Algorithmic Signs, Venice 2017: Tracing the history of computer art

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Abstract
This paper examines Algorithmic Signs, an exhibition exploring the history of pioneering computational art conceived, researched and curated by the author in collaboration with the Fondazione Bevilacqua La Masa (Venice, Italy, October 2017). The author presents the historical context and main concepts that led to the creation of this exhibition. In addition to this, the author demonstrates how Algorithmic Signs provided new interpretations of the history of computer art.

Keywords
Computer art pioneers, exhibitions, algorithmic art, generative art, interactive art

Introduction
Algorithmic Signs was an exhibition held at the Fondazione Bevilacqua La Masa’s historical gallery in St. Mark’s Square, Venice, from 19 October until 3 December 2017. This exhibition explored the history of pioneering generative art and its contribution to the broader field of contemporary art from the 1960s to the present. The history was exemplified in the creative work of five international pioneers in the world of digital arts: Ernest Edmonds, Manfred Mohr, Vera Molnár, Frieder Nake, and Roman Verostko.
Historical context

Given what we know about the influence of Venetian art on the arts, particularly from the Byzantine period to the Renaissance and up to the eighteenth century, Venice and algorithmic art are not the most obvious association in the art world.

Looking for computational art in Venice therefore represents a new, fascinating and exciting adventure. It is an even more challenging task, owing to its hybrid, fluid nature and by the fact that this art uses the computer as a tool or medium; and although around from the mid-1950s, has not been fully accepted by the traditional art institutions and has been overlooked for many years. Despite the fact that major exhibitions on art and technology have been shown internationally from the late 1960s to early 1970s, the sense of excitement instilled by these exhibitions did not last long and in the past 50 years, museum exhibitions on computer art have been a rarity.

Contemporary art in Venice has had a relatively long history that dates back to the first Venice Biennale in 1895. But, as English art historian Lawrence Alloway proved in 1968, the first Biennales, particularly between 1895 and 1914, were devoted to the celebration of the official academic style, or Salon art. Far from being innovative and open to the new European tendencies, the first Biennales demonstrated a conservative and reassuring attitude towards art. The breaking of the original Venice Biennale’s curatorial model happened owing to political circumstances in 1968, the year of European radical revolts for social and economic change. From a curatorial point of view, the 1968 Biennale represented an “anomaly” compared to its previous renditions. Not only the political instances brought forward by the student revolt, but also the introduction of new technologies in art from the mid-1960s contributed and allowed the Biennale to distance itself from its original nineteenth century Salon art model. Owing to innovative and cross-disciplinary projects such as those presented by Argentinean artist David Lamelas and French cybernetic artist Nicolas Schöffer at the 1968 Biennale, the institution started, slowly, to open up towards new media and to accept them as a new form of art.

The 1970 Biennale represented a fundamental step for the art institution in the long journey toward the acceptance of computer art (Franco 2013). The Biennale’s major show Ricerca e Progettazione. Proposte per una Esposizione Sperimentale was curated by Umbro Apollonio and Dietrich Mahlow. It was an exhibition entirely devoted to “experimental” art and featured a large selection of early computer art which included,
amongst others, Frieder Nake’s *Matrix Multiplication* (Fig. 1). Except for the rare case represented by the 1970 Biennale’s experimental show, computer art at the Biennale has since been exhibited only peripherally.

**Algorithmic Signs**

*Algorithmic Signs* represents the first attempt after the 1970 Biennale to bring early computational art and some of its most prominent pioneers back to Venice.

Coming to the computer from completely different backgrounds and experiences—monastic life, jazz music, traditional painting, philosophy, mathematics, and logic studies—the artists featured in the exhibition began to experiment the creative use of the algorithm and computer code to construct their works and make art.

50 years after the first experiments in computational art, international interest in the history of this subject remains strong and at the same time almost uncovered. Focusing on the relationship between computer programming, art and creativity, the presentation of each artist explores the role of programming in their work, looking at how their practice has kept pace with the rapid advance of technology in recent decades.

![Figure 1](image1.jpg)

*Figure 1.* Frieder Nake, *Matrix Multiplication series 29*, 1968. Coloured ink on paper. © Frieder Nake
Figure 2. Manfred Mohr, *P-499-AI*, 1993. Painted steel, 15 parts, 250x1200 cm. ©Manfred Mohr, Photo Giorgio Bombieri

Figure 3. Vera Molnar, site-specific installation based on Molnar’s *13 Variations Mt St. Victoire*, 280x100 cm. ©Vera Molnar, Photo Giorgio Bombieri

Figure 4. Ernest Edmonds, *Growth and Form*, 2017. Generative interactive installation, 250x250 cm. ©Ernest Edmonds, Photo Giorgio Bombieri
Figure 5. Ernest Edmonds, Shaping Space, generative interactive installation, 2012. ©Ernest Edmonds, Photo Giorgio Bombieri

Figure 6. Roman Verostko, *San Marco Apocalypse: Lifting the veil*, 2017. Digital print, 55x30 cm. ©Roman Verostko
Algorithmic Signs featured over 60 artworks, including early plotter drawings, four site-specific installations, two newly commissioned works, and an eight-hour video documentation showing how an algorithmic drawing is made (Figs. 2-6).

Featured Artists

Ernest Edmonds' art explores colour, time, and interaction in the context of colour field painting and systems art. His work extends the Constructivist tradition into the digital age in a powerful and enduring investigation of mathematical and computational systems (Franco 2018). Some of the major artworks that define Edmonds’ singular achievement were exhibited in this show. They included early generative computer-based art systems such as Nagoya (1996), and most recent works in which the artist has explored the potential of an interactive audience in public spaces, extending interactivity to a more comprehensive new form of collective behaviour, and has extended the notion of interactive art to include long-term influence. Shaping Form consists of a series of works on individual stand-alone screens framed so that the image is square. Movement in front of each work is detected by a small camera. This leads to continual changes in the program that generates the images. A viewer can readily detect the immediate responses of the work to movement but the changes over time are only apparent when there is more prolonged, although not necessarily continuous, contact with it. A first viewing followed by one several months later will reveal noticeable developments in the colours and patterns.

Manfred Mohr is a pioneer of computer-generated algorithmic art. After discovering Max Bense's “Information Aesthetics”1 in the early 1960's, Mohr’s art transformed from abstract expressionism to computer generated geometric art. In 1969, the introduction of the computer together with a mechanical drawing device, the plotter, in Mohr’s art extended Mohr's creativity and helped him creating signs generated by the rational structure of programming and algorithmic processes. As he stated in 1985,

I call my work ‘generative’ because all my work is generated from algorithms (logical processes) worked out by myself beforehand. This is my fundamental contribution to aesthetic research. I create signs, graphic existences, out of rational context. These signs refer only to themselves and their content is evidence of their creation. A logical and straightforward development of my work was the introduction of a computer and of a plotter in 1969. Dialogue with the machine thus became an important part of my work - an irreversible extension and/or amplification of my artistic thought. (Mohr/Teufel 1985: n/p)

For the first time in his art, algorithms were used to calculate images. The resulting drawings were made by a plotter. So for example, in works such as P-021 (1969) with a choice of different line characteristics, such as horizontal elements, vertical lines, and zigzags that move mostly from left to right, an abstract text was created. It is basically an alphabet of arbitrary generated elements. From 1972, Manfred began employing the structure of the cube as a system and alphabet, and, as the works exhibited in Algorhythmic Signs demonstrate, over the years he has always maintained the structural elements and constraints of the cube in his vocabulary.

Vera Molnár is one of the pioneers of computer and algorithmic arts. Born in Hungary in 1924, Molnár initially trained as a traditional artist, studying fine arts and obtaining a diploma in art history and aesthetics from the Budapest College of Fine Arts. Inspired by abstract, geometrically and systematically determined painting, she created her first abstract works in 1946. In 1968, she began working with computers and started to create algorithmic paintings based on simple geometric shapes and themes. One of her most moving works, Lettres à ma mere, was exhibited for the first time in Venice. It is a series of works Molnár created with the aid of a computer and a plotter to recreate the handwriting of her mother, between 1981 and 1990. Molnár describes the creative process behind them as follows:

The visual aspect in these pieces, executed with computer and plotter, changes evenly at every line, proceeding from left to right. Using an increasingly random process, the lines – built up with regular sequences going up and down with a tilt of 110-120 degrees – become more and more chaotic as they advance to the right. This phenomenon occurs within each line, within each letter. The letters become
more and more disturbed. The relative order seen in the first letters, on the left side, disappears progressively. (Molnar 1995: 169)

Frieder Nake belongs to the founding fathers of computer art. He studied mathematics and in 1963, “by accident” as he likes to say, became a pioneer of algorithmic art. He had his first exhibition in Stuttgart in November 1965. He has participated in all major international exhibitions on computational art, including Tendencies 4 (Zagreb 1968), Cybernetic Serendipity (London 1968) and the first computer art show at the Venice Biennale in 1970, amongst others. Over the last thirty years, he has exhibited and lectured around the world, and published his work in various academic publications. Matrix Multiplication (Fig. 1), back in Venice since it was exhibited at the 1970 Biennale, represents one of the most iconic computer-generated artworks, and one of the earliest examples of full-colour continuous drawings generated by a computer. Consisting of a grid of little squares where colours have been assigned by mathematical process, the work presents a series of variations that, as Frank Dietrich described in 1986, “reflect the translation of a mathematical process into an aesthetic process.” (Dietrich 1986: 161)

Roman Verostko is best known for his richly coloured algorithmic pen and brush drawings. Born in 1929 in the USA, he was schooled as an artist at the Art Institute of Pittsburgh. A year later he entered monastic life at St Vincent Arch Abbey in Latrobe, PA, where he became deeply involved with art and spirituality. Following studies in philosophy and theology, he was sent to New York and Paris to pursue further studies in both studio practice and art history. In Paris, he maintained a studio where he experimented with automatism and expressionist brushwork. Returning to the monastery he began experimenting with electronically synchronized audio-visuals. Roman departed monastic life in 1968 and joined the humanities faculty of the Minneapolis College of Art & Design in Minnesota. Roman's work with electronic synchronizers led him to an interest in computer circuits and programming. He followed a night course in FORTRAN at the Control Data Institute in 1970, gained more experience with circuits and continued painting and programming electronic audio-visuals. In 1982, he coded a series of visual sequences, “The Magic Hand of Chance”. This program, written in BASIC, grew into his master drawing program, HODOS, generating his art-form ideas with both ink pens and brushes mounted on drawing machines. The front and end pieces for his 1990 limited edition of George Boole’s “Derivation of the Laws...” exhibited in Algorithmic Signs demonstrate the emerging power of generative
art. *Algorithmic Signs* featured some of Verostko’s most celebrated algorithmic poetry drawings. Amongst them, *Green Cloud* belongs to a recent series that was exhibited as a form of “visual poetry”.

**Conclusions**

One of the challenges of this exhibition was to open up new perspectives and uncover a new level of understanding of the intricacies in media art to reveal aspects of creativity that have helped shaping its complex history. The works on display demonstrated how human thought could be amplified by machines and could raise our consciousness to a higher level of comprehension, both intellectually and visually.

*Algorithmic Signs* also revealed an often-overlooked link that connects the work of the five exhibiting artists to past artistic traditions. In particular, the carefully structured and organised works in “Algorithmic Signs” demonstrate unequivocal affinities with the tradition of Constructivism, the modern art movement that began in Russia in the early twentieth century. Based on the supremacy of the functionality of the art object over its exterior appearance and composition, Constructivism inspired artists to explore the potential of modern materials and their role in expressing a new dynamism in modern life. Similarly to the way Vladimir Tatlin, one of the founding figures of Constructivism, explored the potential of new materials in his creations, Edmonds, Mohr, Molnar, Nake and Verostko have investigated the materiality of the art object and its organising structures in the context of computing technologies. They represent the missing fragment of the mosaic that connects this multifaceted and sophisticated line of research and that links the past and future of media art.

**References**
