
Tim OShea, the Principal of the University of Edinburgh, had once invited Pask to visit Edinburgh University. Tim described to me the theatricality of the basement workshop of Gordon Pask, with its velvet drapes and roman columns. This theatricality and the eccentric kitsch of his cartoons very much influenced the design of the exhibition. Tim opened the exhibition with a cartoon of Pask in Calculator Satiricals.

Myself and inspired by the Heath Robinson-like cartoon adorning the exhibition was drawn by Tim in one of his books, ‘Creative Media’. The idea of the exhibition was suggested by Jon Pask and originating from the chapter by the same name in his book, ‘Extended Analogue Computing of Jonathan Mills’.

The idea of the exhibition was inspired by Gordon Pask – especially Jon Bird and others who are investigating and producing work with materials that are semi-conductive and semi-conductive with those of many electrochemical processes and blends my own electrochemical processes and blends my own materials with knowledge of Gordon Pask’s, especially Jon Bird and others who are investigating and producing work with materials that are semi-conductive and semi-conductive with those of many electrochemical processes and blends my own materials with knowledge of Gordon Pask’s, especially

http://www.amazon.co.uk/Biotica-Art-Emergence-

Pask represented Cybernetics, a term now that is of interest but the underlying activity. By moving around the central Foundation, which enabled me to further develop display in a public thoroughfare so that people could view and use the work of Gordon Pask. Alongside Andy Webster’s ‘From Clerks’, Roman Kirschner inspired by Gordon Pask, ‘Especially Jon Bird and others who are investigating and producing work with materials that are semi-conductive and semi-conductive with those of many electrochemical processes and blends my own materials with knowledge of Gordon Pask’s, especially.

http://www.inf.ed.ac.uk/research/programmes/

The Preservation of Entropy


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The Preservation of Entropy

**Electrochemical Glass**

Iron, Copper, Aluminium in conductive fluid

October December 2003

The evolving metallic growths are created by the changing electrical activity between the dissimilar metals which act as a primitive battery, dissolving, transforming and reforming the metals through ionic migration under varying electric field potentials.

The resultant flow and formations of the metals embody the underlying layers of complex interactivity and emergence through electrochemical action between the three base metals of iron, copper and aluminium.
Alembic uses a particle simulation of matter to represent Dynamic Form. A gestural interface enables participants to directly effect the simulation, transforming the simulated matter, thereby becoming creators of their own experience. By moving around the central projection, participants are able to melt, freeze and shape matter by moving around the central circular projection. The temperature of the Alembic moving through fire, air, earth and water is represented by filtered white noise, each element corresponding to a particular frequency range.

Biotica
The aims of Biotica were to produce an immersive three-dimensional flying simulation of Artificial Life and to harness emergence as a productive force for creating life-like organisms from a primitive soup. The Biotica software produced interesting emergent behaviours amongst colonies of Artificial Life creatures, however the Digital DNA that defined each creature had to be painstakingly hand crafted, rather than evolving or emerging from a primitive soup. Due to the abstract rendering and somewhat difficult user interface, the Biotica installation was not so

Spanish

Emergence. [2] 

documented in the book "Biology: Art, Life and Consciousness" by Massimo Pigliucci and Dennis Dugmore. The idea that a system is the sum of its parts is a fundamental concept of Artificial Life. However, the experience of Artificial Life is not simply a sum of its parts. The emergent properties of the system, such as consciousness and self-awareness, cannot be predicted or calculated from the properties of the individual components. This is known as emergence.

Enhancing the experience of Artificial Life, the project aims to create an immersive and engaging environment that allows participants to interact with the system in a meaningful way. Through a combination of technology and creativity, the project seeks to push the boundaries of what is possible in terms of interactive installations and immersive experiences.

Further reading:

- "Biology: Art, Life and Consciousness" by Massimo Pigliucci and Dennis Dugmore
- "Artificial Life" by John Holland
- "Complexity: The Emerging Science at the Edge of Order" by N. L. Biggs

More information can be found at the project website: [http://maverickmachines.com/WordPress/]

Acknowledgments:

The Biotica project was made possible through the support of the University of Melbourne and the Melbourne School of Design. Special thanks to the team at Biotica, including Michael Kozicki from Axon Technologies, for their dedication and hard work.
References


5. OnSite was a collaborative exhibition with three students from Edinburgh College of Art designed to evoke a public awareness of Informatics and its applications.

Through exhibiting Biotica at Siggraph in 2000, I met Jon McCormack and Alan Dorin, who were also creating A-Life artworks at CEMA - Centre for Electronic Media Art, Monash University in Melbourne Australia.

I was invited over for a three month residency. Upon arriving, although I felt it was expected that I might create another Biotica, I was a bit weary of programming and digital simulations, and wanted to create something new. The electrochemical glass and its evolving dendrites beckoned the strangely alien, yet familiar organic beauty of the dendrite, exhibiting a type of emergence so much richer than anything possible in computer simulation.

In the book Biotica, Joe Faith, suggests that emergence is dependent on complexity all the way down. I set out to investigate and reproduce the hidden complex processes behind the electrochemical glass.

For my residency, I created The Preservation of Entropy, a scientific experiment designed to be displayed as an evolving art work, examining and revealing the hidden processes in electrochemical activity.
growth at the nano scale in a solid substrate of electrochemical glass. They knew nothing of the work of Gordon Pask and were extremely excited by the parallels between their research and his.

It is somewhat ironic that the maverick electrochemical experiments of Pask have now found commercial application by Axon without them having prior knowledge of his visionary work.

During my residency in Informatics I gave a talk in the Computational Thinking lecture series where I suggested that analogue computers can offer significant advantages over the digital, in areas of concurrency and non-Turing computability.[6] There are other examples of real world analogue applications, such as the Extended Analogue Computing of Jonathan Mills [7], which serves to demonstrate how modern day analogue devices can solve real-time problems not possible using conventional digital computing techniques. Further examples of alternative computing media can be found via the research strand Unconventional Computing.[8]

A cybernetic view suggests that it is not the materiality that is of interest but the underlying interdependent processes and their modes of application of a maverick machine. I first met Webster I recognised that the Electrochemical Glass was a result of the work of John Biddle and Andy

is suggested, rather than made real.

idea that a dendrite might be influenced by sound. The Pask-style dendrite was introduced as a dendrite glass. Pask apparently had introduced a dendrite experiment on the palette of a live painter. The video art work of Gordon Pask. Andy and Webster; they were working on researching an interface that would allow project a video on a computer screen. Andy and Webster, they were working on researching an interface that would allow project a video on a computer screen.

The displays were similar to heart beat monitors, showing and recording activities over seconds, minutes, hours, and days. The work was displayed in a public thoroughfare so that people would notice and reflect on the progressive changes as they passed by over the weeks and months, possibly years.

The activities were indeed complex and varying, sometimes in cycles over odd lengths of time, one being recorded oscillating over a 23 hour period. I

the Edinburgh School of Informatics can be found at http://artsinformatica.blogspot.com.

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found commercial application by Axon without them having prior knowledge of his visionary work.
I was lucky enough to study Computers and Cybernetics in 1997, and the ideas of feedback loops continue to influence my thinking about interactive systems.

Pask said anything can be a computer, and he also appeared to be dismissive of the digital computer, likening it to a magic lantern, as if it were the projector of a seductive false reality.

Much of Pask’s work and thinking seems to revolve around the use of the analogue and analogies, with mechanical allusions to thinking about thinking and conversation theory with actors playing varying roles. This theme is developed in the exhibition with computation devices using electrochemical, electromagnetic and static electricity processes.

The two beige computers in the exhibition certainly appear dull in contrast to the visceral materials of the maverick machines liquids, mechanics, copper, glass and wood. Like Pask, I am also interested in alternative computing paradigms, finding the digital rather dry and software programming very time intensive.

Axon Technologies, who are featured in the exhibition, have produced a nano-dendritic-memory device, a real world

Glass was exhibiting, albeit slowly, the same kind of dendritic growth Pask had been experimenting with.

The idea that computational processes might be realised through electrochemical action of metals in solutions resonated with the experiments had I carried out in the Preservation of Entropy, and the complex interactions present in the continuing growth of the Glass.

In 2005, the journal Strange Attractor, published images of the glass and an article The Electrochemical Glass - A slow-evolving artwork from a living alchemist; which describes the electrochemical processes behind the Glass, and its connections with the work of Gordon Pask and that of Jon Bird and Andy Webster.

In 2006, whilst working as Artist in Residence at the Edinburgh School of Informatics, I was awarded a grant from the Calouste Gulbenkian Foundation, which enabled me to further develop my interests in electrochemical processes and investigate further the dendritic work of Gordon Pask.

Rather than monitor the electrochemical processes as in the Preservation of Entropy installation, I set out to generate and control their influence by each other. Processes that are able to influence and be influenced by other processes, whether digital, artificial, electronic, chemical or applied to ecological, electoral, chemical, or biological sciences are not media specific, but can be applied to both fields very easily. The concept of underlining Pask’s emerging Cybernetics, a term now that has evolved to evoke a public awareness of Informatics and its many applications.

An introduction to the exhibition was provided by my friend and colleague Michael Goupil, the author of Maverick Machines and the Curator of the exhibition, who further explained how the exhibition had been inspired by the Heath Robinson-like antics of the Electrochemical Glass.

Rather than monitor the electrochemical action between the three base metals, I set out to investigate and reproduce the evolution of the dendritic growth Pask had been experimenting with. The idea that computational processes might be realised through electrochemical action of metals in solutions resonated with the experiments had I carried out in the Preservation of Entropy, and the complex interactions present in the continuing growth of the Glass.

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