Routes Toward British Computer Arts: Educational Institutions

PAGE 57, Summer 2004, Bulletin of the Computer Arts Society

The concept of using computers in art started in a sympathetic social and political climate in the UK. Although in the initial post-World War II period there were no computers available to artists, there was a great wealth of conceptual thinking, informed by cybernetics, which influenced the next generation. With advances in technology and the formation of the polytechnics in the late 1960s, computers became available. In certain institutions, a limited number of artists took up this as a tool, working method or metaphor for practice. Due to these unique issues of access, we find that both artists and persons from a technical or scientific background created work during this pioneering period.

The complexity and rarity of computers at the time meant that any artform based around them was bound to be a specialised branch of art, highly dependent upon support and funding to exist, not least because of the expensive, large-scale nature of much early equipment and the resulting technical expertise required to operate it. Therefore it is not surprising that much of this work did not take place in traditional art spaces. In the face of much official disinterest, the pioneers of computer arts found ways to exist largely outside what may be considered the mainstream artworld of dealer-gallery networks.

This article is an introduction to the role played by British art schools in fostering computer arts activity during the period 1960-1980, and represents only a fraction of the research uncovered so far. It is a portion of a presentation given at the joint CAS/Computer Conservation Society meeting at the Science Museum on 25 March 2004.

Modern public art education in Britain can be traced back to the founding of the Government School of Design created in 1837 - the ancestor of the Royal College of Art and the Victoria and Albert Museum. As opposed to the previous private academies or drawing clubs, the School of Design was the first state supported art school in England. Subsequently, branch schools were established, so that by 1851, seventeen provincial institutions were in existence. They were created to teach design skills using the latest tools in order to stop the decline of industrial art and to compete with Europe. Their special reference to manufacturing is evident in that they were originally run under the auspices of the Board of Trade.

In the early days, there was much wrangling over the exact nature of the curriculum. The painter B R Haydon, who had been instrumental in lobbying Parliament about the idea initially, believed the schools should be modelled on the traditional Renaissance academy prototype. In other words, studies should be based on the human figure and antique drawing. The idea was that some students would then become fine artists, other artisans, with fewer of the former. The Board of Trade, however, decided against this and study of the human figure did not feature in the

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curriculum. But by 1845, Haydon had won, and the prevailing view amongst the establishment was that the figure should be taught. This had the profound effect of turning the schools into establishments teaching both art (based on the 'high' art of figure drawing) and design (ie., latest technology) in one place.

In the 19th-century, mutual understanding between scientists and the arts was assumed to be not only possible, but desirable. The Victorian willingness to embrace new technologies can be seen in the world's first international exposition, The Great Exhibition of 1851 and ultimately the concept of Albertopolis, (the greatest concentration of arts and science institutions in the world) as a vision for the arts and sciences integrated with society. This engagement with the disciplines of humanities and science - namely a long-term belief that together these disciplines were capable of social reform through the reform of design, notions of education through display within an international context and the belief in technology to positively influence these outcomes, has parallels with early computers arts activity in educational institutions.

In the early 1960s artists were not actively using the computer here. Throughout the 1950s and early 1960s, computers were at an early stage in their development, commonly thought of as 'number crunchers' or referred to as 'electric brains'. Not only was it difficult to access this equipment, at this stage it was difficult to perceive of the computer as being an art method or material, let alone one with capacity for interactivity. The new scientific development of cybernetics was to inform the gestation of computer arts. The term cybernetics was first used by Plato in his dialogs on The Laws and The Republic; in the early 19th-century it was used by the French physicist Ampere; in the 20th-century it was reinvented by the MIT mathematician Norbert Wiener, culminating with his book *Cybernetics, or Control and Communication in the Animal and the Machine* (1948). According to Weiner, at a basic level, cybernetics refers to "the set of problems centred about communication, control and statistical mechanics, whether in the machine or in living tissue". Cybernetics, the study of how machine, social, and biological systems behave, offered a means of constructing a framework for art production in which artists could consider new technologies and their impact on life.

In London, this is what happened with the younger members of the Institute of Contemporary Arts (ICA) - the so-called Independent Group. The Group met officially between 1952 and 1955 and included Richard Hamilton, Eduardo Paolozzi, Nigel Henderson, William Turnbull, Lawrence Alloway, Rayner Banham, John McHale and others - a cross-section of the visual arts, theory and criticism. They were interested in the implications of science, new technology and the mass media for art and society. They informed the next generation's interest, not least through their influence on advanced art educational developments in the 1960s, inspired by the Bauhaus example. They were inspired by *Scientific American*, Wiener's writings, Claude Shannon's Information Theory, von Neumann's game theory and D'Arcy Wentworth Thompson's book *On Growth and Form* (1917).

Hamilton, Banham and others of the Independent Group were involved with the exhibition *This is Tomorrow* at the Whitechapel Art Gallery in 1956. In the catalogue, these artists wrote of, "communications research [offering] a means of talking about human activities (including art and architecture) without dividing them into compartments." They cited potential tools and methods of practice. As well as the

more traditional such as, "fingers, arranged in or on hands, operated or produced by body", the authors also list "punched tape/cards arranged in or on punch card machine operated or produced by motor and input instructions". They also acknowledge Edmund C Berkeley and Giant Brains. Berkeley was president of E.C. Berkeley and Associates, actuarial consultants in Boston. His book *Giant Brains, or Machines That Think*, first published in 1949, was both a primer and manifesto, describing concepts such as binary and input/output. So we can see these young artists' belief in the power of modern technologies, even emergent ones (like punch cards) for which the exact artistic employment cannot have been fully clear. This must rank as one of the first published allusions to 'the computer' in relation to artistic practice in Britain.

In 1953, Hamilton went to teach under Lawrence Gowing, Professor of Fine Art at King's College, Durham University (at Newcastle upon Tyne). Together with Victor Pasmore**,** Hamilton set up and ran the 'Basic Design Course', building on the Bauhaus concept of an integrated method of teaching by bridging the gap between the disciplines of the life room and the rigours of basic design. (A similar Basic Course set up at Leeds College of Art by others.) This was a unique concept at this time - no more copying from plaster casts, which had dominated art education since the Royal Academy.

Roy Ascott, a student of Hamilton's and Pasmore's, was encouraged by the process-driven way of working taught on the Basic Design Course. At the time Ascott was working on relief sculpture, where the viewer is complicit with the artist in making the artwork, as seen at his 1963 exhibition at the South Molton Gallery in London. These 'change paintings', as he termed them, were inspired by Pasmore's constructivism, but incorporated an interactive element that reflected Ascott's interest in communications and interactivity. This, together with his previous experiences of working with radar in the RAF, formed his interest in cybernetics. In 1961, Ascott went to Ealing Art School as Head of Foundation Studies to create a two-year course informed by the principles of cybernetics.

Described by Gustav Metzger as "the leading art school of the day", Ascott met Harold and Bernard Cohen, who were teaching in Ealing’s fine art department and Ron Kitaj, among others. Ascott called his course the "Ground Course" - to emphasis learning from the ground up. He brought in a number of important artists and theorists, including Metzger and Gordon Pask to give lectures and demonstrations. This was a revolutionary course - there was no official 'timetable', Ascott developed a way of teaching art that was not based in the traditional 'master and apprentice' system. Instead, he made behaviour and process the model for the course, stressing interdependence, co-operation and adaptability, setting student projects using analogue devises such as calibrators for selecting human characteristics and behavioural alterations in a random but systematic manner.

Ascott's course was among the first Foundation Courses set up. Foundation courses had come about as a result of the radical reform of education in the art and design sector put forward in the First Report (1960) of the National Advisory Council on Art Education, under Sir William Coldstream, Slade Professor at University College London. The effect of the Coldstream Report was the replacement of the outdated National Diploma in Design with the New Diploma in Art & Design (DipAD), which in turn paved the way for the introduction of degree-level (BA) fine art courses.

Ascott later moved to Ipswich Civic College (from 1964 to 1967) as Head of Fine Art. His important contribution to art education can be traced through the following generation. The then sculptor Stroud Cornock met Ascott at Ipswich in 1965 and later took his influential ideas to the City of Leicester Polytechnic, where he founded 'Media Handling' in 1968. One of the main principles of this course was the belief that any medium had validity for artistic activity. This had obvious relevance for people who wanted to work with computers, and indeed, Stephen Scrivener - working on kinetic and light pieces, passed through this course as an undergraduate, before going on to the Slade School of Fine Arts in 1972, where he was the first to do computational work in the new 'Department of Experiment'.

Gustav Metzger himself was one of the first artists to actually detail the specific use of a 'computer' in relation to his practice. His 1961 manifesto declared his interest in computer controlled cybernetic systems, "The immediate objective is the creation, with the aid of computers, of works of art whose movements are programmed and include 'self-regulation'." Later, he gave a lecture at the Architectural Association (1965) with specific details about how computers can be used in sculptures to be auto-destructive. Metzger's position countered those who advocated the utopian possibilities of the coming computer age, with sobering details of its origins in military research. Metzger's "biggest project ever proposed", *Five Screens with Computer,* was too late to be included in *Cybernetic Serendipity,* but did appear in the catalogue with an illustration. Several models for this work were subsequently exhibited at *Event One* (1969). Due to the massive scale and prohibitive cost, this project is as yet unrealised. However, Metzger's ideas had a great impact on those of his peers and the younger generation (he later became the first editor of PAGE).

It is worth remembering that this early activity took place amongst Harold Wilson's 'White Heat' government. At the 1963 Labour Party Conference, Wilson promised a Britain "forged in the white heat of this revolution" with "no place for restrictive practices or for outdated methods". Post-war expansion of science funding was massive - government expenditure in 1962/3 was ten times that of 1945/6 and at least half of this outlay was on technology that had not existed before the War. Science and technology was seen as the engine of progress, a driving force for industrial innovation and economic prosperity. Wilson set up a Ministry of Technology to promote industrial efficiency and the use of new technology in industry.

The great interest in cybernetics and art in Britain during the 1960s culminated in the exhibition *Cybernetic Serendipity* at the ICA, curated by Jasia Reichardt in 1968 and opened by Tony Benn, as Minister of Technology. It is still considered to be the benchmark 'computer art' exhibition for its influence on many pioneers as well as introducing the subject to a wider audience. It is remembered for its innovation and inspiration not just by pioneers, but has become legendary amongst a younger generation as well.

The next generation of pioneers growing up in the climate of optimism around from the mid-1960s, culminating in *Cybernetic Serendipity,* started coming through the art school system in the early to mid-1970s. One of the main characteristics of British computer arts of the 1970s, was that it involved artists who either learned to programme and write code themselves or built up a working relationship with scientists, engineers or technicians, at a time when the computer itself was at a

formative stage. This was made possible largely by the creation of Polytechnics, which concentrated expensive resources into fewer, but larger multi-disciplinary centres. The first ones were designated in 1967 and many art schools were amalgamated into them. In a few institutions, at least, the result was that artists had the opportunity to access expensive and specialist computer equipment and technical expertise (generally belonging to science or maths departments) for the first time. These provided not only education and training but, in some cases, career incubation, employment, research facilities and networking opportunities. This was a unique feature of British education - as an art student, one could learn to programme. Thus, at the Polytechnic, it was theoretically possible to study art and craft (technology) together, as in the first public art schools opened in the 19th-century.

Important centres for computer arts developed in a limited number of centres. These included Leicester, Coventry and Middlesex.

At Coventry School of Art (in the process of becoming Lanchester Polytechnic), Clive Richards (then a technical illustrator) was able to work with Ron Johnson, Head of Computer Science, on an Elliott 803. Writing in Algol, he produced first a picture of an obelisk in 1969 and, in 1970, *Spinning Gazebo,* the first computer animation done in a British art school, later creating the CACTI (Computer-Aided Construction of Technical Illustrations) package. At the same time, the conceptual art group Art & Language started at Coventry involving Terry Atkinson, Michael Baldwin, Dave Bainbridge and Graham Howard – concepts based on computational methods were approached from a fine art tradition. In this way people from the two backgrounds of design and fine art were able to meet/cross in computers.

Middlesex Polytechnic incorporated Hornsey School of Art and Enfield and Hendon Colleges of Technology. In 1968, John Vince, then a programmer, was put in charge of the Honeywell computer (24-kilobit memory) and a "very rare" plotter - the Calcomp model 565. Vince developed one of the first packages for artists, PICASO (Picture Computer Algorithms Sub-routine Orientated), written in Fortran. Artists who worked with John Vince at Hornsey include Darrell Viner and Jullian Sullivan (who later went to the Slade). Later, Vince and his colleagues ran training courses for the television industry (especially the IBA and BBC), teaching designers who had never seen a computer before how to do animation in a short period of time. In 1985, with a grant from the Thatcher government, Middlesex became the National Centre for Computer Aided Art and Design under Paul Brown, a graduate of the Slade. In 1988, this was headed by John Lansdown (later to become the Lansdown Centre).

Art Schools that were not amalgamated into Polytechnics, but developed a strong presence in computer arts include the Royal College of Art (Computer Aided Design began 1967) and The Slade School. At the Slade, the Department of Experiment (later known as the Department of Experimental and Electronic Art), was set up by Malcolm Hughes, a systems artist in 1972. Hughes was instrumental, along with Chris Briscoe, (who later become Head of the Department), in acquiring computer hardware for artists to use at this early date and persuading management to fund computing for artists. Artists who passed through this department include Dominic Boreham, producing plotter drawings written in Fortran and Stephen Bell, who used the teletype machine, previewing his generated images on an oscilloscope, before

plotting on to a flatbed plotter using mapping pens and brushes. Later, in the late 1970s, a Tectronics vector graphic display with built in keyboard was acquired. The Slade department ran until 1981.

In addition, activity took place in a small number of other academic institutions. At the Institute of Computer Science (then in Gordon Square),Tony Pritchett created the *Flexipede*, in 1967 - the first computer animation in Britain, later exhibited at *Cybernetic Serendipity*. At University College London, Edward Ihnatowicz worked in the Department of Mechanical Engineering, as a researcher into robotics, building his major work the *Senster* (1971). At Imperial College, with its ties to the Royal College of Art, Kit (Colin) Emmett and Alan Kitching developed Antics animation software starting in 1971-2, using punch cards on the IBM mainframe with the results plotted on the SC4020.

In this way, the efforts in educational institutions impacted technological developments in the wider world. As the Polytechnics had the equipment and the practitioners within had the expertise, they took on commercial work for advertising agencies and clients like the BBC. As the decade continued and into the 1980s, the field started to grow commercially. Computer animation techniques in particular were in high demand with the entertainment and advertising industries. Pioneers, being trained in computer techniques, also found they had transferable skills. Some migrated from educational institutions to found commercial production houses. Digital Pictures was formed by Paul Brown and Chris Briscoe initially in partnership with the Slade, as a way of running and maintaining the computer there. System Simulation was founded in 1977 by Mallen and Lansdown, with others from the Computer Arts Society and worked on animation projects such as graphic elements within Ridley Scott's *Alien*. Although part of the service industry, such ventures were also important places of research and development while their participants continued to make art and in some cases, teach. Other pioneers were involved with artist-led initiatives and/or held down day jobs in the computing industry. In this way crucial links between the upcoming generation and the latest technological developments were created.

With thanks to all the pioneers who have so very kindly donated their time, expertise and enthusiasm to this project.

Catherine Mason is researching the cultural institutions that educated, supported, managed and funded early British computer arts, with the CACHe Project at the School of History of Art, Film and Visual Media, Birkbeck, University of London. I am grateful for support from the AHRB in funding this research.

CALL: I am mapping educational provision during this period and if you were working with computers or in a programmatic way, I would be very pleased to hear of your educational experiences - please contact me. cs.mason@hart.bbk.ac.uk