# The Idea Becomes a Machine
# AI and Alife in Early British Computer Arts

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*In October 2002 the CACHe (Computer Arts, Contexts, Histories, etc…) project began to investigate the early days of the computer arts in the UK. This three-year AHRB-funded project intends to archive, document and contextualise the computer arts from their origins to around 1980 when the "user-friendly" systems began to appear.*

*This essay discusses the interest in Artificial Intelligence and the nascent field of Artificial Life in the work of the period focussing on developments at the Slade School of Art's Experimental and Computing Dept. It argues that AI and Alife were "natural" extensions of the 20th century interest in procedural (constructivist, system, conceptual) art.*

*Keywords: Artificial Life and the Arts; Artificial Intelligence and the Arts; Generative Computation and the Arts; History of Electronic Arts; Pioneers of the Electronic Arts.*

"The idea becomes a machine that makes the art" - Sol LeWitt (LeWitt 1967)

In 1968 I was one of a generation of young artists who visited the ICA (Institute of Contemporary Art) at their then-new premises in London's Mall to see the Cybernetic Serendipity show (MacGregor 2002). Curated by Jasia Reichardt Cybernetic Serendipity, like other exhibitions in the ferment of the 1960's, challenged many long-held attitudes to the visual arts and their place in culture and society. In particular works by scientists were shown alongside those of professional artists and Reichardt did not differentiate, at least on the level of the exhibited artefact, between the "two cultures".

Like many of my contemporaries I was enthralled by the show and, after a period working with video and analogue electronic systems, I have since 1974 worked almost exclusively with computers and digital systems. Even younger artists, like Ken Rinaldo, credit the show for inspiring their interests in what Kay termed the computational metamedium (Kay 1984). Rinaldo saw the show as a child and only later, when he discovered the catalogue in a second-hand art bookstore, recognised what he had seen and the influence it had had on his development as an artist.

One of the works shown at Cybernetic Serendipity was Edward Ihnatowicz' "Sound Activated Mobile -or- SAM". It consisted of four parabolic reflectors formed like the petals of a large flower on an articulating "stem" or neck. Microphones placed at the foci of the reflectors enabled SAM to accurately detect the location of sounds and to track them as they moved around the exhibition. The visitor was left with an uncanny sensation of being "watched" as they walked around. Alex Zivanovic's web site dedicated to Ihnatowicz' work (Zivanovic 2003) contains a video of SAM in action.

Later Ihnatowicz worked on the ambitious and high budget "Senster" for the Phillip's Evoluon museum in Eindhoven in the Netherlands. Kees Stravers maintains a web site about the Evoluon (Stravers 2003). The Senster was a 16-foot (4 m) articulating robot arm that responded to both sound and movement and was installed in the Evoluon's main entrance gallery. Originally programmed to respond to loud noises it provoked a cacophony whenever school groups visited. This prompted the museum authorities to ask Ihnatowicz to reprogram it to interact with "gentle" movements and sounds. It was installed in 1970 and decommissioned in 1974. A film of the Senster is also available from Zivanovic's web site (Zivanovic 2003).

Ihnatowicz' final robot piece was "The Bandit" part financed by the Computer Arts Society and exhibited at their show "Interact" at the 1974 Edinburgh Festival. It was based on the familiar "One Armed Bandit" gambling machine. Visitors interacted with the lever and the system was able to make pretty accurate analyses of their gender and temperament.

During the period he worked on the robotic pieces Ihnatowicz was a researcher in the Mechanical Engineering Department at University College London which also hosts the Slade School of Art. In 1972 the late Malcom Hughes, who was a member of the System Art group and head of Postgraduate Studies at the Slade, established their Experimental and Computing Department. Ihnatowicz was a frequent visitor throughout the 1970's and often engaged in informal discussions with staff and students on topics of interest. I remember one such discussion about artificial intelligence (AI). Edward referred to the work of Piaget on infant learning and the importance of the tactile stage that precedes and is an essential prerequisite for later visual and metric learning. He stated his opinion that if machines were ever to become intelligent they could only do so by interacting with their environment.

In retrospect it's possible to perceive that Ihnatowicz was an early proponent of embodiment in both the arts and AI and it's clear that he was also a pioneer of the discipline now known as artificial life (Alife). Contemporary roboticists and AI specialists working in the now popular bottom-up methodologies (like for example evolutionary robotics) are often astounded to learn of Ihnatowicz work, particular when they are told its early date. Ihnatowicz died in 1986.

Another regular visitor to the Slade's Experimental and Computing Department was Harold Cohen. Cohen was a well-established artist who had represented Britain with his brother Bernard at the 1966 Venice Biennale. In 1969 he began working at the University of California at San Diego (UCSD) where he became interested in computers and programming. From 1971 he was involved in the AI Lab at Stanford University where Edward Feigenbaum was developing "Expert Systems".

Expert systems get around a major problem in classical, top-down, disembodied AI research. The problem is context. The human mind has an amazing facility to quickly apply a multitude of contextual information to the cognition of ambiguities common in speech and other forms of inter-human communication. Even high-speed modern computers with their linear processing structures can't compete. Feigenbaum was one of a number of researchers who in the late 60's and early 1970's suggested that this could be overcome by limiting the area of intelligence to small, well-defined knowledge bases where ambiguities could be reduced and the contextual cross-referencing applied.

Researchers at the Stamford lab. developed many valuable expert systems like Mycin that was used to diagnose infectious diseases and prescribe antimicrobial therapy (Buchanan 1984). As

a Guest Scholar and artist-in-residence from 1971-73 Cohen began to develop an expert system he called Aaron.  He continues to work on it and jokes that it's the oldest piece of software in continuous development (Kurzweil 2001).  Aaron is a "classical" top-down AI package.  It contains an internal database and set of rules that enable it to produce sophisticated drawings.  Although Cohen is interested in investigating issues to do with cognition and drawing his major achievement has been the externalisation and codification of his own drawing abilities.  Aaron produces 100% genuine "original" Cohen drawings without the need for the "human" artist's intervention.

Ihnatowicz and Cohen represent the first "great masters" of the computer-based arts and it's interesting that they also epitomised the two main approaches to artificial intelligence.  Cohen's work builds upon the classical methods of "top down" internal data representation and analysis.  Ihnatowicz is an early pioneer of the now popular methods of  "bottom up" learning systems – an aspect of what's since become known as "artificial life".

The Slade's Experimental and Computing Department was strongly influenced by the European Systems Art movement.  Many students were pursuing procedural methods for generating art.  The lecturer in charge of the computer studio was Chris Briscoe who was interested in another important influence derived from contemporary scientific investigation - unpredictable, non-linear deterministic systems or what would later become known as "Chaos Theory".  His drawings and sound pieces showed the evolving relationships between inter-dependent graphic and audio entities.  Later in the 1970's a visitor from the USA, the Polish mathematician Andre Lissowski, introduced us to the work of Benoit Mandelbrot and his concept of fractals.

Another important visitor was Ernest Edmonds who was an artist who had been using computers since 1968.  As a professor of computer science Edmonds founded the UK's main research initiative into human computer interface (HCI) first at Leicester and then at Loughborough.  His work in the arts, as with his work in HCI, is concerned with embedded intelligence.  His early paper on artworks that learn published with Cornock (Cornock and Edmonds 1973) was recently revisited (Edmonds 2003).  Several of the computer studio students went on to pursue PhD studies under Edmond's mentorship and became some of the first visual arts students to achieve this award in the UK.

Major computational influences in the studio were Cellular Automata (CAs).  These had been popularised by Martin Gardiner's piece about John Horton Conway's "Game of Life" in Scientific American in October 1970 (Gardiner 1970).  One of the first students in the Dept. was Julian Sullivan who was originally an electrical engineer who had later pursued undergraduate training in fine art at Middlesex Polytechnic (Hornsey School of Art) where he had worked with the computer graphics pioneer John Vince.  Sullivan was particularly interested in CAs and their potential.  His work on boundary detection was adopted by the image processing researchers at UCL.  Sullivan went on to join Briscoe on the staff of the computer studio where he worked until his death in 1982.

Amongst the students in the department who pursued an interest in the nascent field of a-life was Steve Bell who went on to complete a PhD with Edmonds at Loughborough. Bell produced several artworks using predator-prey a-life models that were converted into graphics form using his "Smallworld" software.  Bell is now at the UK's National Centre for Computer Animation at Bournemouth.

I was a contemporary of Bell's at the Slade where I studied from 1977-79.  My primary interests were CAs and deterministic "chaos".  Readers who wish to know more about my

work can read about it in my essay in "Stepping Stones in the Mist" (Brown 2002) or visit my website (Brown 2003).

The Australian art theorist Mitchell Whitelaw suggests that a-life is a natural development of artistic practice throughout the 20th century (Whitelaw 2000). In particular he quotes the work of Paul Klee and Kasimir Malevich. Many artists have claimed that that their work has an independent life of its own and that the artwork "tells" the artist when it's finished.

Those artists associated with the Slade's computer studio in the 1970's felt they were building upon the traditions of constructivism, systems art and conceptualism and that the computer was a "natural" tool with which to continue this kind of work. Many of the more traditional artists associated with the studio and who did not use computers themselves agreed. We did not use the term "artificial life" and would not especially have associated with the term as it was defined by Langton in the 1980's as a form of "experimental biology" (Langton 1989). Our focus was more on procedure and process in their most general sense and moreover many artists actively resisted attempts to apply anthropomorphic interpretations to their productions. Nevertheless references to life and physical and biological processes were often implicit in many of the works. Examples would include Conway's "Game of Life" which had a major influence or my own time-based work "Builder + Eater" (1977) where two concurrent processes dynamically competed for possession of a digital image.

## Conclusion

The Experimental and Computing Department in the Postgraduate School of the Slade School of Art existed from 1972 to 1982. As I hope I have been able to demonstrate above it was a dynamic focus for artists working with computers and especially for those concerned with computational and generative methodologies that, in the 1980's would become "sanctified" by science with the classification "artificial life". My intention in writing this essay has been to put their endeavours on the record and ensure that this almost forgotten period of British art history is preserved.

## Apology

Due to family circumstances I had to leave my home in Australia at short notice in early May of this year (2003). Consequently I have not been able to refer to essential source material in preparing this easy. Nor am I able to show many of the unique images I have from the Slade in the 1970's. As such this essay should be considered more of a personal reminiscence than a scholarly review. I apologise from these shortcomings and would like to assure readers and delegates at Consciousness Reframed 2003 that the complete essay will appear on the CACHe website in the near future.

## References

Brown, P., 2002, Stepping Stones in the Mist, in Bentley P.J., and Corne D.W. editors. Creative Evolutionary Systems. Morgan Kaufmann

Brown, P., 2003, personal website: http://www.paul-brown.com

Buchanan, B. G., and E. H. Shortliffe, 1984, Rule-Based Expert Systems: The MYCIN Experiments of the Stanford Heuristic Programming Project. Reading, MA: Addison-Wesley. See also: http://smi-web.stanford.edu/projects/history.html#MYCIN

Cornock, S. and Edmonds, E.A. 1973, The creative process where the artist is amplified or superseded by the computer, Leonardo (6)1, pp. 11-15

Edmond, E.A., 2003, Logics for construction generative arts systems, Digital Creativity (14)1, pp. 23-28

Gardiner, M. 1970, Mathematical Recreations, Scientific American 223, Oct. p.120

Kay, A. 1984. Computer Software, Scientific American Special Issue, Sept. pp.53-59

Kurzweil,R, 2001,  http://www.kurzweilcyberart.com/

Langton, C.L. 1989.  Artificial Life.  (Proc. Alife I), MIT Press.

Lewitt, S. 1967. Paragraphs on Conceptual Art, Artforum 5, Summer, p. 80.

MacGregor, B. 2002. Cybernetic Serendipity Revisited, In Proceedings of Creativity and Cognition 2002, ACM, pp.11-13 - downloadable from:
http://portal.acm.org/citation.cfm?doid=581710.581713

Stravers, K. 2003. The Evoluon. http://home.iae.nl/users/pb0aia/evoluon/indexe.html

Whitelaw M., The Abstract Organism: Towards a Prehistory for A-life Art, Leonardo (34)4. Pp. 345 - 348

Zivanovic, A. 2003. A Web Site dedicated to the work of Edward Ihnatowicz
http://members.lycos.co.uk/zivanovic/senster/
SAM video - http://members.lycos.co.uk/zivanovic/senster/videoclips/sam_long.mpg
Senstor video - http://members.lycos.co.uk/zivanovic/senster/videoclips/senster_long.mpg

**Biographical profile**

Paul Brown is an artist and writer who has been specialising in art & technology for 30 years. He began using the internet in 1984 and from 1992 to 99 he edited fineArt forum, one of the internet's longest established art 'zines.

In 1984 he was the founding head of the United Kingdom's National Centre for Computer Aided Art and Design and in 1994 he returned to Australia after a two-year appointment as Professor of Art and Technology at Mississippi State University to head Griffith University's Multimedia Unit.  In 1996 was the founding Adjunct Professor of Communication Design at Queensland University of Technology.

From 1997-99 he was Chair of the Management Board of the Australian Network for Art Technology and he is a member of the Editorial Advisory Boards for both Leonardo, the journal of the International Society for Art, Science and Technology and Digital Creativity. His computer generated artwork has been exhibited internationally since 1967 and is currently on show in Europe, the USA and Australia

During 2000/2001 he was a New Media Arts Fellow of the Australia Council and he spent 2000 as artist-in-residence at the Centre for Computational Neuroscience and Robotics at the

University of Sussex in Brighton, England.  He is currently (2002-2005) a Visiting Fellow at Birkbeck College, University of London where he is working on their CACHe project (Computer Arts, Contexts, Histories, etc…).

Examples of his artwork and publications are available on his website at:
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More information about CACHe is here:
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