

On the automation of aesthetic production: effects of algorithmic procedures in art*

“Ideas can be works of art” - Sol LeWitt (1)

Since his conception algorithm had an undeniable impact on human society. From working to cooking, interacting with a device to playing an instrument, every aspect of modern life can be traced back to a series of planned tasks, reduced to logical procedures to be performed. Moreover, with the invention of cryptocurrency – Bitcoin, 2009 – the value of algorithms ceased to be a mere concept to become tangible, a real commodity that can be extracted – 'mined' – and exchanged for solid money. Algorithms are ubiquitous and their impact goes way beyond technology and economics. The procedural thinking had revolutionary effects on the art world too.

The application of algorithms in art can be dated back to the pre-history knowledge of textiles and baskets weaving techniques. But it is from the 9th century with Islamic decorative arts that a step-by-step mathematical procedure was consciously implemented (2).

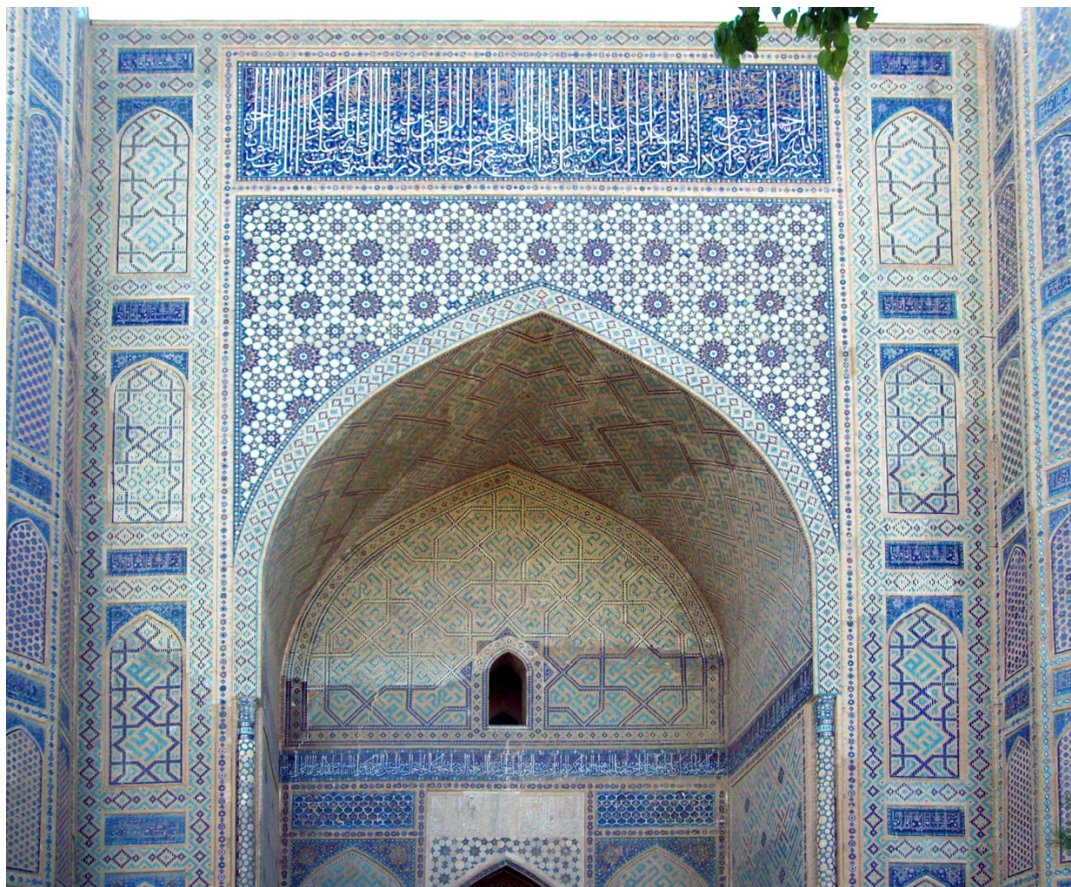


Figure 1: Bibi-Khanum mausoleum (Samarkand, Uzbekistan)
credit: Shuhrataxmedov, Wikimedia Commons.

In Islamic decorative art, simple geometric modules were intersected and repeated infinitely to build extremely complex patterns. The modules disappear in the repetition and melt in a unified, intricate, mathematically perfect design.

Once defined the strict ritual of the algorithm, the artist became a tool, leaving the work of art to be produced only by the process. The artifact, like a plant, sprout and blossom on his own.

By means of repetition, artist and viewer are intended to perceive the concept of infiniteness. As for litanies, looping through the algorithm became the medium of elevation to a spiritual realm.

With the expansion of the influence of Islamic culture, the idea of algorithm was imported in western world as part of other relevant scientific discoveries. Its use in European art, though, was relegated to the 'less noble' field of craftsmanship.

The procedural thinking was applied in western art only in the last century, possibly as a side effects of the groundbreaking invention of the computer.

The algorithm was then rediscovered by contemporary artist and used not to pursue specific results – as in geometric combination – but to investigate possibilities, as an independent form-generator.

“Arte Programmata” (Programmed Art) was a seminal exhibition organized by Bruno Munari and Giorgio Soavi in May 1962, at the Olivetti showroom in Milan, with the catalogue edited by Umberto Eco (3). The exhibition was sponsored by Olivetti – which in the same years was producing revolutionary mainframe computers – and travelled the world with the contribution of the Smithsonian Institution. After the exhibition, several of the works exhibited became part of the permanent collection of MoMA New York.



Figure 2: Grazia Varisco, *Schema luminoso variabile*, 9x9xX, 1961 - opera realizzata per la mostra "Arte Programmata", Showroom Olivetti, Milano, 1962

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The pieces of the exhibition were more like futuristic toys than to canonical sculptures or paintings. Made with collages of tapes, bulbs, pipes, liquids, iron dust, magnets, those artifacts were movable machines that could be operated to produce an ideally never-ending series of variations. They were intentionally constructed to produce chaos or, better, to investigate unseen outcomes.

Unlike other art movements (Abstract Expressionism, Action Painting, Neo Dada) where chaotic investigations were chosen once happened, the intent of Programmed art was to generate chaos according to essential rules of statistical probability. As Umberto Eco noted, Programmed art shifted from *Divine Proportion* to "*Diabolic Disproportion* ... because [Programmed work of art] suspends the choice of possibilities in the indeterminate: once the basic element is fixed and the permutations programmed, the work does not consist of the most successful element, chosen among all the others, but precisely in the co-presence of all the thinkable elements" (4).

Programmed art aspired to be the tool to visualize the invisible as a service for the collectivity. Those works of art were "aids of imagination", translations of the natural reality that contemporary science was discovering – like the infinitely small of the sub-atomic, or the infinitely large of the astrophysics – but which was still

unimaginable by the common people.

As clearly pointed by Eco, still this art imitates nature "but not that nature that we see every day by perceptive habit, but the one we conceptually define in the laboratory [...] art imitates our way of interpreting and defining nature" (5).

With Programmed art, artist and viewer marvels witnessing an algorithm that generates something never seen before, something with results unexplored, a procedural investigation of the unknown.

Although sponsored by a manufacturer of computers, Programmed art had very little to do with computers. It is in 1968 that for the first time Ernest Edmonds used a computer program in his work, the relief *Nineteen*, marking the birth of Computational art (6).



Figure 3: Ernest Edmonds, *Nineteen*, 1968-69

Credit: Ernest Edmonds, Open access, <https://www.mdpi.com/2076-0752/7/1/3/htm>

At the beginning the computer was employed only in the conception of the art piece, which subsequently had to be realized by the artist's hand. Later, plotters and monitors were adopted, and along with the development of computers capabilities,

the evolution of Computational art run fast, open to possibilities never achievable before. Time-changing variables and interaction with the audience were included in the art piece. The work of art became an open system that reacts to its environment.

With the introduction of the computer in the art world, many questions aroused. Could a programmer be considered an artist? Could the outcome of a computer be considered work of art or just a strange object?

If in the other art fields algorithms were well accepted (like scores for music, or plans for buildings, the role of the composer or the architect has never been argued), in visual art the use of algorithms and the role of the artist as a programmer had to be explained.

Firstly, Computational artists had to educate the audience to accept the computer as a medium, as much as a paintbrush or a chisel. Roman Verostko stated this concept clearly: "The [music] score itself is an algorithm – a procedure for constructing the musical experience. But the procedure for writing the music is another matter. Writing the musical score is always the creative work of the composer. We should not confuse the procedure by which the composer creates the composition with the procedure for performing the composition. Similarly, when it comes to *algorithmic art* we should not confuse the procedure by which the artist creates algorithms with the procedures by which the algorithms execute the work" (7).

The authorship of the artist working with procedural thinking needed to be reclaimed. It is with Conceptual art that the question was settled once and for all. Stating the supremacy of pure idea on form, Conceptual artists detached the work of art from its physical presence.

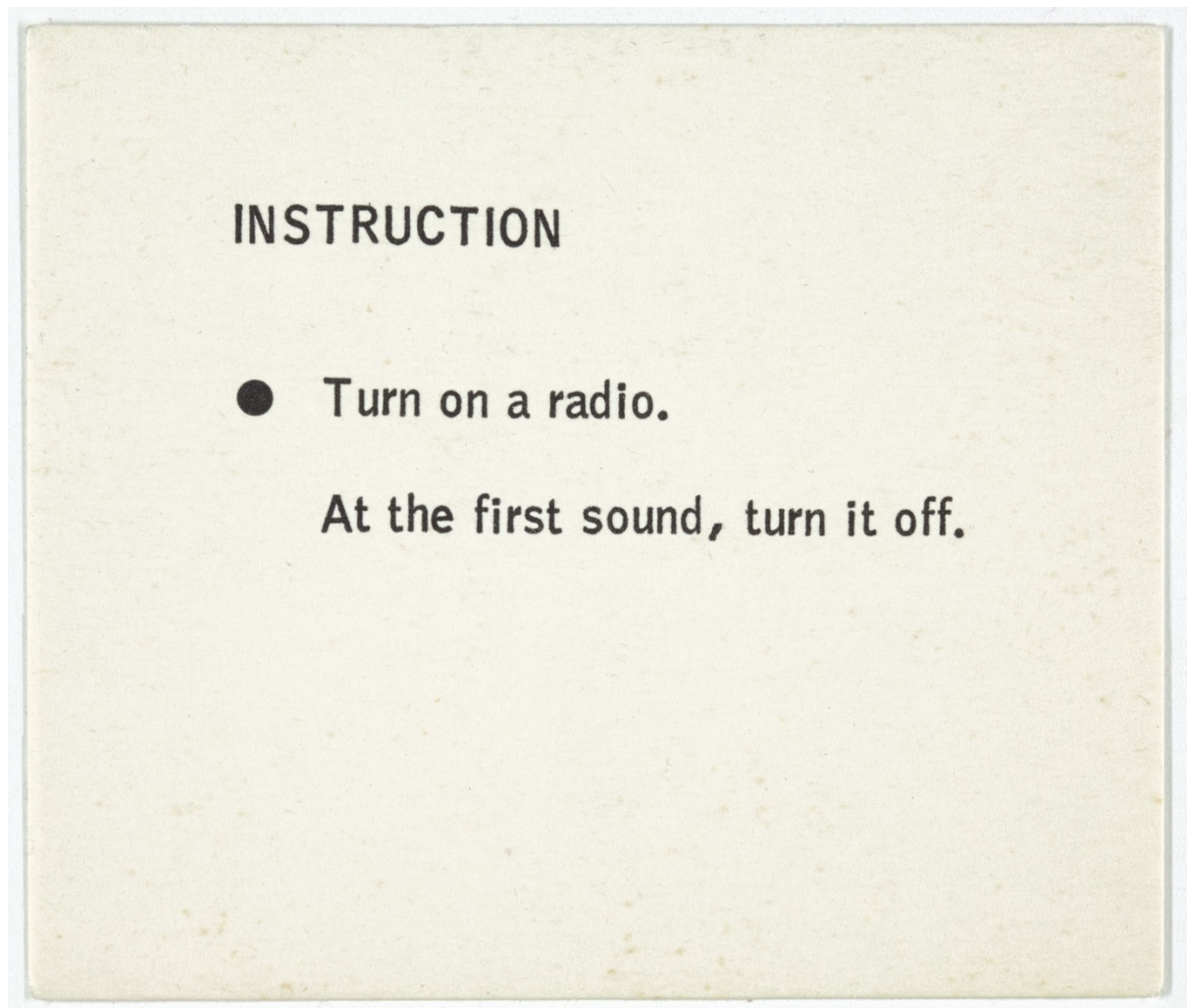


Figure 4: George Brecht, Instruction from Water Yam, 1963

Credit: © 2021 Artists Rights Society (ARS), New York / VG Bild-Kunst, Germany

Even if speculative, the attention of Programmed and Computational artists was on the objects produced by their 'algorithms'. Conceptual artists made a leap forward. They still employed various methods of procedural specification to produce art, but their focus was on the idea and not on the final outcome. The artifact became redundant as the work of art was the idea itself (or, at least, the instructions to materialize that idea).

Sol LeWitt, prominent conceptual artist and theorist, wrote in *Artforum* magazine in 1967: "In conceptual art the idea or concept is the most important aspect of the work [...] all of the planning and decisions are made beforehand and the execution is a perfunctory affair. The idea becomes a machine that makes the art. This kind of art is not theoretical or illustrative of theories; it is intuitive, it is involved with all types of mental processes and it is purposeless. It is usually free from the dependence on the skill of the artist as a craftsman" (8).

The intent, then, is to make the purest art possible, detached from the subjectivity of

the artist, detached from purpose, detached even from execution and form. The work of art becomes word, instruction, it is no longer embodied in an object, it is no longer the result of an algorithm, it is the algorithm itself.

The algorithm can be a machine that makes art, and the work of art can be a program, a set of rules that solves (art related) problems. Therefore, the artist functions as a programmer. Again, according to Sol LeWitt: "To work with a plan that is pre-set is one way of avoiding subjectivity. It also obviates the necessity of designing each work in turn. The plan would design the work [...] the artist would select the basic form and rules that would govern the solution of the problem. [...] This eliminates the arbitrary, the capricious, and the subjective as much as possible. This is the reason for using this method" (9).

As for Islamic decorative art, in Conceptual art the role of the creator decreases in degree: the artist elaborates systems of rules and the work is only the result of their blind application (10).

The work of art became pure idea, pure process, pure algorithm.

In recent days, the advent of Artificial Intelligence and its adoption in the art field seemed to confuse things a bit. Works of art can now evolve by themselves and learn from other artifacts. Will then Artificial Intelligence substitute the artist? Can Artificial Intelligence become an artist?

If considered with attention, those questions are similar to the ones encountered before. Artificial Intelligence can be considered as a tool, a very complex and powerful one, though. The tasks that can be performed are way more shocking than the reiteration of geometric patterns, but the work of art is still the algorithm, and the artist is still the programmer.

The impact of algorithm in art is far to be finished or understood. To conclude with the words of another computational artist, Ernest Edmonds: "The point that we [Algorithmic artists] jointly discovered was that [...] algorithmic art represented art that engaged with the key issues that are part of modern life. [...] In the developed world, at least, we could argue that our lives are partly driven by algorithms and yet they remain an unexplored territory for many people. So this kind of art is engaged with contemporary life like no other. [...] the metaphor of the algorithm, as used in art, is surely a metaphor of life itself, as we know it today. So I argue that this work is in no way on the edge of contemporary art, but is at the very core of our contemporary concerns" (11).

The inquiries of art with algorithms are more important than ever.

Notes

1. Sol LeWitt, "Sentences on Conceptual Art", in 0-9 (New York), 1969, and Art-Language (England), May 1969
2. <https://www.britannica.com/topic/Islamic-arts/Visual-arts>
3. <http://www.reprogrammed-art.cc/library/33/Arte-programmata.-Arte-cinetica.-Opere-moltiplicate.-Opera-aperta>.
4. Umberto Eco, *La forma del disordine*, in Almanacco Letterario Bompiani, edited by Sergio Morando, Bompiani, Milan 1962, p.176, translated by the author
5. Umberto Eco, ibidem, p.176
6. see Francesca Franco, *Algorithmic Signs: Ernest Edmonds, Manfred Mohr, Vera Molnàr, Frieder Nake, Roman Verostko*, Istituzione Fondazione Bevilacqua La Masa, Venice 2017, p.12
7. Roman Verostko, *Algorithms and the Artist*, 1994, ISEA, Helsinki
8. Sol LeWitt, *Paragraphs on Conceptual Art*, in Artforum, June 1967
9. Sol LeWitt, ibidem
10. see Denys Riout, *Qu'est-ce que l'art moderne?*, Editions Gallimard Paris, 2000, trad.it *L'arte del ventesimo secolo*, Einaudi editore, Torino, 2002, p.102
11. Ernest Edmonds, Algorithmic Art Machines, in Arts no.7, January 2018

*This essay was written in late 2020 and was published in: *Dixit Algorizmi — The Garden of Knowledge*, Humboldt Books, Milan, 2022, ISBN 978-88-99385-94-1, pp 140-149.

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