THE MAYOR GALLERY

WRITING NEW CODES

CORDEIRO / MALLARY / MOLNÁR

THE MAYOR GALLERY

WRITING NEW CODES

CORDEIRO / MALLARY / MOLNÁR

3 PIONEERS OF COMPUTER ART

1969 – 1977

WRITING NEW CODES

WALDEMAR CORDEIRO / ROBERT MALLARY / VERA MOLNÁR

3 PIONEERS OF COMPUTER ART 1969 – 1977

THE MAYOR GALLERY

CONTENTS

FROM MIND TO MACHINE: COMPUTER DRAWING IN ART HISTORY

The computer like any tool or machine, extends human capabilities. But it is unique in that it extends the power of the mind as well as the hand.
Robert Mallary [1]

This exhibition presents three major pioneers of computer art - Waldemar Cordeiro, Robert Mallary and Vera Molnár, from three different corners of the globe - South America, the United States and Europe. Although each has an original style and distinctive approach, with these works can be seen a similar modernist aesthetic and common interest in exploiting the unique capabilities inherent in the computer. It is evident that complex and visually arresting imagery can arise from relatively simple sets of instructions.

Before the onset of personal computers, propriety software and the Internet, artists had to learn to programme, work with scientists and technicians and often construct or adapt hardware in order to create their work. It required a leap of faith to use a system and equipment not originally designed for artistic purposes. Artists have always been early adopters of new technology, but the complexity and rarity of computers meant that any art form based around them was bound to be a particularly specialised branch of modernism. This was not least because of the expensive, large-scale nature of much early equipment and the resulting technical expertise required to operate it. Today, we daily carry around with us technology with thousands of times more processing power than the machines of fifty years ago. It is hard to imagine what a challenging task it must have been for artists working with computers at a time when the technology itself was at a formative stage - it involved long hours, dedication and a particular type of mind-set.
Computer art is an historical term to describe work made with or through the agency of a digital computer predominately as a tool but also as a material, method or concept from around the early-1960s onward, when such technology began to become available to artists. The writing of an algorithm, a step-by-step procedure fed into the computer on punched cards or paper tape would produce lines (visible on an oscilloscope or CRT screen if one was available), which could be output to a plotter. Plotters conveyed the image direct to paper via a moving pen, felt-tip or pencil. Due to their very nature, plotter drawings from this pioneering period are fairly rare today. Therefore it is especially good to see works from these three gathered together at the Mayor Gallery.

Constructing rules or sets of pre-determined instructions to produce art, has precedents within art history. Influenced by aspects of Constructivism, Op Art, Systems Art and Conceptualism and Concrete art, methodologies were discovered that laid a foundation for computer arts to develop and provided an inspiration to artists working in a programmatic way. Further, this approach had relevance to the times - Cordeiro wrote that Concrete art and Constructivism were movements that "helped create a 'machine language' appropriate to the communications systems of the urban and industrial society."[2]

These artists were thinking about a systematic way of working before they had access to computers. Molnár's speaks of a "machine imaginaire," her name for her method of conceptualising a system to dictate the drawing, without having access to digital technology.

Paul Klee's process driven approach to drawing - "an active line on a walk…"[3] was also an inspiration to pioneers who found a parallel with the crafting of code to draw lines on a screen.

Partly a response to the overt subjectivity of Abstract Expressionism, in the 1960s Sol LeWitt's work was about generating forms through rules that someone else carried out: "The idea becomes a machine that makes the art".[4] Although LeWitt's machine was metaphorical rather than literal, nevertheless this radical concept raised questions about art process and creative behaviour.

The coming together of Cordeiro, Mallary and Molnár at the Mayor Gallery is particularly apt in this year of the 50th anniversary celebrations of *Cybernetic Serendipity.* This now legendary exhibition of 1968 at London's Institute of Contemporary Arts featured work by Mallary.

Cybernetic Serendipity was the first comprehensive international exhibition in Britain devoted to exploring the relationship between new computing technology and the arts. Ambitious in scope and scale the exhibition involved over 300 people - artists, designers and practitioners from around the world and encompassed corporations, such as Boeing and General Motors, and research institutes, including Bell Telephone Labs and the National Physical Laboratory. The breaking down of barriers between the disciplines of art and science was an important factor. The latest computer models from IBM were shown alongside sculptures, robots, plotter drawings, animated films, poetry and computer-generated music. Not everything was technological - Bridget Riley's painted abstraction was exhibited alongside computer-generated work, to draw attention to their similar geometric aesthetic. No differentiation was made between object, process, material or method, nor between the background of makers, whether art school educated or scientist-engineers. As the curator Jasia Reichardt wrote in her introduction to the *Studio International* accompanying publication, the exhibition showed "…artists' involvement with science, and the scientists' involvement with the arts..[and] the links between the random systems employed by artists, composers and poets, and those involved with the making and the use of cybernetic devices."[5]

Cybernetics, the study of how machine, social, and biological systems behave had by this time penetrated almost every aspect of technical culture. Of enormous influence was Norbert Wiener's 1948 book *Cybernetics, or Control and Communication in the Animal and the Machine*. 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".[6] Wiener's concept was that the behaviour of all organisms, machines and other physical systems is controlled by their communication structures both within themselves and in relation to their environment.

Serendipity was about discovering the 'happy accident' and Reichardt was inspired by Horace Walpole's retelling of the ancient story of the three princes of Serendip who travel the world, "making discoveries, by accidents and sagacity, of things they were not in quest of..."[7] Accidents and the role of chance (even fabricated ones - what Duchamp called "canned chance"[8]) have been a key component in modern art, at least since Dadaism. Later, artists became fascinated with the computer's capability for producing random events; random number generators can be introduced into the program to produce unexpected elements within a planned structure.

The optimistic and celebratory nature of the project is indicated by the ICA's press release which promised "A gallery full of tame wonders which look as if they've come straight out of a science museum for the year 2000."[9] Although its subject matter was avant-garde, presenting a type and style of artwork that was outside the mainstream of British art at this time, *Cybernetic Serendipity* was facilitated and inspired by a post-war spirit of optimism in the positive power of new technologies.

Intsallation shots of *Cybernetic Serendipity* at the ICA, London
© Cybernetic Serendipity, 1968

Why this ground-breaking exhibition found a natural home at the ICA is indicated by the institution's history. Founded in 1946 by prominent individuals among them surrealist Sir Roland Penrose and poet and critic Sir Herbert Read, the ICA was conceived to be an alternative to the conventionality of the Royal Academy. Their first show was held in 1948 and displayed some 83 artists, the roster of which would be the envy of any museum line-up today: Bacon, Brancusi, Freud, Klee, Matisse, Picasso and so on. It was a repost to the conservatism of Post-war culture in Britain more used to seeing old masters in galleries. The ICA also gave Jackson Pollock his first London showing before international fame beckoned (1953).

Throughout the 1950s the ICA became famous for avant-garde exhibitions such as Richard Hamilton's *On Growth & Form* (1951) and an association with proto-pop artists including Eduardo Paolozzi and the Independent Group. This group of radical thinkers - the ICA's younger members, included architects, visual artists, theorists and critics interested in new ways of looking at the world. Inspired by *Scientific American*, Cybernetics, Claude von Shannon's Information Theory, von Neumann's Game Theory and D'Arcy Wentworth Thompson, they considered what implications science, new technology and the mass media might have for art and society. The Group's best-remembered show *This is Tomorrow* (1956) held at the Whitechapel Gallery was a model of collaborative, inter-disciplinary art practice. The catalogue contains the first British published reference to the possible use of computers in art as well as marking the beginnings of Pop Art.

Cybernetic Serendipity was the first show from the ICA's new premises in the Mall. It was the German philosopher Max Bense (1910-90) who inspired Rechardt to consider computers. Bense's interest in information theory, semiotics and cybernetics led to the foundation, with engineer-philospher Abraham Moles, of Information Aesthetics: "Being opposed to emotion-based value judgments, [Bense] considered any artifact as an object open for aesthetic analysis and mathematical evaluation."[10] They saw aesthetic information as part of human communication and computers given the rules for generating aesthetic information, could produce aesthetic objects.[11] Bense had a great impact on the nascent field of computer-generated art, exhibiting work first by Georg Nees and then Frieder Nake in Stuttgart in 1965, now recognised as the first ever shows of computer art.[12]

Recalling the exhibition Reichardt has spoken about the power of the 'new': "People wanted to be a part of it; it was so exciting - you walked in and got a shiver down your spine."[13] Princess Margaret and Lord Snowdon attended and saw Bruce Lacey's robots *ROSA BOSOM* (Radio Operated Simulated Actress - Battery Or Standby Operated Mains) and 'her' companion the interactive *MATE*, which followed ROSA around. They also listened to computer-generated music whilst sitting in a large pod.[14] Avant-garde and experimental music by John Cage, Iannis Xenakis and others featured in the show.

Three-dimensional work was an important part of the exhibition and as well as a robot by Nam June Paik, Nicholas Schöffer's interactive cybernetic tower and Jean Tinguely's kinetic sculpture made from recycled machine parts, visitors saw Robert Mallary's sculpture *Quad I*. Probably the first sculpture modelled with plotter print-outs of drawings created via computer, this first iteration was made in plastic. About this QUAD series of sculptures, the artist later wrote that if at first they, "appear to be rather conventional examples of abstract volumetric sculpture […] rest assured, [the computer] did play a role at the design stage, even though its contribution is not apparent." He goes on the state that what is missing, "is an output medium that matches the computer in its contemporaneity […]. In fact, I am still looking for that medium…"[15] It is interesting to ponder what Mallary would have made of the 3-D printing processes available today, perhaps a perfect output for his ideas of 50 years ago. The artist's fascination with using code to define geometric shapes - ellipses, arcs, curves is evident also in his *Incremental* series drawings on view in the present exhibition.

Princess Margaret and Lord Snowdon pictured attending *Cybernetic Serendipity* © Keystone Pictures USA

Drawing via computer enables exploration of calculations that would be mentally impossible. It provides the artist with the possibility of producing sequences through iteration, the repetition of sets of instructions that can be adjusted so that each version is slightly different. Thus families of images can be created through the manipulation of parameters in the program. Mallary wrote about using random number subroutines to generate "variety-within-specified-limits"[16] In fact, for these artists using code to draw was really about an exploration of the nature and practice of drawing itself. Thus allowing, as Molnár said in 1980, "the painter to clear his brain of mental/cultural *ready-mades* and in enabling him to produce combinations of forms never seen before, either in nature, or in museums, to create unimaginable images."[17]

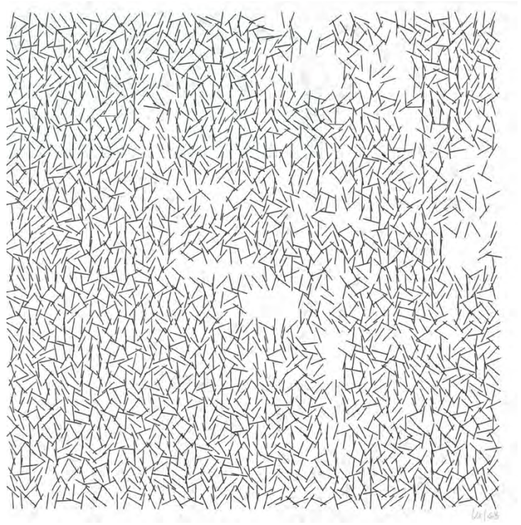
Cybernetic Serendipity has become the benchmark computer art show not least for its influence upon subsequent generations. A scaled-down version travelled to the Smithsonian in Washington DC and the Exploratorium in San Francisco. Thus a younger generation of artists was introduced to the positive power of computing for artistic purposes. This generation subsequently laid the foundation for decades of advancement in the arenas of digital image-making, animation, interactivity, intermedia and cross-disciplinary collaboration in the arts which is a feature of much art today, not to mention the digital special effects movie and gaming industries.

The same year as *Cybernetic Serendipity*, Cordeiro began working with the computer in Brazil, experimenting with an IBM 360/44, in collaboration with the physicist Giorgio Moscati. These are considered Brazil's first computer drawings. Cordeiro foresaw great possibilities for computers and communication in Brazil and believed the computer could be an agent for positive social change and even lead to greater democratisation of art. He identified a crisis in contemporary art as a result of "two variables: the inadequacy of traditional art media to transmit information, and the inefficiency of the information they carry in regards to language, thought and action." He called for the creation of interdisciplinary artworks, "taking advantage of scientific research and discoveries" to help counter this.[18]

A year after *Cybernetic Serendipity*, the major exhibition *Tendencies 4: computers and visual research* (1969) took place in the Gallery of Contemporary Art, Zagreb with both Cordeiro and Mallary participating. The New Tendencies movement emerged in the early 1960s, initially dedicated to Concrete and Constructivist art, Op and Kinetic art and included intellectuals and artists from across Europe; members of GRAV (Groupe de Recherche d'Art Visuel) and Umberto Eco were associated with them as were Bense and Moles.

On view was Mallary's drawing, *TRAN 2*, similar to the coloured plotter drawings in the present exhibition. The third variation of his QUAD series - *QUAD III*, 1969, made from laminated plywood was also on view in Zagreb. As in the other versions, the form of this work was dictated by parameters set by the artist's program. Plotter print-outs were then used as templates to cut the plywood, which was layered together and finally polished.

Installation views showing work by Mallary (top on back wall) and Cordeiro (below on left) © *New Tendencies 4*, 1969



Vera Molnar, *Interruptions*, 1969, Plotter drawing, 35 x 33 cm
© Victoria and Albert Museum, London

This early period of computer art has been somewhat neglected by art history. However in recent years there has been interest in rediscovering hitherto overlooked aspects of modernism. Increasingly, exhibitions featuring digital art are being mounted at major institutions around the world. At MOMA New York this year *Thinking Machines: Art and Design in the Computer Age, 1959–1989*, included work by Cordeiro and Molnár. The Whitechapel's *Electronic Superhighway* (2016) featured Molnár among displays of early pioneers. There is a forthcoming major show at Los Angeles County Museum of Art, LACMA. In July this year the Victoria & Albert Museum opens *Chance and Control: Art in the Age of Computers*, to celebrate both their collection and the anniversary of *Cybernetic Serendipity*, featuring Cordeiro and Molnár works from the permanent collection. The V&A acquired its first work in 1969, following *Cybernetic Serendipity* - a folio of the limited edition prints published by Motif to coincide with the ICA exhibition. The significant holdings of the Department of Computer Art at the V&A consist of the archives of the Computer Arts Society and the large collection of works on paper amassed by the American art historian and curator Patric Prince as well as further donations and recent acquisitions.

The desire for audiences to understand the history of our now pervasive digital world continues to grow. The work of early innovators such as these collected together by the Mayor Gallery deserves to be and is now becoming more widely known. This art remains as visually stimulating and its processes and methods as intriguing today, as it was in the 1960s.

Catherine Mason, April 2018

(ENDNOTES)

1 Ruth Leavitt (ed) *Artist and Computer*, NJ: Creative Computing Press/NY: Harmony Books, 1976, p. 5
2 Waldemar Cordeiro *Manifest Arteônica*, 1971
3 Paul Klee *Pedagogical Sketchbook*, London: Faber & Faber, 1968, p. 16
4 Sol Le Witt "Paragraphs on Conceptual Art" in *Artforum* Summer 1967
5 Jasia Reichardt *Cybernetic Serendipity: The Computer and the Arts: A Studio International Special Issue* London: Studio International, 1968
6 Norbert Wiener *Cybernetics, or Control and Communication in the Animal and the Machine*, Cambridge: MIT Press, 1948
7 Horace Walpole letter to Sir Horace Mann 28 January 1754
8 Michel Sanouillet and Elmer Peterson (eds) *Salt Seller: the Writings of Marcel Duchamp (Marchand du Sel)* New York: Oxford University Press, 1973, p. 33
9 Cybernetic Serendipity exhibition press release, Tate Britain Archive (VA PUB 179)
10 With thanks to compArt database of Digital Art: http://dada.compart-bremen.de/item/agent/209
11 Max Bense *Der Spiegel* Nr. 18/1965 S. 151f with thanks to Christoph Klütsch http://www.computerkunst.org/Praesentation_London/body.html
12 Slightly later that year the Howard Wise Gallery, NY exhibited work by Bela Julesz and Michael Noll, one of the very first showings of computer art in the United States
13 Jasia Reichardt conversation with author 6 July 2016
14 Reported in the *Daily Mirror* 24 September 1968
15 Ruth Leavitt (ed) *Artist and Computer*, NJ: Creative Computing Press/NY: Harmony Books, 1976, p. 7
16 ibid, p. 6
17 Vera Molnár, *Minimal* exhibition at the DAM Gallery, 2017
18 Waldemar Cordeiro (ed) *Arteônica* São Paulo: Editora das Americas, 1972, p. 3-4 translated by Eduardo Kac With thanks to Annateresa Fabris *Waldemar Cordeiro: Computer Art Pioneer* Leonardo Volume 30, No. 1 February 1997

BIOGRAPHY - CATHERINE MASON

Catherine Mason has been researching computer art since 2002 and is a board member of the Computer Arts Society. She is the author of A Computer in the Art Room, the origins of British Computer Arts 1950-1980 (JJG: 2008) and co-editor of White Heat, Cold Logic (MIT: 2009). She curated Bits in Motion, a screening of pioneering computer animation at the National Film Theatre, 2006.

WALDEMAR CORDEIRO

WALDEMAR CORDEIRO
(b. 1925 Rome, Italy - d. 1973 São Paulo, Brazil)

Cordeiro had charisma. Physically large with very elegant features, making full use of his strong bass voice, publicly proclaiming his unusual ideas, he cut a striking figure and was seen as controversial, with a volcanic personality too. These characteristics could have led to facile success in life. Instead, he took on a challenging mission in a country of colonialist culture such as Brazil in the 1950s: Cordeiro decided to lead an avant-garde movement that would create its own authentic art, rather than copy from other countries.

Cordeiro led a Spartan lifestyle. He took his artistic production quite seriously as a cultural activity for which he, as an individual, was merely a spokesperson. His personal life was radical too, and his words and actions, very trenchant in most cases. In the early days of the Concrete movement, Cordeiro, leader of Concrete Art Ruptura collective (Geraldo de Barros, Leopoldo Haar, Kazmer Féjer, Anatol Wladyslaw, Luiz Sacilotto, and Lothar Charoux) set out on a course that really shook up the cultural structures of the period, both from the Brazilian society's political viewpoint and from the perspective of art history. Concrete artists never made a living from the art market; they relied on their productive activity in urban society. In Brazil, Concrete art was a political art form. From the perspective of art history, the visual values of Concrete art took roots in the scientific principles of Visual Gestalt, which distinguished it from other coeval geometric movements. By going beyond a concern to get away from figurative art, its concept marked a historic discontinuity or rupture, as its artistic bases started to relate directly to scientific bases. In other words, it set a turning point in the timeline of art history.

Cordeiro's oeuvre was a work in progress, a constant evolution. Each new period leveraged previous experience. In Rome, he studied figurative art, did Cubist works, and drew caricatures for a local newspaper. After arriving in Brazil in 1946, he developed an abstract period prior to engaging in the production of his Concrete art that went on until 1960. In the early 1960s, the artist went through a spell of 'intuitive geometric painting' (his own words). In 1964, he joined poet Augusto de Campos in the creation of the 'Popcrete'. Then he turned to kinetic and opera aperta works, in 1967-1968, which preceded an investigation on computer art, as Latin America pioneer, that he named *Arteônics* (Artronics) (1968-1973).

His computer art researches involved writing code (working with programmers) and applying mathematics, logic and programming as well as Visual Gestalt principles. Together with a generation of artists who were investigating computer art, he integrated an international collective that sought to decipher and even simulate the means by which humans created and conceived art, in the neurological and scientific sense of the word. Later this approach was dropped and the term 'art & technology' was to art creations.

His early work connected with academic/scientific investigation is still very important today. The art & technology trend eventually ended up absorbed by other artistic tendencies. Today the focus has turned to technological novelties coming into the market, focus has switched from the semantics to media as centre of artistic creation. Cordeiro's electronic art investigations treaded a new path for one of the most exciting periods of his life, initially at Universidade de São Paulo (USP) and then at Universida de Estadual de Campinas (UNICAMP). At the latter, the results of his investigations drew the attention of the Dean, who asked him to design its new Arts Institute. Being self-taught, he was insufficiently qualified to officially teach courses or head a department. To resolve the issue, he was awarded an honourary degree, a much-unexpected development in his life. The Arts Institute still exists today, but the teaching program has never been put into practice. Cordeiro died on the eve of his inaugural class in a first course to be taught during school recess. The production of Waldemar Cordeiro was abruptly interrupted with his premature death in 1973, the fruit of 25 years of creative work (he left Italy for Brazil at the age of 21 and died when he was 48).

Waldemar Cordeiro: creative, honourable and ingenious. The images of his computer-art production originated in photos. In the case of the work, The Woman That is Not B.B. (Brigitte Bardot), the picture is a Vietnamese during the Vietnam War.

The first step of this research was the digitalisation of the photo done manually because scanners did not exist at that time. The photo was transformed to off-set (figure 1). A grid was placed on top of this off-set, and each square numbered manually with a value between 0 and 6, corresponding to the amount of black-white contained in it. (figure 2) These numerical values were transcribed to punched cards, each line of the image corresponding to one punched card.

Figure 1.

Figure 2

Figure 3.

The second step was printing using alphanumeric symbols (letters) overlapped. The choice of letters was made by the artist (figure 3) to obtain the black-white levels of the original photo. Using an IBM 360/44 computer, the printing process of each image took approximately 5 hours with the technological resources of the time.

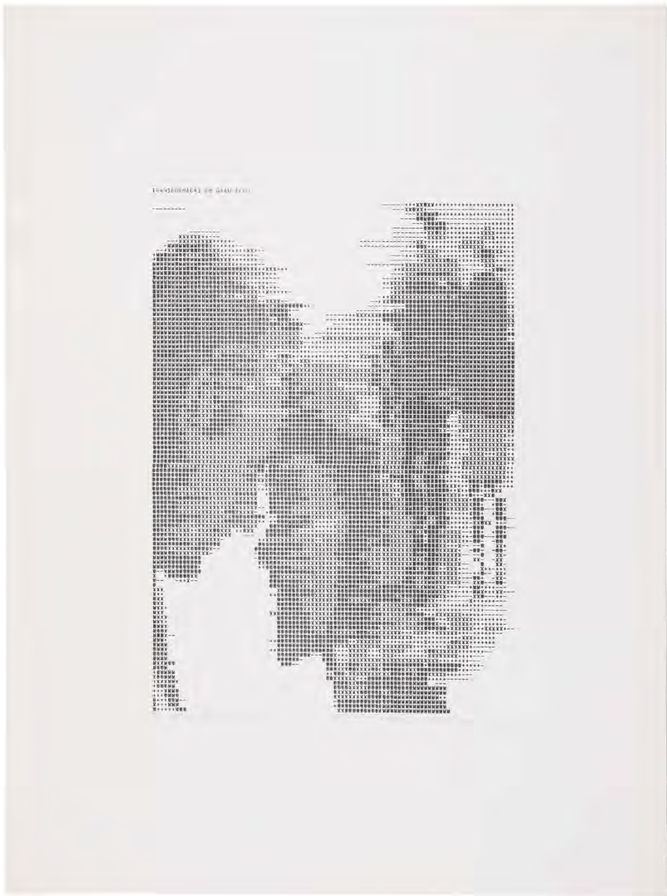
The third step was the mathematical operations applied on the digitalized image, to obtain the visual effects desired by the artist. In this image, the visual effect was to choose other letters by random and substitute 27% of the original digitalised as a noise in the original image. The research was to verify the intelligibility of the image, meaning, in this case, the destruction of the original digitalised image. Semantically, the destruction of the war.

In his computer art creations, he applied this knowledge in figurative images. This was one of the rare examples in this universe at that time, since most artists created abstract works.

The common point to all artists, at that time, was the discovery of digital processes both in image processing and in philosophical thinking. The artistic concepts used in his first work (1968), almost 50 years ago, is still used in our daily lives. Can you imagine our life without the image processing?

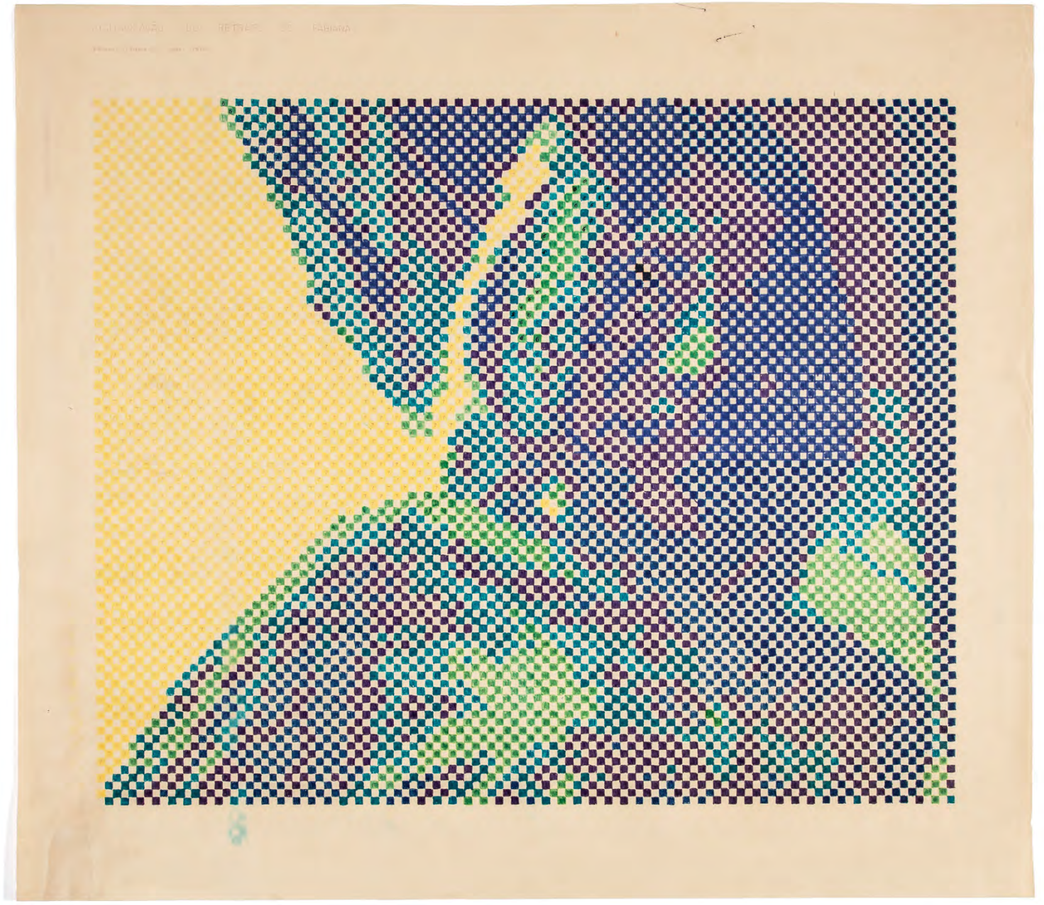
Analivia Cordeiro, October 2017

WALDEMAR CORDEIRO
Derivatives of an image degree 1
1969
Offset printout
61.2 x 44.5 cm
24 x 17½ inches



WALDEMAR CORDEIRO
Derivatives of an image degree 0
1969
Offset printout
61.2 x 44.5 cm
24 x 17½ inches

WALDEMAR CORDEIRO
Digitalização do retrato de Fabiana
1970
Carbon and marker pen on paper
56.7 x 65 cm
22¼ x 25½ inches



WALDEMAR CORDEIRO
The Woman that is Not B.B. (Brigitte Bardot)
1971
Offset printout
61.2 x 44.5 cm
24 x 17½ inches

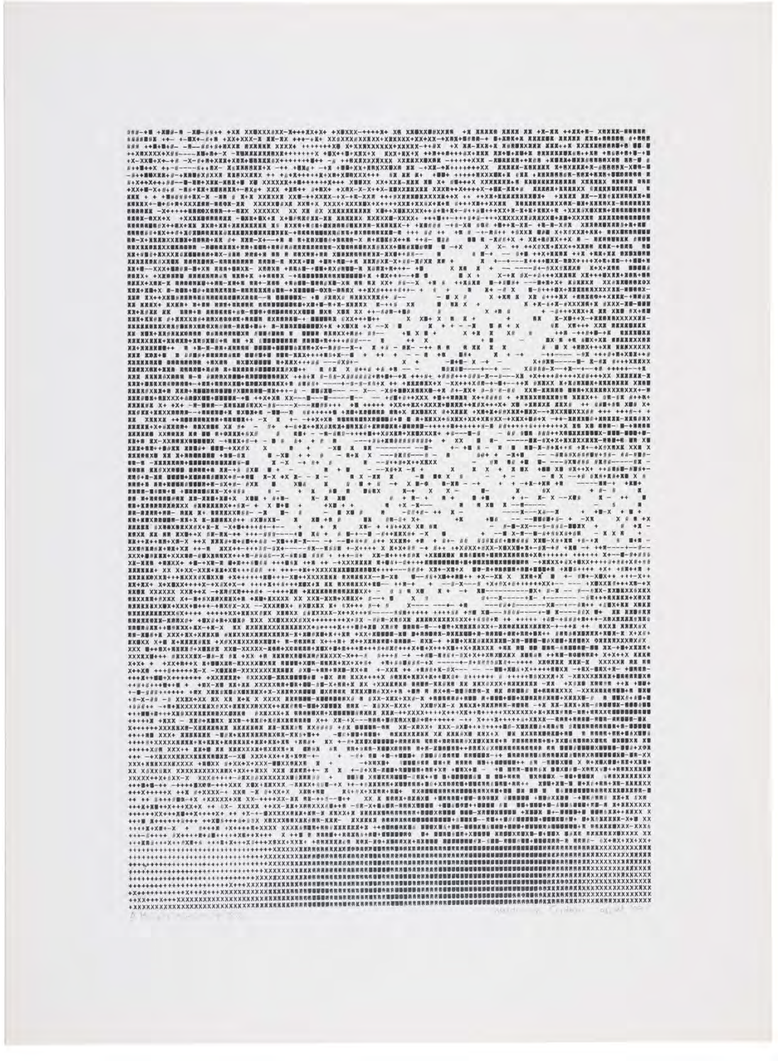
Jonathan Benthall, director of ICA London in 1972, wrote: ``The second example of computer graphics I illustrate is from two Brazilians from São Paulo, Waldemar Cordeiro and Giorgio Moscati, an artist and a nuclear physicist respectively. The set is called Derivations from an Image, and has much to do with the photography as with the computer. An image - in this case a Valentine´s Day poster - is fragmented by the computer into a matrix in small fragments, each of which is given a ``dark value``, from 0 to 6 depends on where it belongs in the ``grey`` spectrum between white and black. The computer (an IBM 360/44) then performs transformations on the numbers, and a standard line printer is used as the output device. The transformation is based on the difference between each fragment´s darkness value and its successor´s. Thus, if a certain horizontal line of an image is given by the following sequence of darkness level:

6 6 4 2 0 0 6 6 6 5 5 5

The derivative will be:

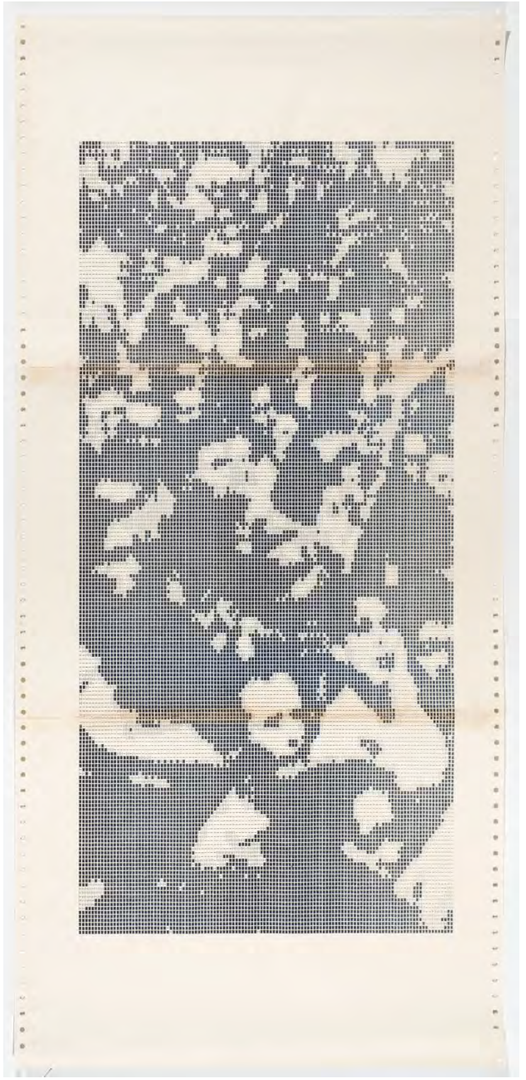
0 2 2 2 0 0 6 0 0 1 0 0

Waldemar Cordeiro comments: ``This transformation creates another image in which the contour characteristics of the image are enhanced, and in which sudden changes in darkness give place to dark thin lines while soft changes in darkness are transformed into light bands. Second and higher transformations are possible and images have a completely different structure`` ... it would be absurd to describe Derivations from an Image as a profound work; what it is most interesting about it is the possibility it suggests of effecting a similar modulation on cine film. It seems like so many stills from a film sequence, exploring, perhaps, an elusive human relationship without the need for actors in motion. `` (Benthall, Jonathan; Science and Technology in Art Today, Thames and Hudson, London, 1972, pages 66, 70)



WALDEMAR CORDEIRO
Untitled
1972
Offset print
83.6 x 39.7 cm
32 x 15¾ inches

WALDEMAR CORDEIRO
Untitled
1972
Offset print
83.6 x 39.7 cm
32 x 15¾ inches



WALDEMAR CORDEIRO
Untitled
1972
Offset print
83.6 x 39.7 cm
32 x 15¾ inches

ROBERT MALLARY

ROBERT MALLARY: PIONEER COMPUTER ARTIST
(b. 1917 Toledo, USA - d. 1997 Northampton, USA)

Robert W. Mallary was a renowned American sculptor and pioneer in computer art. He was born in Toledo, Ohio, and grew up in Berkeley, California, where he studied art from his childhood. In his twenties, Mallary travelled to Mexico City to attend La Escuela de Artes del Libro (1938-39) and the Academia de San Carlos (1942-43). Mallary writes, "My involvement with the computer is the consequence of a long-standing interest in art-and-technology that extends back to the very beginning of my career in 1936. My first enthusiasm was the Mexican school of mural painting and my model was David Alfaro Siqueiros, who as early as 1932 was advocating a revolution in the technology of art. For Siqueiros this meant using the airbrush and synthetic automobile lacquers to paint his out-sized propaganda murals, and I began by following in his footsteps." Mallary started experimenting with plastics in 1938 and used both acrylic and polyester plastics in his art in the 1940s, as well as fluorescent dyes and pigments.

As Mallary continued to pursue his fine arts career, he taught art in Los Angeles and worked as a freelance art director and commercial artist. Always interested in art and technology, he constructed an eight-bladed "Stroboplane" in 1951, a circular configuration of aluminum, wood, photographs and electrical components with flashing strobe lights that created images in depth. In 1952, Time magazine featured a full-page colour photograph of Mallary's "Luminous Mobiles," made from clear acetate painted with fluorescent dyes and pigments, which was hung from wires and glowed under ultraviolet lights in a dark Sacramento gallery. In 1954, Mallary exhibited paintings made of polyester at the Urban Gallery in New York City and, upon moving to Albuquerque in 1957 to teach at the University of New Mexico, made large-scale reliefs using sand and straw hardened with polyester resin.

When Bob moved to New York City in 1959 to teach art at Pratt Institute in Brooklyn, his career as a Neo-Dada or "junk artist" was well underway. In the Greenwich Village streets around his loft on Broome Street, Bob collected discarded cardboard, fabrics, and other found objects to create abstract relief sculptures and assemblages, bonded together with liquid plastics and polyester resins. His reputation as a prominent assemblage or "junk artist" was launched by his inclusion in the historic "16 Americans" exhibit at the Museum of Modern Art in 1959, and the "Art of Assemblage" exhibit in 1961. Mallary's work was also displayed in the Whitney Sculpture Biennial in 1961. Life magazine had an article about Bob's art, and his monumental sculpture "Cliffhangers" was displayed in the New York State Pavilion at the 1964 World's Fair in Flushing, NY. Robert Mallary was now a part of the New York art scene, along with such notable artists as Willem and Elaine de Kooning and Wayne Thiebaud, with whom he had worked at Rexall (in Los Angeles) as an art director in the 1950s. In a recent conversation with Bob's daughter Martine, Wayne (who named his youngest daughter "Mallory" in honour of Bob) said, "Bob was my mentor. He helped me shape up and read and do things. He was a good critic."

Unfortunately, the toxicity of the liquid plastics Bob used for his art caused him liver problems, so he had to stop using them. As a result, Bob started creating assemblage sculptures in bronze, which were shown at the Allan Stone Gallery in New York City in 1966. (Bob had four exhibits at the Allan Stone Gallery between 1961-66). Mallary's large-scale welded steel sculpture "Pythia" is on permanent exhibition at the Nelson A. Rockefeller Empire State Plaza Collection in Albany, NY.

Mallary writes, "I turned to the computer in 1967 on learning for the first time about its ability to generate and transform images." In 1968, he became one of the first artists (if not actually the first) to create a sculpture by using a computer program. Bob's son Michael Mallary (a 23-year-old CalTech doctoral student in physics at the time) wrote the Fortran program, TRAN2, to draw multiple shapes, using the algorithms specified by his father. The process for designing and fabricating the sculpture began with Bob drawing two profile views (i.e., from two directions 90° apart) of the desired sculpture on graph paper. For each of the more than 100 layers of the sculpture, four coordinates were read off of the two graph paper images (i.e., Xneg, Xpos, Yneg, Ypos) and punched on to a computer card. After reading the data cards, TRAN2 calculated hundreds of connected contour points (i.e., points on the slice perimeter) for each horizontal slice. After these multiple two-dimensional cross sections were printed out with the computer plotter, each "slice" drawing was glued to a slab of plywood (or plastic, or marble), then traced and manually cut out with a band saw. These discs of varying shapes were then stacked on a central vertical axis, glued together with epoxy, ground to a smooth contour, and finally laminated and polished. This resulted in the Quad series, which includes the prototype, Quad I (1968), made of plastic; Quad II (1968), made of plywood; Quad III (1969), made

Quad I displayed at *Cybernetic Serendipity* exhibition, ICA, London © Cybernetic Serendipity

of plywood; and Quad IV (1970), made of marble. Quad I - the very first sculpture created using the TRAN2 program (as the preliminary model or maquette for the other Quad sculptures) was displayed at the ground-breaking "Cybernetic Serendipity" Exhibition of Cybernetic Art at the Institute of Contemporary Arts in London in 1968.

Bob is quoted as saying that even if his Quad sculptures weren't actually the world's first computer-generated sculptures, they were certainly the first ones by a true fine artist with an established reputation in the art world.

Mallary continued to write, lecture and develop software for creating sculpture at the University of Massachusetts, where he was Professor of Art from 1967-1996. In collaboration with other colleges in western Massachusetts, Bob directed the interdisciplinary "Arstecnica Center for Art and Technology" at UMass. In addition to teaching in the graduate computer art program at UMass, he also taught at least one undergraduate computer graphics course each semester. For that, he developed a library of procedures (Fortran subroutines and functions) that he called the ArtFile, and had the students do a variety of projects in 2D and 3D.

Robert Mallary was a visionary. At the Fifth National Sculpture Conference at the University of Kansas in 1968, Bob said, "Sculpture has always reflected the technology of the time. For instance, bronze casting in classical civilisation was, in a sense, the advanced space technology of that day. Sculpture must advance as technology advances. The computer is just one of the new tools advancing technology has given us." The article Mallary wrote for Artforum in 1969, titled "Computer Sculpture: 6 Levels of Cybernetics," states that "The computer, once it has the form description data it needs, is converted, in effect, into a sculptural modeling and shaping tool." Mallary thought of the computer as an intelligence and information amplification device which would be linked synergistically with the unique, creative capabilities of the human mind for performances - intellectual and creative - surpassing the capabilities that either the human or the computer would have if they functioned separately.

Mallary's sculptures, assemblages, computer graphics, and stereoscopic 3D projection art were exhibited at the Herter Art Gallery at UMass in 1990, and at the Springfield Museum of Fine Art in Massachusetts in 1995. The Mitchell Algus Gallery in New York City had a one-man show of his work in 1993, and The Mayor Gallery presented Mallary's "New Mexico Reliefs 1957-1958" at Frieze New York in May 2017.

Robert Mallary's work is in the permanent collections of the Museum of Modern Art; the Whitney Museum of American Art; the Nelson A. Rockefeller Collection of Modern Art at Kykuit in Tarrytown, NY; the Los Angeles County Museum of Art; University of California, Berkeley; the Museum of Fine Arts, Houston; and the Victoria and Albert Museum in London (which has some of Mallary's computer plotter drawings). He has been written about in *Time*, *Life*, *Artforum*, *Art in America*, *Leonardo*, and *ArtNews*.

Martine Mallary, April 2018

ROBERT MALLARY: TRAN2 COMPUTER SCULPTURE

Robert Mallary created the very first computer sculptures in 1968 using the Fortran program called TRAN2. The algorithm goals were specified by R. Mallary and the FORTRAN program was written by Michael Mallary. Early sculptures called Quad II and Quad III are shown in Figure 1 below. The slight difference in the height to width ratio illustrates the power of this approach to easily generate many variations.

Figure 1a. *Quad II*
First computer aided sculpture
1968, Robert Mallary

Figure 1b. *Quad III*, 1969,
Robert Mallary

The process for designing and fabricating these sculptures started with R. Mallary drawing two profile views (i.e. from two directions 90o apart) of the desired sculpture on graph paper. For each of the more than 100 layers of the sculpture, four coordinates were read off of the two graph paper images (i.e. Xneg, Xpos, Yneg, Ypos) and punched on to a computer card. Example profiles are shown in Figure 2.

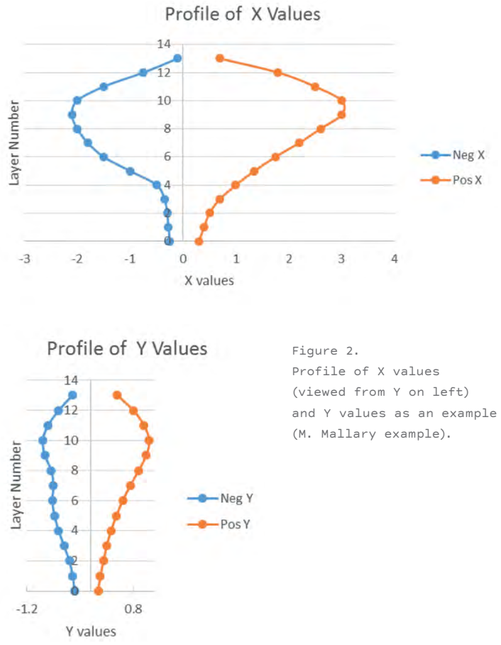


Figure 2.
Profile of X values
(viewed from Y on left)
and Y values as an example
(M. Mallary example).

After reading the data cards, TRAN2 calculated hundreds of connected contour points (i.e. points on the slice perimeter) for each horizontal slice. The plotted image of each slice consisted of four different elliptical shapes for each of the four quadrants of the plot*. For example, the full ellipse that Slice #12 uses only for quadrant #1, is shown in Figure 3. It is based of Eq[1] below** and its negative mirror image using Xpos as the maximum value of X and Ypos as the maximum Y value. For quadrants #2, #3, & #4 , Slice #12 is constructed with Eq(2], Eq[3], and Eq[4]. The plot of Slice #12 is shown in Figure 4.

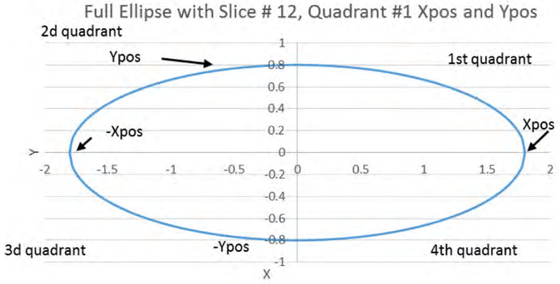


Figure 3. Full ellipse that is used only for the 1st quadrant of Slice #12

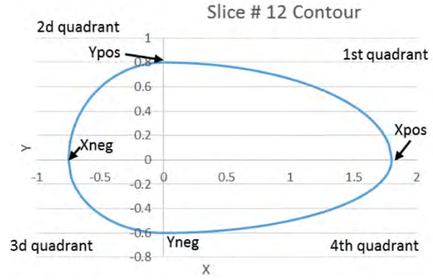


Figure 4. Computer generated layer #12 contour using the profiles in Figure 2.

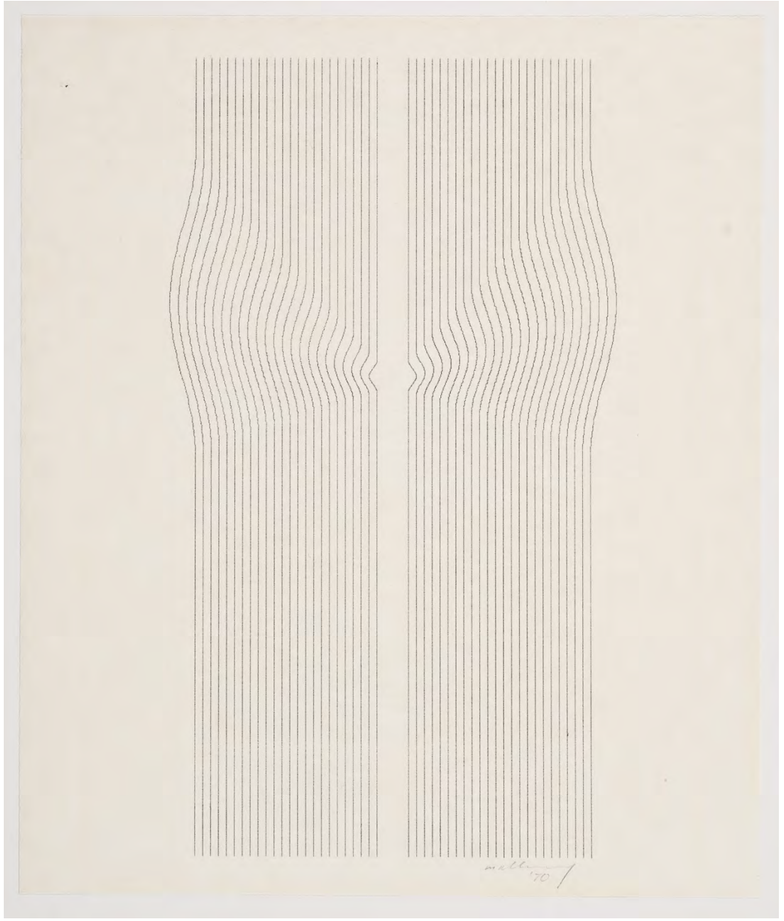
The plot for each layer was then glued to a sheet of plastic or wood and the slice perimeter was manually cut with a band saw. All of the slices were then stacked and bonded together. The layer to layer "jaggies" were then sanded and polished smooth and the sculpture was mounted on a pedestal. Use of the 3D printers available today would of course save a great deal of manual labor.

by Mike Mallary

* The four quadrants of an X/Y plot are: #1 is X>0, Y>0; #2 is X<0, Y>0; #3 is X<0, Y<0; and #4 is X>0, Y<0. On a clock these quadrants correspond to: 12 to 3; 9 to 12; 6 to 9; and 3 to 6.

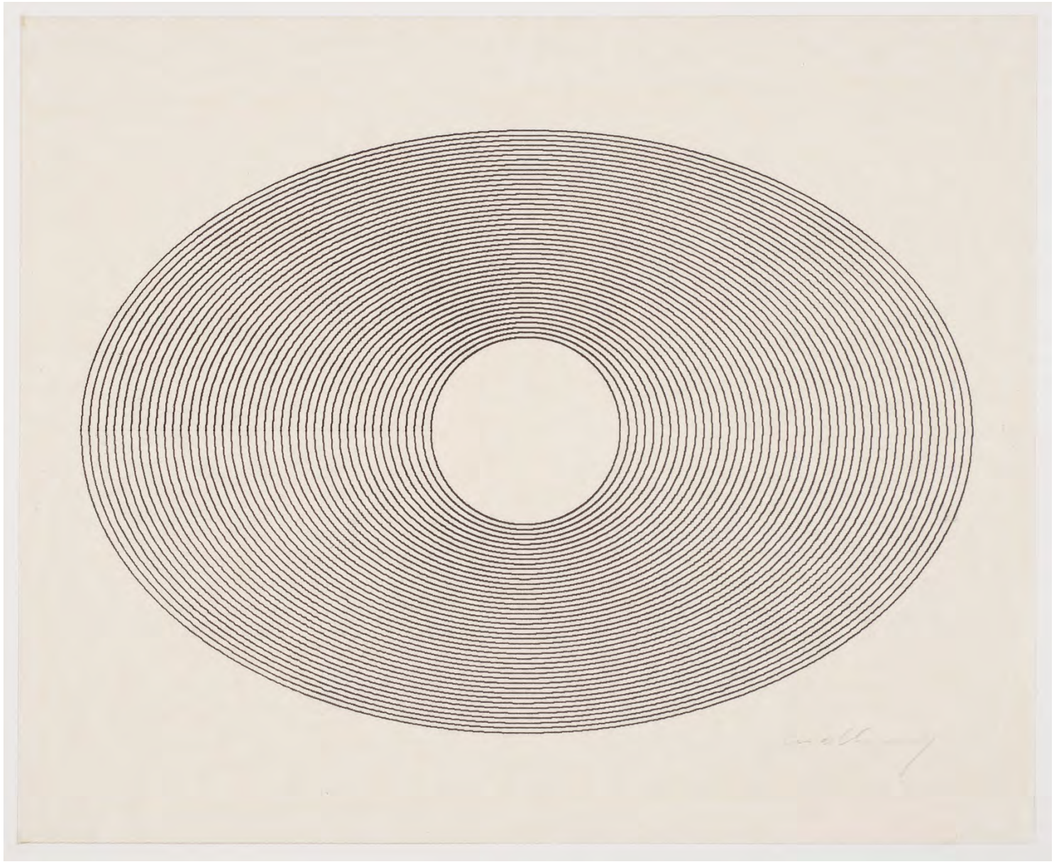
**TRAN2 stepped X in small increments and calculated the values of Y for an ellipse with the corresponding profile parameters. So for each quadrant the equations were (note that Sqrt(Z) is the square route of Z):

1st quadrant	(X>0 and Y>0)	uses	Eq[1]	Y = Ypos*Sqrt(1-[X/Xpos]2)
2nd quadrant	(X<0 and Y>0)	uses	Eq[2]	Y = Ypos*Sqrt(1-[X/Xneg]2)
3rd quadrant	(X<0 and Y<0)	uses	Eq[3]	Y = Yneg*Sqrt(1-[X/Xneg]2)
4th quadrant	(X>0 and Y<0)	uses	Eq[4]	Y = Yneg*Sqrt(1-[X/Xpos]2)

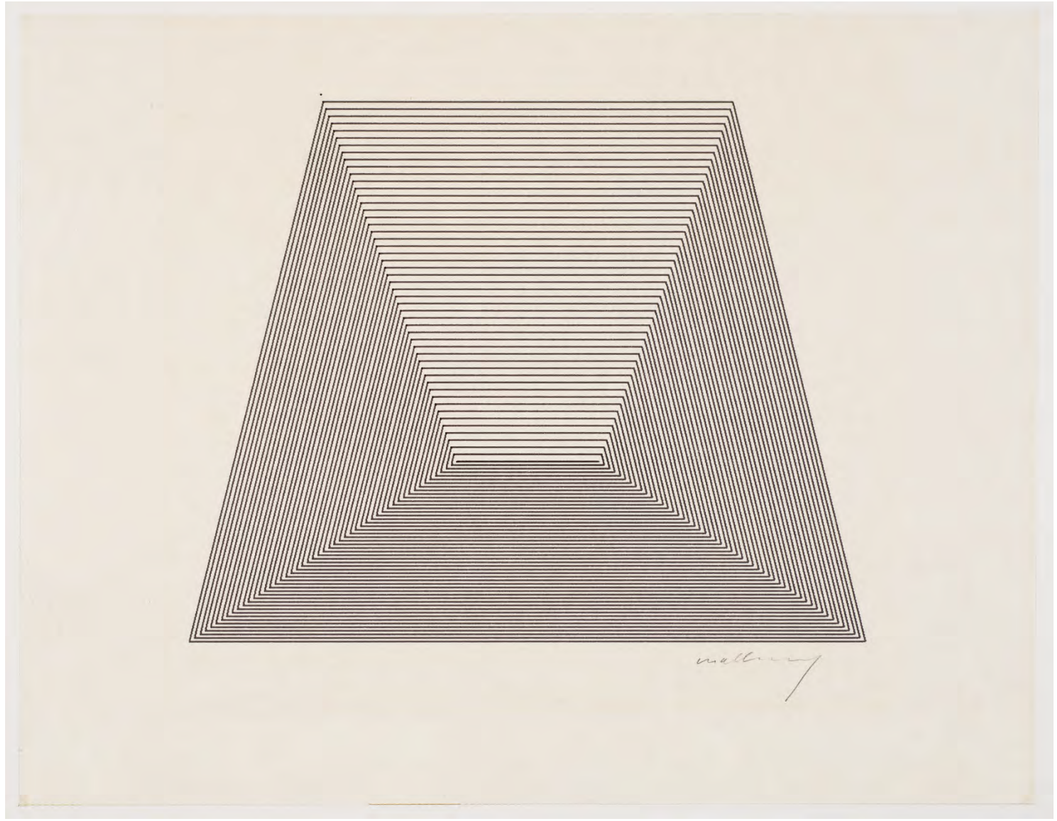


ROBERT MALLARY
Incremental series
1970
Computer drawing
28 x 23.7 cm
11 x 9¾ inches

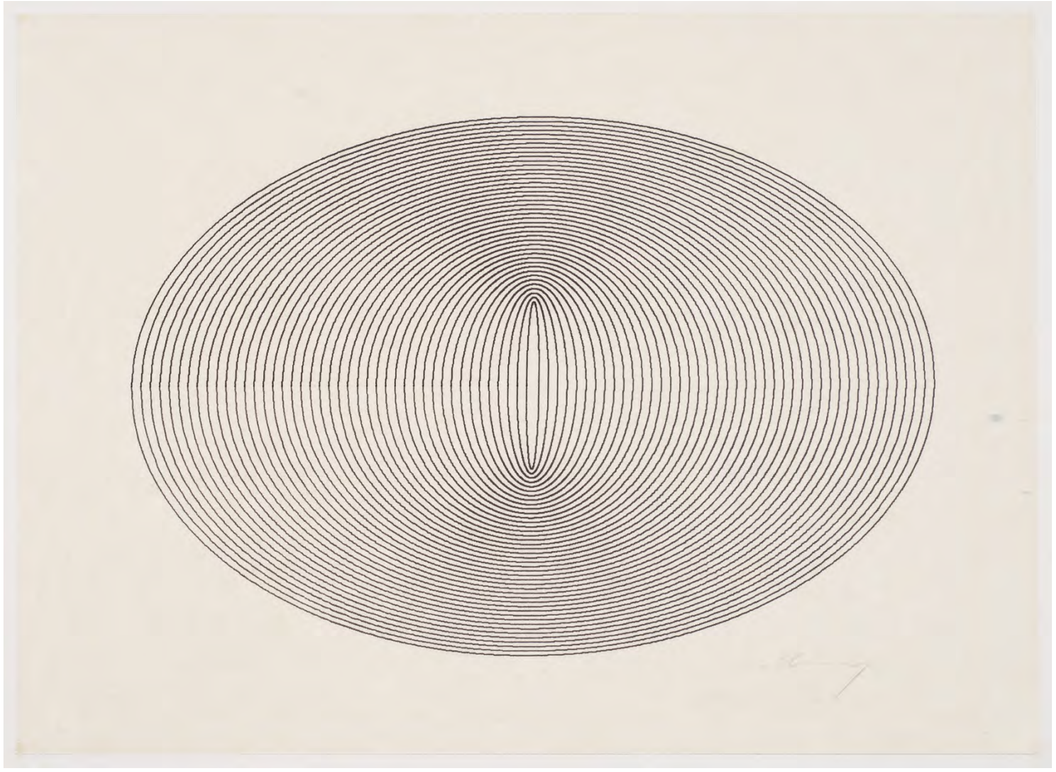
ROBERT MALLARY
Incremental series
1970
Computer drawing
26 x 22 cm
10¼ x 8¾ inches



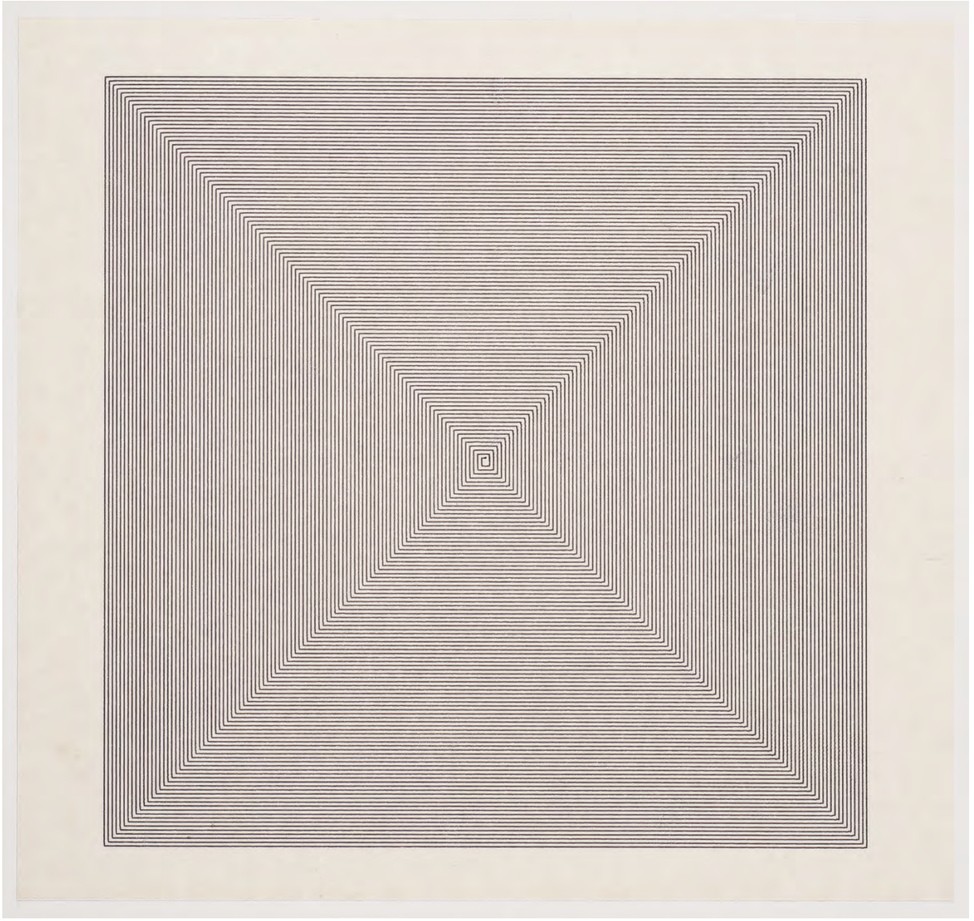
ROBERT MALLARY
Incremental series
1970
Computer drawing
28 x 34.7 cm
11 x 13½ inches



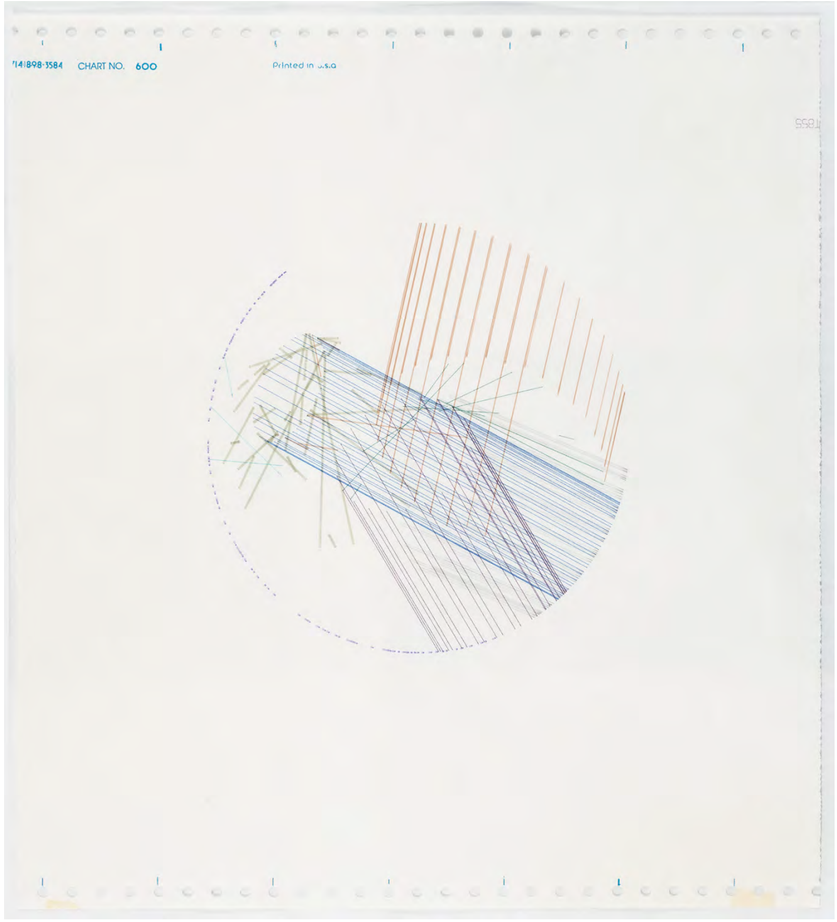
ROBERT MALLARY
Incremental series
1970
Computer drawing
28 x 36.2 cm
11 x 14¼ inches



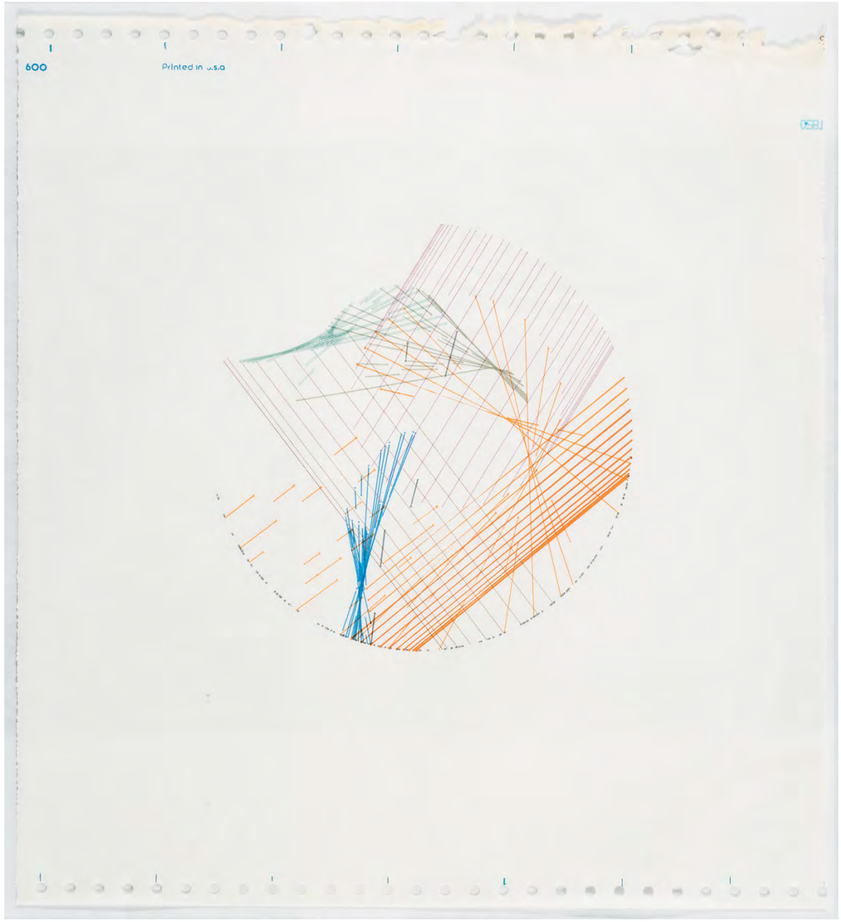
ROBERT MALLARY
Incremental series
1970
Computer drawing
28 x 38.5 cm
11 x 15¼ inches



ROBERT MALLARY
Incremental series
1970
Computer drawing
28 x 29.8 cm
11 x 11¾ inches



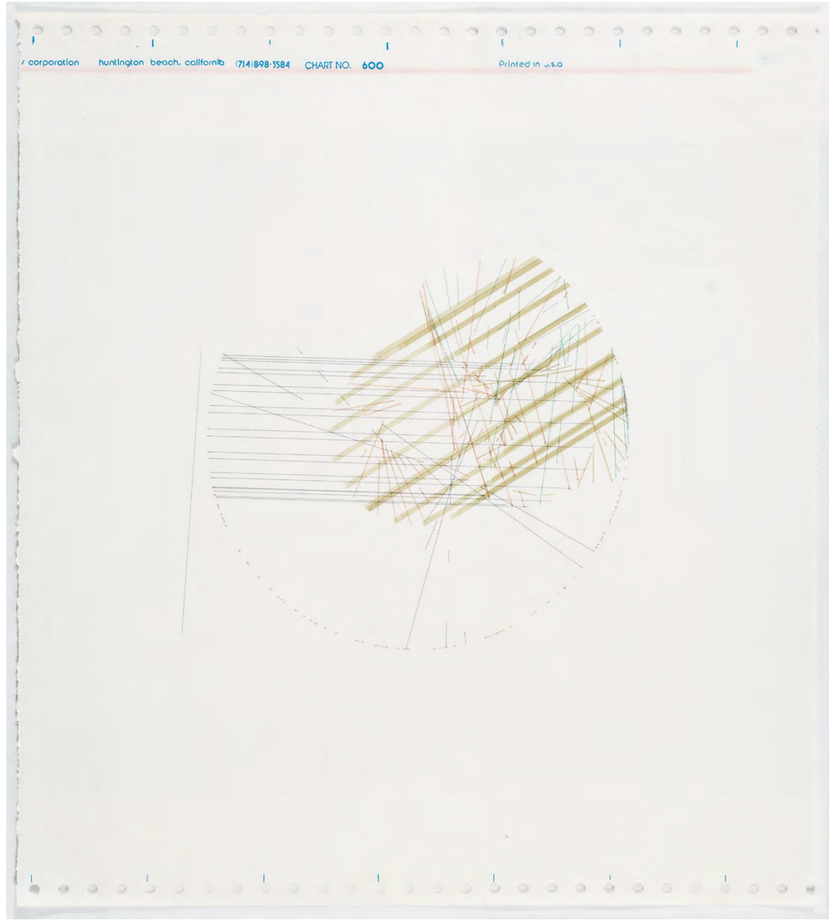
ROBERT MALLARY
Solar series
c.1970s
Computer drawing
39 x 36 cm
15½ x 14¼ inches



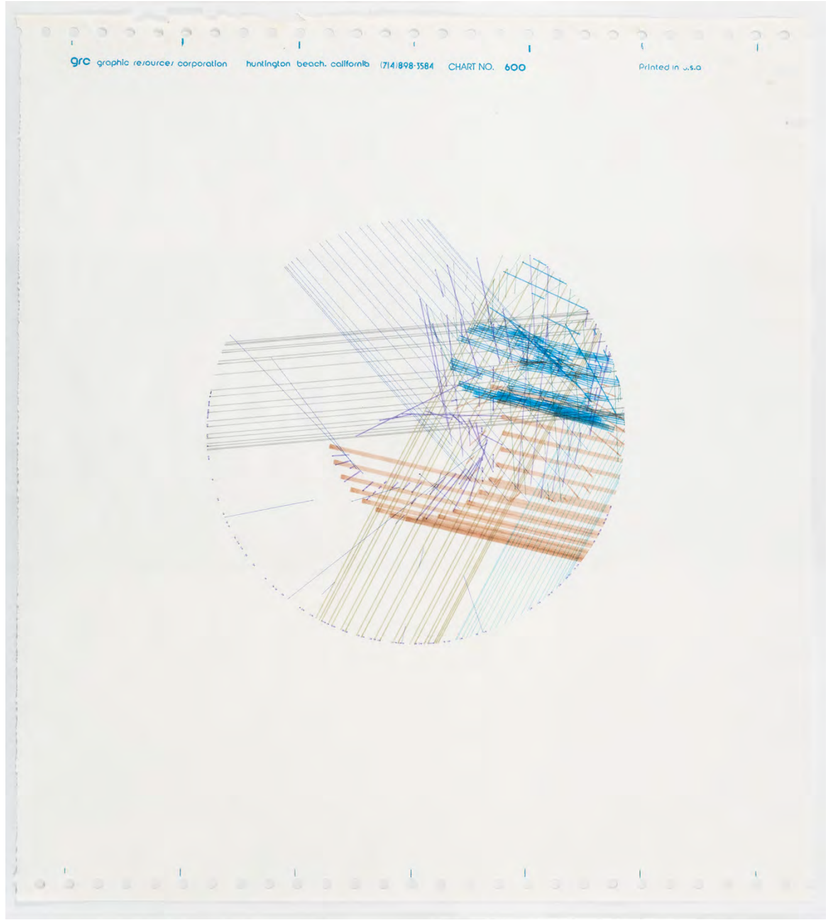
ROBERT MALLARY
Solar series
c.1970s
Computer drawing
39 x 36 cm
15½ x 14¼ inches

ROBERT MALLARY
Solar series
c.1970s
Computer drawing
39 x 36 cm
15½ x 14¼ inches

ROBERT MALLARY
Solar series
c.1970s
Computer drawing
39 x 36 cm
15½ x 14¼ inches

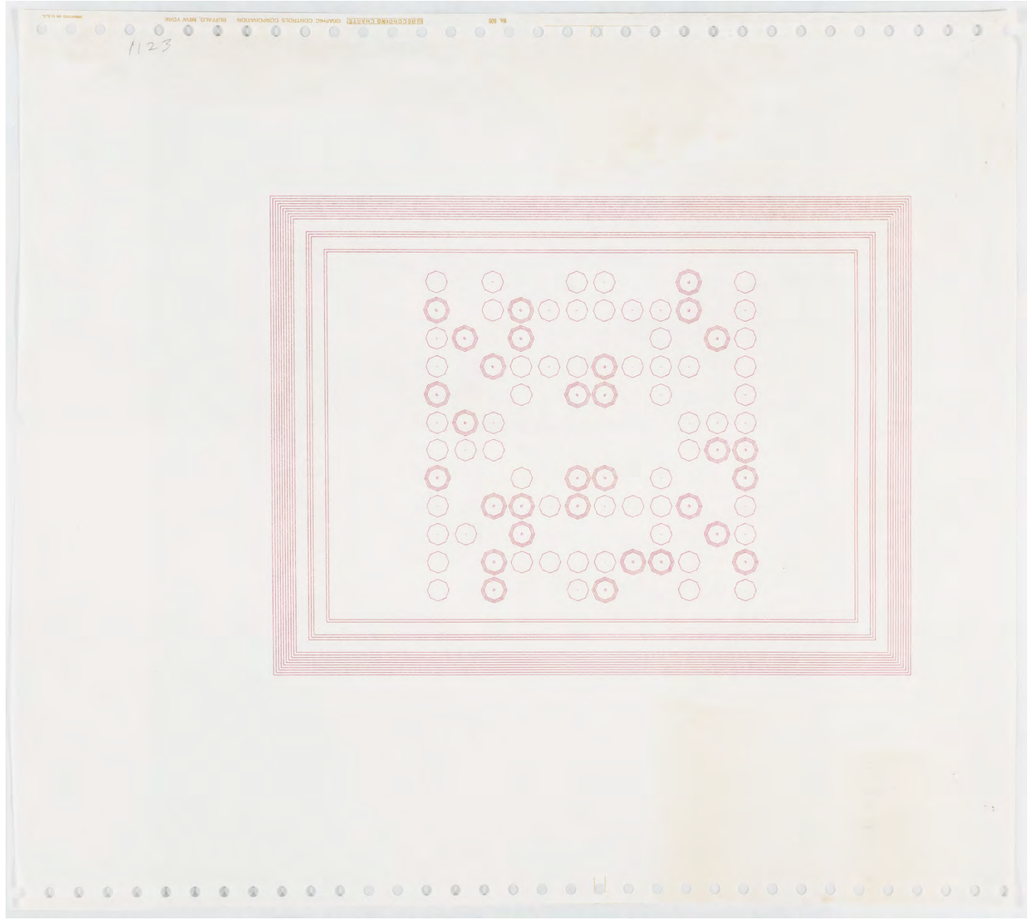


ROBERT MALLARY
Solar series
c.1970s
Computer drawing
39 x 36 cm
15½ x 14¼ inches

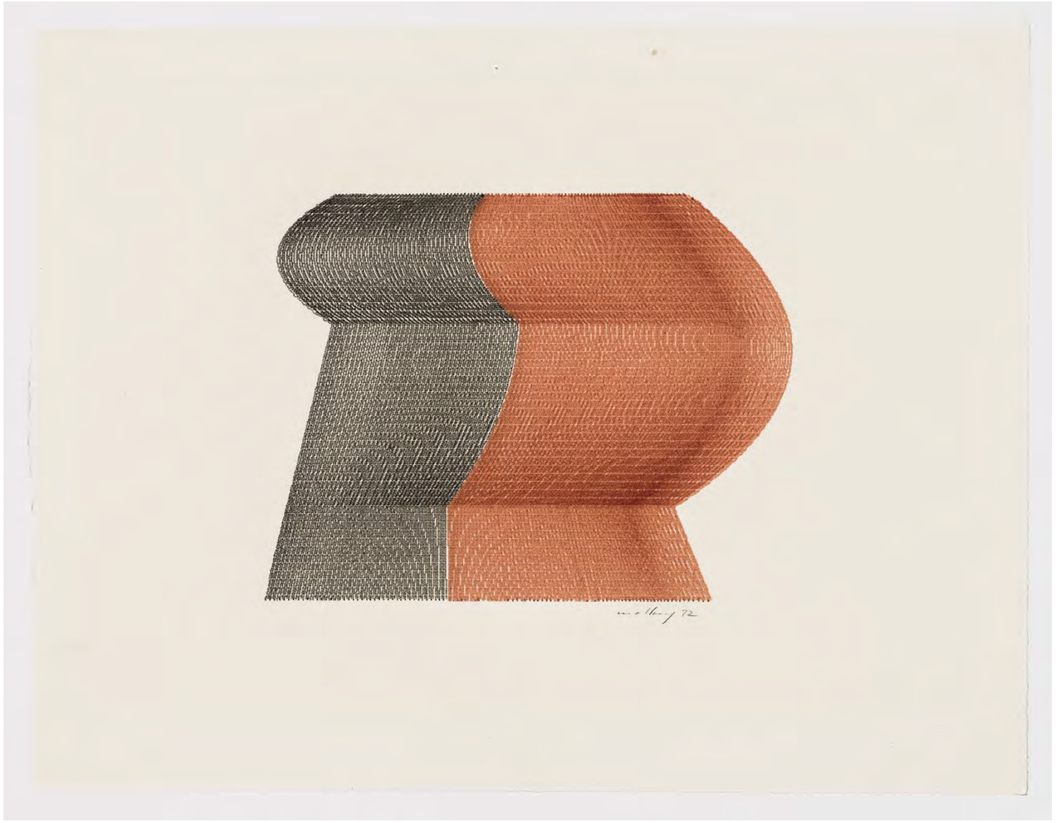


ROBERT MALLARY
Solar series
c.1970s
Computer drawing
39 x 36 cm
15½ x 14¼ inches

ROBERT MALLARY
Unititled
c.1970s
Computer drawing
39 x 35 cm
15¾ x 13¾ inches



ROBERT MALLARY
Unititled
c.1970s
Computer drawing
39 x 43 cm
15¾ x 17 inches

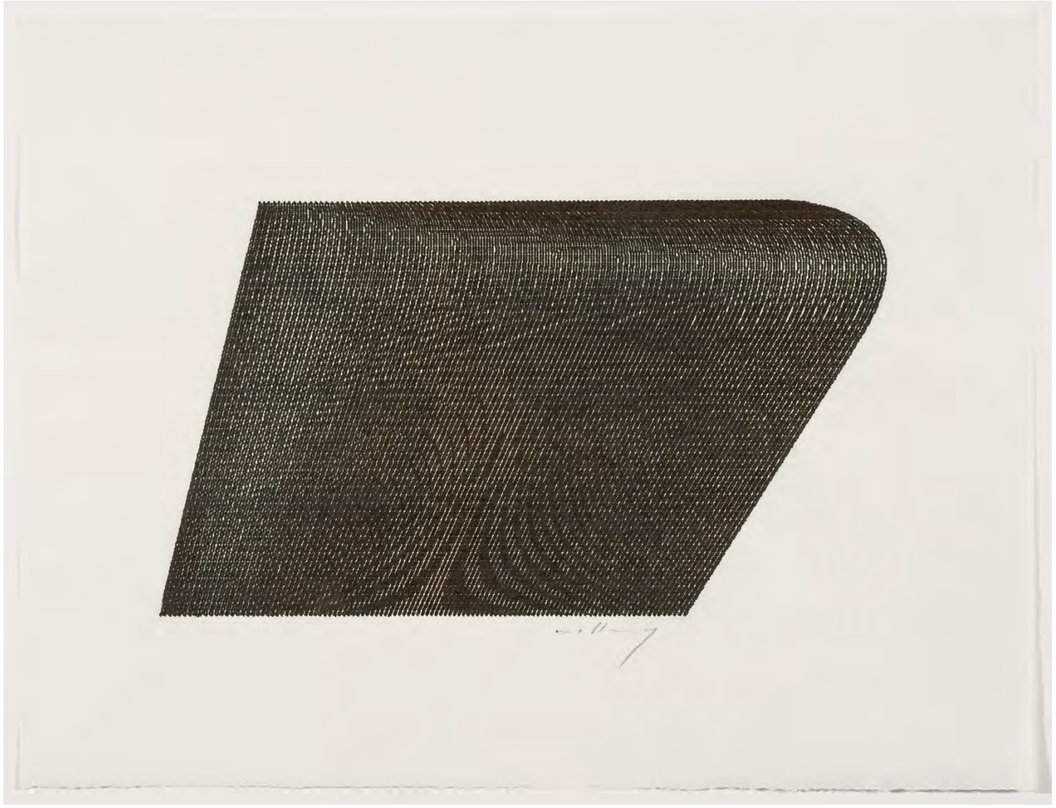


ROBERT MALLARY
2 colour plotter graphic
1972
Computer drawing
22 x 28 cm
8¾ x 11 inches

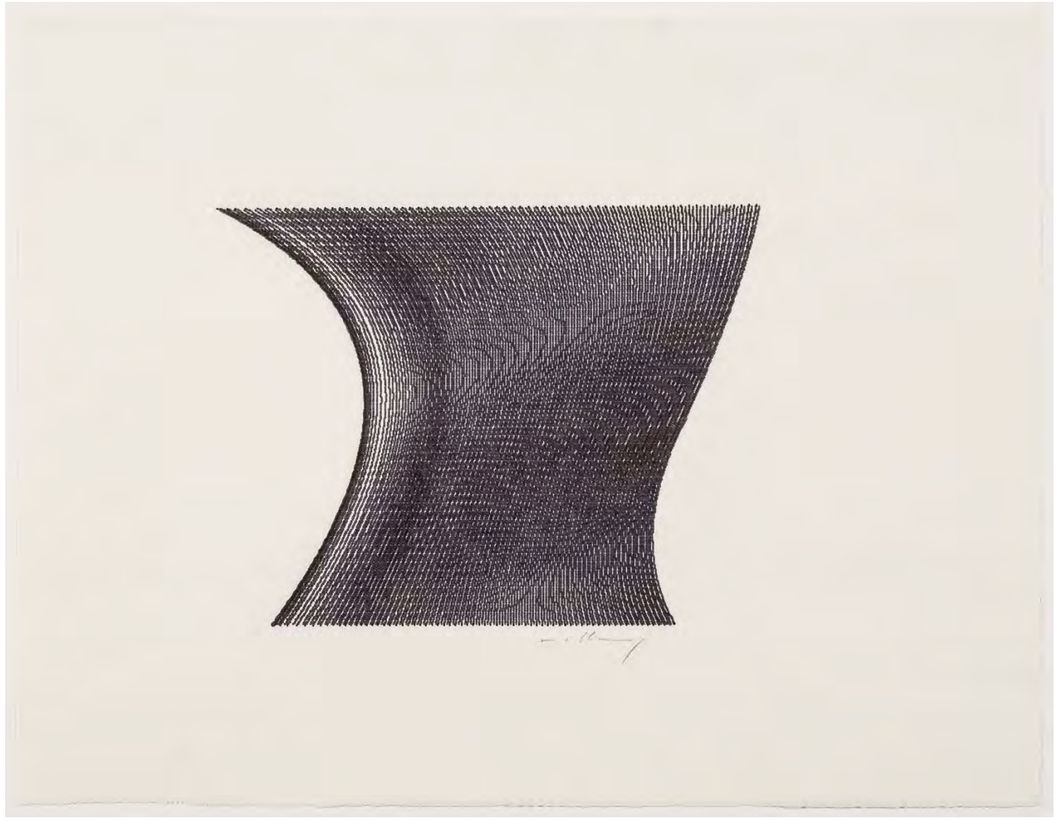
ROBERT MALLARY
3 colour plotter graphic
1972
Computer drawing
28 x 22 cm
11 x 8¾ inches

ROBERT MALLARY
Incremental series
1972
Computer drawing
28 x 19.5 cm
11 x 7¾ inches

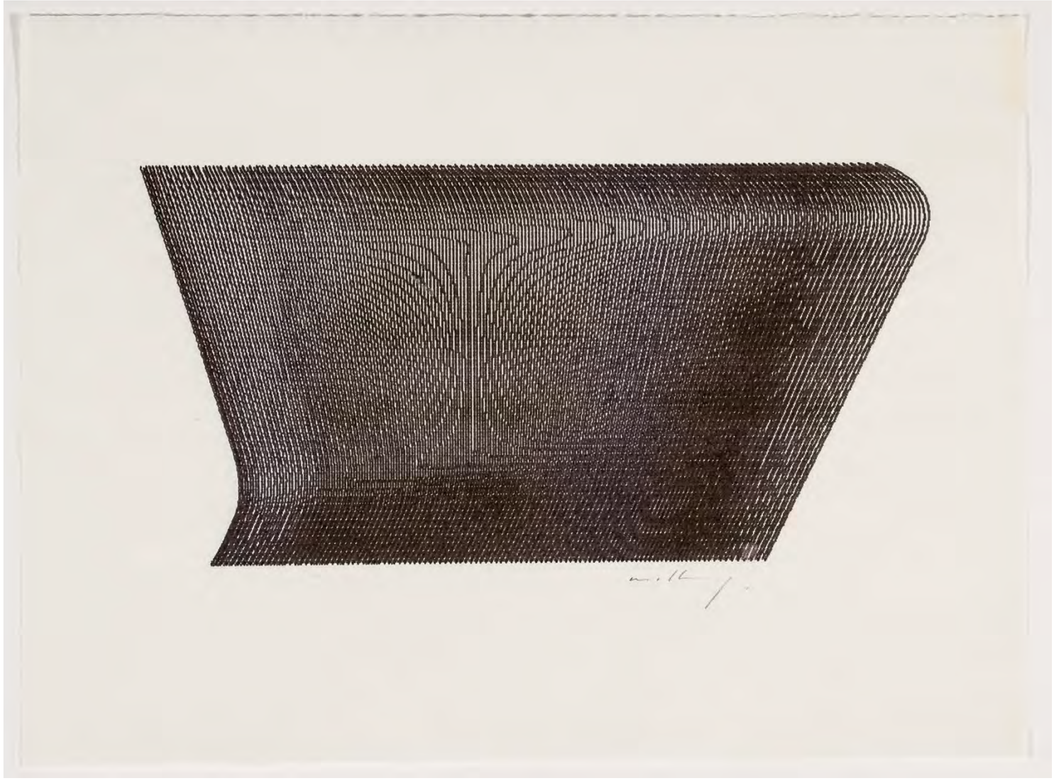
ROBERT MALLARY
TRPL series
1972
Computer drawing
28 x 21 cm
11 x 8¼ inches



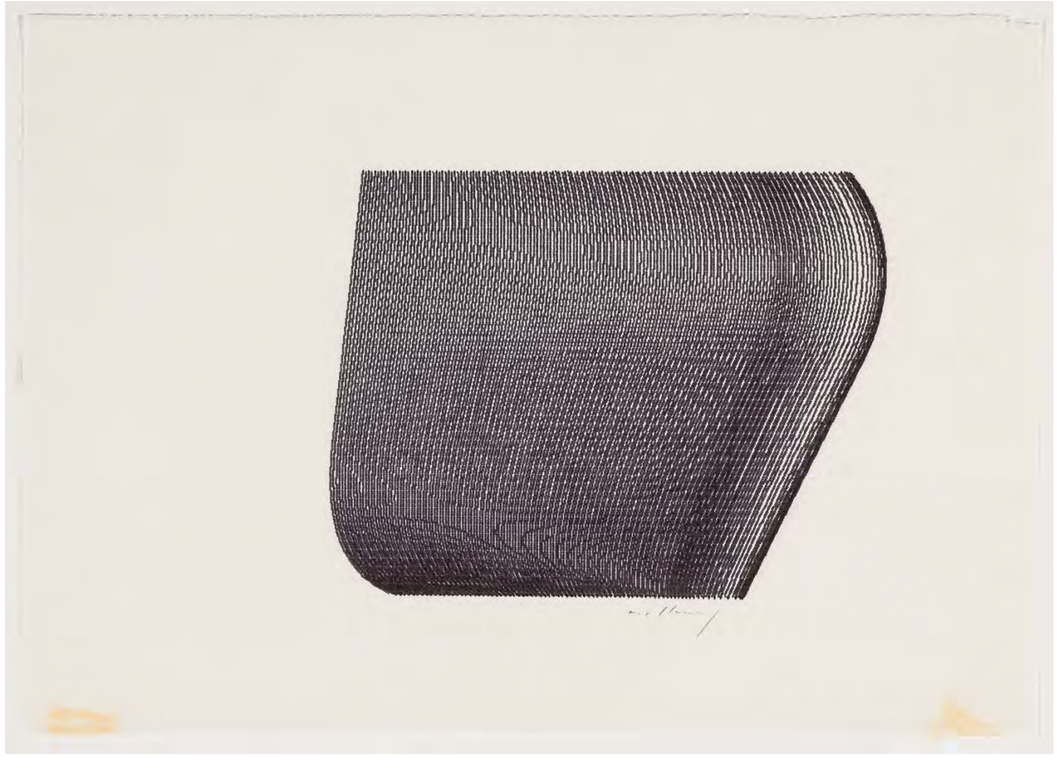
ROBERT MALLARY
Incremental series
c.1972
Computer drawing
21.5 x 28 cm
8½ x 11 inches



ROBERT MALLARY
Incremental series
c.1972
Computer drawing
22 x 28 cm
8¾ x 11 inches



ROBERT MALLARY
Incremental series
c.1972
Computer drawing
21.5 x 29 cm
8½ x 11½ inches



ROBERT MALLARY
Incremental series
c.1972
Computer drawing
19.5 x 27.5 cm
7¾ x 10¾ inches

ROBERT MALLARY
Quad III
1969
Computer-generated plywood laminate
195.5 x 25.5 x 30.5 cm
75 x 10 x 12 inches

VERA MOLNÁR

VERA MOLNÁR INTERVIEW BY ANGERIA RIGAMONTI DI CUTÒ FOR *STUDIO INTERNATIONAL* (EDITED)

'I have no regrets. My life is squares, triangles, lines'

The pioneer of computer-assisted art recounts her love affair with lines, the balancing of order and chaos, and preparing to be surprised. Born in Budapest in 1924, Vera Molnár moved to Paris in the late 1940s, pursuing a lifelong fascination with geometric forms, both in her solo practice and as a co-founder of GRAV (Groupe de Recherche d'Art Visuel). Attuned from childhood to the possibilities of a system-based art, Molnár conjured up a "machine imaginaire" whose hypothetical programmes altered the concrete bones of her images, rotating, disordering, and fracturing specific elements in multiple iterations.

Later, facilitated by the freeing spirit of 68, Molnar gained access to actual computers, the imagined machine now real. Throughout, her ingenious research has probed the question of what a machine can accomplish, whether intervening on geometric forms, printed or handwritten letters.

Avoiding premeditation, Molnár fine-tunes her programmes as the works unfold, favouring an instinctive method that enables greater receptiveness to the unpredictable, an approach she has called "the conversational method". In addition to the computer's evident speed and scope for calculation, Molnár values its greater finesse and intuitive potential in realising an imagined image: "This may sound paradoxical, but the machine, which is thought to be cold and inhuman, can help to realise what is most subjective, unattainable, and profound in a human being".

Angeria Rigamonti di Cutò: I'd like to start by talking about the early years of your career in Budapest, particularly about the artists that interested you at the time. I was struck that you discovered your modernist compatriots such as [László] Moholy-Nagy mainly after you'd left Hungary. I think you've mentioned [Jean] Hélion, and I imagine that Cézanne and Klee were points of reference since you cited them in several works. James Joyce too; you even dedicated a beautiful 'livrimage' to him.

Vera Molnár: Joyce reached Budapest at the end of the war in a very good translation that someone had brought from Paris. I had no idea who James Joyce was, no idea. I read him and it took my breath away.
(…)

To come back to Budapest, one event was James Joyce and Ulysses, the other was Matisse, not Moholy-Nagy whom I didn't know, as you were saying.

Because just before the war I was already at the fine arts academy but it was a National Socialist education where one didn't talk about such degenerates. But Matisse arrived through the same channel as Ulysses, our French professor at art school who was implicated in the last political trial, a heroic trial, he left soon afterwards. His name was François Gachot. (…) Afterwards, again through François Gachot, Cézanne entered my life. (…) I liked the Mont Sainte Victoire so much. And have cited it several times…
(…) That was the source and the next step would be Mount Ste Victoire with the computer. How did it come back the second time? I was in the States, my husband was working, I think at MIT but I'm not sure. In any case for me it was heaven because there was no cooking or shopping to do so I had all the time in the world but there was nothing in Cambridge. It's not far from Boston but it's still quite a distance. I would go to the library and I came across a book on geometry with Gaussian curves. It interested me because I was a little tired of squares, circles, squares, circles, triangles, square, circles… I liked Gaussian curves. I tried making some, injecting a little disorder in the ascent and descent. I was very pleased, thought I was brilliant. I made a whole pile of drawings - this has nothing to do with Mount Ste Victoire yet, but wait, it will re-appear. These were Gaussian curves with disorder. On the last day in the motel our case was stolen, it had all our work of two or three months, nothing valuable, not a cent, a note, nothing except our work. And this imbecile, instead of throwing it in a ditch or giving it to the first cop, disappeared. I said, shit, I never want to hear about Gaussian curves again. I went back to circles and squares and thought no about it, the thought sifted down to the bottom of my brain.

One day, I had an exhibition in Aix-en-Provence. The first morning - I don't know exactly sure where I was staying, but I think now that's where I was - I open my window and the Gaussian curve was in front of me: it was Mount Sainte Victoire. I said to myself, I'd better quickly start working on this again. For once I had no paper, no pencil, nothing. I took out of the cupboard the lining paper, it was torn. I still have that drawing. I started working on it and it became my subject, I did it on the computer, that was an idea that had nothing to do with Mount Ste Victoire. It was a single line placed on the plotter, without removing the pen, it appeared elsewhere, but lower down, so it was coming and going, like a shuttle. I did one return journey, two or four quickly, according to a childish mathematical rule. I really liked it. I also did one where I removed the pen, starting again, with the same curve with the *pentimento* method. Do you know what that is? It's a drawing you do like this, looking for - Delacroix did some beautiful ones, with many lines, fifty lines. It's called *pentimento*. You change your mind, my whole life has been a *pentimento*, I do it all the time. I've also done it with one line, two lines, four lines, a thousand lines. The rule of my game was very scientific, do you know where I stopped my progression? When the paper tore.
(...)

ARC: But it's interesting that essentially you started 'programming' as a child. Because you regularly drew the view on Lake Balaton in the same four colours and when you ran out, you systematically used the closest colours in the palette. Was there something in particular that triggered the passage from the figurative to the abstract?

VM: Well, it happened through trial and error, small movements, going back and forth, retracing my steps, to and fro. As always, my state of mind - I can explain it best by talking about another eminent colleague, [František] Kupka.

When he began doing non-figurative painting, he went to the forest, kneeled before nature and begged its forgiveness for having betrayed it. I wasn't a believer, so I didn't kneel down. But a fine arts apprenticeship is very hard: a portrait of my mother, a sunset, apples and pears. And suddenly, total freedom is horrible, you can do anything. And you know what helped me there a lot? It was cubism.

I came across cubism which in a sense is a figurative tendency, it represents something, even if not faithfully. So, this ambiguity between figuration and abstraction, that's precisely where I began. That was the passage. Because until then - today I know this - I played at painting like a rich girl who's given everything, pastels if you want them, pencils if you want them.

With cubism - I was already at art school - I caught hold of something. Afterwards it moved by itself. There are many contradictions, for example still today I really like Paul Klee who has nothing to do with non-figurative painting. I have no regrets. My life is squares, triangles, lines. I am mad about lines.

ARC: You later developed precise systems to create variations and deviations of geometric forms, sometimes using specific percentages to create these transformations. You called this a 'machine imaginaire'. Later still, you gained access to real computers which presumably saved you a lot of time.

VM: It saved me a lot of time, and wasted a lot of time.

ARC: But did you see the computer purely as mechanical tool, 'a slave that carries out your wishes', as you've defined it, or can it actually change your way of thinking and working?

VM: Both. It's a tool that works nights, that has no respect and offers no salary increases.

What interests me in life, even today, is surprise. With the computer you create a programme, you faithfully execute your idea. You'd really be a slave if you didn't try out crazy ideas. So you have to prepare yourself to be surprised, which one wouldn't have done working by hand or otherwise. And, on the other hand, mistakes are also good surprises. You get a comma or slash wrong and something comes that you hadn't wished for at all. But that's also a very curious thing, unfortunately I threw the mistakes away, stupidly. What a pity. How stupid, well in effect there was no room.

ARC: The pioneering computer programmer Grace Hopper said that programming was like planning a dinner party, in the sense that everything had to be prepared beforehand but you've said that you develop the rules as you go along, so I imagine that the machine can, perhaps paradoxically, surprise you, as you were just saying, and enable an almost intuitive relationship between the artist and the machine?

VM: Yes, I think that ultimately the intuition of an artist is the "random walk" of the computer. To return for a moment to surprises, misses, mistakes that I've made, it resembles my work after all, which is why I regret having thrown things away.

Why on earth, what was left of my thoughts, when everything else was wrong but something remained. I really regret having got rid of those mistakes. I felt I'd betrayed myself, come on my girl, you're intelligent, don't allow yourself…

Nowadays we probably don't realise to what extent, at the time, using a computer to make artworks must have seemed eccentric.

ARC: Do you think that the climate of May 1968 facilitated things and what reaction did you get from the university when you contacted them to find out if you could use their computers?

VM: It would only have been possible in ’68. I had long dreamed of computers, not exactly sure what it was about, but still somehow realising. In ’68 we spoke to anyone, asking any question, there was a freedom. I knocked at the door of the director of the calculus department at the University of Paris at Orsay (I was unknown to him), and told him, ‘I’d like to try making visual art with your computers’. The expression on his face! You can’t imagine. Should I call a nurse immediately? Later, I got to know him, we were talking and he said, ‘do you know why I agreed?’ ‘No’. ‘Because of Voltaire. Suddenly, a phrase of Voltaire came to mind. Voltaire said, I wholly disagree with what you say and want to do, but I will defend to the death your right to try it’.

And then, even you really can’t imagine, at the time it was the very beginning of the arrival of computer screens. Imagine a computer with no screen, where one can only imagine, using only 0,1,000, 111. Goodness…

When I saw a screen for the first time, I’ll never forget it. It was like arriving in Paris, or the end of the war, there are days like that that you never forget. I had the impression that this screen had been invented for me. That other people didn’t know what to do with it.

I always thought scientists were a bit narrow-minded. They don’t understand that a square and a triangle together can produce wonderful things. I had the impression that it was made for me. In a way, I was right. Interacting with a computer, you imagine something and a moment later you see it. You say, yes, maybe, a little - and then you see it.

Anyway, this dialogue - a painter has it with his paper and pencil - but it’s so much slower than with a more or less well-established programme. You can go through infinitely more possibilities.

Another paradox, and it’s the greatest paradox, is that working with a computer you reach what you imagined with greater finesse than when you work by hand. Simply because you’ve gained so much time. Because any crazy idea, you can realise it, or later say, no -it doesn’t interest me, or maybe there’s something in it.

I’ve never done it, but I imagine that it’s bit like psychoanalysis. You learn something about your own desires and tics. For example, you understand very quickly when you always repeat yourself all the time: Ah, my girl, my boy, you’re being silly. In any case, it was a great adventure for me, a great adventure.
(…)

ARC: At the same time you don’t seem to have been tempted by kineticism which was a prevalent direction at the time with anti-expressionist abstractionists. You seemed purely interested in, almost in love with, the square and all its possible permutations.

VM: You’re absolutely right but it wasn’t a rejection of something I didn’t like, I found it fascinating, it’s a game for the eye. But it was exactly at that time that I had to learn Fortran, Basic, and I don’t know what else, so I didn’t have the time. So, it wasn’t an oversight, it was simply lack of time. (…) There are things I didn’t do because they didn’t interest me but I didn’t do op art because I had this idea that I had to learn Fortran.

ARC: You’ve described yourself as situated between the ‘three cons’. Unfortunately, the play of words will get lost in translation.

VM: It’s meaningless.

ARC: But it’s still a useful and witty formula: namely computers, constructivism and conceptual.

VM: I said it one day by chance. I was asked where I would place myself. I have a young friend who did his thesis on my work who found another expression which I really like, he said I’m an anarcho-constructivist, which isn’t bad. Because I’m not, you know what a concrete artist is? I’m absolutely not one, really. Inventing systems and then following them, no way. I adore taking little side routes, I adore allowing myself to be disturbed. If I see some spit or shoelaces, I run over to photograph it. I don’t like obedience.

ARC: Though Max Bill did include you in his exhibition of concrete art in 1960 I think?

VM: Thanks Max Bill.
(…)

ARC: Another really fascinating series is *Lettres de ma mère* where you combined handmade and computer drawings based on your mothers’ letters, in which her handwriting became increasingly irregular. That combination of handmade, personal signs and others produced by the computer is particularly interesting because it introduces an autobiographical element which might seem to be in contradiction with the usual rejection of the personal in your work?

VM: Like many things in life, the whole work and its reception were based on a misunderstanding. I was fascinated by my mother’s handwriting that was perfectly regular at the beginning of the line and as the line progressed it became more disordered. Years passed, it was already disordered at the beginning and completely so by the end. So that crescendo of disorder really fascinated me as it was completely against the principles instilled in me at art school: principles of disorder, order that are the basis of painting.
(…)
So into this crescendo moving right, done on the computer, between alternate lines, I would insert by hand the crescendo at the beginning with the signs becoming increasingly more regular.

It was interesting but something else. Because what intrigued me in my mother’s letters and handwriting was precisely that attack on classical composition inculcated in me at art school.
(…)
This is just to say that the computer is an amazing thing because you can look at something out of curiosity then and there that would take 15 days of work so you wouldn’t do it. On the computer you immediately see it in front of you.

ARC: You worked collaboratively with your husband François Molnar and you also belonged to an artistic collective, GRAV [Groupe de Recherche d’Art Visuel].

But in both cases, you returned to solo practice. For all the 60s interest in collectives, do artistic partnerships work? In practice, doesn’t the tension between a rejection of the market and the need to sell often cause problems within groups?

VM: It’s hard working with someone, but it’s wonderful because it’s not 1 plus 1 equals 2, but 1 plus 1 equals 3 or 4. But with my husband it worked because we were quite different. Paradoxically, I was more organised and he was more imaginative. It worked very well.

But with GRAV it was hard because there was a misunderstanding from the beginning. Above all and immediately they wanted an art career, with galleries, museums, dealers. I didn’t want that at all.

Another paradox, the lot of the poor woman stuck at home, that helped me work.
(…)

ARC: What was your experience of being the only woman in that milieu, at least in France I think?

It’s interesting that in the world of computer art there were some notable women, whether practitioners or critics and curators such as Jasia Reichardt who curated the landmark Cybernetic Serendipity exhibition. But there weren’t many, considering that computer culture derived from engineering and the military.

VM: Men have always helped me. I’ve learnt many things from men. Not because they were men. Someone I learnt a lot from was Abraham Moles who isn’t talked about anymore. He caught on to modernity, to new ideas, very quickly. I don’t suffer from the idea of being a woman. No, perhaps I was lucky and came across intelligent men. They actually helped me more than anything else, though perhaps it was based on a misunderstanding, ‘poor little thing with her dishes and cooking, with nothing to do, we can help her’. The composer Pierre Barbaud helped a lot, but I also helped him.

ARC: In the States, for example, some practitioners of digital art including Lillian Schwarz had institutional support at Bell Laboratories which hosted the well-known Experiments in Art and Technology co-founded by [Robert] Rauschenberg.

In France I imagine you had to make your own way. Was this autonomy an advantage?

VM: Both, because my husband often worked in the States so I often had - I knew Bell Laboratories very well and did a few things there. You know, I play at being an intelligent woman but it isn’t true. Chance pushed me left and right and I seized opportunities. I was very happy in the States, really happy, going to libraries, working freely, but I was also very happy in France. The hardest thing is ageing. I’m 93 and it’s becoming difficult but until now it’s been fascinating, a real adventure.

ARC: I find it fascinating that despite an antipathy to individuality or artistic heroism, something called style persists. Ultimately, one can always distinguish a Molnar from a Morellet, a Judd from a LeWitt and so on. You yourself have theorised aesthetic guidelines for computer art.

But isn’t it impossible to systemise beauty – and I think many people would consider your works beautiful?

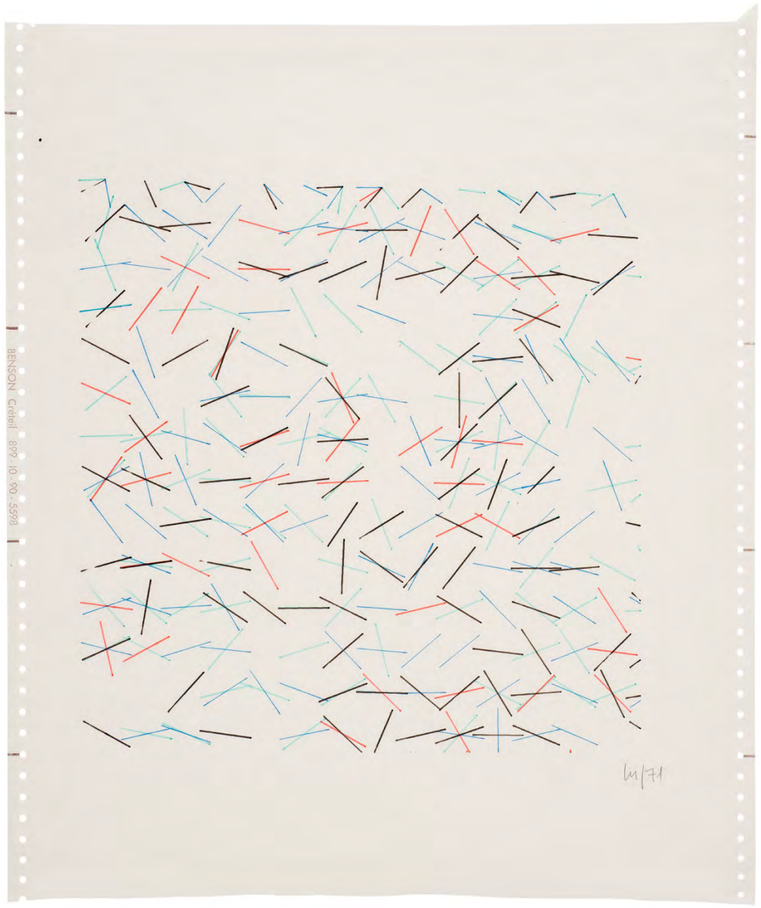
VM: No, I want to, I wanted to especially, but I don’t think in general that one can.

Ultimately, my whole life has been a series of disappointments, starting from the idea of becoming a ‘Leonarda’, not from Vinci but from Budapest: to know, to know how. Everything. Later, I realised that I’d like to understand everything but it wouldn’t be that quick. Later – and it’s the same in politics – I would say to myself, working with intuition I have no certainties, none at all. Leonarda da Vinci stayed in Budapest.

ARC: What does reaching a fairly advanced age bring in artistic terms?

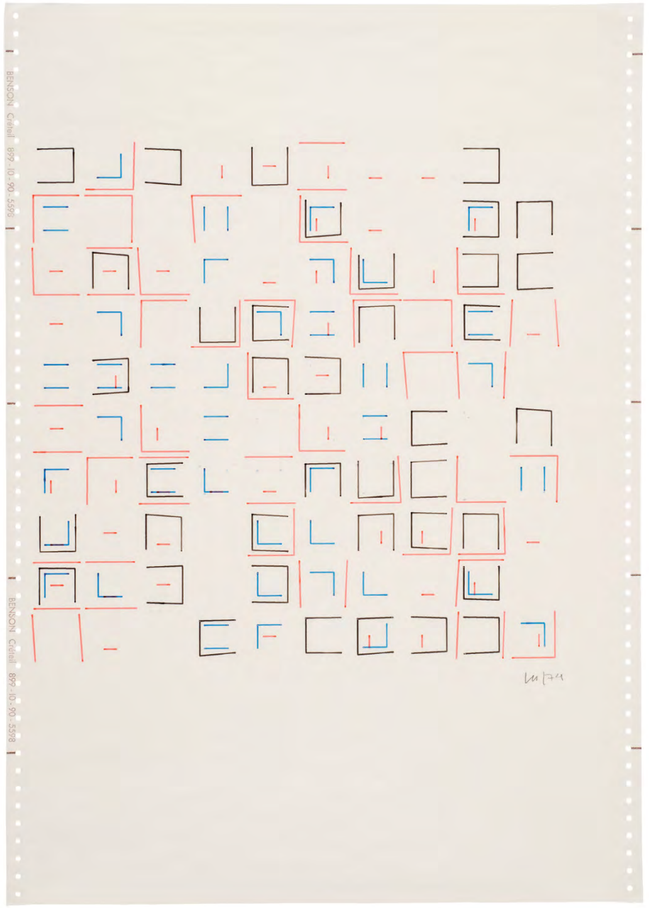
VM: It’s very comfortable. You invent absolutely any nonsense and will always find someone interested. You always find someone, now I have a new friend, an editor at Bernard Chauveau [publisher]. I tell her any old nonsense and she always finds time for it. When I was 30, I couldn’t have, I wouldn’t even have dared say it. There are advantages, also one is more relaxed. I can tell you anything that comes into my head and if you don’t like it, tough. But *Studio International* means something to me, I must have that issue.

ARC: Thank you, Vera Molnár.

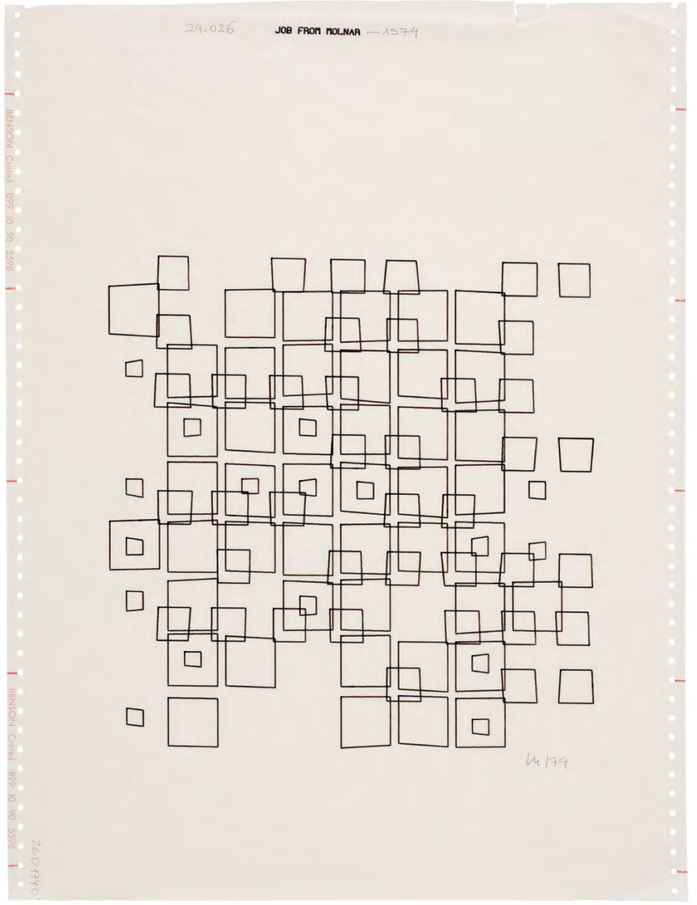


VERA MOLNÁR
Untitled
1971
Computer drawing
42.5 x 36 cm
16¾ x 14¼ inches

VERA MOLNÁR
Untitled
1971
Computer drawing
51.5 x 36 cm
20¼ x 14¼ inches



VERA MOLNÁR
Untitled
1972
Computer drawing
51.5 x 36 cm
20¼ x 14¼ inches



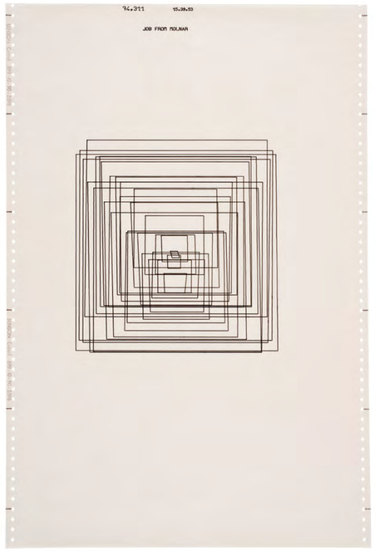
VERA MOLNÁR
Untitled
1972
Computer drawing
46.5 x 36 cm
18¼ x 14¼ inches

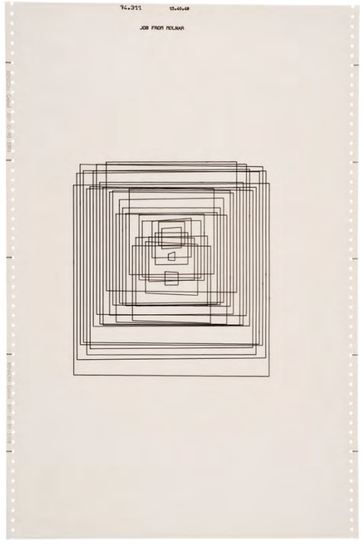
VERA MOLNÁR
Untitled
1972
Computer drawing
30 x 30 cm
11¾ x 11¾ inches

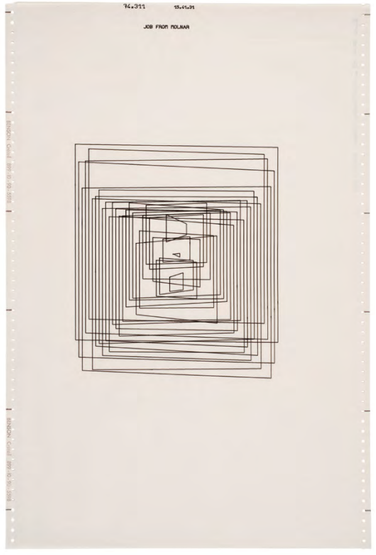
VERA MOLNÁR
Untitled
1972
Computer drawing
30 x 30 cm
11¾ x 11¾ inches

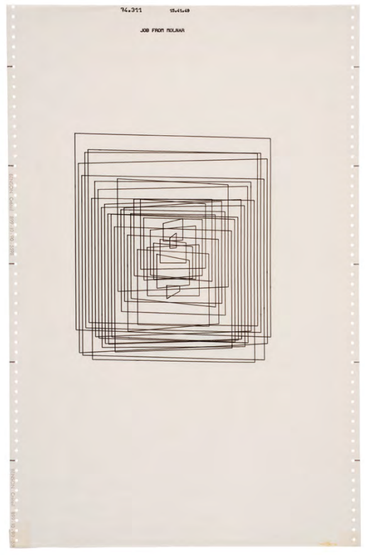
VERA MOLNÁR
Untitled
1972
Computer drawing
30 x 30 cm
11¾ x 11¾ inches

VERA MOLNÁR
Untitled
1973
Computer drawing
50 x 36 cm
19¾ x 14¼ inches

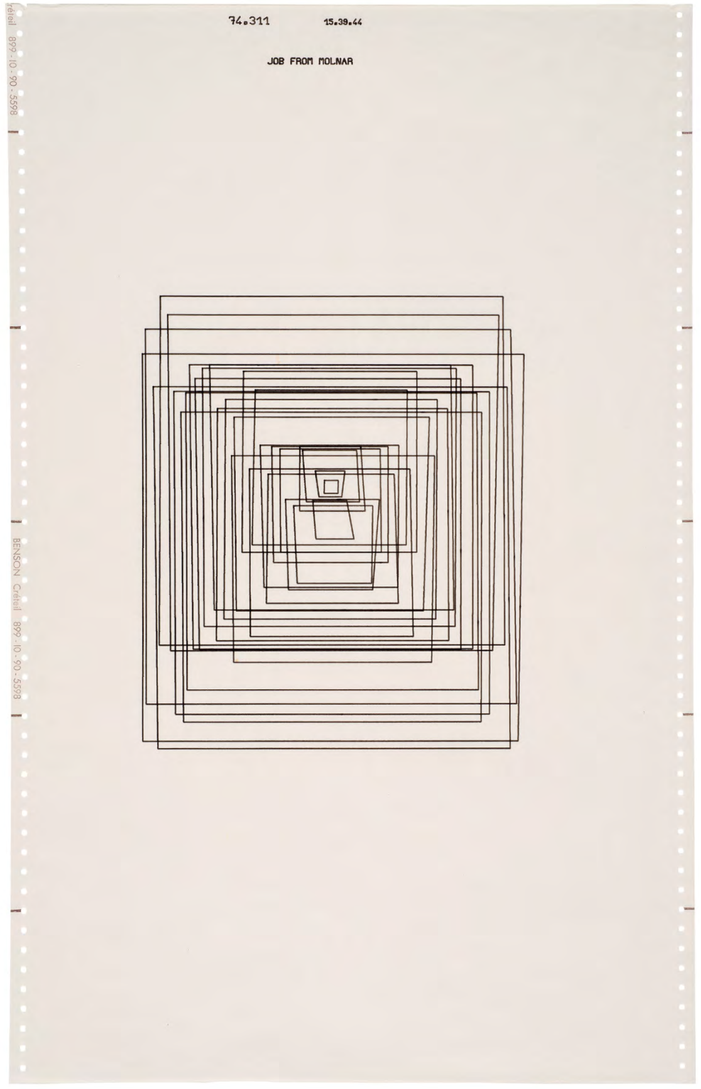


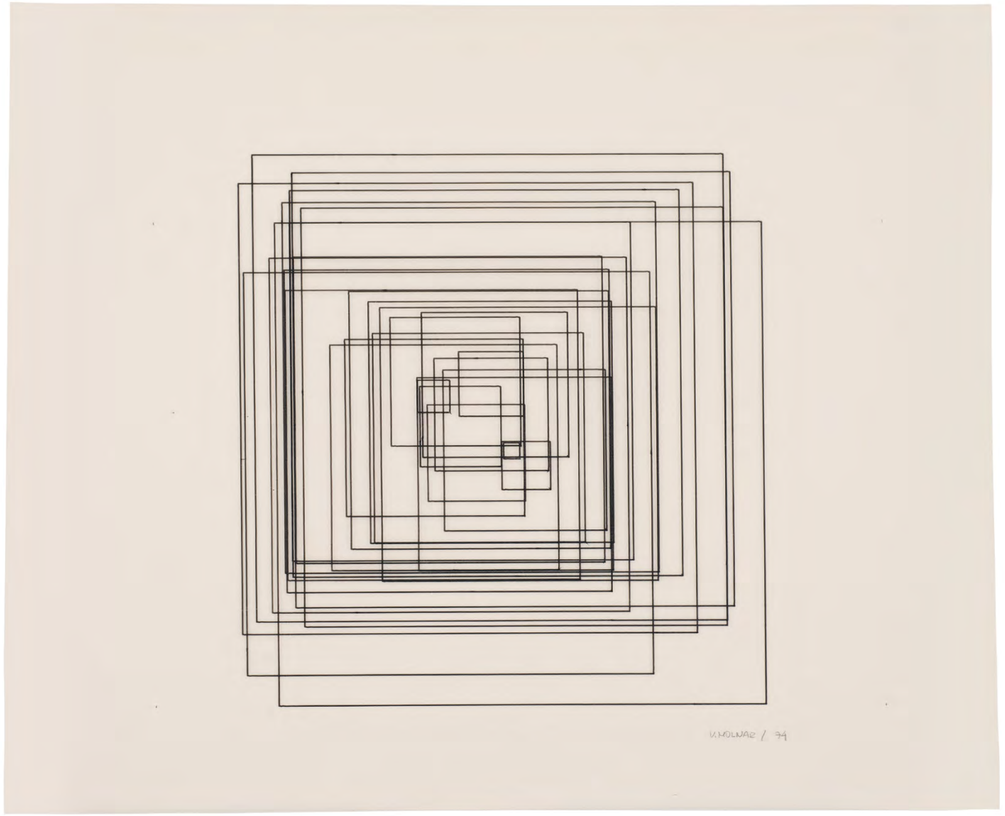




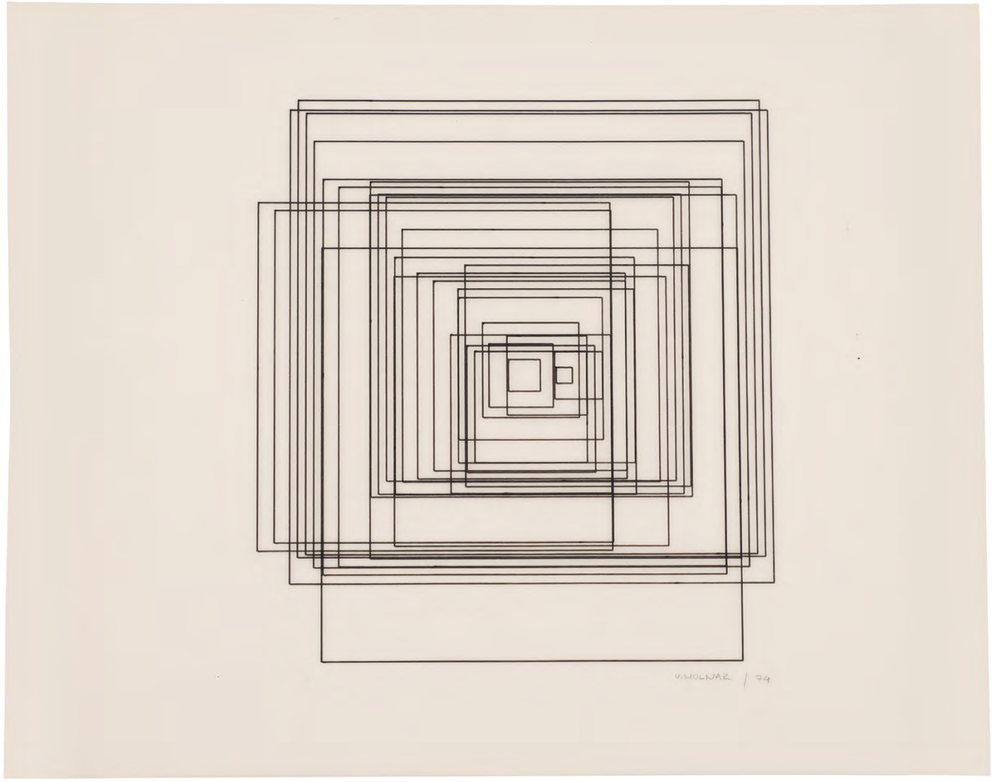


VERA MOLNÁR
Trapèzes inscrits 1 – 5
1974
Computer drawing
55 x 36 cm
21¾ x 14¼ inches

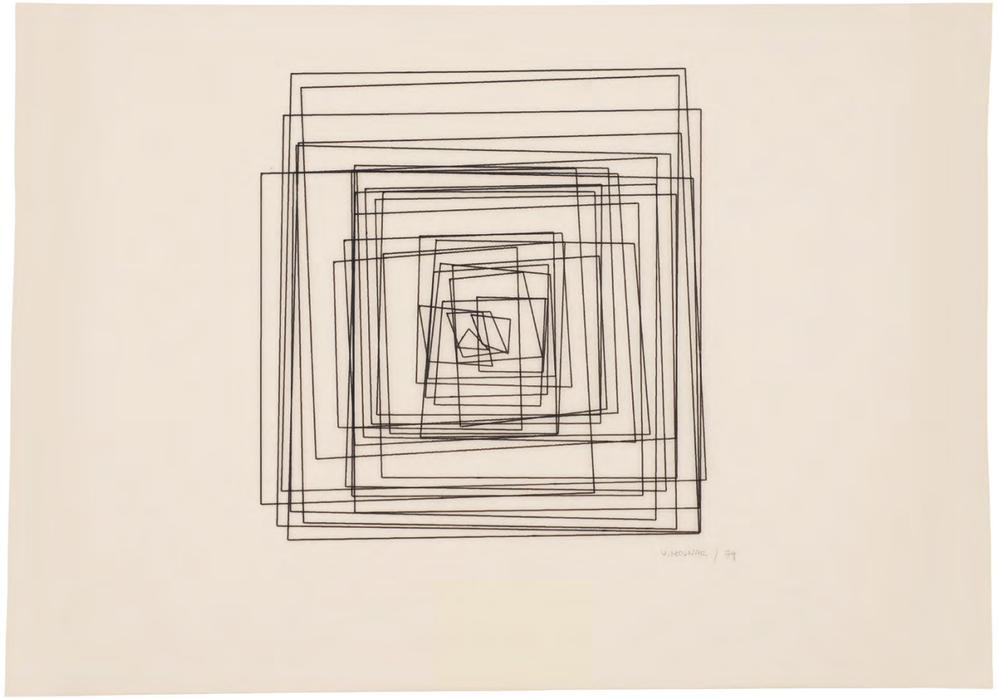




VERA MOLNÁR
Untitled
1974
Computer drawing
33 x 40 cm
13 x 15¾ inches



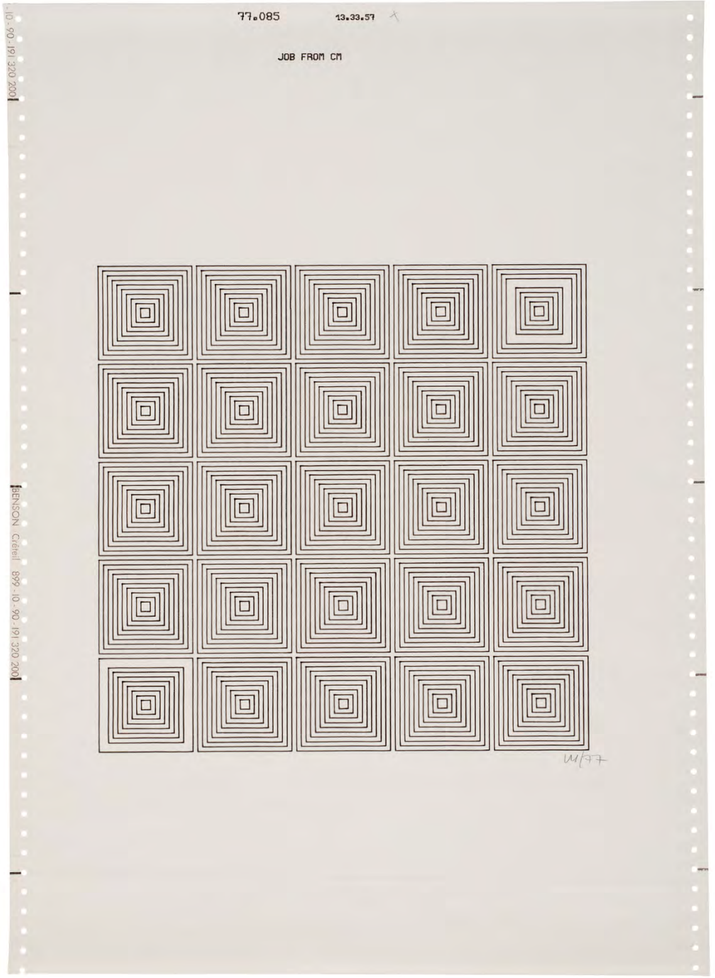
VERA MOLNÁR
Untitled
1974
Computer drawing
29.5 x 30 cm
11¾ x 11¾ inches



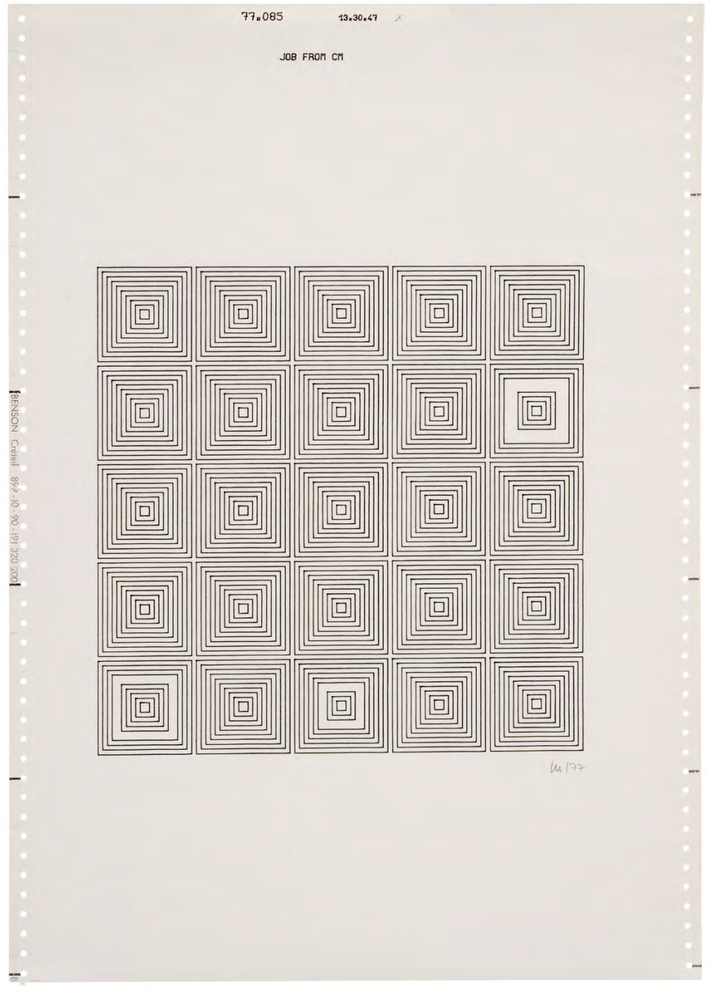
VERA MOLNÁR
Untitled
1974
Computer drawing
33 x 46 cm
13 x 18¼ inches

VERA MOLNÁR
Untitled
1974
Computer drawing
33 x 40.5 cm
13 x 16 inches

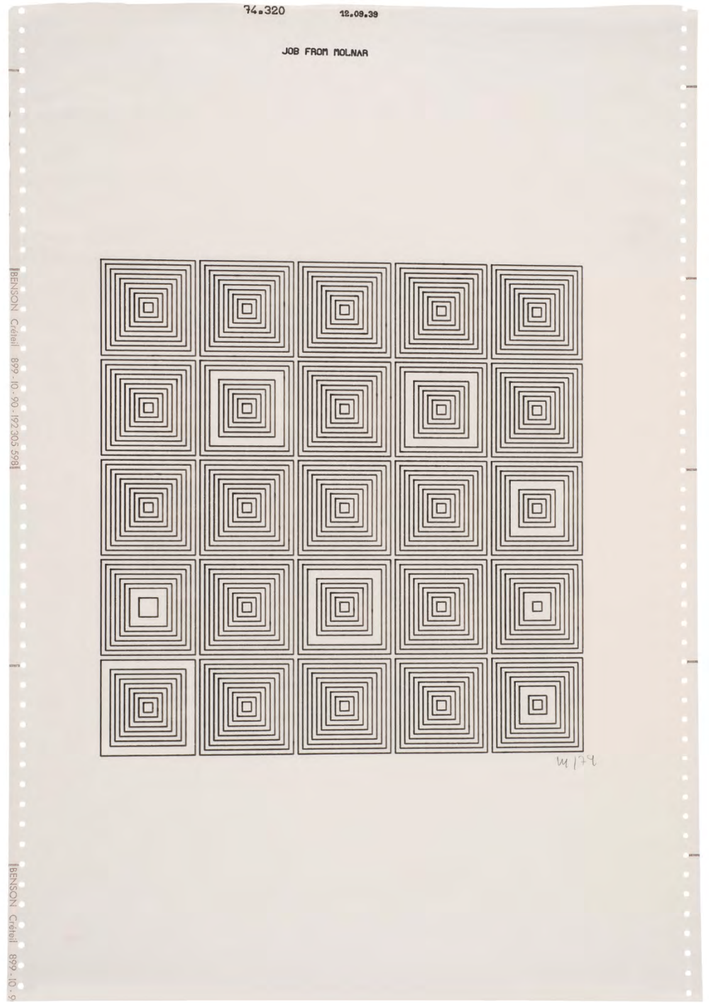
VERA MOLNÁR
Untitled
1977
Computer drawing
50 x 36 cm
19¾ x 14¼ inches



VERA MOLNÁR
Untitled
1977
Computer drawing
50.5 x 36 cm
20 x 14¼ inches



VERA MOLNÁR
Untitled
1974
Computer drawing
51.5 x 36 cm
20¼ x 14¼ inches



LIST OF WORKS

WALDERMAR CORDEIRO

16 *Derivatives of an image degree 1*
1969
Offset printout
61.2 x 44.5 cm
24 x 17½ inches

17 *Derivatives of an image degree 0*
1969
Offset printout
61.2 x 44.5 cm
24 x 17½ inches

19 *Digitalização do retrato de Fabiana*
1970
Carbon and marker pen on paper
56.7 x 65 cm
22¼ x 25½ inches

21 *The Woman that is Not B.B. (Brigitte Bardot)*
1971
Offset printout
61.2 x 44.5 cm
24 x 17½ inches

23 *Untitled*
1972
Offset print
83.6 x 39.7 cm
32 x 15¾ inches

25 *Untitled*
1972
Offset print
83.6 x 39.7 cm
32 x 15¾ inches

27 *Untitled*
1972
Offset print
83.6 x 39.7 cm
32 x 15¾ inches

ROBERT MALLARY

34 *Incremental series*
1970
Computer drawing
28 x 23.7 cm
11 x 9¼ inches

35 *Incremental series*
1970
Computer drawing
26 x 22 cm
10¼ x 8¾ inches

36 *Incremental series*
1970
Computer drawing
28 x 34.7 cm
11 x 13½ inches

37 *Incremental series*
1970
Computer drawing
28 x 36.2 cm
11 x 14¼ inches

38 *Incremental series*
1970
Computer drawing
28 x 38.5 cm
11 x 15¼ inches

39 *Incremental series*
1970
Computer drawing
28 x 29.8 cm
11 x 11¾ inches

40 *Solar series*
c.1970s
Computer drawing
39 x 36 cm
15½ x 14¼ inches

41 *Solar series*
c.1970s
Computer drawing
39 x 36 cm
15½ x 14¼ inches

42 *Solar series*
c.1970s
Computer drawing
39 x 36 cm
15½ x 14¼ inches

43 *Solar series*
c.1970s
Computer drawing
39 x 36 cm
15½ x 14¼ inches

44 *Solar series*
c.1970s
Computer drawing
39 x 36 cm
15½ x 14¼ inches

45 *Solar series*
c.1970s
Computer drawing
39 x 36 cm
15½ x 14¼ inches

46 *Unititled*
c.1970s
Computer drawing
39 x 35 cm
15¾ x 13¾ inches

47 *Unititled*
c.1970s
Computer drawing
39 x 43 cm
15¼ x 17 inches

48 *2 colour plotter graphic*
1972
Computer drawing
22 x 28 cm
8¾ x 11 inches

49 *3 colour plotter graphic*
1972
Computer drawing
28 x 22 cm
11 x 8¾ inches

50 *Incremental series*
1972
Computer drawing
28 x 19.5 cm
11 x 7¾ inches

VERA MOLNÁR

51 *TRPL series*
1972
Computer drawing
28 x 21 cm
11 x 8¼ inches

52 *Incremental series*
c.1972
Computer drawing
21.5 x 28 cm
8½ x 11 inches

53 *Incremental series*
c.1972
Computer drawing
22 x 28 cm
8¾ x 11 inches

54 *Incremental series*
c.1972
Computer drawing
21.5 x 29 cm
8½ x 11½ inches

55 *Incremental series*
c.1972
Computer drawing
19.5 x 27.5 cm
7¾ x 10¾ inches

57 *Quad III*
1969
Plywood laminate
195.5 x 25.5 x 30.5 cm
75 x 10 x 12 inches

66 *Untitled*
1971
Computer drawing
42.5 x 36 cm
16¾ x 14¼ inches

67 *Untitled*
1971
Computer drawing
51.5 x 36 cm
20¼ x 14¼ inches

68 *Untitled*
1972
Computer drawing
46.5 x 36 cm
18¼ x 14¼ inches

69 *Untitled*
1972
Computer drawing
51.5 x 36 cm
20¼ x 14¼ inches

70 *Untitled*
1972
Computer drawing
30 x 30 cm
11¾ x 11¾ inches

71 *Untitled*
1972
Computer drawing
30 x 30 cm
11¾ x 11¾ inches

72 *Untitled*
1972
Computer drawing
30 x 30 cm
11¾ x 11¾ inches

73 *Untitled*
1973
Computer drawing
50 x 36 cm
19¾ x 14¼ inches

75 *Trapèzes inscrits 1 - 5*
1974
Computer drawing
55 x 36 cm
21¾ x 14¼ inches

76 *Untitled*
1974
Computer drawing
33 x 40 cm
13 x 15¾ inches

77 *Untitled*
1974
Computer drawing
29.5 x 30 cm
11¾ x 11¾ inches

78 *Untitled*
1974
Computer drawing
33 x 46 cm
13 x 18¾ inches

79 *Untitled*
1974
Computer drawing
33 x 40.5 cm
13 x 16 inches

81 *Untitled*
1977
Computer drawing
50 x 36 cm
19¾ x 14¼ inches

83 *Untitled*
1977
Computer drawing
50.5 x 36 cm
20 x 14¾ inches

85 *Untitled*
1974
Computer drawing
51.5 x 36 cm
20¼ x 14¼ inches

THE MAYOR GALLERY since 1925

21 Cork Street, First Floor
London, W1S 3LZ
t: +44 20 7734 3558
www.mayorgallery.com
info@mayorgallery.com

Printed on the occasion of the exhibition:

WRITING NEW CODES: CORDEIRO / MALLARY / MOLNÁR
3 PIONEERS OF COMPUTER ART 1969 - 1977

6 JUNE - 27 JULY 2018

Edition of 500

All dimensions of works are given height before width before depth

The colour reproduction in this catalogue is representative only

With thanks to Catherine Mason, Analivia Cordeiro, Martine and Mike Mallary, Vera Molnár, Angeria Rigamonti di Cutò, Jasia Reichart, the Victoria & Albert Museum, Hungarian Museum of Modern Art, Amy Baker and Christine Hourdé.

Cover image: Robert Mallary, *3 colour plotter graphic, 1972*

Design by Stephen Draycott

Published by The Mayor Gallery

Production by Birch Print, Heritage House, DE7 5UD

ISBN: 978-0-9957416-7-6