

Aesthetics of Rationality in Early Ages of Computational Art

MAT 200A Final Project

Felix Yuan

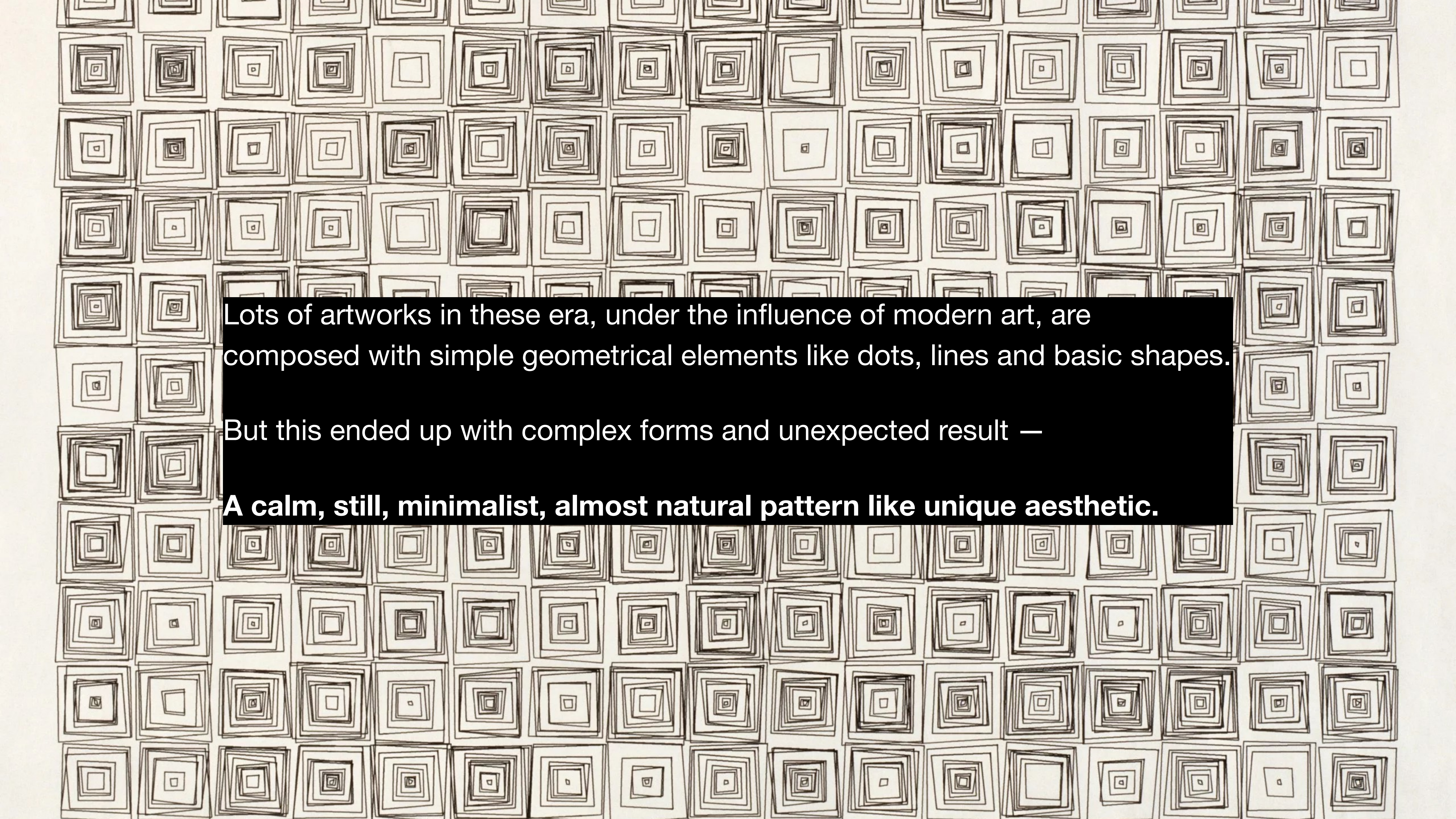
Dec 2, 2025

The heated debate on how AI and machine learning reshaped our everyday life and art is sometimes frustrating.

But it is very shocking of how easily we tend to forget only a few decades ago, the idea of having a computer in every home or in an artist's studio was also completely outlandish, **which generated the same level of anxiety about the future of labour and creativity.** [1]

However, artists of that early age managed to audaciously expand the boundary of creativity and created a unique aesthetic — ***the Aesthetic of Rationality***.

This history is inspiring and should not be overlooked, and we can continue to learn from it.



Lots of artworks in these era, under the influence of modern art, are composed with simple geometrical elements like dots, lines and basic shapes.

But this ended up with complex forms and unexpected result —

A calm, still, minimalist, almost natural pattern like unique aesthetic.

Two Categories of Computer graphic [2]

1. Those which approximate to pure design or art;
2. Those which are not made with any aesthetic end in view but which serve to visualize complex physical phenomena.

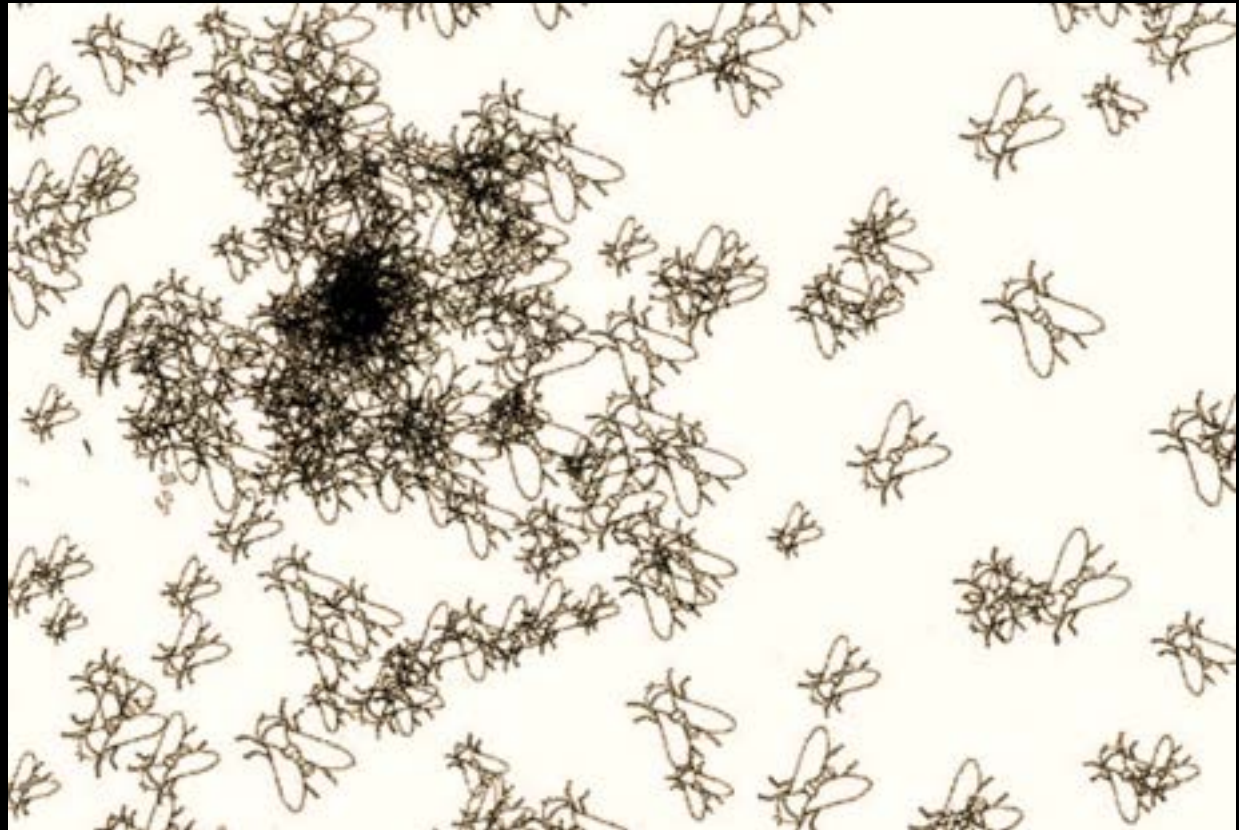
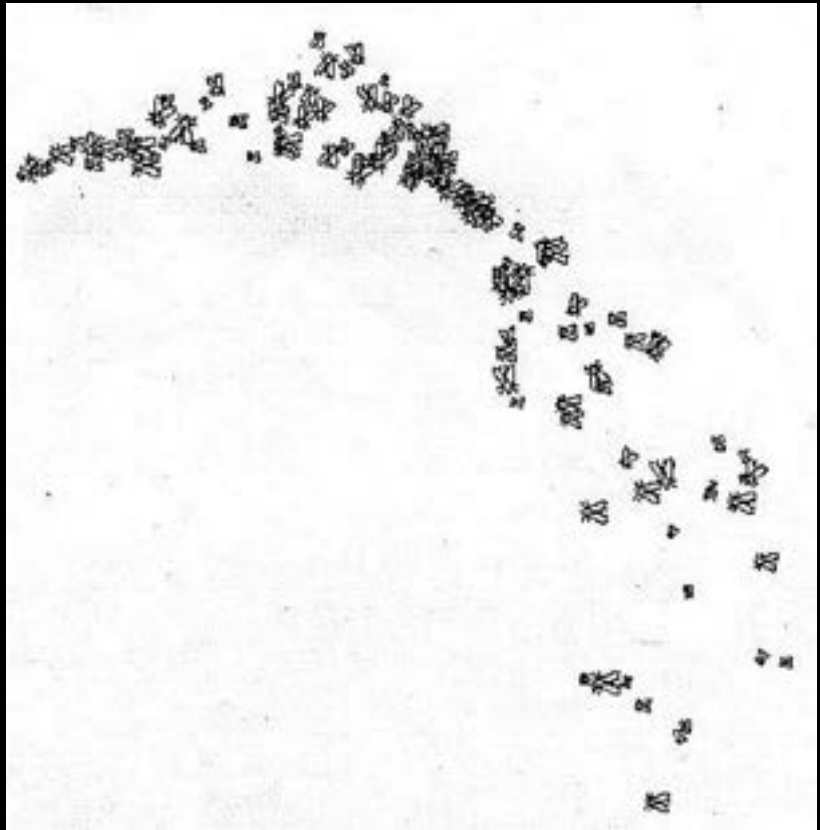
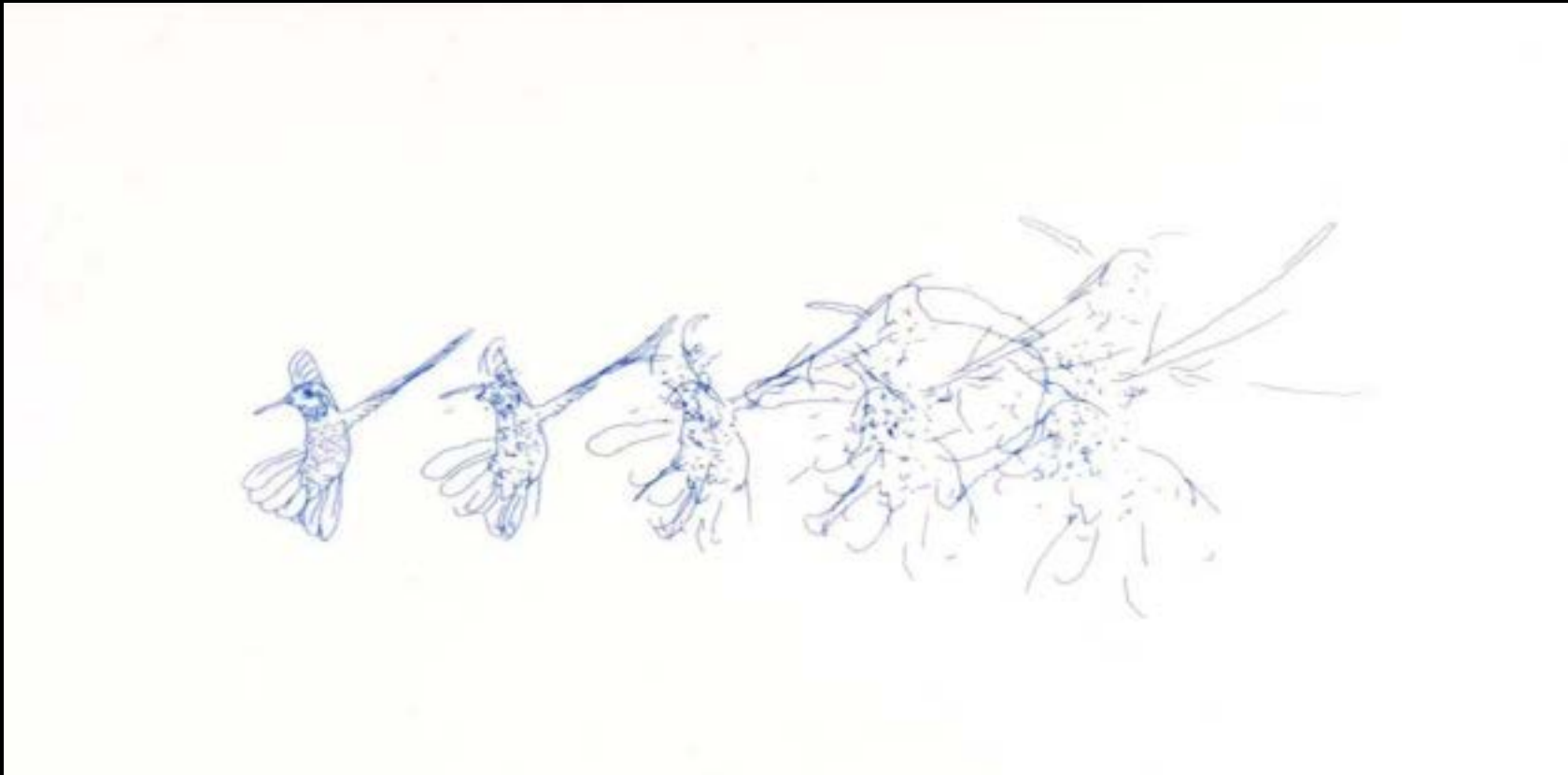
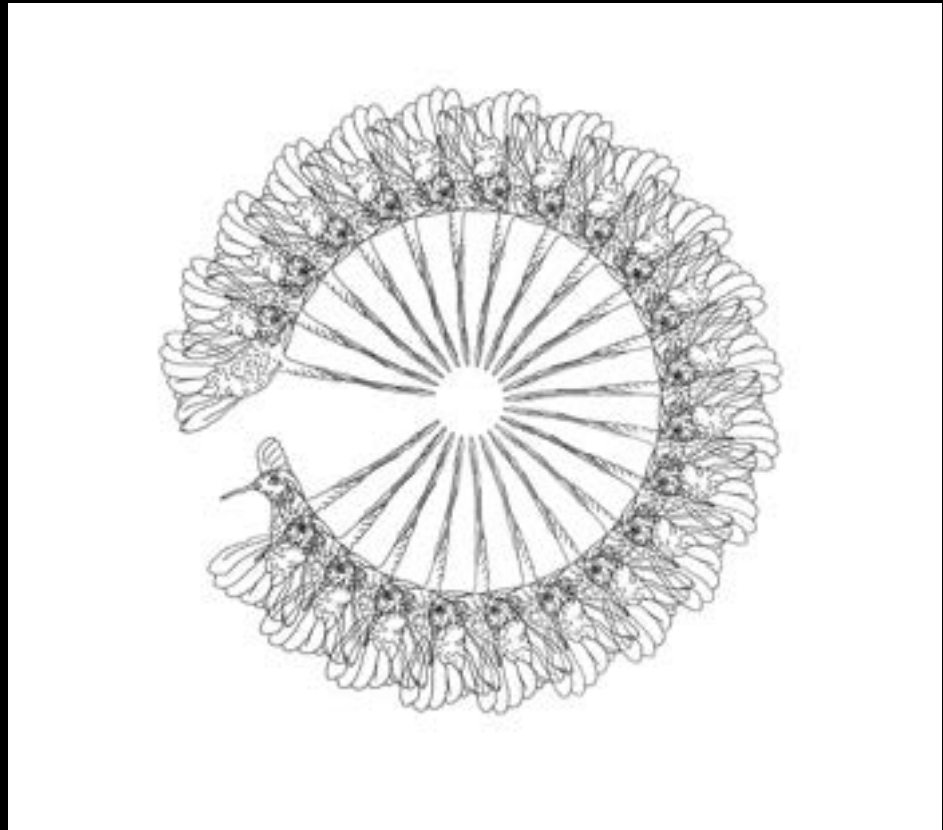
This presentation will be divide into three sections:

1. Computational visualization artworks with a clear intent or theme
2. More abstract artworks made by artist's dialogue and co-working with computer
3. Machine generated artworks with little or no intent beforehand

The background features a complex, abstract composition of overlapping geometric shapes. A large orange shape is prominent in the upper left, with a white line tracing its boundary. Below it, a green shape is partially visible. To the right, a dark grey shape overlaps with a yellow one. In the lower section, a blue shape is overlaid on a green one, which in turn overlaps with a yellow one. The overall effect is a layered, multi-colored geometric pattern.

Visualizing the Existence

Existing Object



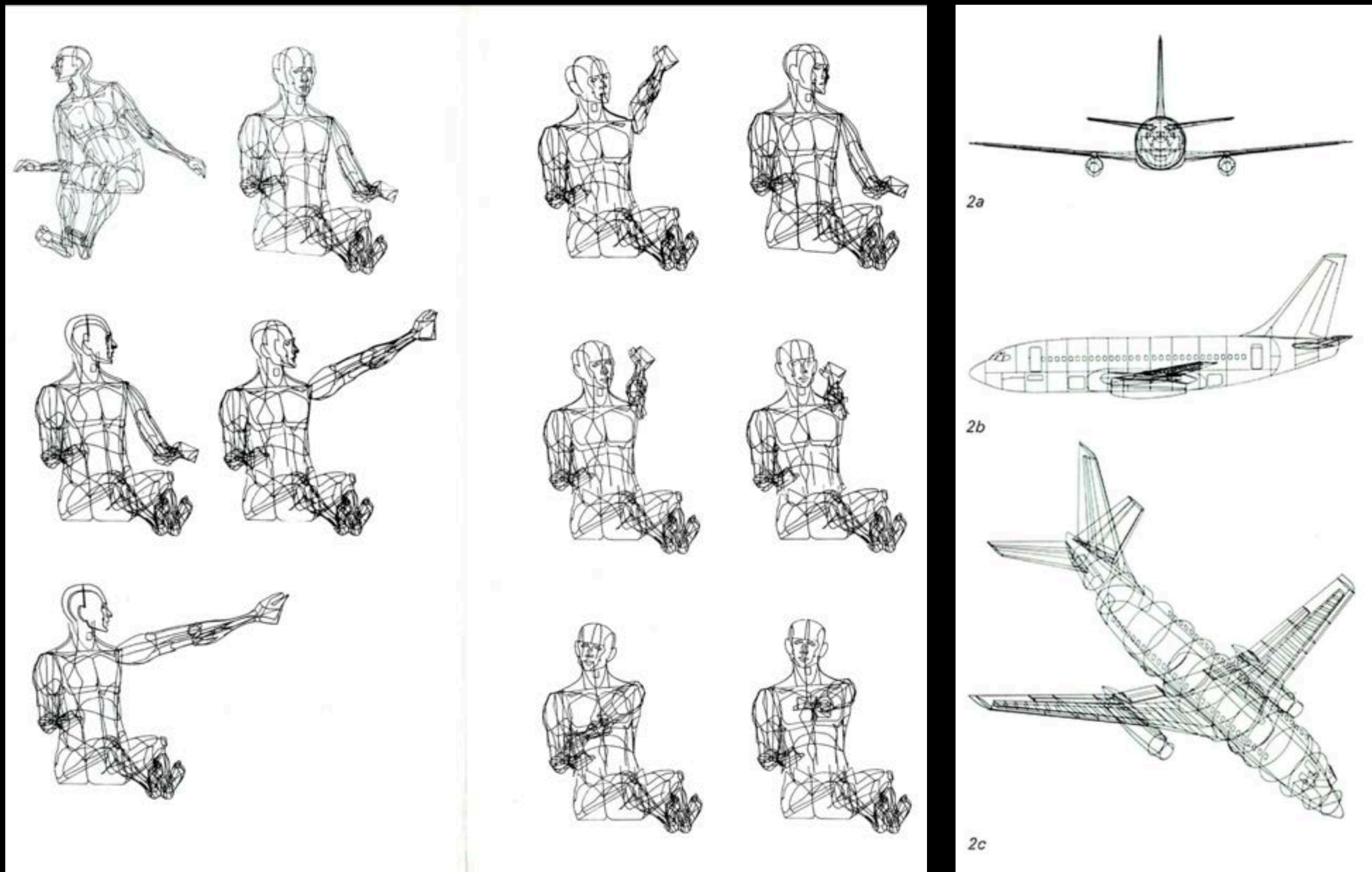
Charles A. Csuri

Humming birds, 1967 (Upper Left)
First computer films to include non-abstract figures [5]

Random War, 1967 (Lower Left to the Left)
Computer generating with pseudo-random number

Sine Curve Man, 1967 (Lower Left to the Right)

Flies, 1966 (Above)



Boeing Computer Graphics

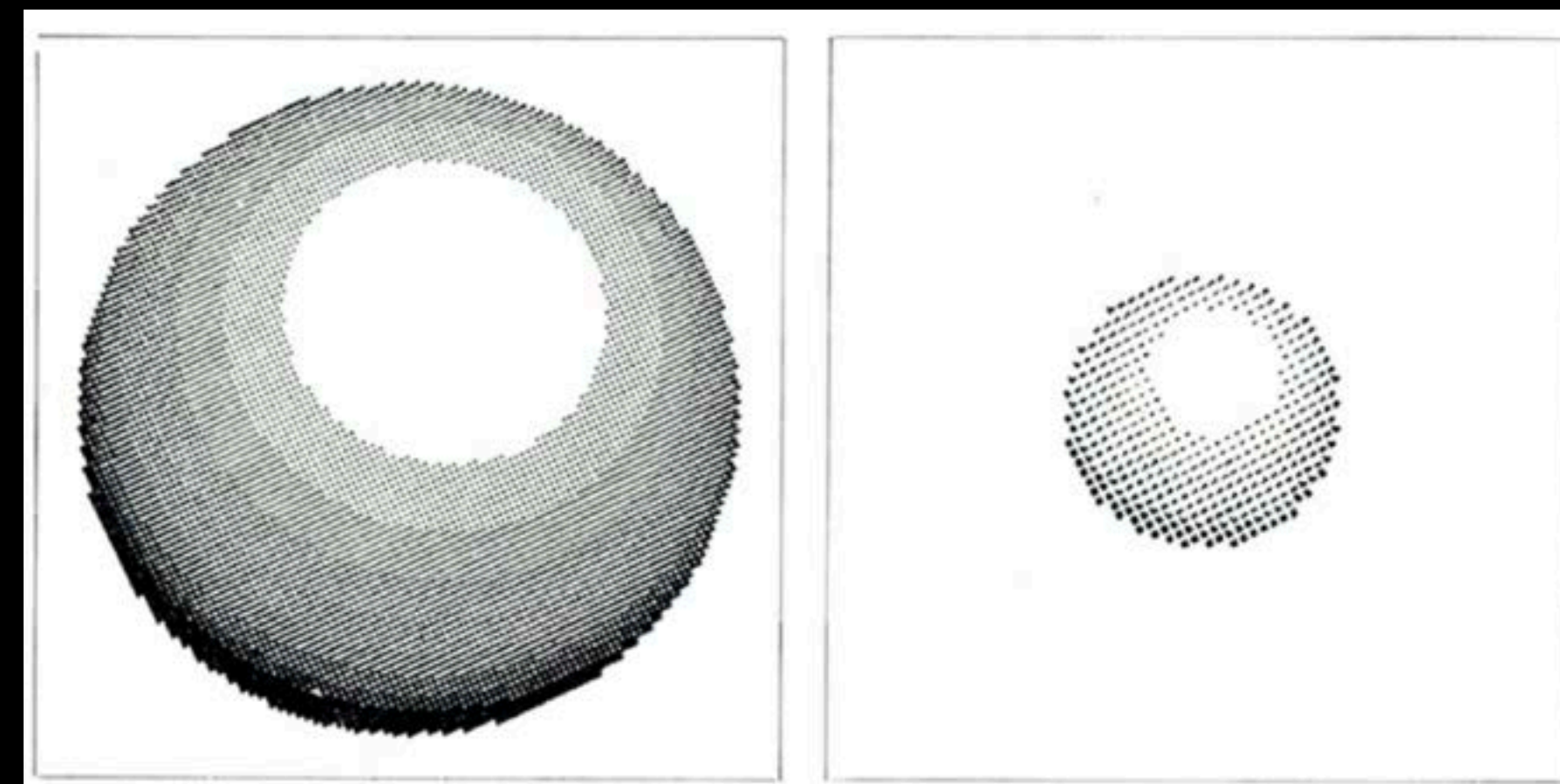
Human Figure (Left)

Keypunch, IBM 1400C reader printer, IBM 7094 computer, Gerber plotter.

Boeing 737 Project (Right)

Keypunch, IBM 1400C reader printer, IBM 7094 computer, Gerber plotter.

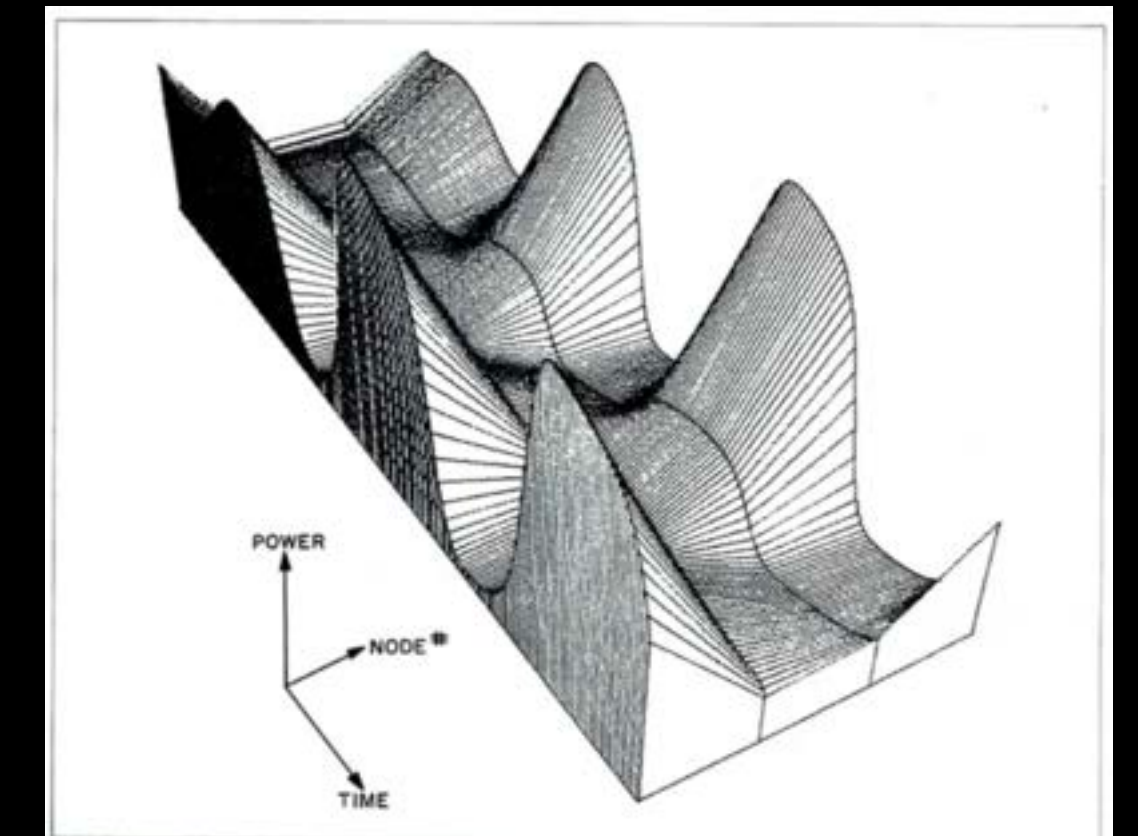
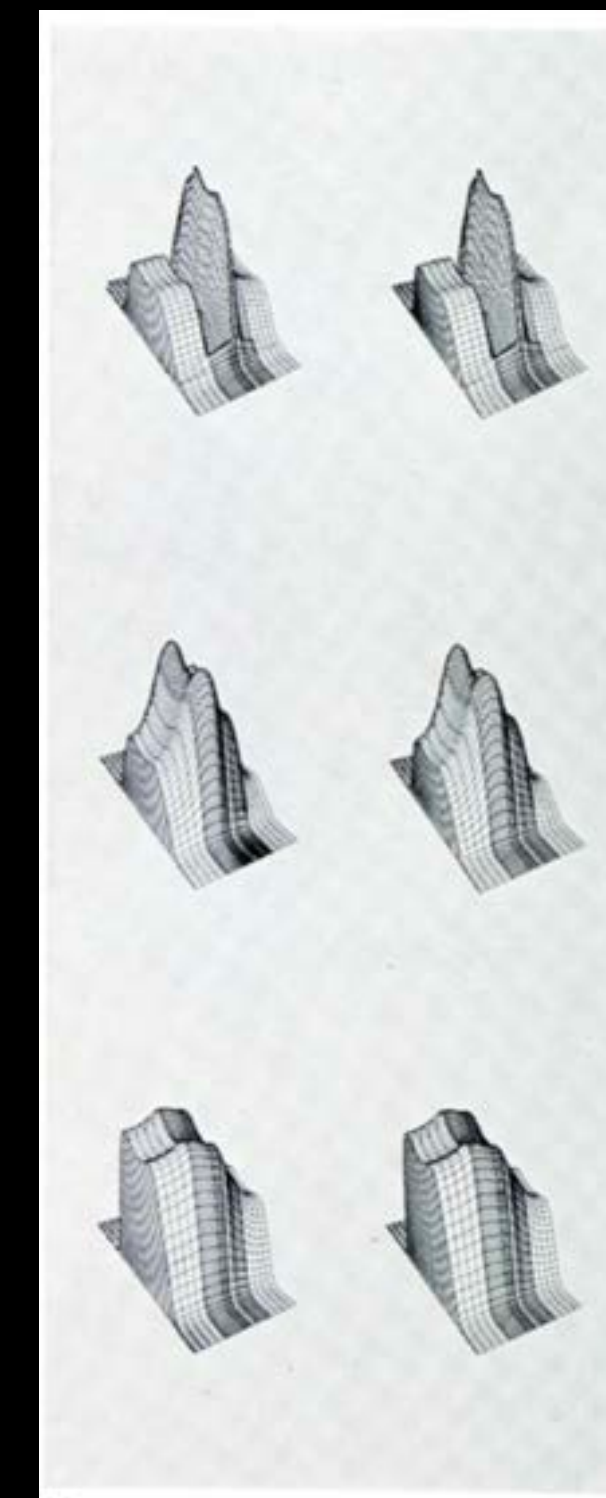
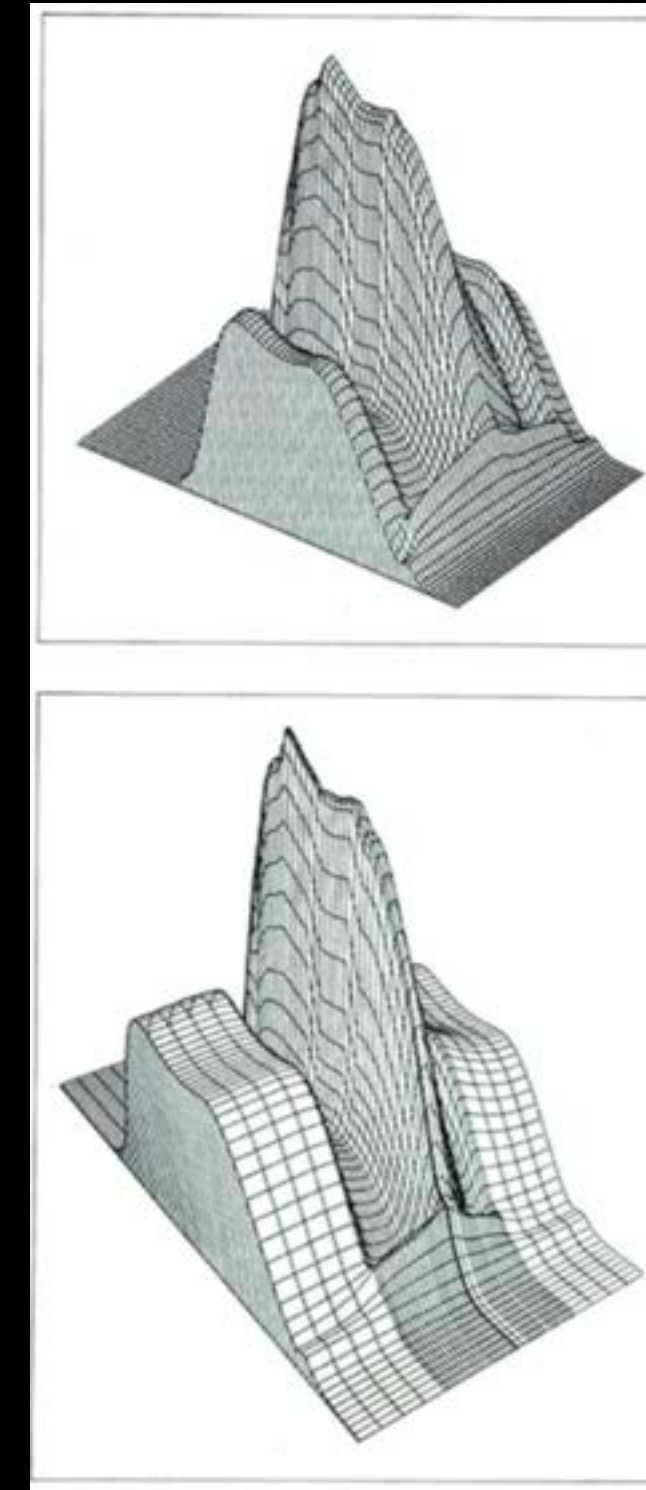
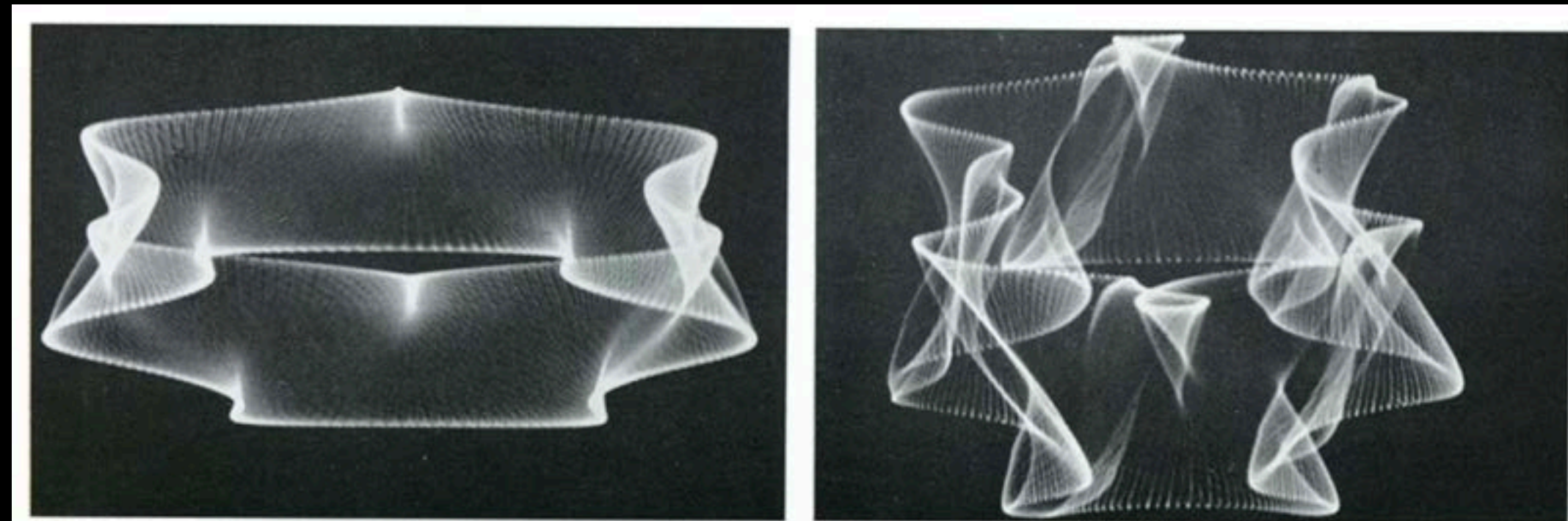
Alan Parkin
How to Draw a Ball, 1968
Elliott 4120, Rapidograph pen 0.2



Physical Phenomenon / Mathematical Concepts

Hugh Riddle and Anthony Pritchett
Sidebands, 1968

Stills of a kinetic sequence generated by an analogue system
Lissajous figure for frequency measurement
Use line to substitute classic Lissajous figure

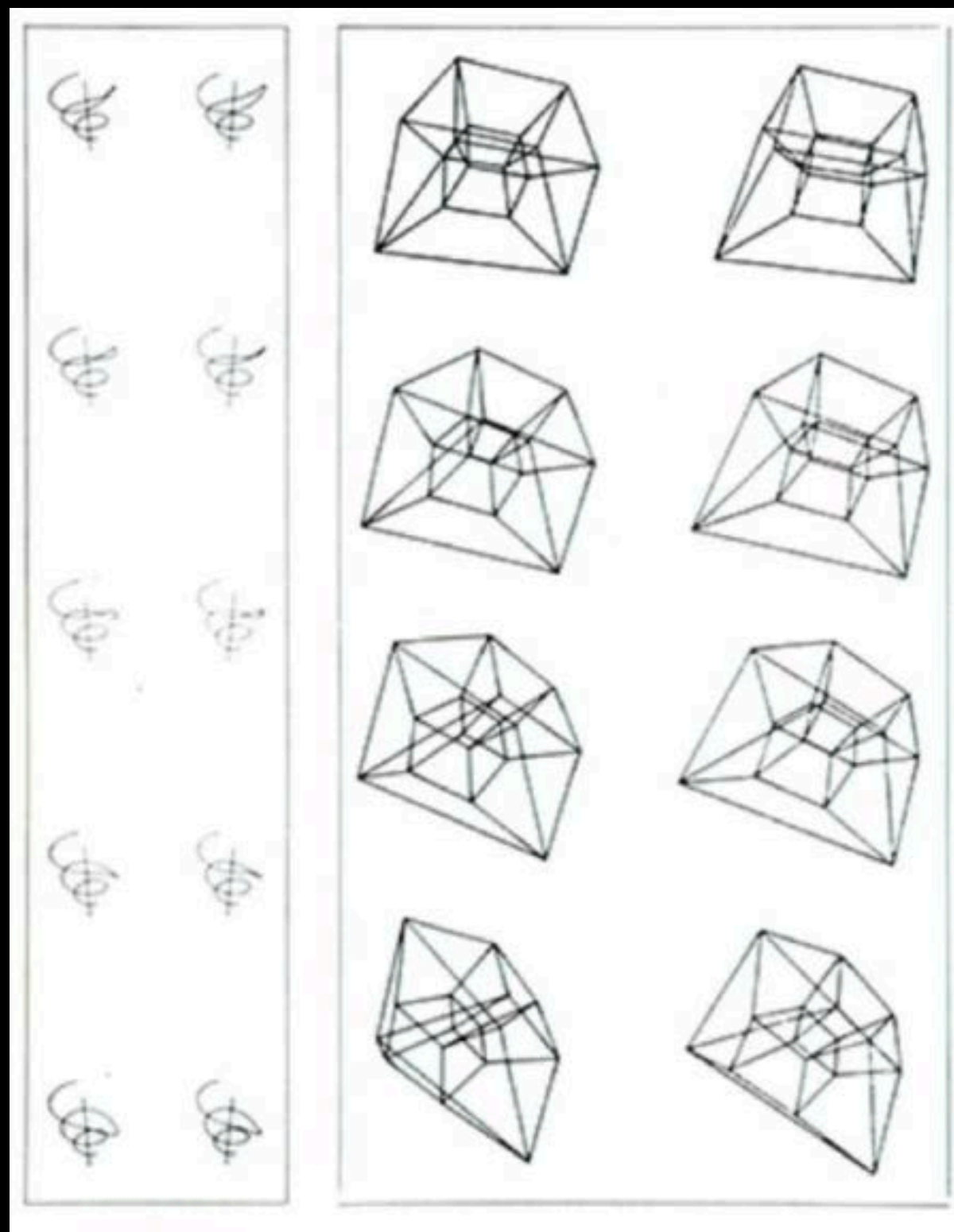


D. J. DiLeonardo
Isometric view of neutron distribution

Perspective views of the neutron distribution in a reactor (Left)

Actual stereo pairs (Middle)

Perspective view of the reactor power as a function of time at several reactor core locations (Right)

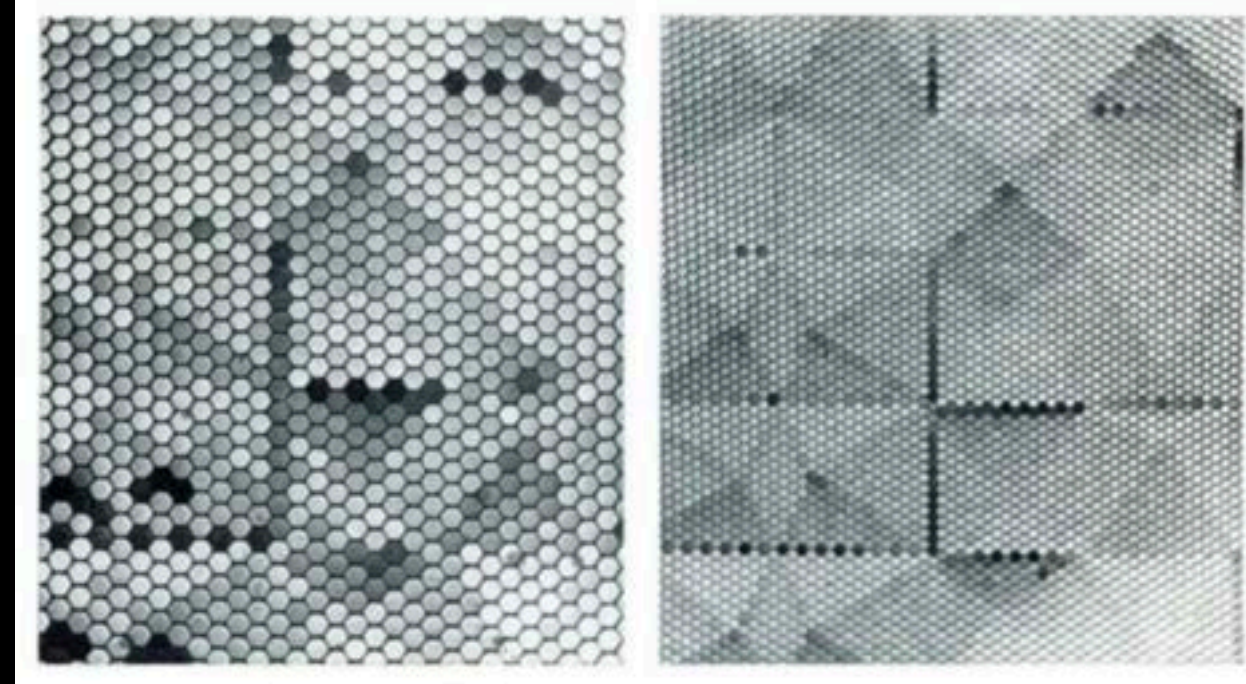
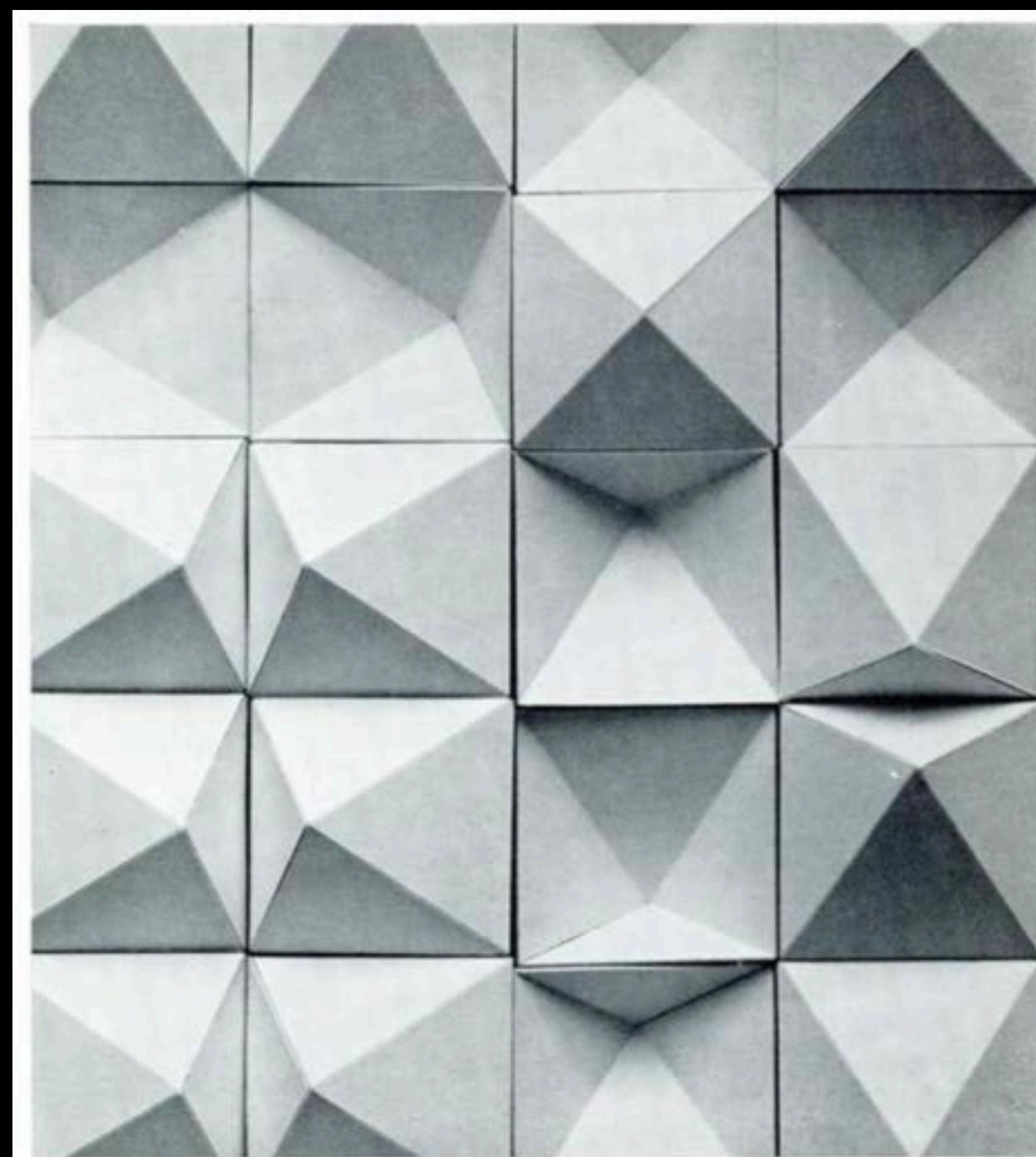


Robert Dick, Hexagonalized Pictures

Picture-to-magnetic tape device

Relief surface used for brightness translation (Upper)

Hexagonalized value translation (Lower)



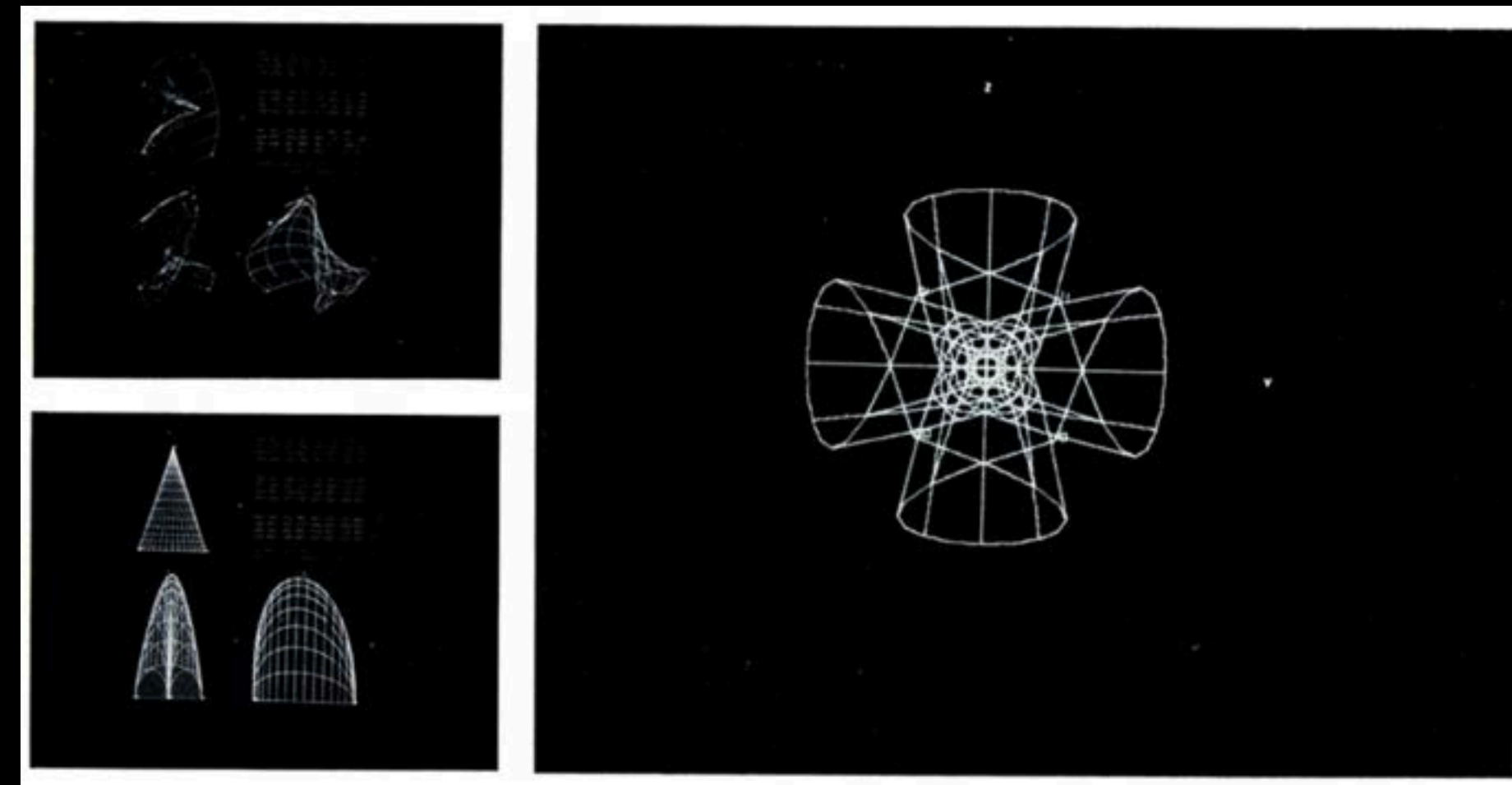
A. Michael Noll

Simulated basilar membrane motion (Left)

Basilar membrane of the inner ear

Four successive stereo pairs (Right)

Four dimensional cube



A.R. Forrest, Mathematically Defined surfaces

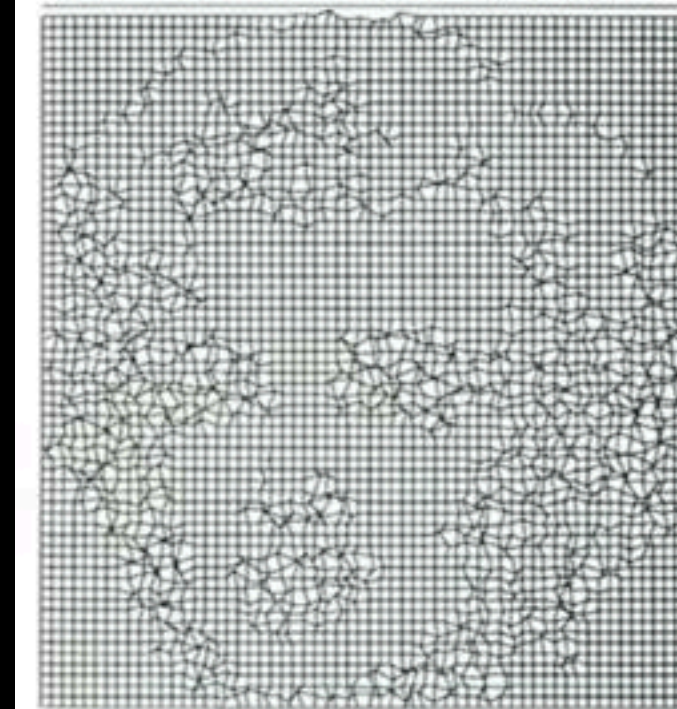
More Abstract Ideas



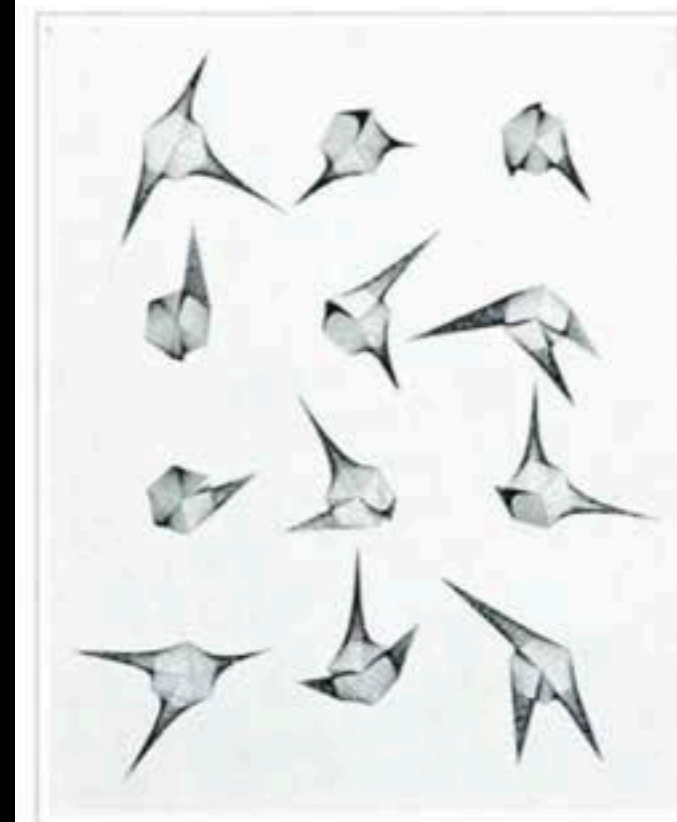
CTG Group



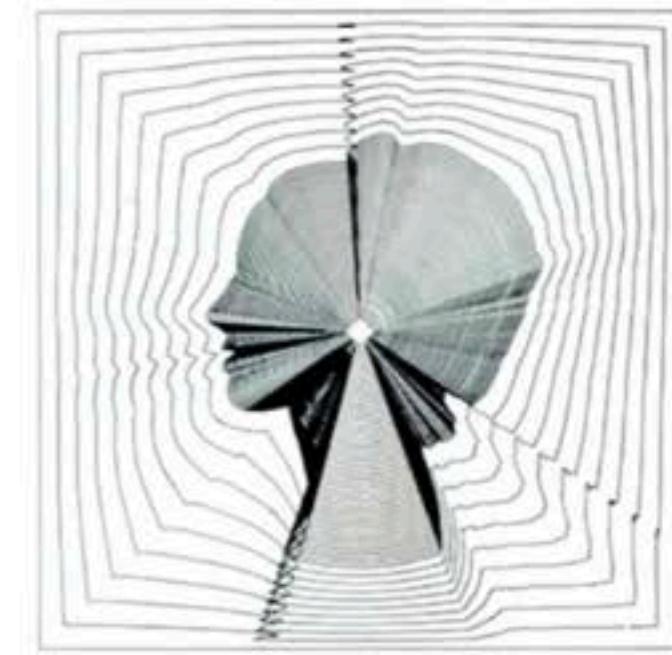
Kennedy in a dog



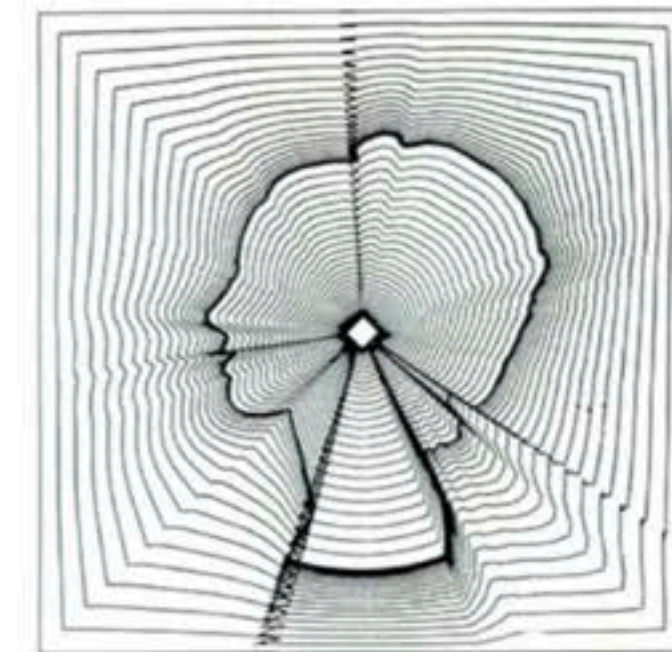
Monroe in the net



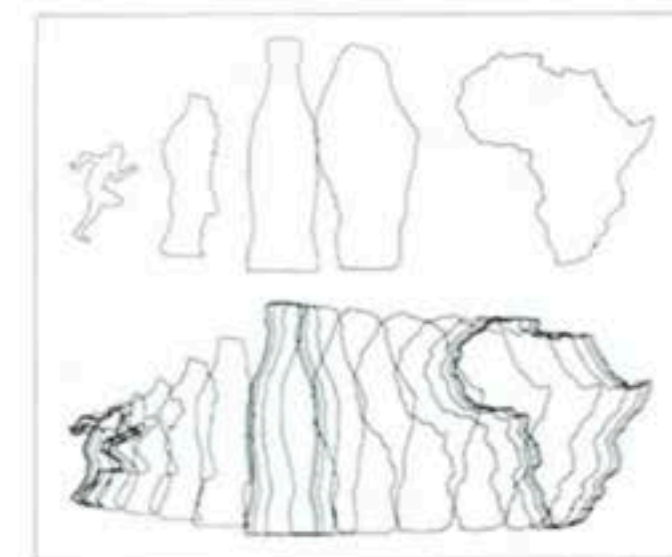
Upheaval collection (b)



Return to a square (a)



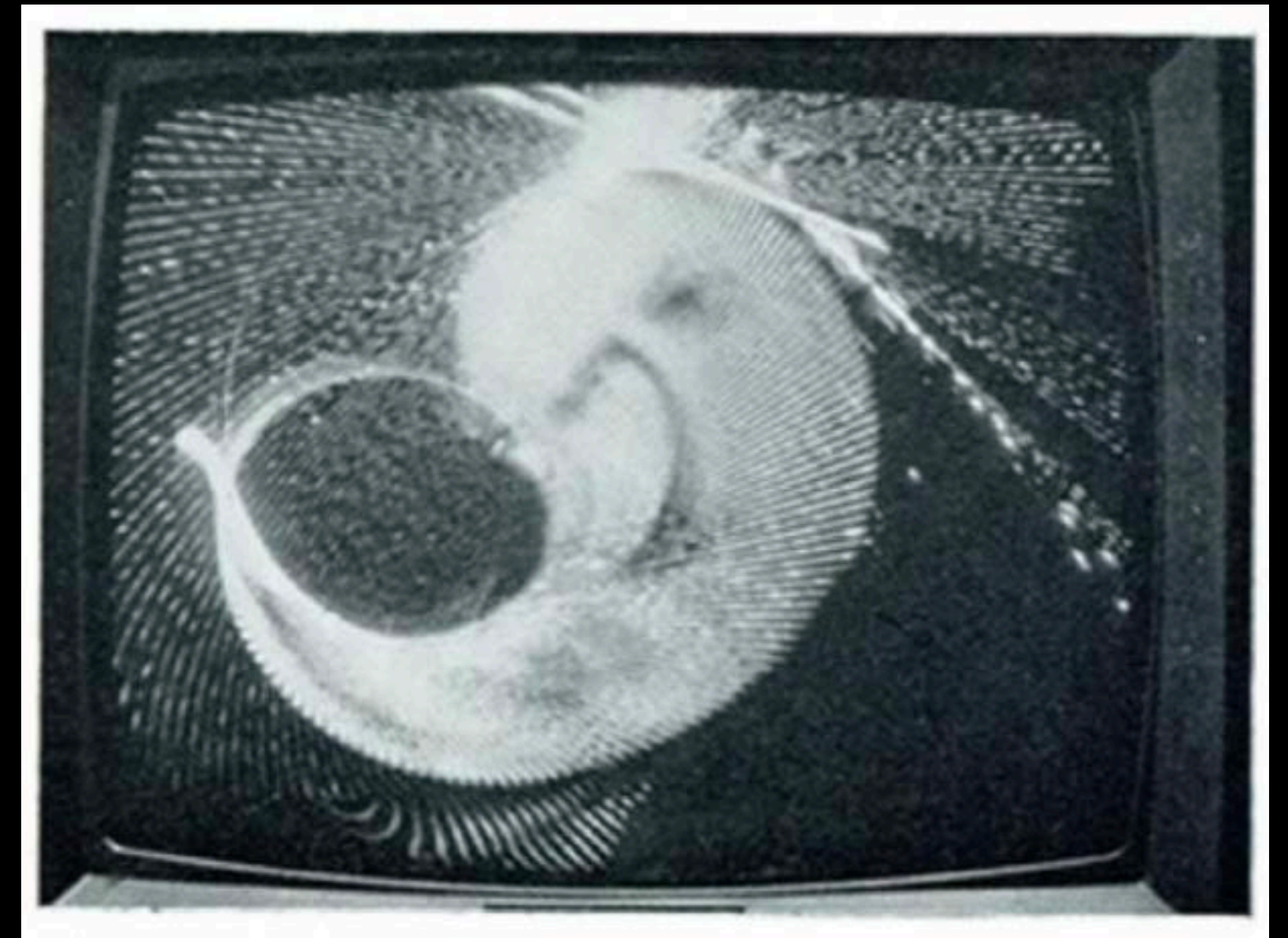
Return to a square (b)



Running cola is Africa



Deformation of Sharaku



Nam June Paik, *McLuhan caged*

TV (Paint with magnetic field)

$$\log_a \text{Cage} - 3.5\sqrt{\text{McLuhan}} = \pm \text{sorry}$$



Dialogue with the Computer

Stepping further into abstraction, artists from the early ages also explored how to really push the boundaries of visual expression with computation.

One big trend under this theme is the movement of Optical (Op) Art and Kinetic Art. Op art features bold geometric patterns rendered with machine-like perception that playfully (sometimes painfully) tricks the eye, prompting reflection on the nature of visual perception with a futuristic style. [3]

Kinetic Art, use patterns and sculptures with movements in a similar way to create similar unique visual effects. [3]

There are also artists explore the possibilities of visual expression with multiple ways of experiments with the algorithm. Under this dialogue with machine, a new way of abstraction formed which reflects the aesthetics of rationality.

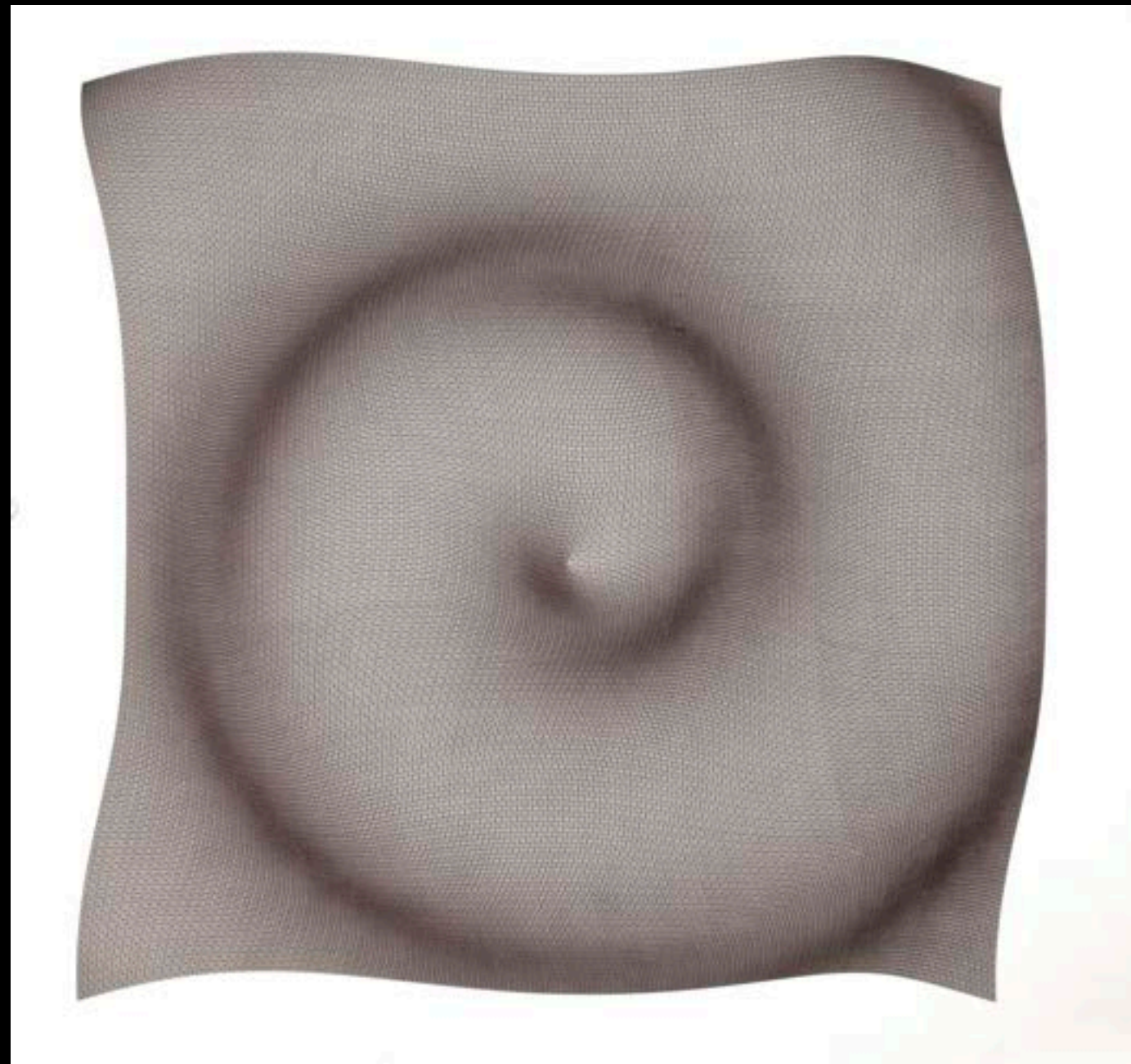
Op Art



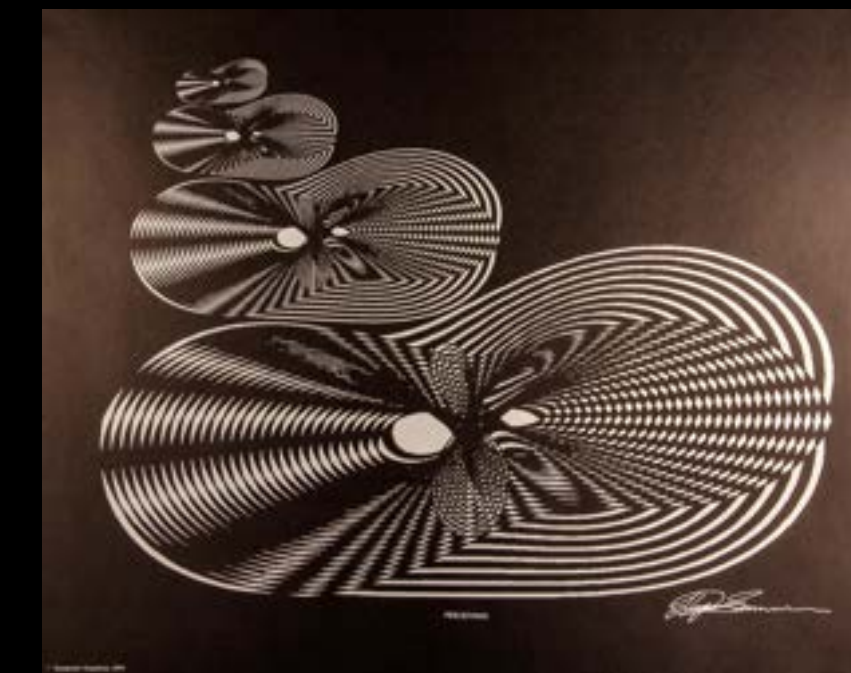
Karl Gerstner, *Lens Picture No. 15*, 1964

Plexiglas lens mounted on painted formica with electric light

<https://www.instagram.com/reel/DDkRj0ex-hI/>

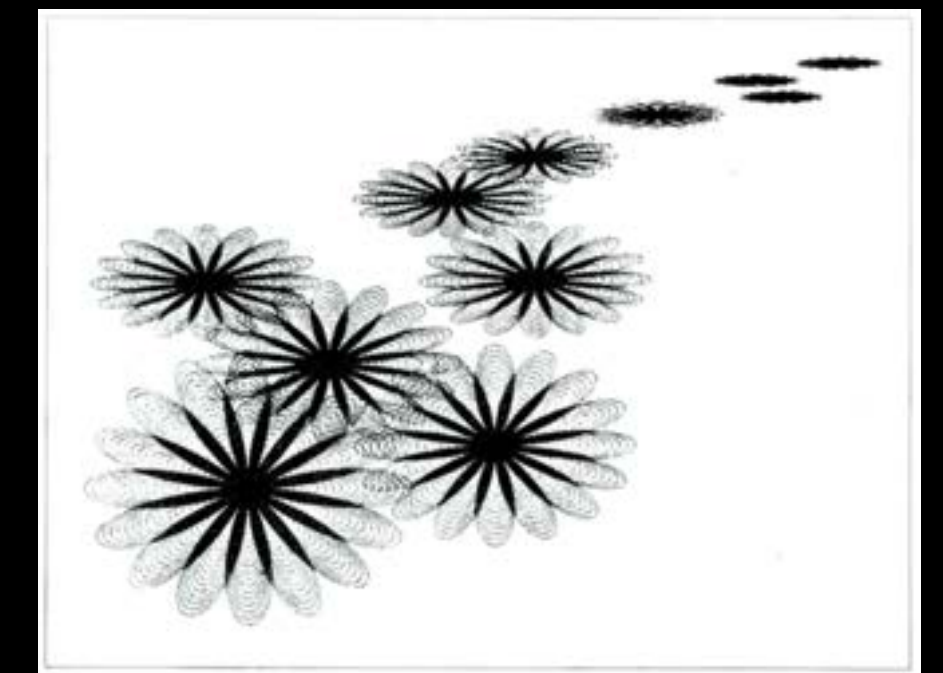


Jean-Pierre Hébert, *Spiral Dilation*, 1988



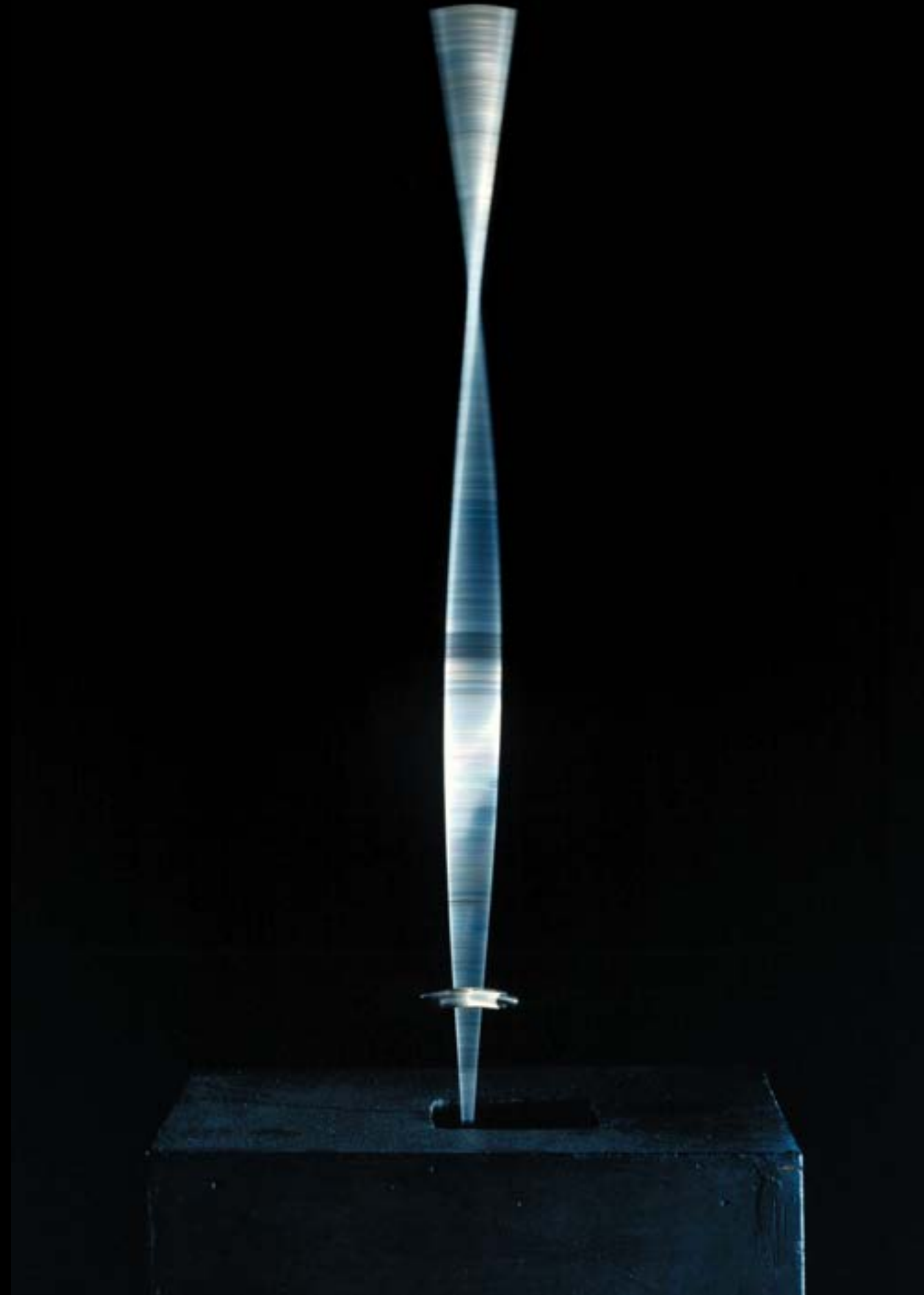
Llyod Summer

Perceiving, 1971 (Left)



Friendly Flowers of Time and Space (Right)

Kinetic Art



Naum Gabo
Standing Wave, 1919 (Left)
Linear No.2, 1962 (Right)

Abstraction exploration through dialogue with the machine

It's only one step from Mondrian to the computer.

—Georg Nees, 1969 [4]

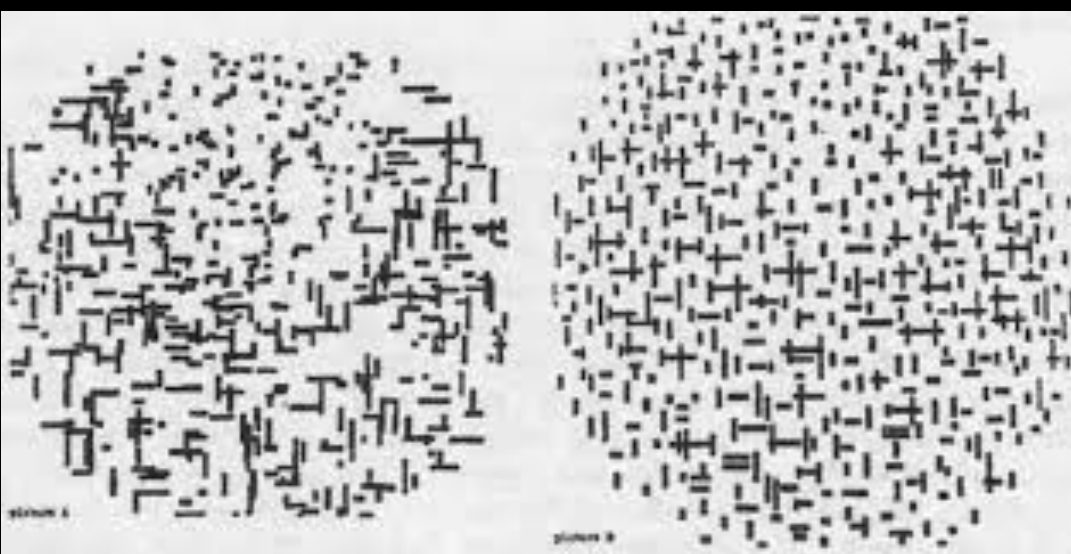
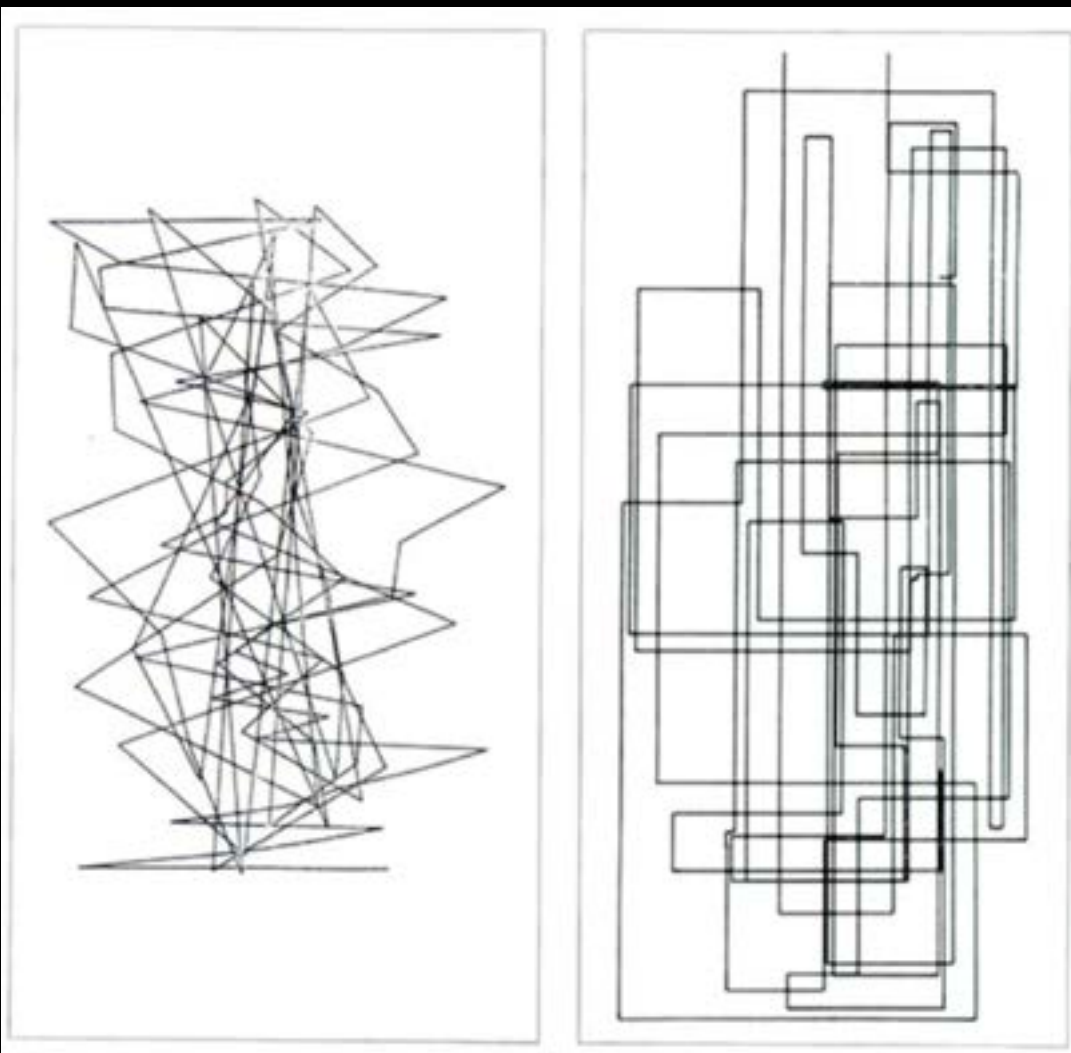
The worst state of affairs is when science begins to concern itself with art. — Paul Klee, 1906 [4]



It has been questioned if computer art is art since the first attempts are made by scientists, engineers and artists rely a lot on them at earlier time. And lot of themes are related to mathematical curves like Fibonacci spirals or Lissajpis figures.

Ben F. Laosky was the first to recognize the aesthetic potential of these scientific patterns. [4]

Ben Laposky, *Electronic Abstractions Series*, 1952
Lissajous curves made with light

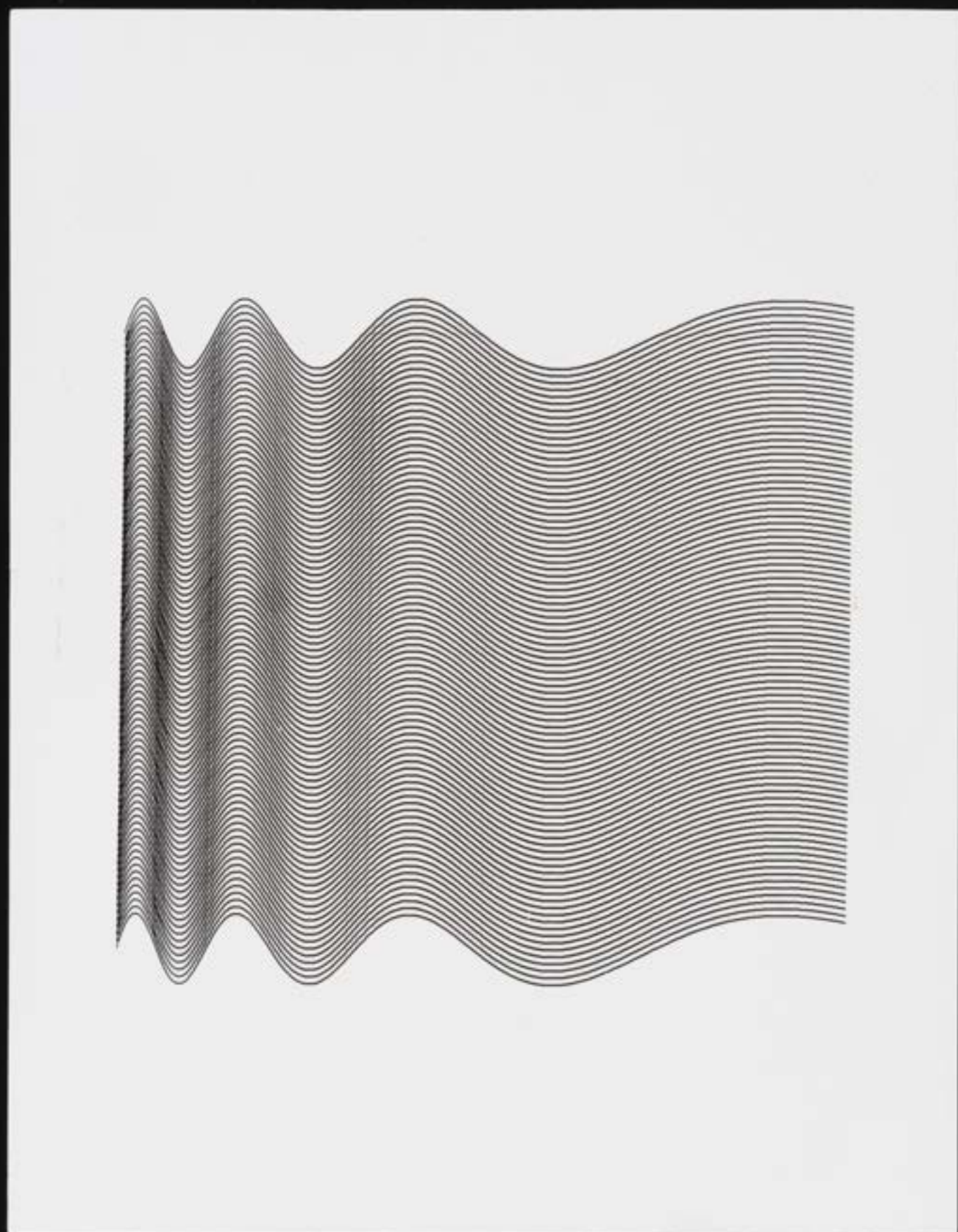


A. Michael Noll (Bell Labs)
Gaussian Quadratic (Upper Left)

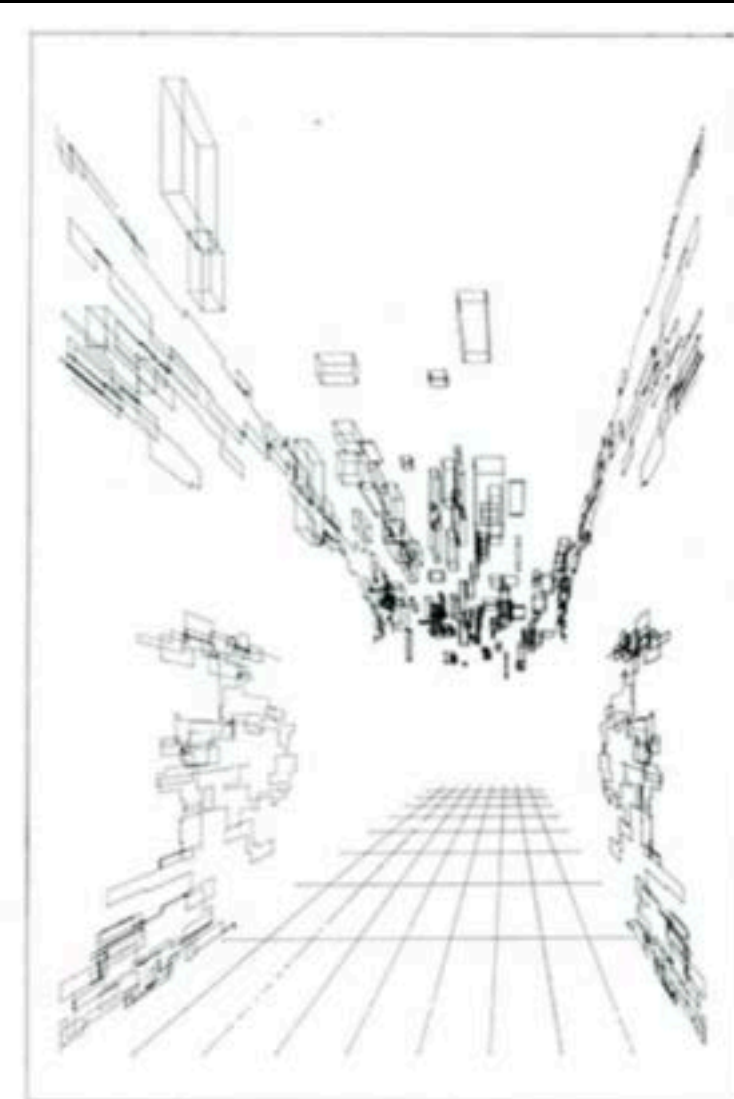
Comparison with Mondrian, 1964 (Lower Left)

IBM 7094, Programmed in FORTRAN

Ninety parallel sinusoids with linearly increasing period, 1964 (Right)



Georg Nees



Top far left, Georg Nees, 23-corner graphic

Top centre, 8-corner graphic

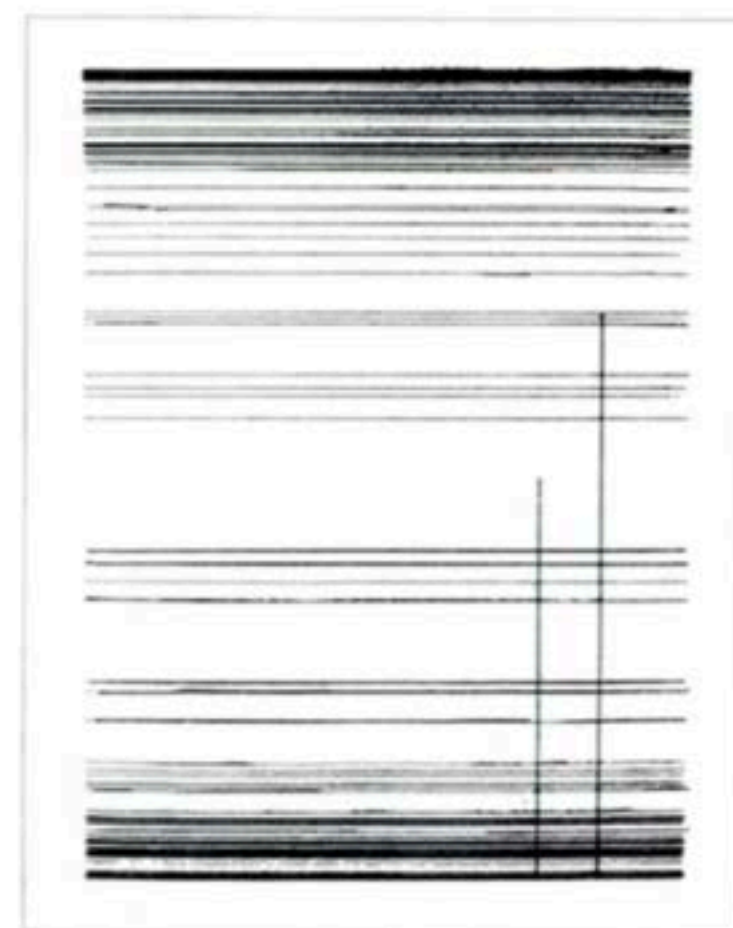
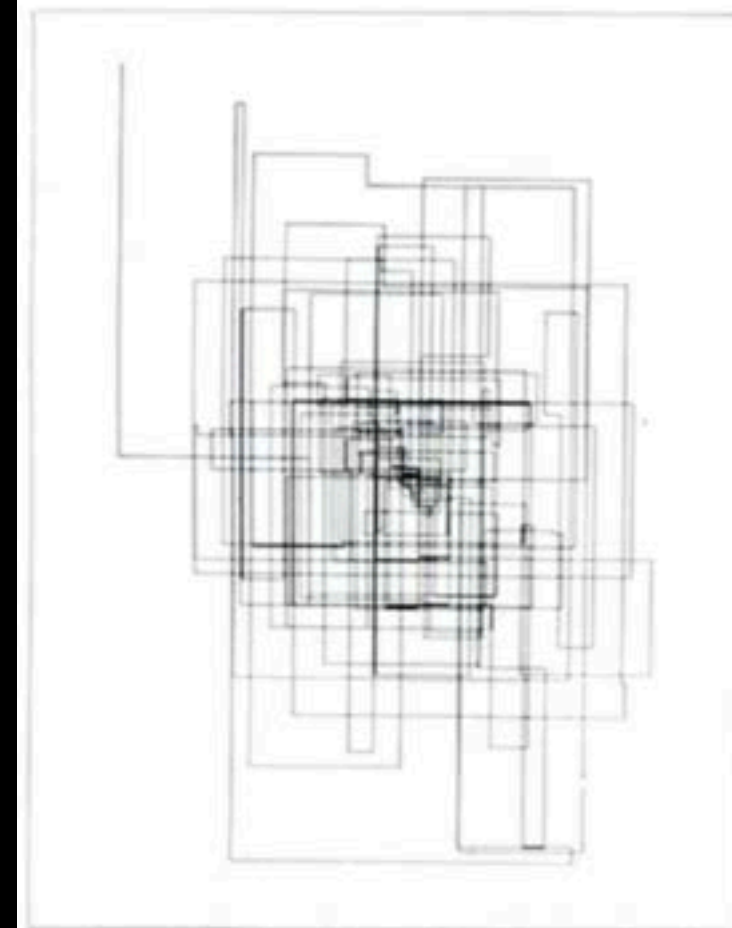
Above, *Corridor*
Programme for this picture was constructed as follows:

Two separate linear-rectangular progressions were generated on the left wall. Then the pattern was copied symmetrically on the right wall. A set of cubes were spaced randomly on the ceiling and the floor pattern was drawn.

The programme was written in Algol, run on a Siemens 2002 computer and plotted with a Zuse-Graphomat

Far left, *Axis parallel maze*

Left, *Curtains*, graphic discovered by error

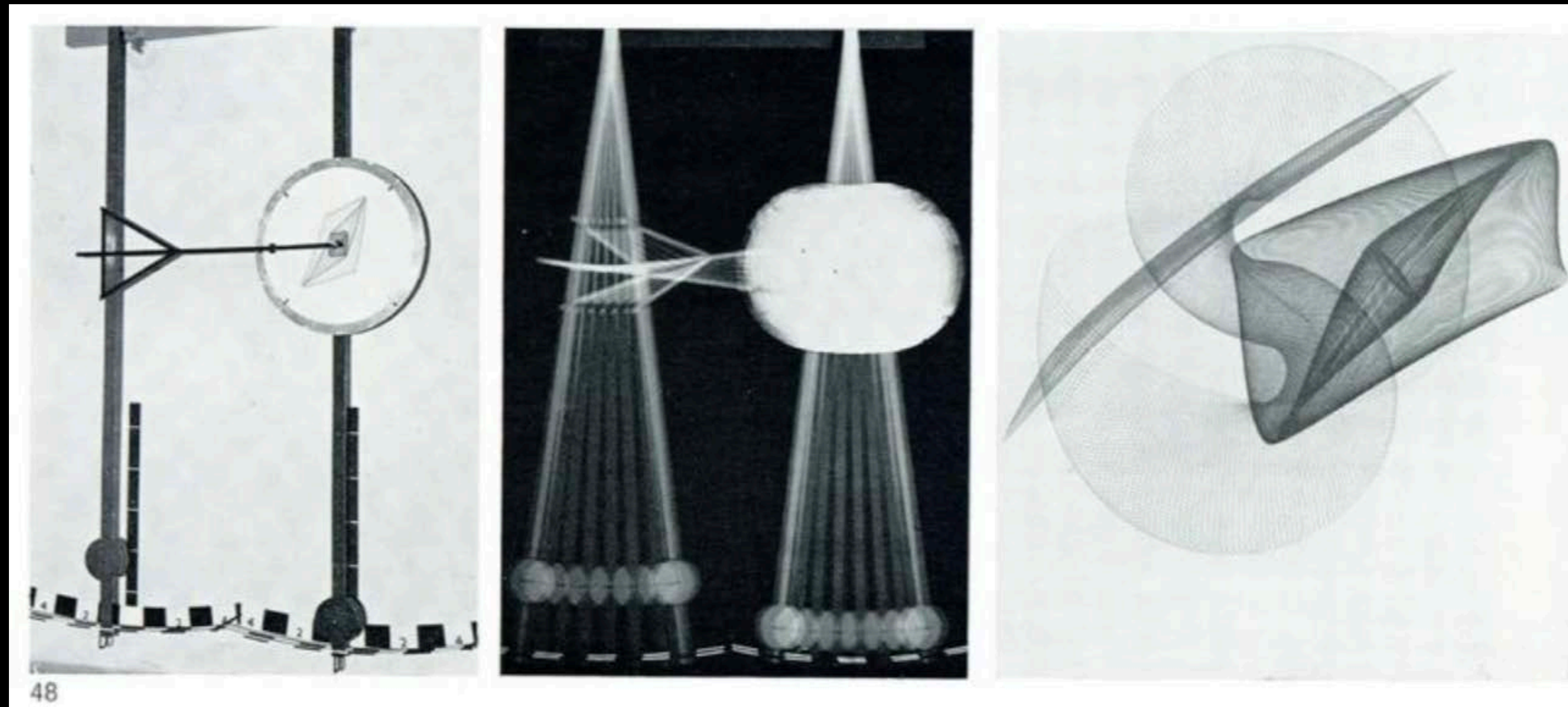




Co-working with the Machine

One of the most audacious attempts in exploring the aesthetics of rationality is to **handle the work very largely or completely to the machine.**

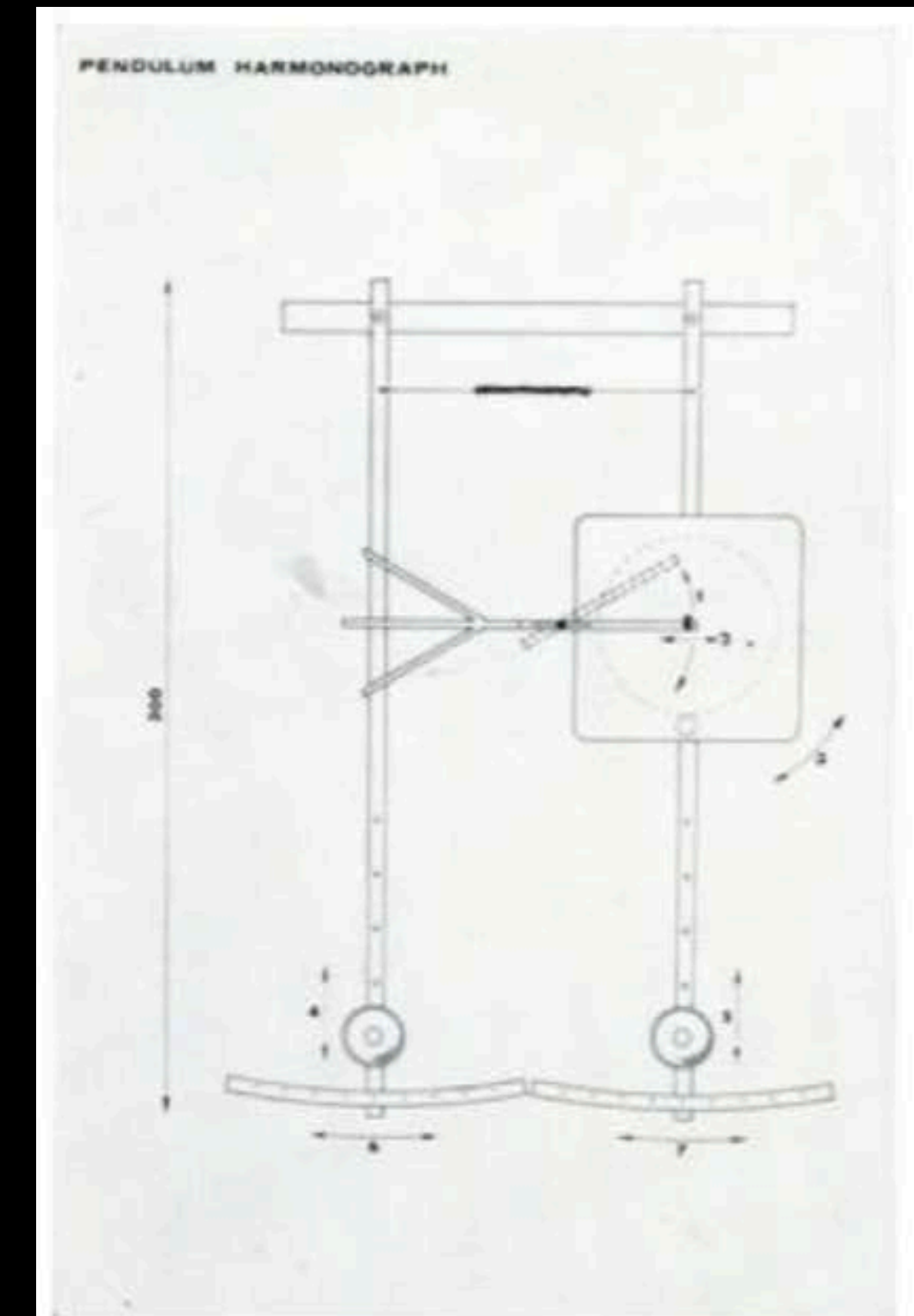
By designing the mechanism and generation algorithm, letting the machine do the work also comes out with unexpected results.



Ivan Moscovich, *The pendulum harmonograph: a drawing machine*, 1951

Aiming at creating abstract designs of a more advanced or complex degree than those already existing

Twinpendulum harmonograph



Twin pendulum harmonograph constructed by I. Moscovich, Director of the Museum of Science and Technology in Tel-Aviv.

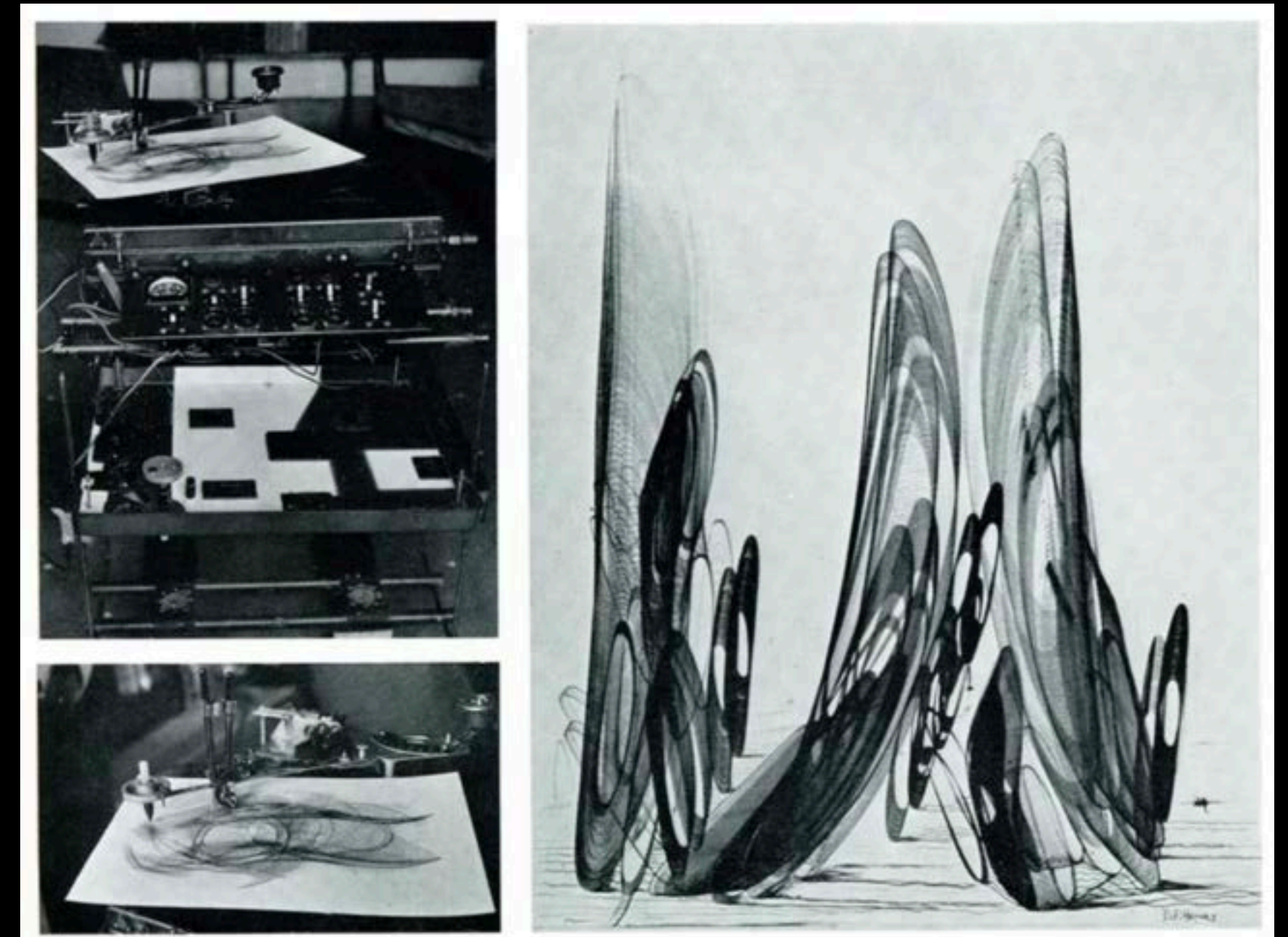
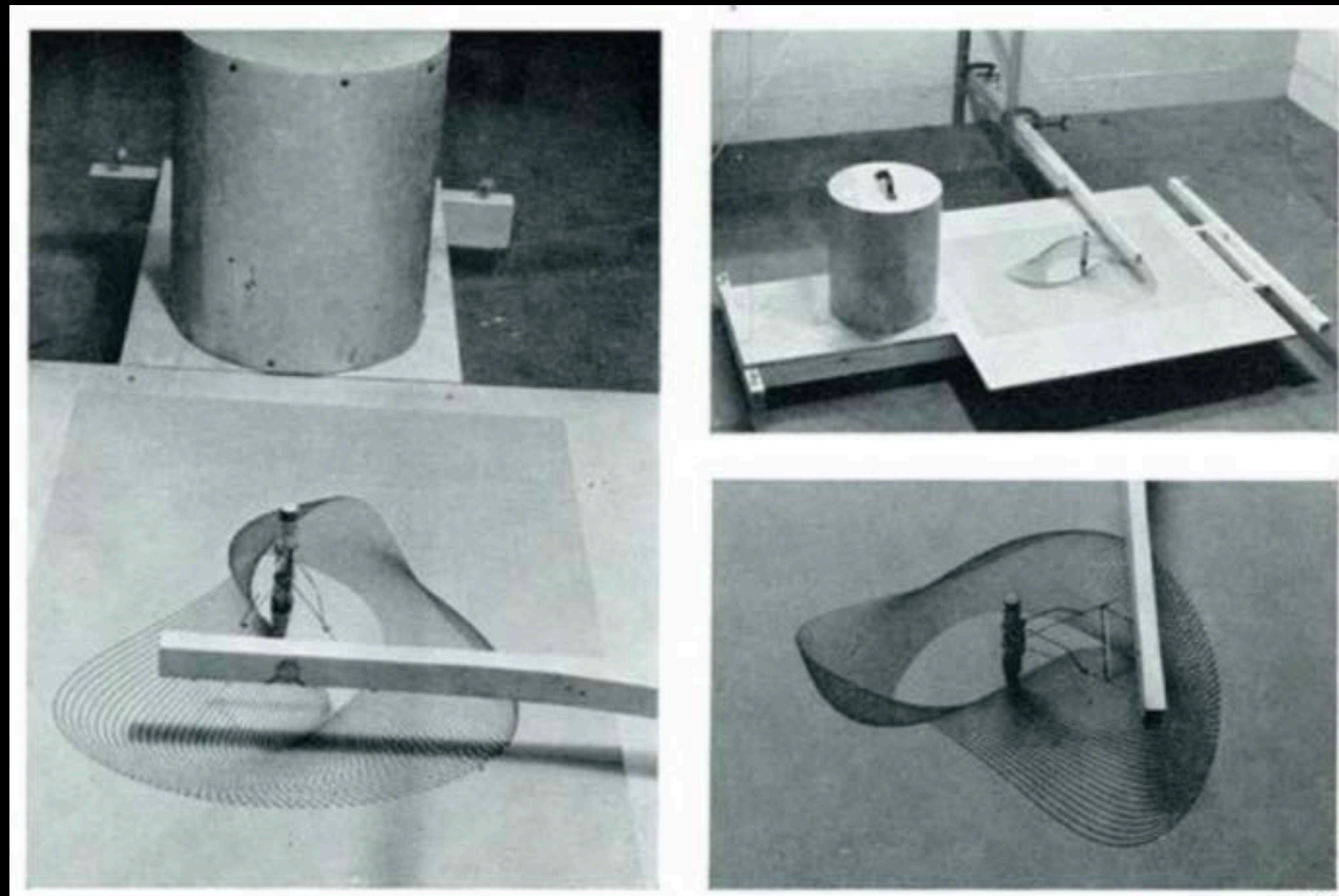
Features:

1. Angle of arm carrying the pencil
2. Extension of arm carrying the pencil
3. Revolving board holding the paper
4. } Changeable lengths of pendulums
5. }
6. } Variable amplitudes
7. }

The machine is simple in construction and easily controlled so that a skilled operator can make compositions as big as 30 × 30 inches.

John Ravilious, *Drawing Machine*

From designing repetitive wall-paper like pattern to draw single pattern



Desmond Paul Henry, *The Henry Drawing Computer, Untitled, 1962*

Consider machine either as an aid in producing drawings, or as a producer of completed drawings

Drawing created by combination of pen movement and table movement

The pen is moved in elliptical paths of various dimensions, and harmonic table-movements distort the ellipses at selected points, at the same time shifting the paper in a curved path.

Data Source

- [1] Friedman, T. (2005). *Electric dreams : computers in American culture*. New York University Press.
- [2] Institute of Contemporary Arts, & Reichardt, J. (1969). *Cybernetic serendipity : the computer and the arts*. Praeger.
- [3] Buffalo AKG Art Museum, host institution, Musée d'arts de Nantes, host institution, Sirén, J., Lévy, S., Ryan, T. R., Caplan, L., Valyi-Nagy, Z., & Gaboury, J. (2024). *Electric Op* (First edition.). Buffalo AKG Art Museum.
- [4] Jones, L., Los Angeles County Museum of Art, host institution, DelMonico Books, publisher, Ferran, B., Frank, P., Funk, T., Higgins, H., Hoy, M., Logan, J. K., Mark, L. G., McKim, J., Salvesen, B., Shanken, E. A., Steinberger, S., Taylor, G. D., Tigerman, B., & Wood, D. (2023). *Coded : art enters the computer age, 1952-1982*. Los Angeles County Museum of Art.
- [5] Shanken, E. A. (Ed.). (2009). *Art and electronic media*. Phaidon Press. <http://books.google.com/books?isbn=9780714847825>

Thank you