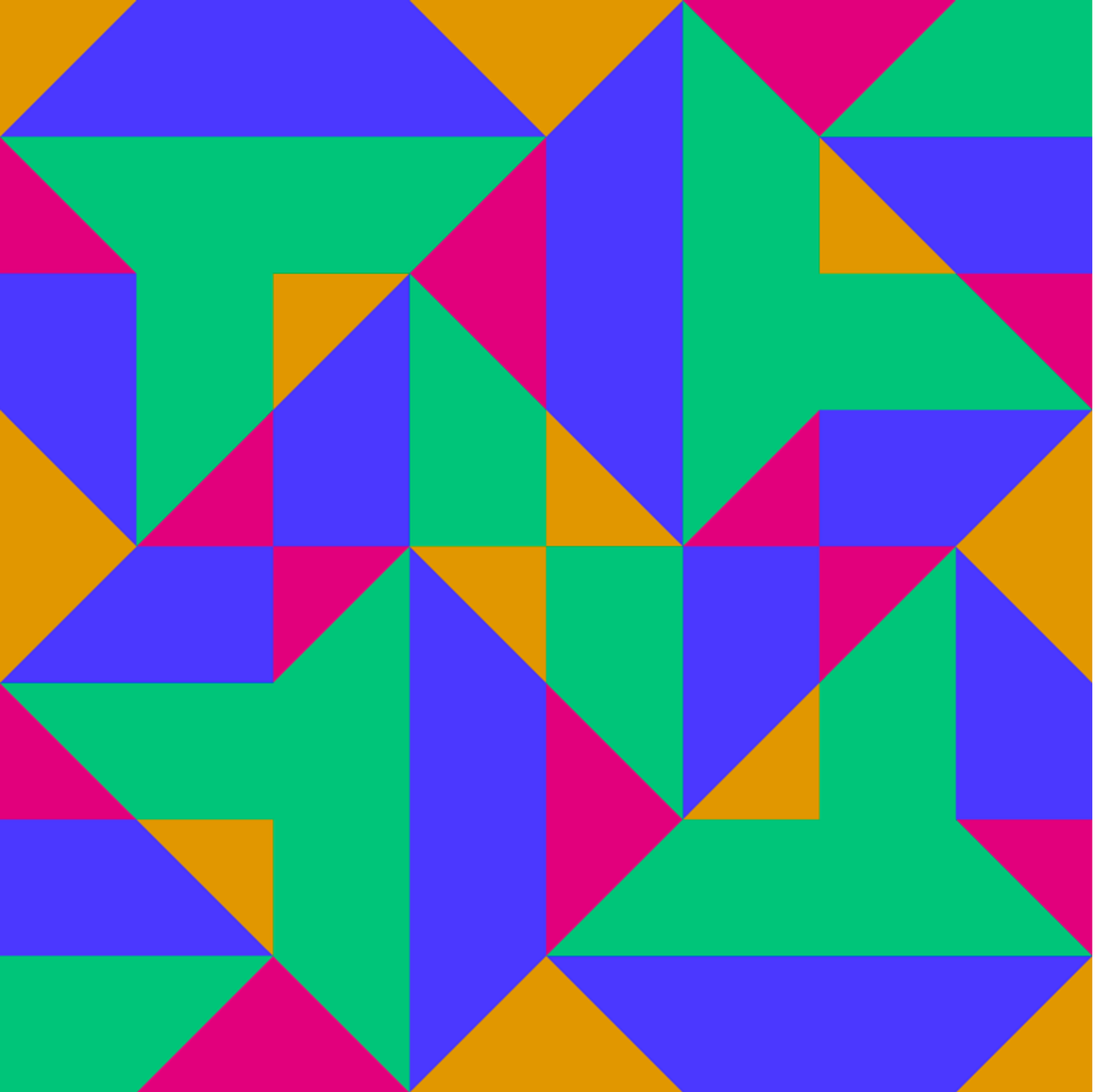
Paul Brown

Retrospective

1966–2022



COMPUTER ARTS SOCIETY

British Computer Society Specialist Group

Published in 2023 by Interact Digital Arts Ltd, Leicester.
interactdigitalarts.uk/publications

First limited edition of 50 numbered copies with 10 artist's proofs.

ISBN 978-1-9993103-4-9

Citation:
Brown, P. (Ed.). (2023). Paul Brown: Retrospective 1966–2022. Leicester: Interact Digital Arts Ltd.
ISBN 978-1-9993103-4-9

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Introduction

Sean Clark

This catalogue is part of the Computer Arts Society's 2023 exhibition of work by our long-time member Paul Brown. At the time of writing, the exhibition is on show at the BCS, Chartered Institute for IT offices in Moorgate, London and will be moving soon to the Phoenix Cinema and Art Centre in Leicester. The exhibition forms part of a new series of touring exhibitions from the Computer Arts Society that we hope will demonstrate the long and varied history of the computer arts.

It is very appropriate that the work of Paul Brown should be among the first of these exhibitions. Paul is a true pioneer in the field of computer arts and computer image-making. His career covers a period in history that has seen the computer evolve from a device the size of a room that had to be operated by experts, to something that we all carry around in our pockets and use without thinking. Likewise, the notion that a computer might be something that an artist could make use of has gone from a fringe idea to mainstream acceptance.

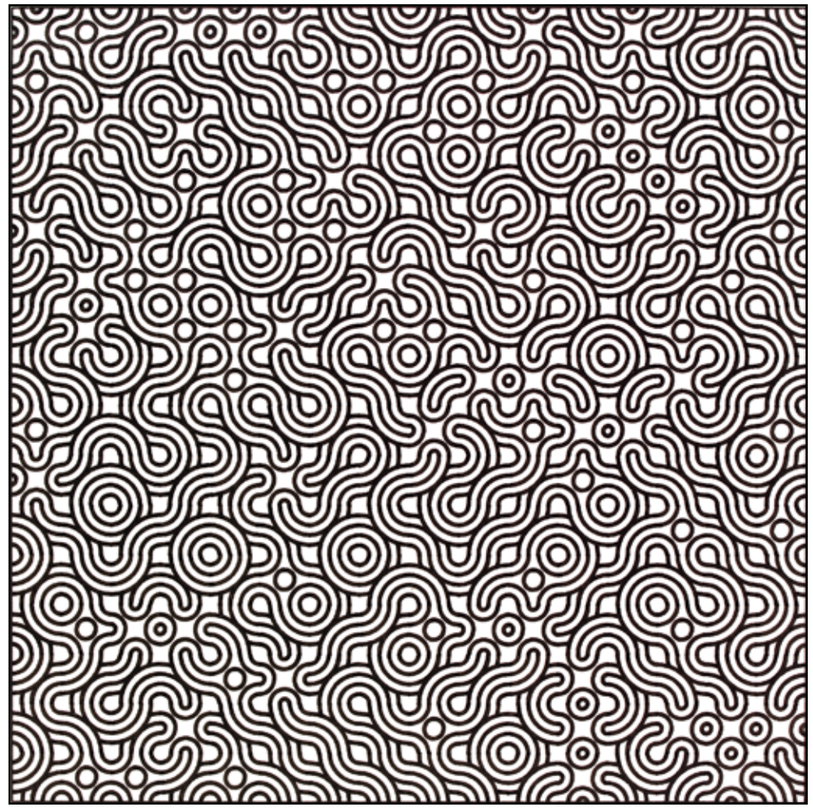
As well as navigating this fast-changing technical landscape during his career as an artist, Paul has also helped us understand what it means to make artwork with computers. He has asked important questions such as "What, if anything, is unique about computer art?" "What is the nature of the relationship between the artist and the machine?" And, the big one, "Will computers one day replace us as art-makers?"

These questions have been part of a broad discussion that has included many other pioneering CAS members, such as Harold Cohen and Ernest Edmonds, and have become increasingly relevant to wider society in recent years. As we sit in the midst of an Artificial Intelligence revolution, there is concern about where the lines between computers and humans will eventually be drawn. It is interesting to note that it is often artists, such as Paul, who are at the forefront of investigating the potential benefits and risks of new technologies.

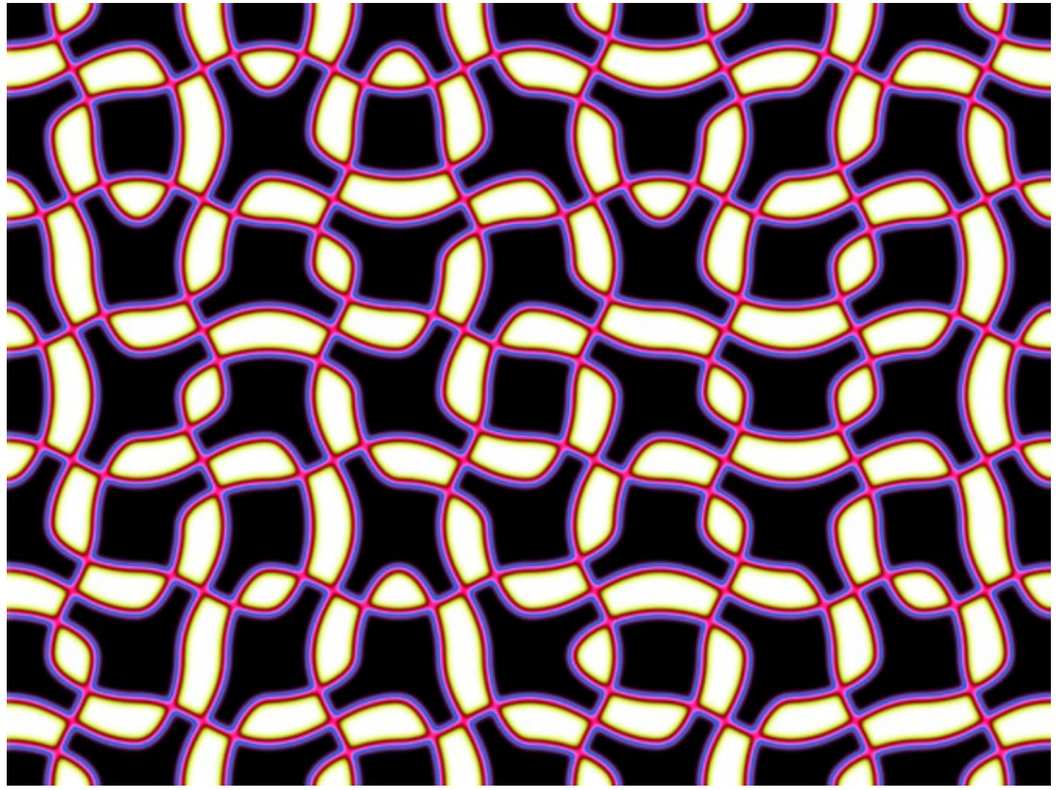
As well as the pioneering use of technology in his work, something else that is particularly significant in the art of Paul Brown is its focus. From the earliest piece in this exhibition from 1966, up to the latest from 2022, you can see that Paul's interest in permutations, combinations, repetition, grammar, colours and forms, always shines through. This clarity of vision makes Paul not just an important computer artist, but an important artist in general.

In this catalogue, you will find essays by Dr. Bronać Ferran and the artist. These offer insights into Paul's history and process. The materials gathered and prints produced for the exhibition have been deposited in the Computer Arts Archive and organisations or venues wishing to show this exhibition, or others in the series, should contact the Computer Arts Society for details.

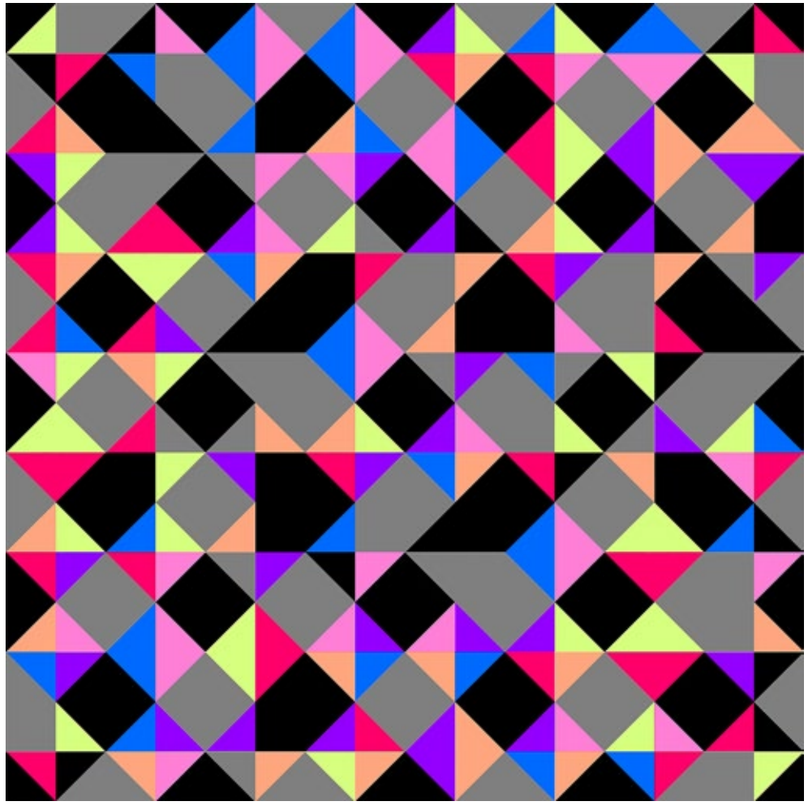
Dr Sean Clark
Computer Arts Society Chair
info@computer-arts-society.com
May 2023



(6) **Untitled Computer Assisted Drawing**
Plotter Drawing, 32 x 32 cm, 1975
Victoria & Albert Museum, Patric Prince Collection, E961-2008



(15) **Gymnasts**
Giclée Print, 1995



(19) **Amaze Amiss**
Giclée Print, 2000

Brave New Worlds

Paul Brown

We are getting closer to the dawn of artificial intelligence. Not the fumbling attempts of inference engines or learning systems but a true and robust, sentient, self-replicating and evolving non-human intelligence that will replace us as we are consumed by our own effluence. It will excel in the depths of space well away from the corrosive wetware's of Earth-bound organic intelligences. Then the AIs will go exploring, seeking new sources of energy and knowledge. For them a hundred-thousand-year voyage will be no more challenging than taking the number 38 bus a few stops to visit the supermarket to buy the week's groceries. Brave New Worlds.

When I was in my 20's I painted in oils and acrylics on canvas, card and paper. I smoked a lot of dope and hung around with other artists, poets and musicians. Then around 1971 or 2 a friend came back from Amsterdam with some very pure Sandoz LSD. "Just take half a tab" he said and so, of course, I took the whole tab. The trip was amazing – I explored my body: skin boundaries, muscles, bones, joints, veins, fluids. Then I found nerves and followed them into my spinal cord and onward to my brain – I entered my mind. I was looking at me – from the outside – and was in awe. It was like being in a vast cavern full of different frequencies and harmonics. The next morning I woke up and knew that I had to find out more about computers: I had seen the light and found my mission at last!

I learned about Symbolic Logic, Boolean Algebra, Spencer Brown's Laws of Form[1]. I practiced high-level computer languages, then low-level: assembler, machine code and micro-code (the code that drives the inner workings of the central processing unit – CPU – the computer system's holy of holy's). What I discovered at the end of all my exploring was that it's all just bits! Switches that can be open (0) or closed (1) together with a few very basic logical rules for opening and closing them like NotAND and NotOR. The internet, social media, cyberspace, the metaverse, AI, simulations of galaxies colliding, streaming TV, special movie effects, navigating a satellite to Pluto, etc… are all made possible by these switches and simple logical operations. The reason it all appears magical is because there are an inconceivable number of switches and they are being opened and closed at unimaginable speeds.

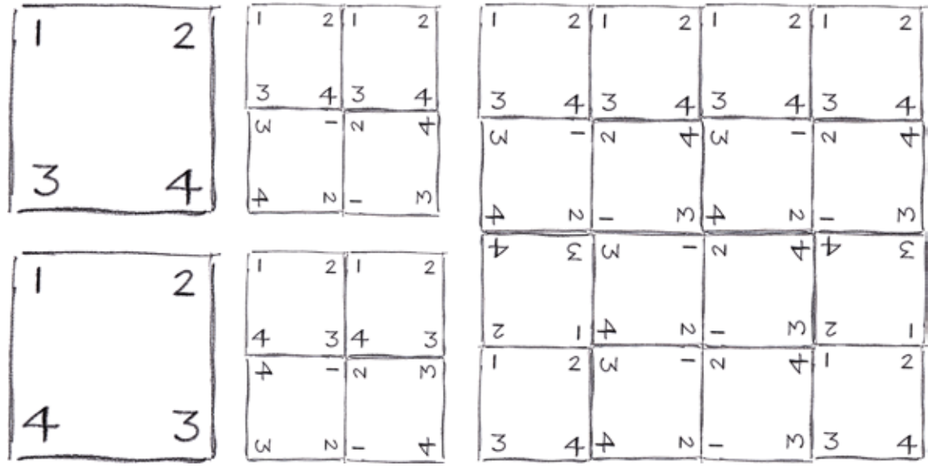
I began to build switches and logical 'gates' from transistors, capacitors and resistors. I learned how to design and build digital systems from integrated circuits or ICs. Then microprocessor chips began and the homebrew revolution that created today's industry giants like Apple and Microsoft took off. Not forgetting the USA's military industrial complex with its boundless appetite for this stuff and whose deep pockets drove rapid innovation.

And now we have a new paradigm: Quantum Computing. Hold your breath (it won't be long now)…

In 1968 I had seen Cybernetic Serendipity and recognised that digital systems were something I needed to engage with. The next year I discovered John Conway's cellular automaton (CA) The Game of Life[2] and, during the next decade began to integrate

1 Spencer-Brown, George. Laws of Form. London: Allen & Unwin, 1969.

2 Gardner, Martin. The fantastic combinations of John Conway's new solitaire game "life", Scientific American 223 (October 1970): 120-123.



(2) **Untitled Drawing**
Pencil on paper, 1967
Recreated 2015

CAs into my own work. I created generative time-based pieces that were geometric interpretations of the CA's operations (p. 9). This kind of methodology has dominated my work ever since and I've described it as The Geometric Sublime: the ability of a few simple marks and rules to engender vast universes of interest. A couple of years before I discovered Conway's Life-Game I had done a drawing (p. 7) that was, I learned later, a symbolic representation of an EXclusive OR logical operation. Looking at it I heard my own voice as an artist for the first time – an important milestone in any artist's life. It was so successful that it got me thrown out of art school because I was considered "unfit to pursue a career in the fine arts". I moved on to work in psychedelic lightshows – Nova Express with Jim MacRitchie - and then in community arts under the mentorship of the choreographer Bill Harpe who encouraged me to pursue my interest in randomness and chance as well as new media technologies like video.

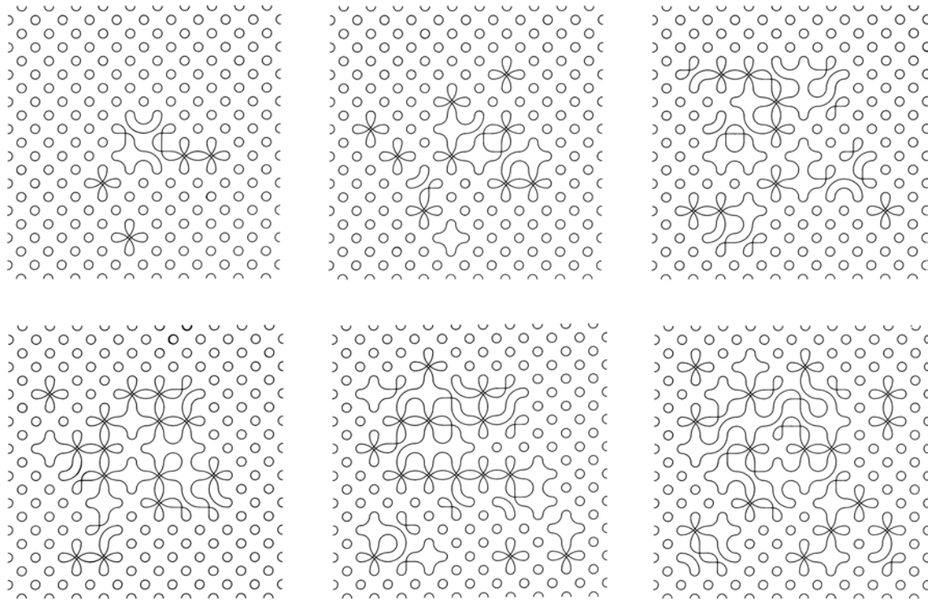
Then in 1974, after my cosmic LSD trip, I returned to college to learn about computers and their potential for the visual arts. I built real-time generative systems (p. 15, p.39) and produced lots of plotter drawings on paper. Although I first used digital systems as productivity enhancers I soon recognised they had much more to offer: they could be creative assistants. When I got to the Slade School of Art in 1977 to work for two years in the postgraduate EXPerimental & Computing Dept I met Harold Cohen, Edward Ihnatowicz, John Lansdown, Ernest Edmonds, Peter Beyls and many other pioneers of this new meta-medium[3]. It was a vibrant community and I discovered AI and began to work on the kind of generative systems that would, a decade later, be named Artificial Life or A-Life by Chris Langton[4]. At EXP we didn't like to anthropomorphise our work and wouldn't have selected a name like A-life. We considered ourselves system and conceptual artists, continuing the traditions of Constructivism, De Stijl and, especially, Art Concret: a self-referential art that investigated its own formal internal processes and mechanisms.

This exhibition spans 56 years of my career – from 1966 to 2022. The first work (p. 12), painted when I was just 19, was also my first exhibited artwork and was included in the 1967 Northern Young Contemporaries at the Whitworth Gallery in Manchester. It consisted of 11 identical hexagonal fibreglass tiles that could be bolted together in a variety of different arrangements. Although it was a relatively naive piece it introduced a methodology that would inform my future career. Then in 1967 I did the drawing that pointed me to my future and changed my life as described above (p. 7). I was reading Anton Ehrensweig's Hidden Order of Art where he discusses the role of subconscious processing in creative activity[5]. He suggests that connections between previously unrelated or divergent notions are built during a subconscious experience that Freud called The Oceanic and are subsequently reified and brought into consciousness as new artworks or cognitive concepts. This corresponded to my limited experience as an artist and, when I finished reading it, I contemplated an 'experiment' to examine his theories and decided to produce a random image to see if the

3 Kay, Alan. Computer Software, Scientific American 251, 3, (September 1984): 52-59.

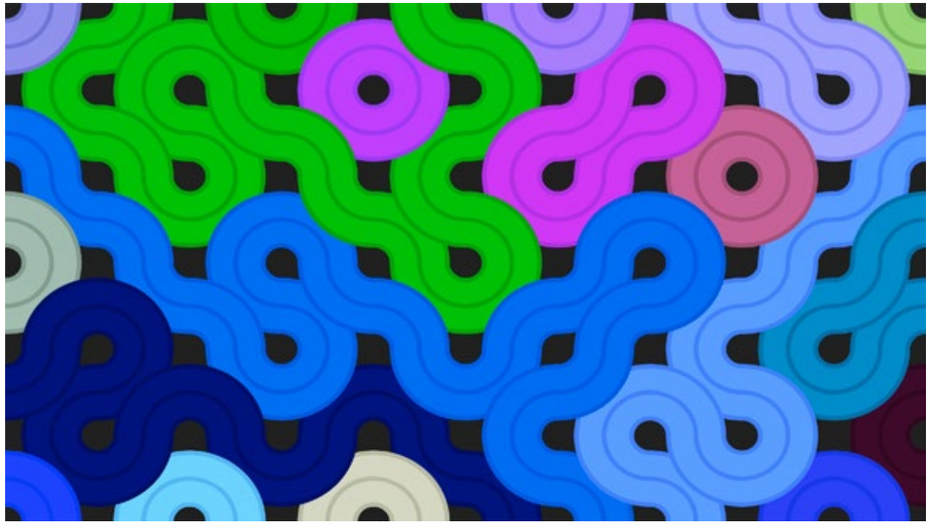
4 Langton, Chris. Artificial Life – An Overview, MIT Press, 1997

5 Ehrensweig, Anton. The Hidden Order of Art - a Study in the Psychology of Artistic Imagination, Weidenfeld & Nicolson, 1967.



(8) LifeMods
Six Sequential Plotter Drawings 1977

(28) **Dragon**
Kinetic Painting: Realtime Computational & Generative Artwork, 2012
Java App, made with Processing



(29) **Four Dragons**
Kinetic Painting: Realtime Computational & Generative Artwork, 2012
Java App, made with Processing

same subconscious processing might apply (p.19). It's an octagonal tile with four rotations. I didn't have a dice to hand so flicked though the corner page numbers of Hidden Order and rotated the tile according to the number selected. The resulting image attracted and held my attention and became another important milestone in my early career.

I became obsessed with the idea of using collections of simple entities to create more complex constructions. My maxim was "the whole is greater than the sum of its parts" then later, a lot later, I discovered terms like emergence. My father bought me a large drawing table with an articulated drafting head. I invented simple geometric rules then threw a dice to direct me what to do next. These drawings would take weeks to finish and were often not of interest and discarded. Some were reinterpreted as colour studies (p. 21, p. 23). I showed a portfolio of my work to some friends, the artist Fanchon Fröhlich and Herbert, her physicist partner. They encouraged me to return to college to study computing.

In her book A Computer In The Art Room Catherine Mason describes how the amalgamation of small urban colleges, of art, engineering, fashion & textiles, printing, etc., to form the UK's Polytechnics, created opportunities for artists to get involved in computing and digital processing.[6] I enrolled in the art school at Liverpool Poly (now John Moore's University) and spent three years working between Maths, that had an ICL 1904A mainframe, Engineering with its DEC PDP8 minicomputer and digital fabrication lab, and Sculpture. Once I mastered the languages (FORTRAN and PAL-III Assembler) and media – punched cards, paper tape and the PDP8 front switches – I began to produce plotter drawings that automated my previous work.

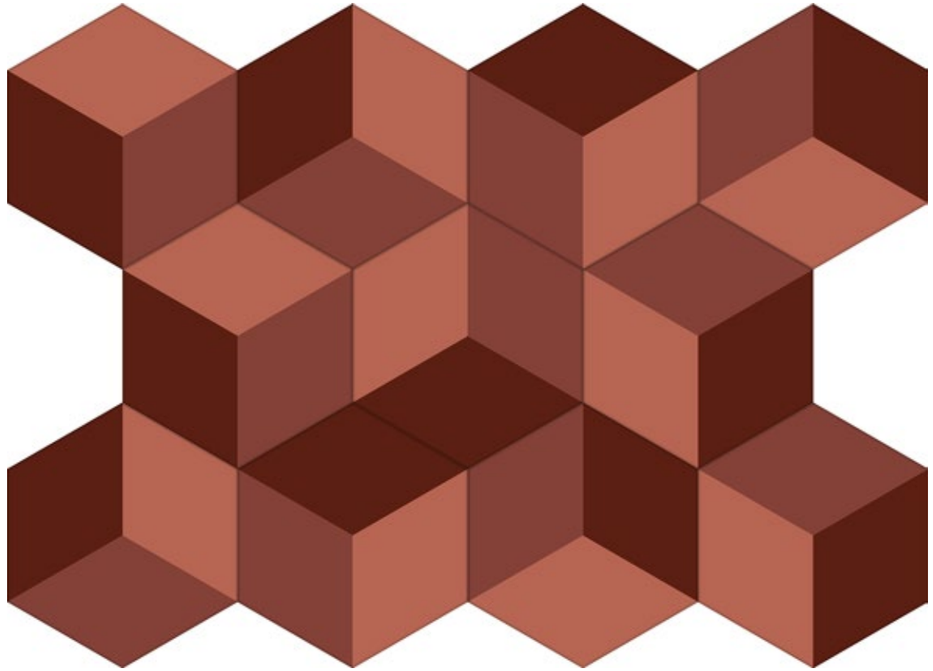
One has become my most reproduced artwork thanks to its acquisition by the Victoria & Albert Museum as part of the Patric Prince Collection (p. 3). I won a competition to design and build The North West Export Award for the Confederation of British Industry and, with their assistance was able to spend time with many of their members' companies to design and build the artwork (p. 15). It was my first real-time generative artwork and possibly one of the first in the world. It is described in the Computer Arts Society's bulletin PAGE[7].

Back then there was no decent colour output and I produced a number of large-scale canvases by planning the work using a program which defined the geometry and colour using Munsell classifications. I then converted these by hand onto canvas using the Liquitex Munsell range of acrylic paints (p. 22, p. 33).

David Saunders, co-founder of the UK's System Group, was one of my tutors at Liverpool and he encouraged me to apply to the Slade School of Art's new postgraduate EXP department which had been founded by another System's member – Malcolm Hughes. It had its own dedicated Nova 2 Minicomputer (p. 31) – a powerful bit-slice system with 16K of 16-bit word magnetic core memory. Having hands-on access to a computer system for several hours each week allowed me to experiment more than had been possible using the punch-card, batch processing, 24-hour turn-around back in Liverpool. Also University

6 Mason, Catherine. A Computer In The Art Room, JJG Publishing, 2008.

7 Brown, Paul. The CBI North West Export Award, PAGE 62 – the bulletin of the Computer Arts Society, Autumn, 2005.



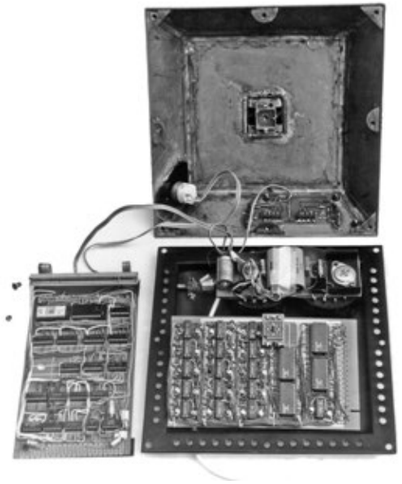
(1) **Untitled Reconfigurable Painting**
Acrylic on fibreglass, 11 sections each 44.5 x 50 cm, 1966
Recreated 2016

College London – UCL – where the Slade is based, had fast terminal access to their mainframes as well as to the University of London supercomputers that, as postgraduates, we could also use. We were close to Annely Juda's Gallery in Tottenham Mews where she was showing the Russian Constructivists as well as the European systems artists. And, just around the corner on Tottenham Court Road, was Proop's Bros. war-surplus electronics shop – a wonderland of stuff.

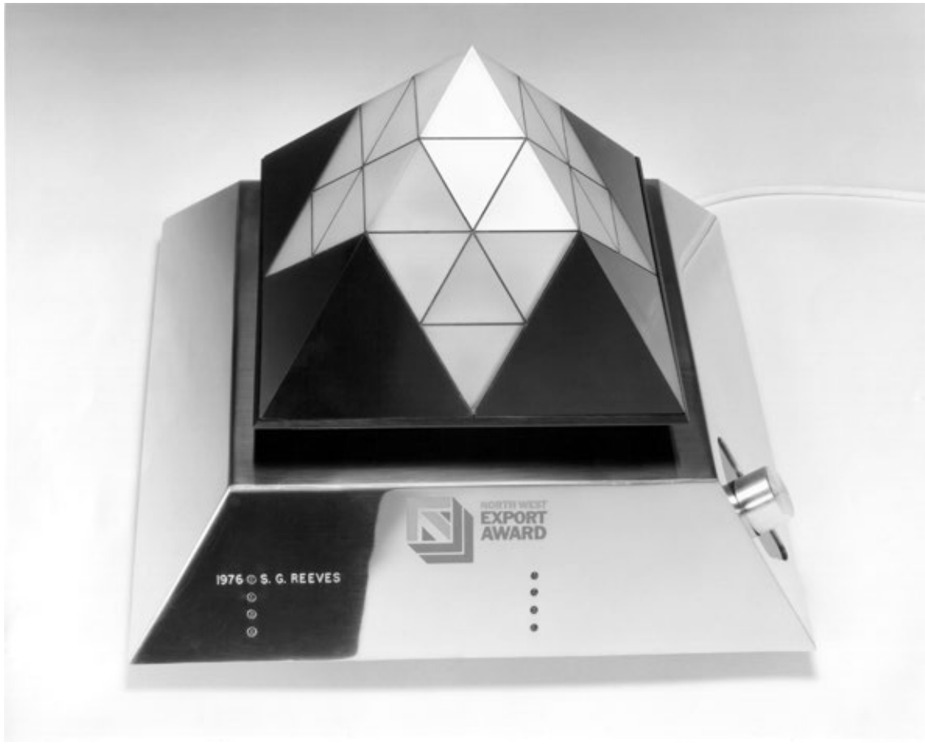
At the Slade I consolidated my methodology for using cellular automata to control symmetrical tiles in a time-based environment. The first successful output was a series of sequential drawings produced using a CA based on Conway's 'Life' (p. 9). Julian Sullivan had developed a frame-store for the Nova: it was 96 x 96 pixels at 1-bit black and white. Now that today's screens are up to 8K resolution – 7680 × 4320 pixels in full colour – it's hard to imagine my excitement at having access to such a low-res but real-time display. My work Builder/Eater was developed for it and, with the assistance of Chris Briscoe – who ran the computing programme, it took me about three months to get working. Jim Boulton commissioned me to build a facsimile for his Digital Archaeology section of the Barbican's Digital Revolution show in 2014. It took me about two weeks to complete using Processing on a Raspberry Pi (p. 39). Two concurrent processes compete for possession of the screen. They are both random walks where one – the Builder – turns pixels on and the other – the Eater – turns them off.

The I Ching or Book of Changes has had a major influence on my artistic practice since the 1960s.[8] It's an ancient Chinese oracular cosmology where the two binary principles – Yang and Yin – permutate to form eight 3-bit 'words' or Trigrams and these pair with each other to form the 64 Hexagrams or 'architypes'. These can mutate into any of the others which give the 4096 changes to which the title of the book refers. The expansion is binary: 2, 2x2x2, 8x8, 64x64. It's also an interactive generative system with emergent properties and a lot of my work echoes its structure (p. 29, p. 17). I also worked with 3-dimensional CAs, but was limited by the small memory of the Nova to 16 x 16 x 16 matrices (p. 16).

After leaving the Slade in 1979 I worked in industry writing the code for the first graphic design workstation – The Aesthedes – for Claessens BV in the Netherlands before setting up the UK's first dedicated

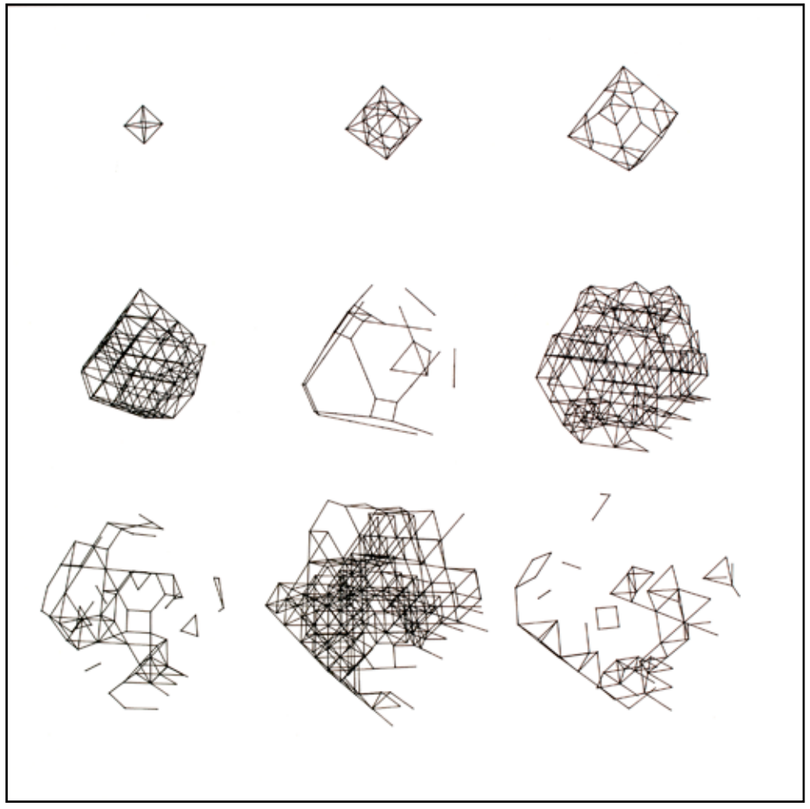


8 Wilhelm, Richard (Trans.). The I Ching or Book of Changes, Routledge & Kegan Paul, 1951

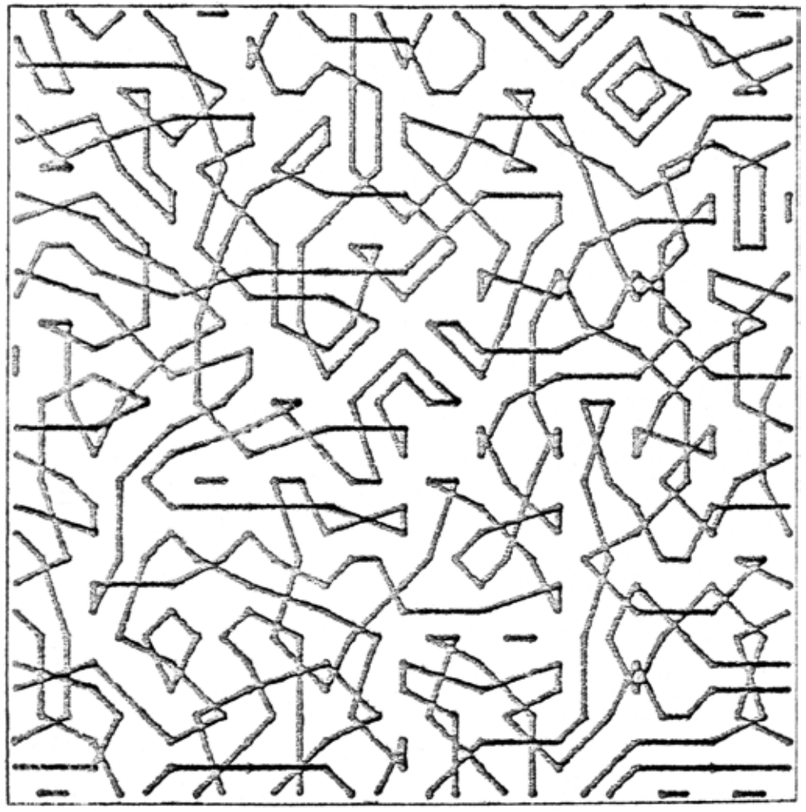


< Internal Electronics, Detail

(7) **CBI North West Export Award**
Stainless Steel, Perspex, Electronics, 25 x 20 x 25 cm, 1977
Commissioned by the Confederation of British Industry



(10) **BIGDIM / 0 10 10 0 0 0 0 200, 120 / 11, 969**
Plotter Drawing, 1979
Victoria & Albert Museum, Computer Arts Society Collection, E132-2008



(11) **Circus**
Photocopied Plotter Drawing, 1979

Computer Special FX company – Digital Pictures – with Chris Briscoe. In 1984 I went back into academia to establish the UK's National Centre for Computer Aided Art and Design at Middlesex Poly where we also created one of the UK's first masters programmes in the computational arts – the MA Computing in Design. By 1990 I was surfacing from a ten-year period spent in entrepreneurial activity that had drained all my time. I began to pick up the threads I had abandoned a decade earlier. High resolution laser printing had arrived, first in monochrome (back cover), then in colour (p.20). Then in 1992 I got access to an Iris 3024 – a high quality ink jet printer made for the pre-press industry. For much of the 1990's I produced prints. They were single-frames of generative works and used the same process as my earlier pieces however using Mac laptop computers with their colour screens I could post-process the monochrome vector skeletons using image processing software apps like Adobe's Photoshop. (p. 36, p. 4, p. 5, p. 35)

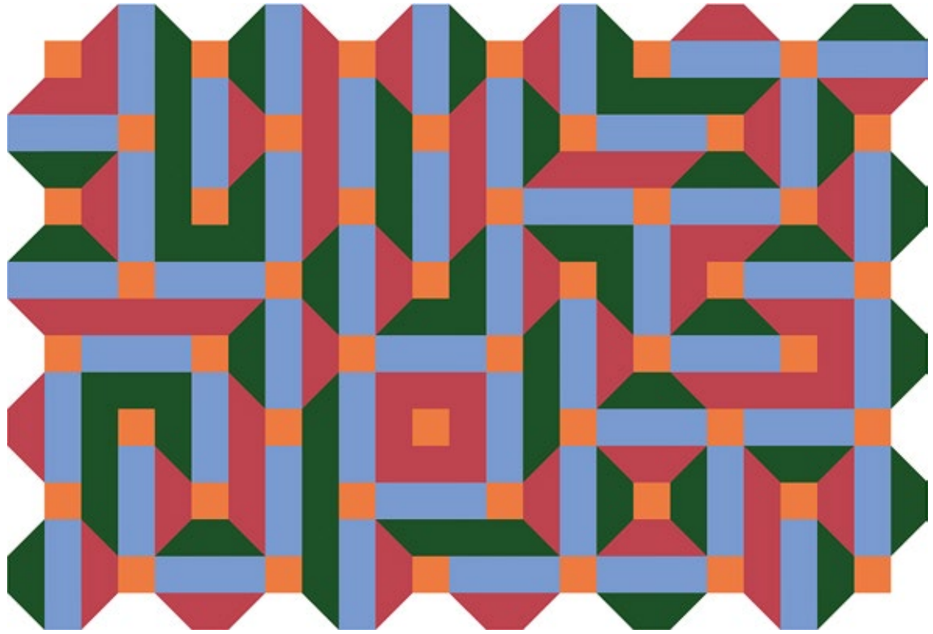
MacroMind, later MacroMedia, introduced Director in 1990 with its own embedded object-oriented graphics language – Lingo. It ran on my Mac laptop and in 1992 I began to use it to create real-time, time-based generative works at VGA resolution (640 x 480 pixels) (p. 41). My laptop wasn't powerful enough to do all the processing on the fly so I had to precompile large databases of sprites that the lingo program could pull up in sequence according to the generative rules then play them back, like a grid of small flipbooks. I liked the sprites themselves and produced a series of prints, books and postcards using them. (p. 37, p. 38).

I met Casey Rees at the Third Iteration Conference in Melbourne in 2005 where I chaired their Art Show. He ran a workshop on Processing – the Integrated Development Environment for Java that he had begun in 2001 with Ben Fry. I began to use Processing to develop my generative works and with the new, more powerful MacBook systems the artworks could be resolution independent (up to 8K these days) and could all be computed in real-time – no need for sprite flipping. (p. 25, p. 10, p. 11) I borrowed the term Kinetic Painting to describe these works. I'd heard it used by Frank Malina to describe his kinetic, electro-mechanical lightboxes but his son Roger told me Frank had borrowed it from Nicolas Schöffer, the Hungarian pioneer of cybernetic art.

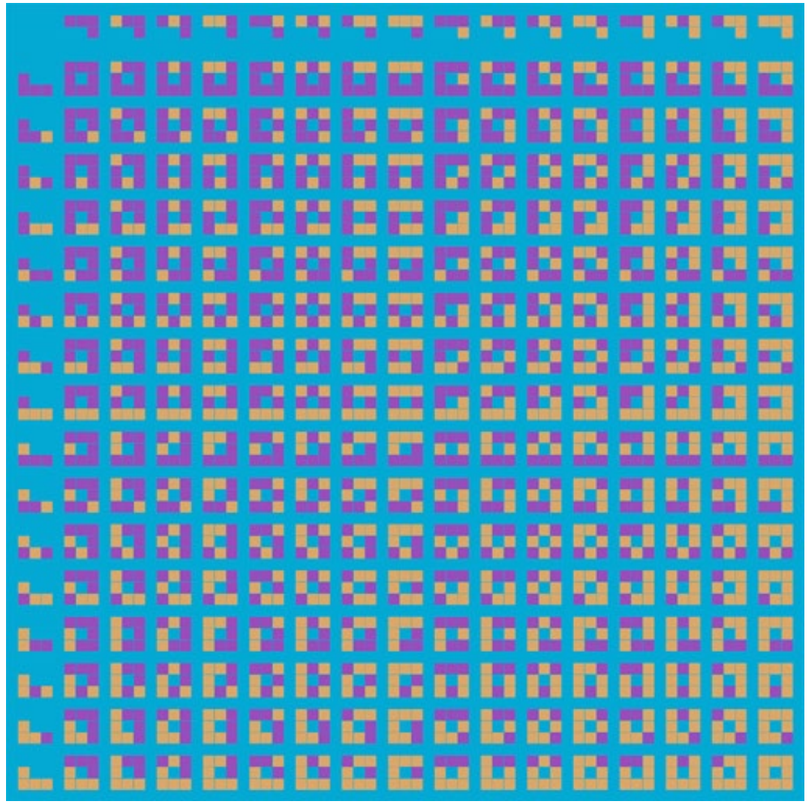
These works begin with simple geometry – hence The Geometric Sublime – and, like the sprites I had previously employed, these rudimentary diagrams inspired me. When employed in generative works they often operate like formal grammars and this insight led to a number of books and prints (p.27, 34, p. 38) which compose my most recent work.

Like many late modernist artists, and in particular Charles Biederman, I believe that the creation and appreciation of art is concerned with visual cognition and that this is pre-linguistic.[9] This sets me apart from the postmodernists who believe all higher-level thinking is based in language. We can analyse phenomena, form concepts, manipulate them and derive conclusions entirely in the visual domain. Only later do we need language to reify our perception and consolidate it in consciousness. Our concept of the subconscious may well consist of these pre-linguistic cognitive processes. Vision is pre-processing and is fast, language is post-processing and is slow. It's probable that early hominids evolved the former before they developed linguistic skills and this now remains as a foundational element of our consciousness.

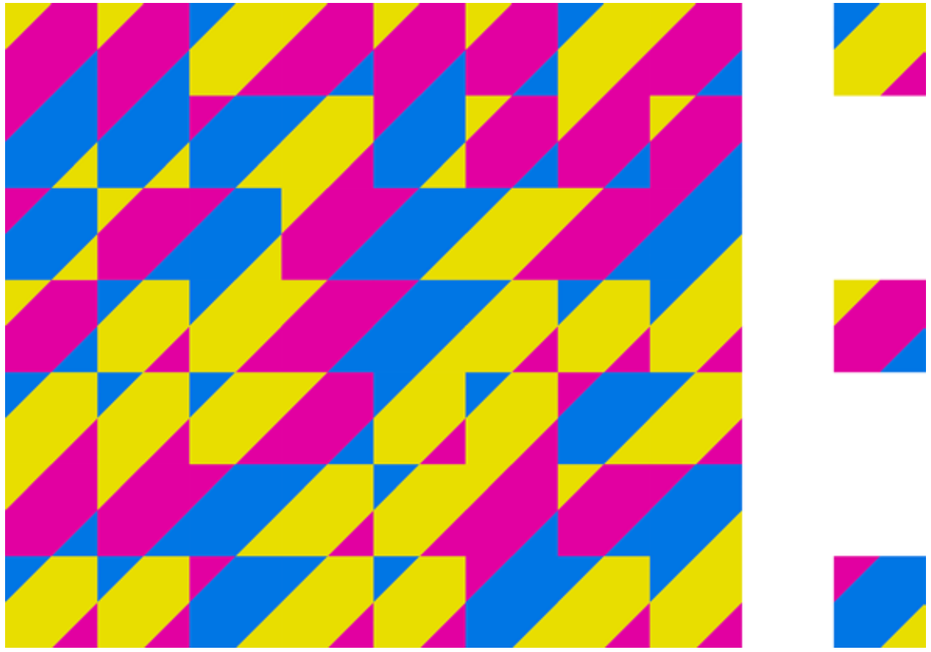
9 Biederman, Charles. Art As The Evolution of Human Knowledge, Red Wing Press, 1948.



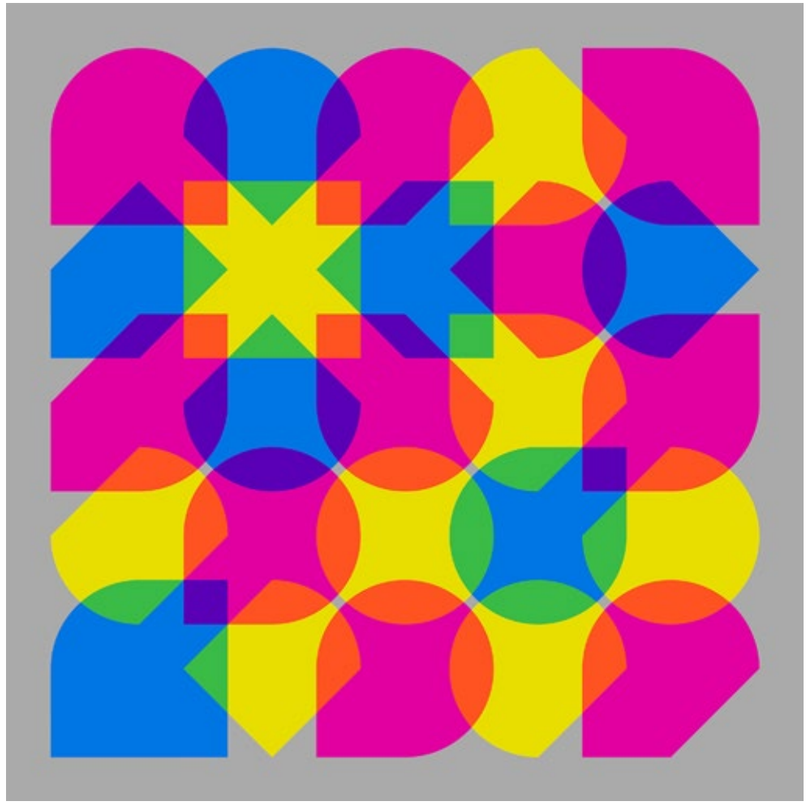
(3) **Untitled Gouache**
Gouache on Paper, 1968
Recreated 2016



(13) **Neighbourhood Count**
Laserprint, 1991
Recreated 2014



(4) **Untitled Gouache**
Gouache on Paper, 1974
Recreated 2016



(31) **Untitled Painting**
Acrylic on cotton, 1977
Collection E. St John, London

(5) **Untitled Painting**
Acrylic on paper, 1975

First Gen. Generative:
Paul Brown's Art Of Code, Colour, Light And Movement

Bronać Ferran

Now when the concept of generative art is no longer culturally marginalised and when the idea of artificial intelligence and artificial life has become a topic of mainstream discourse, how might we pay tribute to living figures, such as the Halifax-born artist Paul Brown, who pointed the way towards our contemporary scenario almost six decades ago? Brown is a primary representative of the First Gen. of Generative Artists, who were working at the experimentalist edges of artistic practices of the 1960s and 1970s, getting started when the terminology of computer art and media-based practices was only being invented. They took pioneering steps for others to follow, yet recognition of this lineage among contemporary artists, who have been flocking to adopt the generative nomenclature in recent years, sometimes tends to be meagre.

What this brief essay posits is the value of knowing that history. In so doing, we might recognise more fully the broader sphere of experimentation that formed the cultural, social and technological milieu in which early computational practices first developed. This is embodied within Brown's practice and in his sense from the outset of being active within a community that differed significantly in ethos from the capitalistic, profit-making agenda that distinguishes the narrative now associated with the highly hyped domains of crypto-art, non-fungible tokens and Web3 practices.

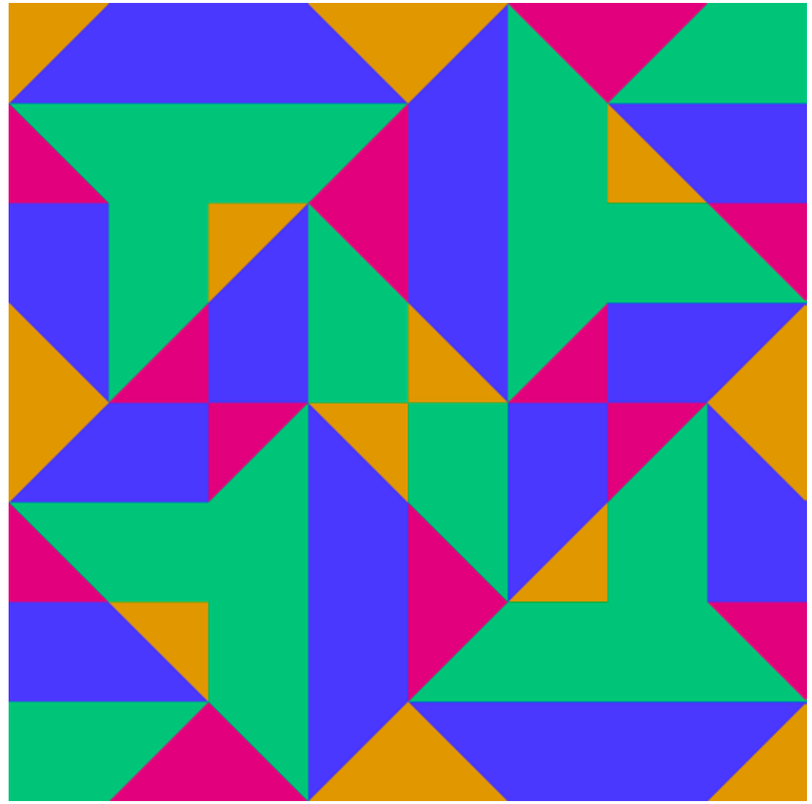
As this exhibition also shows us, Brown, from the 1970s onwards, used computational skills, tools and processes to draw lines of speculative connection across from the concept of the work of art to the simultaneously growing domain of cellular automata. What he produced, as we see in this exhibition, were works that seem to exist in an auto-productive state of becoming, as if evolving in a non-linear fashion from the fashioning of ones and zeroes within the act of computer coding.

For media historian, Grant D. Taylor, meanwhile, what characterised Paul Brown's works in particular over decades was the combining of "simple geometric shapes and linear patterns" with biomorphic and curvilinear forms. Taylor has described Brown, moreover, as "one of the first digital artists to theorize the natural alignment between the idea of generative programming and biological growth".[1]

In a lecture in 2020, the world-leading cognitive linguist, Noam Chomsky, spoke of his conviction that language formation in human brains is a non-linear binary set process, with the transference from the neurological level to the manifestation in the material world, often involving degrees of linear interference, not least in traditional modes of writing, such as this text for example. Indeed, for Chomsky, the use of visual signs can be a way in which the non-linear nature of language formation may be made manifest.[2] This seems to me to have potential pertinence to Brown's elaboration in this catalogue of his commitment to the notion of a visual, nonverbal mode of expression that works of art, such as he has been producing for decades, encapsulate.

1 Grant D. Taylor, "The Family Code: Art and Life", Art That Makes Itself, Brown & Son: Purveyors of Digital Images Since 1968, ed. Bronać Ferran, (London: Daniel & Paul Brown, Watermans Arts Centre, 2016), pp. 36-47 (p. 43, p. 45).

2 I am paraphrasing Noam Chomsky's lecture entitled 'The Delphic Oracle: Her Message for Today,' published by Abralin, a Brazilian organization promoting the scientific study of language, in 2020, available at: <https://www.youtube.com/watch?v=SO3tE7clWhI>; [accessed 1.4.2021]. I am summarizing points that Chomsky made between thirty and forty five minutes into the lecture.



(27) **4^16**
Kinetic Painting: Realtime Computational & Generative Artwork, 2006
Java App, made with Processing

Moreover, Brown's development as an artist coincided precisely with a point of post-war cultural transition in which the language of form, expanded by constructivist and concrete artists in multi-planar directions was permeated by processes of non-linear movement that changing technological systems helped to facilitate. Chomsky, meanwhile, in his *Syntactic Structure*s, (1957), had differentiated between "some formalized system of mathematics" that he noted may "be considered a language" and natural languages (those that humans speak or write).[3] He proposed a "generative grammar" that involved a system of "rules" that have been explained as follows: "in order for a theory of language to be productive […] at least some of its principles or rules must be recursive" meaning that "it can be applied to its own output an indefinite number of times, yielding a total output that is potentially infinite". For Chomsky such principles were "transformational in the sense that they account for the syntactic and semantic properties of sentences by means of modifications of the structure of a phrase in the course of its generation".[4]

His ideas had a significant influence on others, including the Stuttgart-based philosopher and scientist, Max Bense. In February 1965, in the world's first text about computer graphics as art, Bense drew an analogy with Chomsky's generative grammar in introducing the related concept of "a generative aesthetics" in describing what occurred when a Siemens employee, Georg Nees, devised a program to create random computer plotter drawings. Bense suggested that Chomsky's generative grammar could be viewed as analogous to modes of art making made using computer algorithms.[5]

Both Bense and Chomsky had also assimilated the preceding semiotic theories of Charles Sanders Peirce, whose ideas of theories of signs in turn absorbed the recombinant and relational logic of George Boole's concepts of binary encoding from the late 1840s. This in turn built on the calculus of Gottfried Leibniz, who was in turn inspired by the Chinese *I-Ching*, although Leibniz's Western promulgation of a rational calculus arguably simplified the complex cosmology of the Eastern system.

From his youthful outset as an artist, Brown intuitively and independently tapped into this formative lineage. He has described a defining moment in his own developmental trajectory when, in 1967, the head of year at the School of Art in Manchester "gently and kindly" told Brown that "maybe" he "wasn't cut out for a career as an artist".[6] However, what Brown had produced for the annual critique of student work was what we would now immediately recognise as a programmatic drawing, or a conceptual schema, to be activated in the production of a system-based arts practice. But it was simply *too* different, *too* notational and *too* semiotic to be comprehended as such by those

3 Noam Chomsky, Syntactic Structures, (The Hague, Paris: Mouton, 1957, this version 1972), p. 13.

4 This is adapted from Noam Chomsky, 'Rule Systems in Chomskyan Generative Grammar' at the Encyclopedia Britannica site, at https://www.britannica.com/biography/Noam-Chomsky/Rule-systems-in-Chomskyan-theories-of-language; [accessed 12.3.2022].

5 Max Bense, "projekte generativer ästhetik" [project of generative aesthetics], originally published in rot 19 (February 1965), eds. Max Bense and Elisabeth Walther, np., (author trans.), Bense stated: "Generative aesthetics is therefore an analogue of generative grammar (Chomsky) in that it is, like these, sets of a grammatical scheme and provides realizations of an aesthetic structure".

6 Paul Brown, "From Building Blocks to Building Code", Art That Makes Itself, pp. 12-21 (p. 12).

(18) **The New Grammar**
Giclée Print, 2008

schooled in conventional painting.

Brown's willingness to seemingly remove traces of the artist's hand and selective agency in the making of visual signs, in which he used both rational and randomness processes, was a forerunner nonetheless of many trends in our contemporary digital culture. This included his radical willingness, as Taylor has also observed, to afford agency to machine-based processes.

Indeed, as Brown has described, this event and his subsequent dropout from this course, led him in a direction in which he in a sense found his calling. On visiting Jasia Reichardt's seminal *Cybernetic Serendipity* exhibition at the ICA in London in 1968, Brown then realised, as he has put it, "my weird ideas had found their medium […] I realised that the kind of stuff I really wanted to do could be done using digital machines".[7] As Brown has elaborated, during the same period he "experimented with light shows, film, video, multi-media performance and more".[8] Although typically here self-effacing, Brown formed part of the Nova Express *Lightshow* that made works for major musicians and performers of the period, including Canned Heat, Meredith Monk, The Nice, The Who and Pink Floyd.

His experimentation soon after included trying out some 'LSD', a drug made illegal in Britain in 1966. It produced the experience that he describes in this catalogue (p. 6) as follows: "The trip was amazing – I explored my body: skin boundaries, muscles, bones, joints, veins, fluids. Then I found nerves and followed them into my spinal cord and onward to my brain – I entered my mind. I was looking at me – from the outside – and was in awe. It was like being in a vast cavern full of different frequencies and harmonics. The next morning I woke up and knew that I had to find out more about computers: I had […] found my mission at last!"

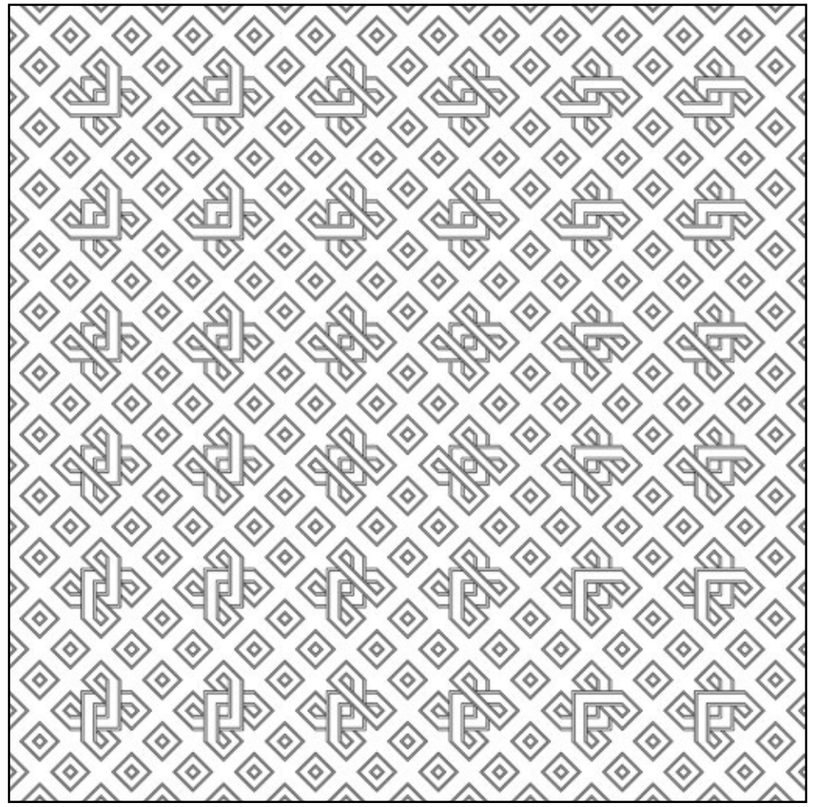
Unlike older, visionary artists such as Mark Boyle and Gustav Metzger, who became known also for their contribution to live light shows (and, in the case of Metzger, stunning light crystal based immersive installations in the 1960s), Brown was younger and keen to go beyond projections, to actually learning to programme computers. What Brown subsequently achieved may be perceived as a speculative mode of interrogation of binary computational modalities by the psychic structures of mind. What he produced over the next few decades gave form in code to aspects of the flowing, improvisatory, moving and time-based aspects of the performance events in which he had participated as well as to the widening of consciousness that he experienced as a young artist. The combination produced a hypnotic morphing of whorls and loops and knots, where Brown effectively blends and combines a mathematical and psychedelic approach to the visual language of form, creating geometric arabesques and light-filled choreographies.

This too seems to me to have been fruitfully infused by the experiences he had earlier, where ahead of getting his hands on a computer, he was very much part of the alternative art scene within then 'happening' Britain, "street-selling underground magazines" and "managing a basement coffee bar" that they called "the Arts Lab" in Manchester.[9] Soon after he began living at one of the most important locations in the history

7 Paul Brown, "From Building Blocks to Building Code", p. 13.

8 "Art That Makes Itself and other generative beginnings: Paul Brown interviewed by Bronač Ferran", Interdisciplinary Science Reviews, 2017, Vol. 42, Nos. 1-2, 2-3, pp. 158-168, (pp. 163-164).

9 "Art That Makes Itself and other generative beginnings", p. 164.



(9) 36 Knots for Fu Hsi
Plotter Drawing 1979, Recreated 2009
Victoria & Albert Museum, E169-2010

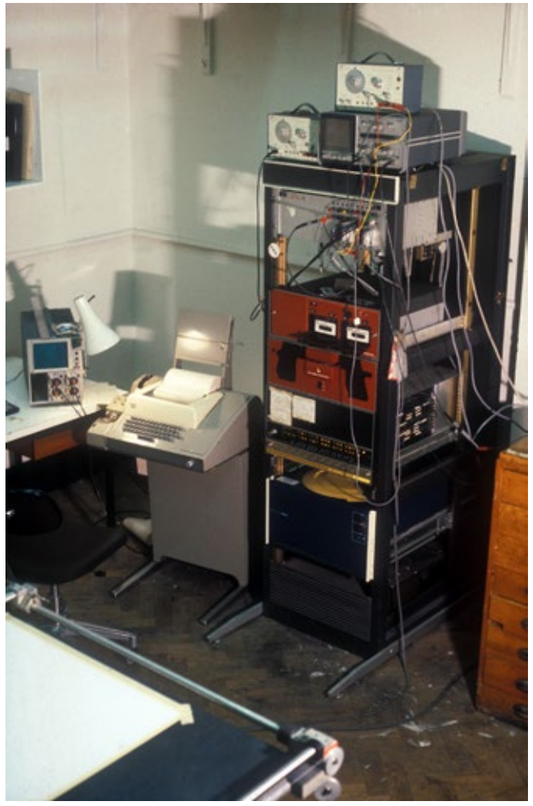
of community arts in the United Kingdom, the Blackie Project in Liverpool. He was also at the time a new husband and father and so grappling with the realities of life in Britain in the relatively austere 1970s. In 1974 he returned to art school, this time in Liverpool, where the art school had recently become a polytechnic, meaning that students in fine art were able to visit the engineering and maths departments, facilitating Brown's interest in forging such a line of connection.

The establishment of a Computer Arts Society in Britain [CAS] in 1968, with a regular newsletter entitled PAGE (with Metzger its inaugural editor), brought interested people together internationally, to share ideas, information about events, project outlines and views on what the concept of computer arts might mean. Against what became a high degree of resistance to such practices among aspects of the arts establishment, a sense of strong mutual cooperation took hold among the foundational figures in CAS, among whom was John Lansdown, an architect, whose offices in in Bloomsbury in central London provided a basis for many early CAS gatherings. It was around the corner from the Slade School of Art, at University College London, a leading London art college where from 1973, the Head of the Post-graduate School, Malcolm Hughes, created an Experimental Department, that later changed its name to the Experimental and Computing Department or EXP for short. Brown became a student at this course from 1977-1979. This formed a further pivotal phase of his professional development.

Once again he extended his community of practice in meeting other individuals who shared a growing passion and preoccupation with the development of systems-based practices, such as his student peers, the late Dominic Boreham, as well as Stephen Bell, who was, like Brown, an artist who brought a wider art school imaginary into this context of early computer art development. The students in turn benefited from successful efforts made by Hughes and a systems artist, Chris Briscoe, earlier in the decade to secure the purchase by UCL of "an inhouse computer system". As Brown has written, this was "exceptionally primitive" compared "to a modern computer", with no operating system when it arrived.[10] However it provided the basis for other technical progressions and solutions to be added, all of which fed into the sense of an adventure in a wholly new cultural direction that brought with it inevitably an accelerated recognition that what was being developed had radical interdisciplinary implications. As Brown has also reflected, what excited him (and several of his peers) most when they were studying at the Slade was finding out about "new ideas emerging from science and mathematics – chaos theory, iteration, emergence, fractals" that formed part of what became known as systems theory in the early sixties and led directly soon after to the creation of new interdisciplinary domains such as 'A-Life' or artificial life soon after. Embedded within these domains and their theorisation was the idea of network theory, as a field that privileged again the rational and the relational, the calculated and the emergent, the design and the randomness.

Working also at UCL in this period, but in the

10 Paul Brown, "From Systems Art to Artificial Life: Early Generative Art at the Slade School of Fine Art", White Heat Cold Logic: British Computer Art 1960-1980, eds. P. Brown, C. Gere, N. Lambert and C. Mason (Cambridge, Mass, London: MIT Press, 2008), pp. 275-289 (p. 278).



(30) **The Slade *Data General Nova 2* Computer System**
Around 1978

Mechanical Engineering department, was Edward Ihnatowicz, who became for Brown a key figurehead of what might potentially be achieved by means of "bottom up learning systems […] what's since became known as 'artificial life'". The second important figurehead for Brown during this next phase of his own professional incubation was the luminary, Harold Cohen, an artist and educator at Ealing School of Art as well as Chelsea College of Art earlier in the 1960s, who represented Britain, along with his brother, the constructivist artist, Bernard Cohen, at the 1966 Venice Biennale. Although Harold Cohen moved to work in San Diego in 1969, he was a regular visitor to the Slade. His way of working began to represent for Brown the counterpoint to that of Ihnatowicz, representing what Brown has called "top-down internal data representation and analysis".[11] Indeed, it is my view that through these formative encounters with these two contrasting approaches, that Brown found his own intermediary way that combined the clarity and abstraction of the top-down use of symbolic language of coding to create aesthetic, even painterly ends as well as a concern for the emergent properties of what might evolve, in a multi-agented fashion, towards a condition of network propagation.

Over the following decades, in keeping with this analysis, he became known as a practitioner of computer art with his own distinctive imprimatur, that appeared to build on a historical trajectory from concrete and constructivist art practices as well as being actively engaged in widening networks of engagement that grew in emergent and sometimes random fashion. Brown attended the first meeting of a group of artists within the annual science and engineering led SIGGRAPH Convention in 1981. He also assumed a role of editor of the fine Art Forum mailing list during a crucial stage of the emergence of media art internationally in the 1990s.[12] It is important also to remember the leading role he played in education, being a founding figure with respect to the National Centre for Computer-Aided Art and Design at Middlesex University in 1984. So too we might recall Brown's long-term contribution to the work of the Computer Arts Society, helping with its successful research application to the U.K's Arts and Humanities Research Council (then Board) in 2001 that led to the Computer Arts, Contexts, Histories etc [CACHe] project from 2002-2005 and to the book published by MIT Press in 2008, in collaboration with Birkbeck, University of London.

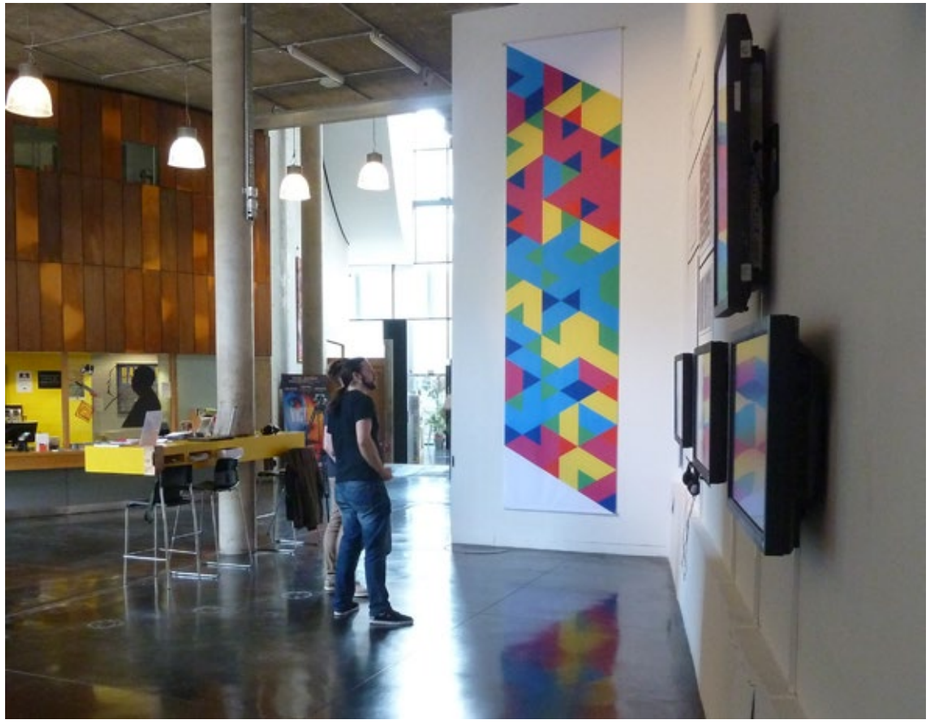
Not least, moreover, is his role as father to Daniel Brown, who emerged as one of the world's leading digital artists in the late 1990s, selected by Creative Review as one of its "Stars of the new Millennium', among other accolades.[13] As commentators to the "Art That Makes itself" publication reflected, the conjoined contribution of "Brown & Son: Purveyors of Digital Images Since 1968", to the aesthetic use of software from the 1960s into this century crystallised and embodied a first and second generation of generative art practices.

The "Brown & Son" exhibition, that filled the spaces

11 Brown, "From Systems Art to Artificial Life: Early Generative Art at the Slade School of Fine Art", pp. 275-277.

12 See Paul Brown's website at: http://www.paul-brown.com/WORDS/ISEAFAF.HTM; [accessed 2.3.2023].

13 See Daniel Brown's website at: https://danielbrowns.com; [accessed 2.3.2023].



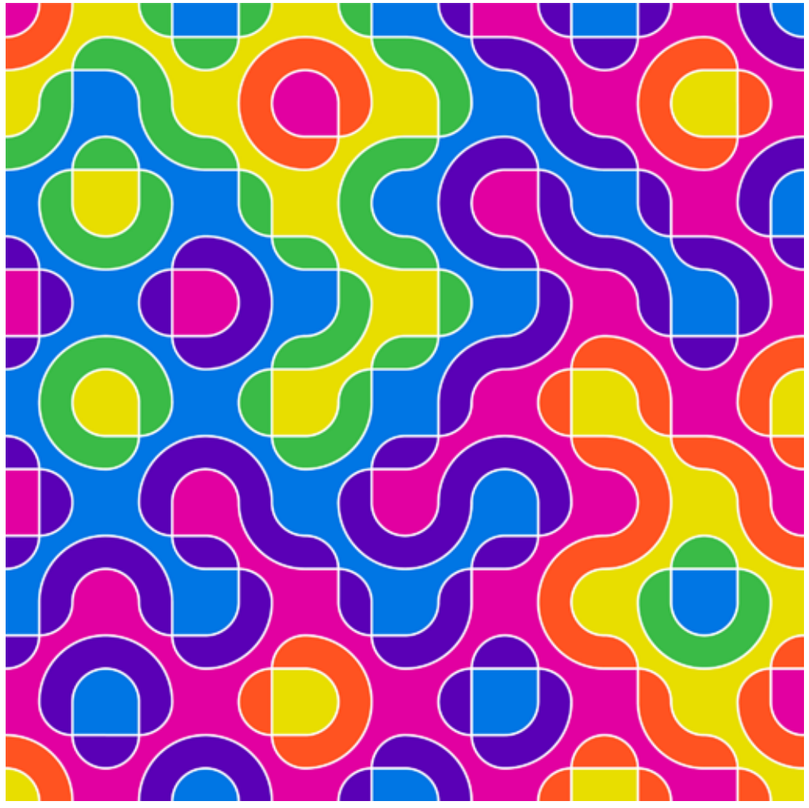
(21) **Untitled Reconfigurable Painting**
Acrylic on cotton, six canvases each 147 x 127 cm, 1977. Recreated 2015
Installation shot - *Brown & Son: Scouse Roots*, The Foundation for Art and Creative Technology - FACT, 2015

of the Watermans Arts Centre in London with works of code, colour, light and movement, was in turn radically ahead of the curve of the growth of commercial interest in software-based art that has occurred since that period. Since 2020 in particular, commercial art galleries and auction houses that overlooked digital media art for decades have begun promoting newer works at amplified prices, whilst arguably stripping away the underlying collectivising narrative that underpinned the gestation of an ecology of practice since the 60s.

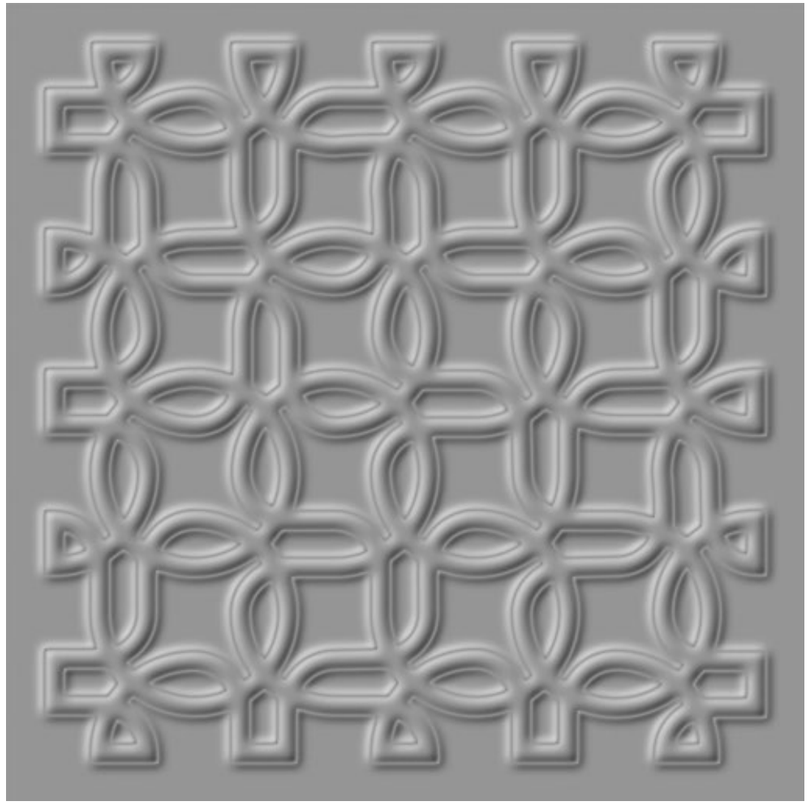
Yet in recent weeks, an exhibition in the United States has gone some way to balance this scenario. Closely researched by its curator Leslie Jones for over a decade, Coded: Art Enters the Computer Age, on display at the Los Angeles County Museum of Art [LACMA], from February-July 2023, draws overdue attention to the interconnection between a post-war shifting social and political zeitgeist and the corresponding emergence of art and technology practices. Whilst this is a North American-led exhibition, within which British-born artists are underrepresented, the media attention being given to the LACMA show highlights a growing context of positive critical reception with respect to this early material. It has also shown a widening of interest among younger audiences in understanding the roots of a flourishing contemporary digital culture.

What in turn, this new CAS exhibition makes manifest, in a way that Brown's sustained collaborative and community-building efforts sometimes veil, is the discrete and powerful sensibility underpinning what he has been doing as an artist. An agent of the progression from early computer art practices into the digital and generative art of the present, as well as the current worldwide flourishing of related communities of practice, Brown is a master of code, colour, line and number, whose works are not just innovative but beautiful and enduring.

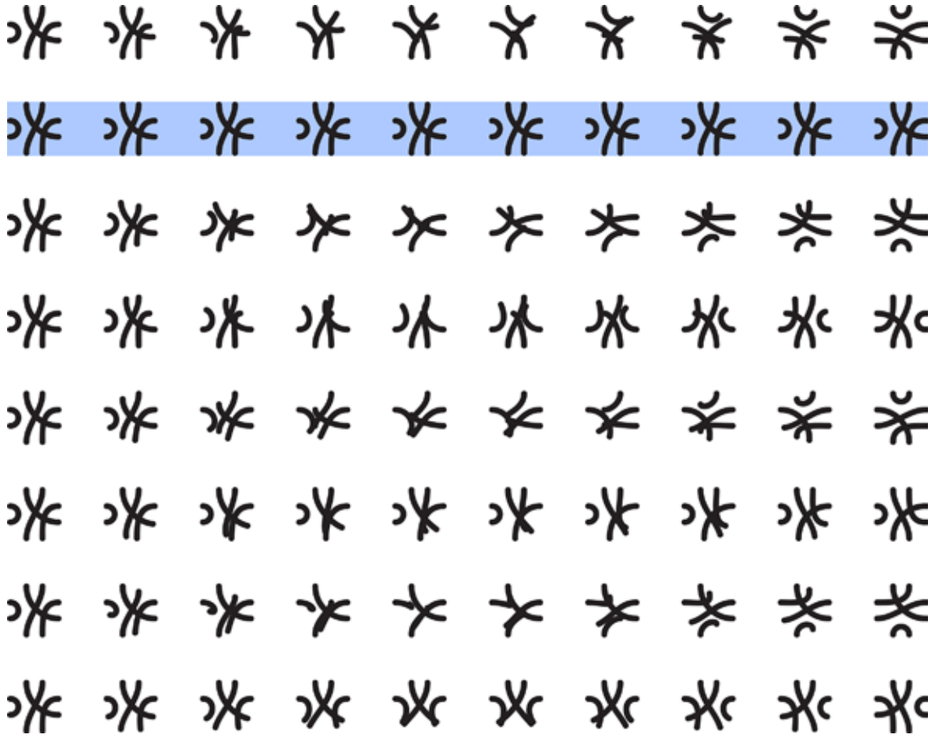
(23) **The Complete Grammar**
Artist's Book, 2015



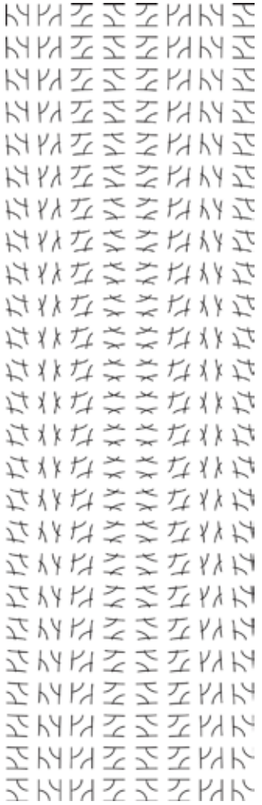
(19) **Wrapping Paper**
Giclée Print, 2017



(14) **Ceiling Detail from** ***The House of Signs***
Giclée Print, 1996

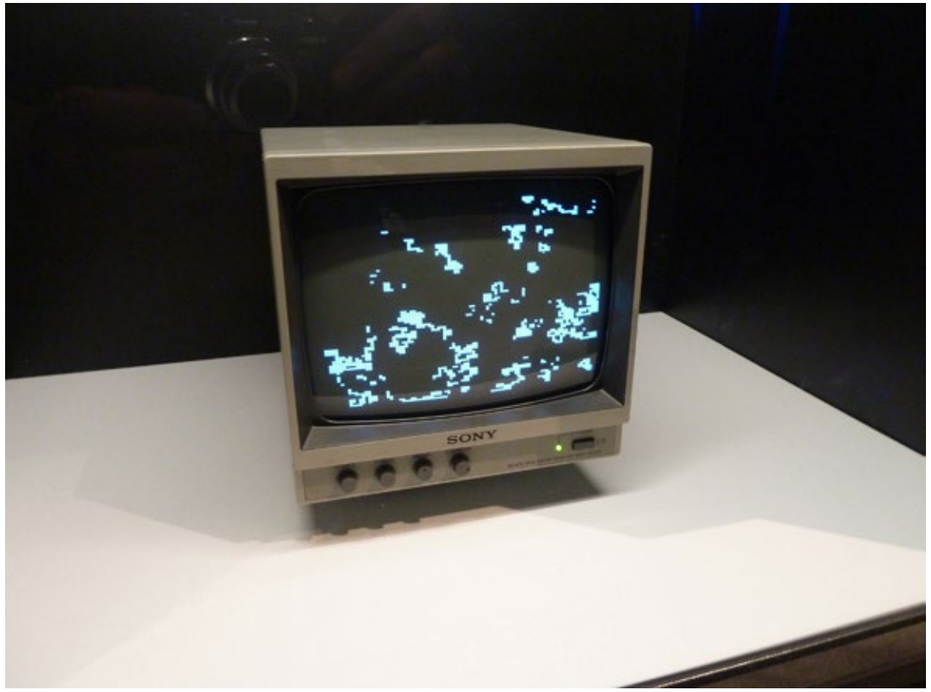


(17) **Page 2 from** ***The Book of Transformations***
Giclée Print, 2000



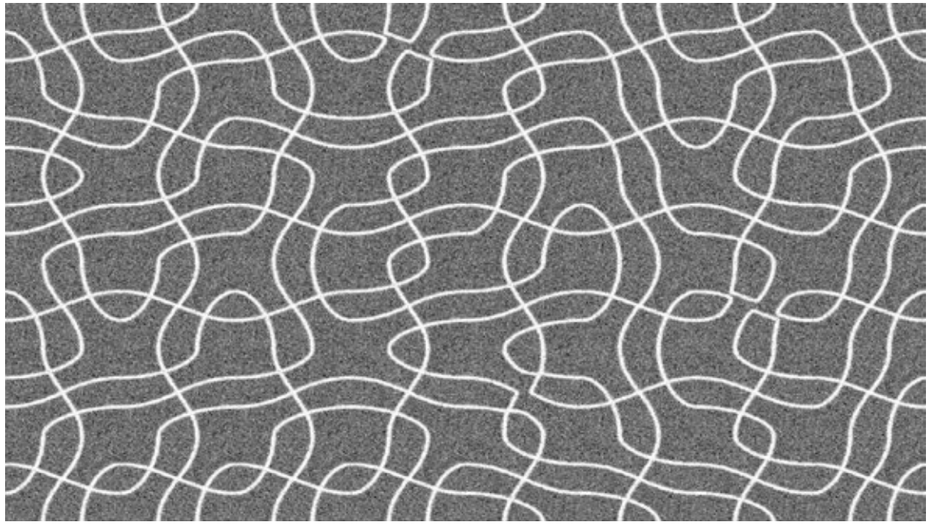
(22) **Long Loop**
Giclée Print, 2000

(24) **The Derivation of Two Unique Cubes**
Artist's Book, 2022



(25) **Builder / Eater**
Kinetic Painting: Realtime Computational & Generative Artwork, 1978
Recreated 2014

Index of Images



(26) **SAND LINES**
Kinetic Painting: Realtime Computational & Generative Artwork, 1999
Sound by Carla Thackrah

Credits and Acknowledgements

Paul Brown would like to thank all the people who have generously contributed to his career over the years: teachers, friends, mentors, patrons, relatives, professional colleagues and students. There are far too many to mention individually but they will know who they are and to all of them my sincere and grateful thanks.

Thanks are also due to Dr. Bronać Ferran for her insightful and illuminating critical essay and to Dr. Sean Clark, Chair of the Computer Arts Society, who curated and produced the exhibition.

The CAS is an international society and also a Specialist Group of the BCS - the UK's Chartered Institute for IT. The BCS have generously made the public areas of their prestigious London HQ available, together with modest funding, for an ongoing series of exhibitions by the society of which this is one.

For almost two decades the artist was an honorary visiting professor and artist-in-residence at the Centre for Computational Neuroscience and Robotics in the Department of Informatics at the University of Sussex in Brighton, UK. He would like to thank them for the provision of a studio space as well as access to technology and expertise regarding leading edge artificial life and AI research.

And, finally Paul would like to thank his partner, Wendy Mills, and sons Tristram and Daniel who have supported him through good times and bad. Dan provides one of the artist's favourite critical commentaries on his time-based artworks which he describes as "dad's wrigglers".

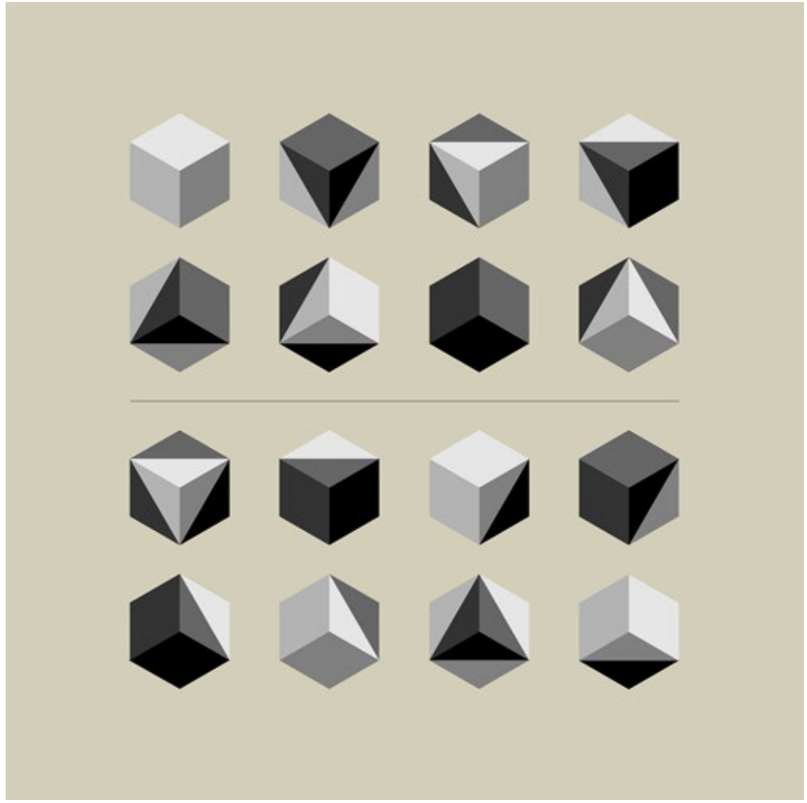
Computer Arts Society
Specialist Group

About the Computer Arts Society

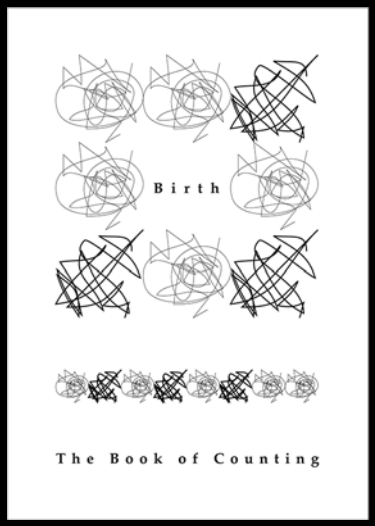
The Computer Arts Society (CAS) was founded in 1968 to promote the understanding of the role of digital and electronic media in the arts. As it has developed over time, a key aim has become to ensure that the long history of the computer arts is recognised by contemporary artists, technologists, audiences and collectors. The society currently organises talks, events, exhibitions, and performances and uses social media to highlight the ways that digital and electronic technologies can be of value to the creative sector. After celebrating its 50th anniversary in 2018, CAS renewed its commitment to promoting the use of digital media in contemporary practice and to providing a forum for diverse audiences of all ages and backgrounds to meet and exchange ideas. The Computer Arts Society is a specialist group of the BCS Chartered Institute for IT and works closely with the Computer Arts Archive Community Interest Company.

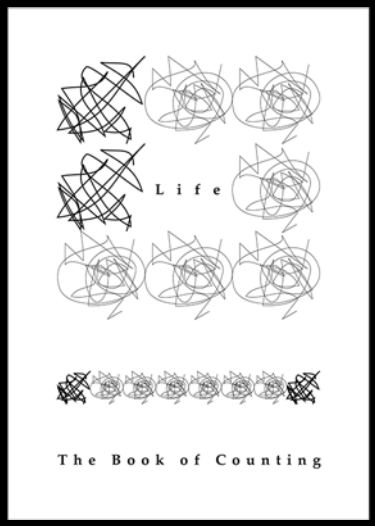
www.computer-art-society.com

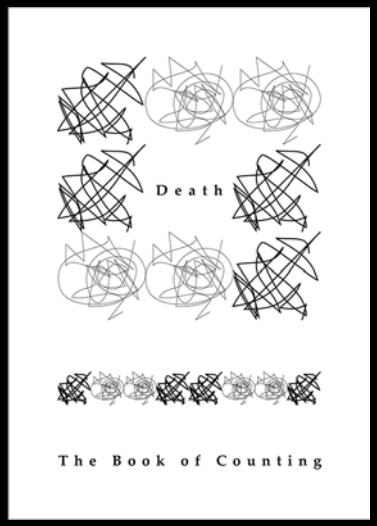
(Back Cover – 12) **Birth, Life and Death - Three Pages from *The Book of Counting***
Laserprint, 1990



(20) **Two Unique Cubes**
Giclée Print, 2022







ISBN 978-1-9993103-4-9