3: The arrangement used in the large touch screen interfaces built for Sommerer and Mignonneau.

### 11.1 Close-scale interfaces - The Reading Machine

At a more personal scale, interaction can be made more immersive by presenting the viewer with a much more curious instantiation of the MKS interface. For example, in my *Reading Machine* (1998) I retained the mouse electronics and substituted new navigational controls. Essentially the mouse has two functions: to move a cursor around the screen so that the user can point to items on it, and to indicate to the computer that the user wishes to activate a process that jumps the computer and its display into

some new section of its program. In the *Reading Machine* I separated the two functions, as in Engelbart's original version of the mouse (Engelbart,



Figure 4. Stephen Jones' *Reading Machine*. Note Morse key to left and navigation wheel to right of monitor. © Stephen Jones

1967). Here, the navigation function is handled by a gimballed wheel placed (conveniently to the right hand) that is rotated for cursor movement up and down the screen, and tilted for movement to left or right across the screen. The horizontal movement is handled by switching on a DC motor whose spin-rate is controlled by a potentiometer that measures the degree of tilt. The mouse click is handled by a Morse key at the left hand. [Fig.4] The overall effect of this two-handed "Mouse for Babbage's Difference Engine", as I call it, was to give the reader a much more engaged interaction while exploring the both linear and non-linear pathways of the work. The use of the legs from an old Singer sewing machine and the engraved and brass-bound wooden tabletop with a monitor set into it at a comfortable reading angle, gave the desk a Victorian technology feel. Since it took considerably more physical action to navigate and the left-right motor ran quite slowly, making a whirring noise as it went, several users reported that they felt much more engaged at the desk while reading the screen. It became a desk you could settle into, taking your time in exploring.

## **12. Large-scale interfaces - 3DIS**

The 3-Dimensional Interactive Stage (3DIS) developed by Simon Veitch is a large-scale sensor system that could be used by dancers to control musical production, *eg*, as composed by Warren Burt (Burt, 1988) or could be used by artists, *eg*, Jill Scott or Severed Heads, to allow the actions of the viewer to control the behaviour of the artwork. In 1988 Severed Heads used 3DIS in an interactive environment, called *Chasing Skirt*, where the audience, on gaining a little experience, could actually compose the music and video by moving among a collection of triggers consistently attached to locations in the viewing space which were sensed through the camera in the 3DIS system. For some viewers, once the connection was made the compositional process was seen to be quite absorbing. (Severed Heads, 1988)

## **13. Virtual Reality Interfaces - Osmose**

Char Davies' *Osmose* is a large-scale, fully immersive, and very sensual Virtual Reality work. It is the most complete immersion in a truly other space that I have experienced. The interface is a belt that reads the expansion of the chest while breathing and an HMD that renders the viewer entirely within the virtual space. Once in harness, and inside the realm Davies has developed, your subjectivity is determined by Davies' own sense of beauty and wonder at the evanescence of what might well be underwater space but, to me, was more like some of the spaces I find myself in when reading some of the more evocative science fiction, vast spaces of colour and thinly veiled objects which, in *Osmose*, centre on a tree and the water-flow through a stream from which the tree drinks. One dives into the stream, following it up into the roots of the tree joining the motes of energy that float up through the trunk and into its leaves, rising on up into a text space of glimpsed quotation catching only phrases from the philosophy and background of her work, or diving down into the subspace of code where operating elements of the system are exposed.

Here immersion is demonstrated in a way quite distinct from the oft-stated

"hallucinatory" or "dream-like" experience of cyberspace and virtual reality. These are subjectivities I have not experienced in dreams: they are evocations of meaning brought to us from the metaphor of diving. Several times I had to catch myself from trying to dive down through the stream into the lower spaces realising that I would crash on my head if I followed on that course. It is clear that the combination of interface and content of the work supported in a most complete way the viewer's immersion in it.

#### **14. In conclusion**

Interaction in the realm of the machine echoes interaction in human space, which in turn shows clear structural similarity to the basic behaviours of organisms. It is not unreasonable to suggest that Interaction is a fundamental process for the maintenance of life. Interactive artworks make a useful laboratory situation for the study of interaction.

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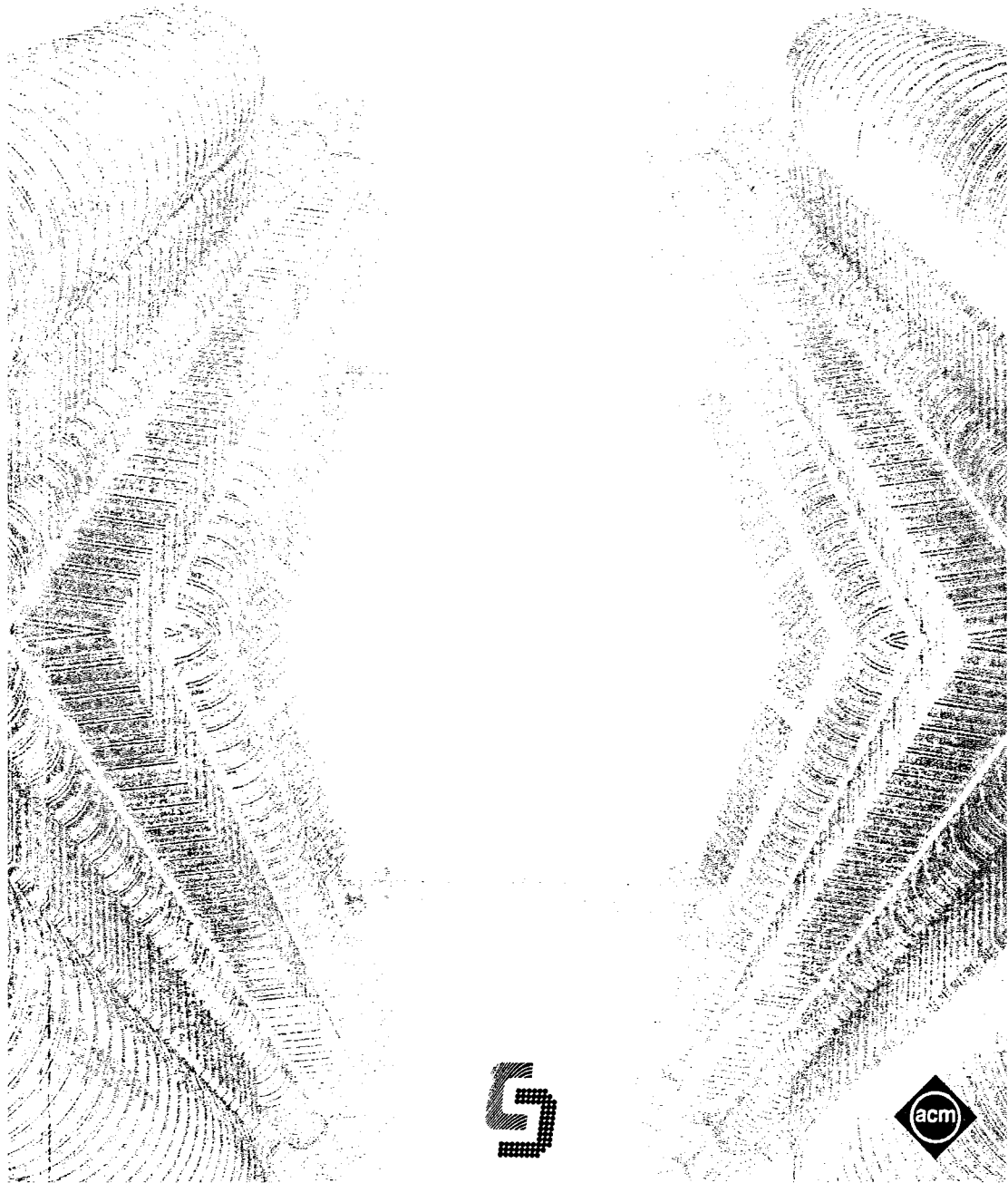
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# Interaction: Systems, Practice and Theory

University of Technology, Sydney 16th - 19th November 2004  
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