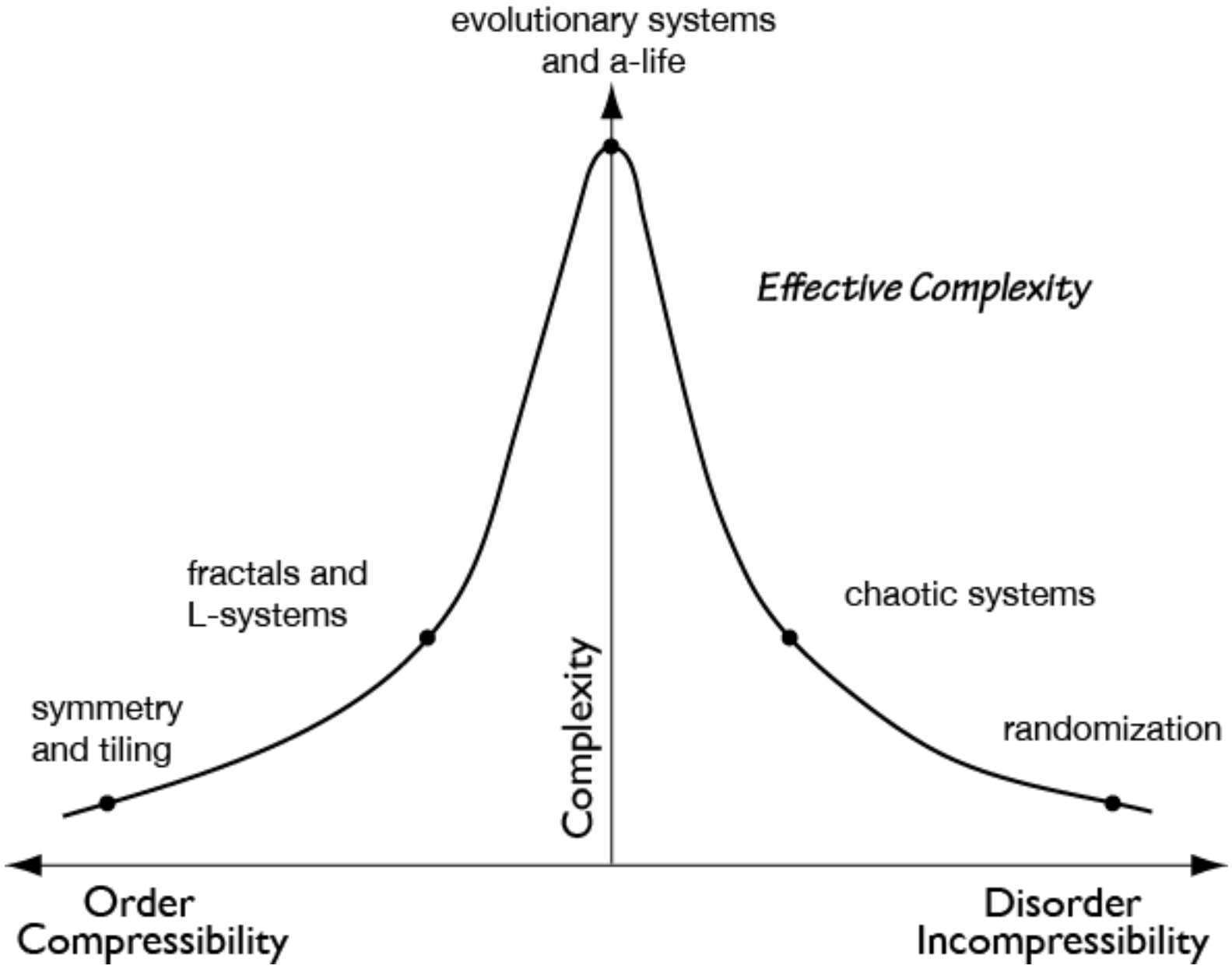
“Generative art refers to any art practice where the artist uses a system, such as a set of natural language rules, a computer program, a machine, or other procedural invention, which is set into motion with some degree of autonomy contributing to or resulting in a completed work of art.”

# “Systems in Art Making and Art Theory….”, Philip Galanter




http://median.newmediacaucus.org/caa-edition/systems-in-art-making-and-art-theory-complex-networks-from-the-ashes-of-postmodernism/

# What is Generative Art?

## Complexity Theory as a Context for Art Theory

**Philip Galanter, BA, MFA**
*Interactive Telecommunications Program, New York University, New York, USA.*
*e-mail: galanter@nyu.edu.*

### Abstract

In this paper an attempt is made to offer a definition of generative art that is inclusive and provides fertile ground for both technical and art theoretical development. First the use of systems is identified as a key element in generative art. Various ideas from complexity theory are then introduced. It is noted that systems exist on a continuum from the highly ordered to the highly disordered. Citing examples from information theory and complexity science, it is noted that highly ordered and highly disordered systems are typically viewed as simple, and complex systems exhibit both order and disorder. This leads to the adoption of effective complexity, order, and disorder as organizing principles in the comparison of various generative art systems. This inclusive view leads to the somewhat surprising observation that generative art is as old as art itself.

**Sequence of Automation Complexity** (p.10-11)

1) Full human participation, software as design tool (using Adobe software like Photoshop)
2) User provides various attributes/parameters, software generates results automatically (like fractal design program)
3) Encode artist style into rules and algorithms by which software performs (Harold Cohen)
4) Transformational: New image is created out of an existing image which is reformulated algorithmically (image processing filtering)
5) AI: Collection of existing images are analyzed then iteratively processed, then reduced dimensionally to produce a new image

https://link.springer.com/article/10.1186/s42492-018-0006-1

# Randomized Autonomous Systems

- In 1787, Mozart wrote “Dice Game” each sequence selected from 11 precomposed segments selected by dice throw
- “According to the Laws of Chance”, Jean Arp (1933) https://www.tate.org.uk/art/artworks/arp-according-to-the-laws-of-chance-t05005
- Cut-up technique eat author William Burroughs and Brion Gysin: https://en.wikipedia.org/wiki/Cut-up_technique
- “Music of Changes”, John Cage, indeterminate music, composition through random selection of sounds compositions, and the I Ching (a symbol system used to identify order in chance events) https://en.wikipedia.org/wiki/Music_of_Changes

**https://en.wikipedia.org/wiki/Systems_art (Related methods)**

# System Art (Artists look at systems) & Related Methods

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## Systems art

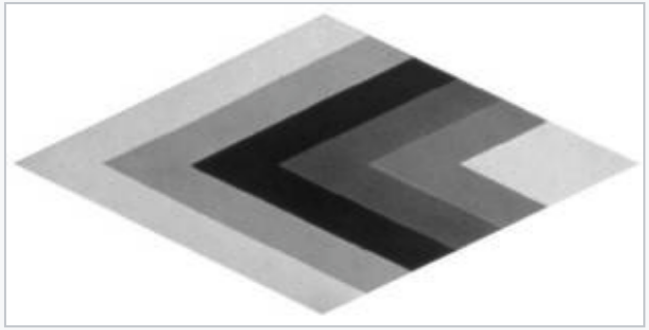
4 languages

Article Talk Read Edit View history Tools

From Wikipedia, the free encyclopedia

**Systems art** is art influenced by cybernetics and systems theory, reflecting on natural systems, social systems, and the social signs of the art world itself.[1]

Systems art emerged as part of the first wave of the conceptual art movement in the 1960s and 1970s. Closely related and overlapping terms include *anti-form movement*, *cybernetic art*, *generative systems*, *process art*, *systems aesthetic*, *systemic art*, *systemic painting*, and *systems sculpture*.



Kenneth Noland, Trans West, 1965.

https://en.wikipedia.org/wiki/Systems_art

# Cybernetics

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# Cybernetics

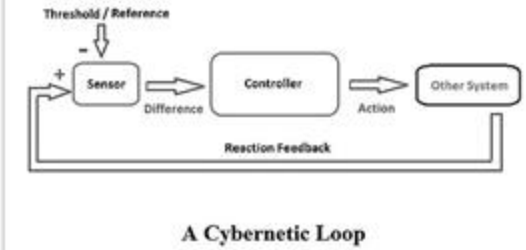
82 languages

Article Talk Read Edit View history Tools

From Wikipedia, the free encyclopedia

*For organisms with both organic and mechanical parts, see cyborg.*
*For other uses, see Cybernetics (disambiguation).*

**Cybernetics** is the transdisciplinary study of circular causal[1] processes such as feedback and recursion, where the effects of a system's actions (its outputs) return as inputs to that system, influencing subsequent action.[2] It is concerned with general principles that are relevant across multiple contexts,[3] including in engineering, ecological, economic, biological, cognitive and social systems and also in practical activities such as designing,[4] learning, and managing. Cybernetics' transdisciplinary[5] character has meant that it intersects with a number of other fields, leading to it having both wide influence and diverse interpretations.




Principle diagram of a cybernetic system with a feedback loop

## Complex systems

# Systems Theory

**Systems theory** is the transdisciplinary[1] study of systems, i.e. cohesive groups of interrelated, interdependent components that can be natural or artificial. Every system has causal boundaries, is influenced by its context, defined by its structure, function and role, and expressed through its relations with other systems. A system is "more than the sum of its parts" when it expresses synergy or emergent behavior.[2]

| Complex systems | |
|---|---|
| **Topics** | |
| Self-organization | [show] |
| Collective behavior | [show] |
| Networks | [show] |
| Evolution and adaptation | [show] |
| Pattern formation | [show] |
| Systems theory and cybernetics | [show] |
| Nonlinear dynamics | [show] |
| Game theory | [show] |
| V • T • E | |

Changing one component of a system may affect other components or the whole system. It may be possible to predict these changes in patterns of behavior. For systems that learn and adapt, the growth and the degree of adaptation depend upon how well the system is engaged with its environment and other contexts influencing its organization. Some systems support other systems, maintaining the other system to prevent failure. The goals of systems theory are to model a system's dynamics, constraints, conditions, and relations; and to elucidate principles (such as purpose, measure, methods, tools) that can be discerned and applied to other systems at every level of nesting, and in a wide range of fields for achieving optimized equifinality.[3]

General systems theory is about developing broadly applicable concepts and principles, as opposed to concepts and principles specific to one domain of knowledge. It distinguishes dynamic or active systems from static or passive systems. Active systems are activity structures or components that interact in behaviours and processes or interrelate through formal contextual boundary conditions (attractors). Passive systems are structures and components that are being processed. For example, a computer program is passive when it is a file stored on the hard drive and active when it runs in memory.[4] The field is related to systems thinking, machine logic, and systems engineering.

https://en.wikipedia.org/wiki/Systems_theory

# Emergence



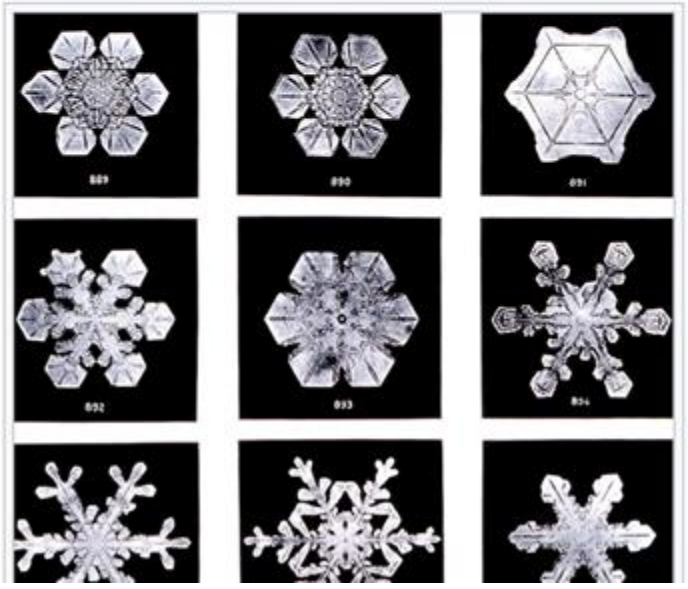
## Emergence



From Wikipedia, the free encyclopedia

*For other uses, see Emergence (disambiguation).*
*See also: Emergent (disambiguation), Irreducibility (disambiguation), Spontaneous order, and Self-organization*

In philosophy, systems theory, science, and art, **emergence** occurs when a complex entity has properties or behaviors that its parts do not have on their own, and emerge only when they interact in a wider whole.



Emergence plays a central role in theories of integrative levels and of complex systems. For instance, the phenomenon of life as studied in biology is an emergent property of chemistry and physics.

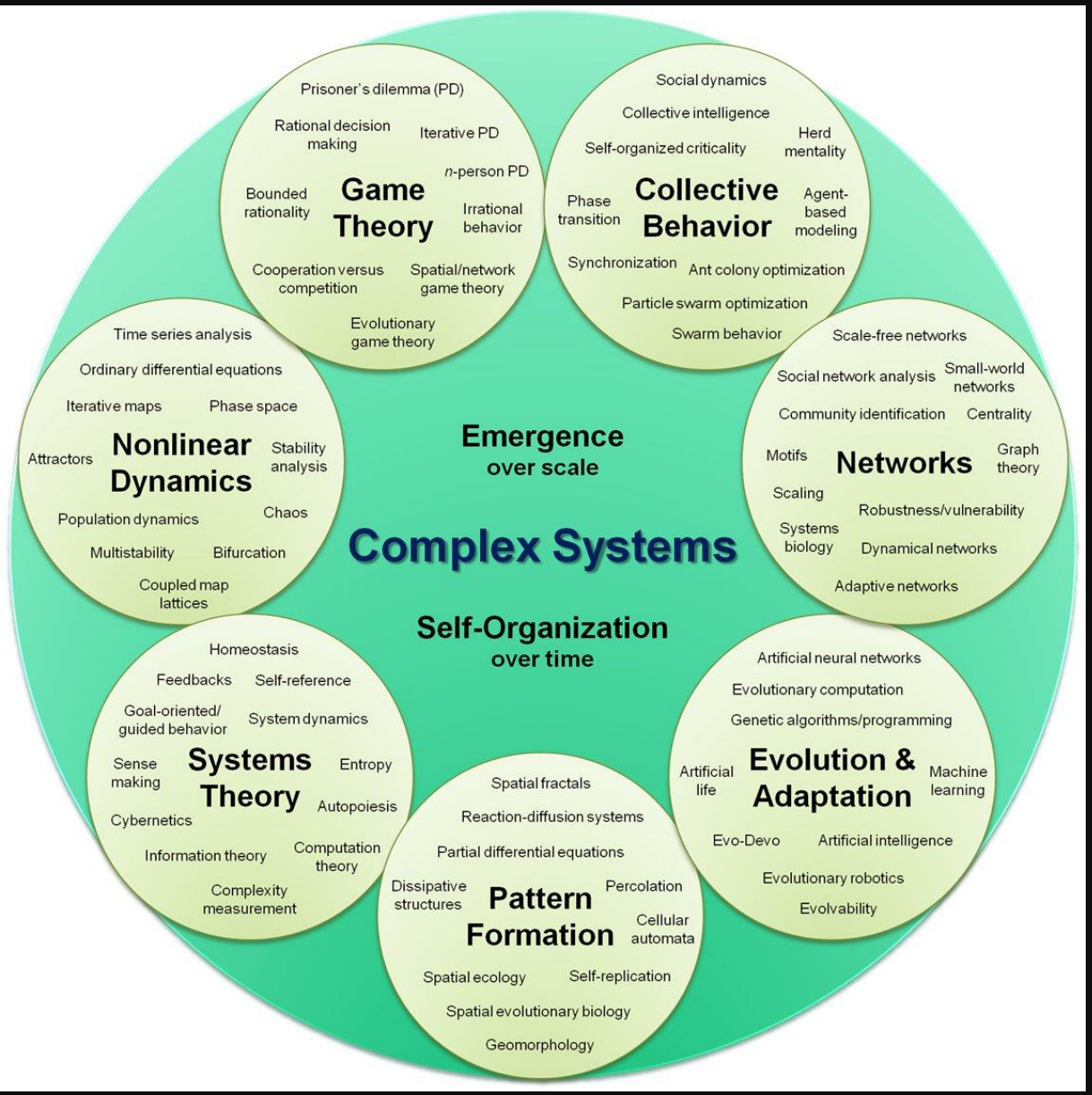
In philosophy, theories that emphasize emergent properties have been called emergentism.[1]

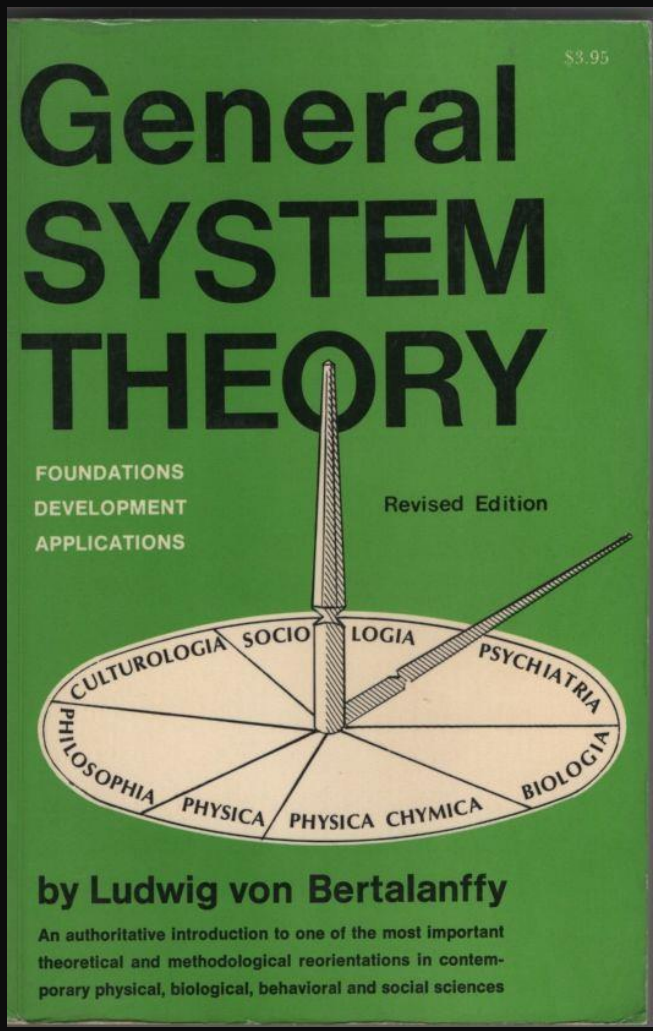
# System Art (Artists look at systems) & Related Methods

- System Art (Subset of Conceptual Art), influenced by cybernetics and systems theory
- Cybernetics: Explores regulatory systems, their structures, constraints and possibilities, such as feedback https://en.wikipedia.org/wiki/Cybernetics
- Systems Theory: The study of interrelated and interdependent parts https://en.wikipedia.org/wiki/Systems_theory
- Emergent behavior: Properties or behaviors which emerge only when the parts interact (school of fish, beehive, water crystals/fractals) – functioning as a collective https://en.wikipedia.org/wiki/Emergence

**https://en.wikipedia.org/wiki/Systems_art**

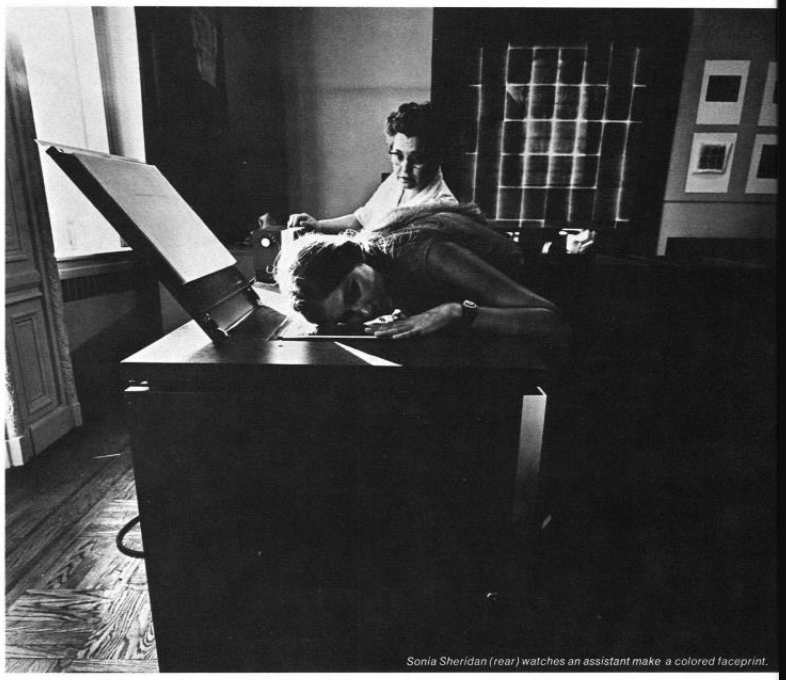
# “General Systems Theory”, Ludwig von Bertalanffy (1968)




https://en.wikipedia.org/wiki/Systems_theory

# “Software”, Exhibition at Jewish Museum, NYC curated by Jack Burnham



Sonia Sheridan (rear) watches an assistant make a colored faceprint.

**Sonia Sheridan**
**Interactive Paper Systems** 1969-70

Part of the basic equipment for *Interactive Paper Systems*, a 3M Thermofax machine is simply a revolving belt which permits a treated paper to react to carbon as it passes in seconds through the heated machine. Demanding no special training, it can be used to produce a variety of color transparencies, spirit masters, stencils and opaque copy. Through experimentation we have discovered that some of its artistic uses lie in making large projection transparencies, copy for film making, transparencies for photo screening, freak color separations, instant textile design, image distortion and transparency collages.

The Color-in-Color machine, available for a portion of the exhibition time, is a recent 3M invention which translates into full color any two or three dimensional object which can fit in its 8"x10" format. This instrument is a major breakthrough in the graphics field, for it can produce an endless variation of images within a span of minutes. In the hands of a creative person neither the size nor the quality of the image is limited. It can be adapted to produce images on either paper or onto a matrix, which is then transferable to any heat resistant material by means of an ordinary iron or a companion Color Processor. We have considered using this instrument for rapid film animation, instant 2-3D books, rapid textile design, light printing with stencils, colorful and dynamic correspondence and a variety of other possibilities. Michael Schumacher has done some fine photomontage work with this machine. Keith Smith exploded the size limitation by cutting up Kodalith positives and ironing them onto a huge quilt combined with silkscreen and photographs. *Cosmo*, a team of Robert Frontier and William McCabe, rephotographed the Adlai Stevenson family album on the machine, took slides and projected them so that black and white photos were completely altered. We have been able to increase the variety and volume of correspondence and to carry on interactive graphics with artists, inventors and businessmen.

The capacity of the new graphic machines for instant production has the most profound implications for the visual world. The artist, who once spent hours rendering an orange, can photograph the orange whole, cut up into any variety of forms, or squeezed into juice, and can rephotograph it within minutes. In an hour's time he can produce 120 variations; in eight hours he can have almost 1000 different versions of the orange. It is obvious that this work process becomes another kind of time for the artist as the distance from conception to conception is reduced to minutes and objects change as rapidly as thinking allows.

Equipment on loan from the 3M Corporation



**Hans Haacke**
**Visitors' Profile** 1969
with assistance from Scott Bradner (Art & Technology, Inc., Boston)
Digital Equipment Corporation (time share PDP-8 computer)

A teletype terminal with a picture scope is connected with a digital computer on a time-sharing basis and serves both as input and output device.

Using the keyboard the visitors can answer questions which are posed to them on the scope. Due to branches in the polling program a number of these questions are personalized and vary from visitor to visitor.

Essentially the questions are of two types. One set asks the visitors for *factual* information about themselves, e.g., age, sex, educational background, income bracket, etc. The other set of questions inquires about their *opinions* on a variety of subjects.

The computer compiles the answers, compares them with information received from other visitors and correlates data relevant for a statistical breakdown.

A terminal prints out the processed information in the form of statistics giving percentages and cross-tabulations between answers, opinions and the visitors' demographic background. The processing speed of the computer makes it possible that at any given time the statistical evaluation of all answers is up to date and available. The constantly changing data is projected onto a large screen, so that it is accessible to a great number of people.

Based on their own information a statistical profile of the exhibition's visitors emerges.

**Hans Haacke**
**News** 1969

Local, national and international news is being received fr U.S. as well as from foreign news services. It arrives in the exhibition via teletype print-out at the same time as it is being received by the other clients of the various news services. The print-out accumulates and piles up behind the teletype machines.

*Visitors peruse N*

https://monoskop.org/images/3/31/Software_Information_Technology_Its_New_Meaning_for_Art_catalogue.pdf

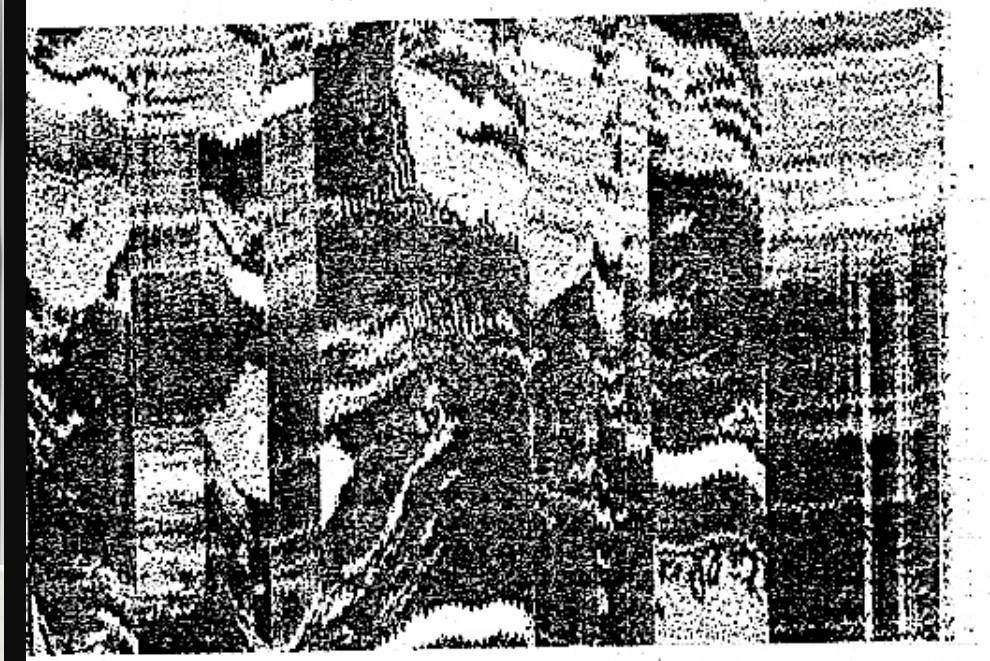
# Generative Systems & Electrostatic works, Sonia Sheridan(1968)



d. Dip a leaf or similar flat object into the magnetic powder. Shake off the excess. Place on a sheet of paper below the plexiglass and rub the plexiglas with the fur until the leaf begins to move and the powder spreads about. Once you have observed and imaged this process try taping the leaf to the sheet of paper so that only the powder shifts. A clear image of the leaf should appear on the paper.

Examples:





Composite Joint Image

The sounds of raindrops in Iowa City, an infra-red photograph of the sun transmitted from Pittsburgh, and "sequential drawings" transmitted from Chicago produced this "composite joined image." The image was made by transmitting the three sets of signals, in a conference phone call, and picking up a "composite image" on "facsimile machines" located in the three cities.

https://www.fondation-langlois.org/html/e/page.php?NumPage=2048

# “Generative Systems”, Sonia Sheridan, Art Institute of Chicago (1970-1980)

## GENERATIVE SYSTEMS

Every push of a button, every press by hand, every type of a key, every match burn is a moment in time. High-speed equipment permits the accumulation of hundreds of moments in the span of minutes or seconds. As fire burns instantly, so thermal images are made in seconds. Wires and fiber optics transmit information long distances in minutes. From the state of *think it-have it* we have moved to the state of *have it-think about it*. The age of the original is here. Each moment is unique, no two are exactly alike. A reproduction for everyone is metamorphosed into an original for everyone.

For over a decade Generative Systems faculty and students have been studying the positive and negative implications of relative speed on art. It has raised an entirely new set of conditions for the continuous-running, stopped-time, 2-3D tactile systems. Thermography, electrostatics, magnetics, photography, accoustical graphics, transmission and much more are all interrelated with past and present fields of art. We try to keep the whole systems functioning, while individuals explore in depth. Slow and fast, private and public, old and new, positive and negative, on and off, inner and outer, east and west, north and south -- such contradictions are characteristic of Generative Systems.

Like Graham Peck in his book on China TWO KINDS OF TIME, we look both at the river moving toward us (as in the East) and to where the river is flowing ahead (as in the West). We move in two knds of time.

Sonia Sheridan

GENERATIVE SYSTENS

the process

| Manual, Mechanical and Electronic Time Systems<br><br>Slow-Fast, Input-Output, Stopped-Time, Continuous Time, Transmission, 2 or 3 Dimensional tactile Products: paper, cloth, ceramics, plastics, metals, wood. | Machines owned by the Generative Systems Department of the School of the Art Institute of Chicago.<br><br>Any or all interactive with drawing, painting, print-making, ceramics, weaving, textiles, sculpture, performance, film. |
|---|---|
| CHEMICAL | |
| LIGHT | BASICALLY THERMAL |
| SOUND | BASICALLY ELECTROSTATIC |
| ELECTROSTATIC | MAGNETIC |
| AIR | SOUND |
| THERMAL | LIGHT |
| TRANSMISSION | TRANSMISSION |
| MAGNETIC | COMPUTERS |

HOMOGRAPHICS

the product

light hand pressure electrostatics interactive systems transmission flow thermography fire progression vibration hand

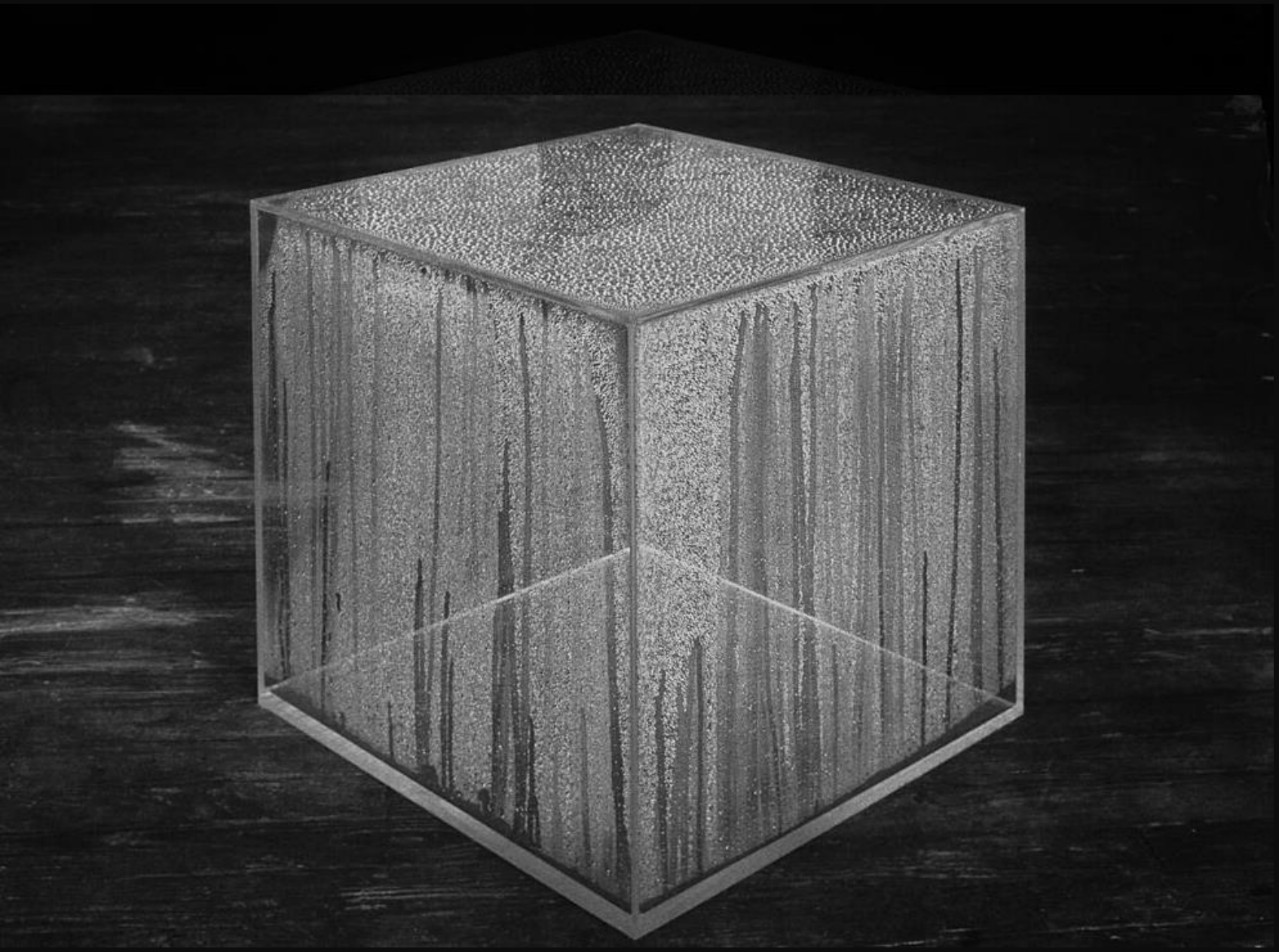
interactive systems generative systems process 1 and 2 homography electrostatics hand pressure flow fire thermography

artist-scientist progression color light private sound vibration magnetics generative systems old-new public private

product process holistic inner-outer slow-fast East-West on-off transmission progression teach-learn hand-machine

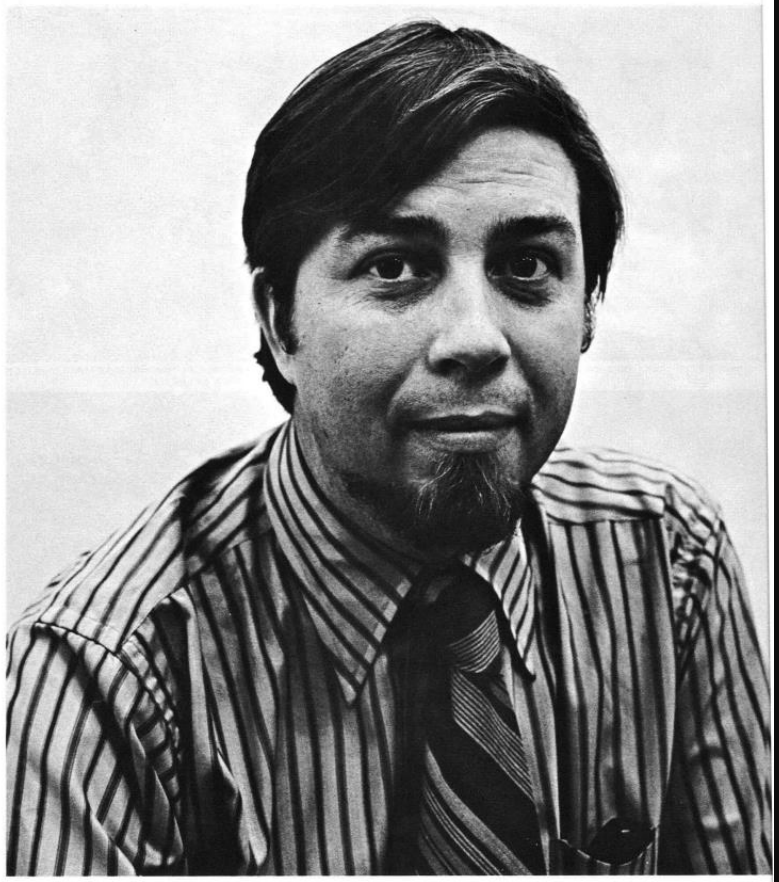
https://soniasheridan.org/book/chapter01/page01.html

# “Condensation Cube”, Hans Haacke (1965)



https://www.macba.cat/en/art-artists/artists/haacke-hans/condensation-cube

# “Software”, Exhibition at Jewish Museum, NYC curated by Jack Burnham



## Notes on art and information processing

**Jack Burnham**

*Software* is not specifically a demonstration of engineering know-how, nor for that matter an art exhibition. Rather in a limited sense it demonstrates the effects of contemporary control and communication techniques in the hands of artists. Most importantly it provides the means by which the public can personally respond to programmatic situations structured by artists. *Software* makes no distinctions between art and non-art; the need to make such decisions is left to each visitor. Hence the goal of *Software* is to focus o sensibilities on the fastest growing area in this culture: information processing systems and their devices.

In just the past few years, the movement away from art objects has been precipitated by concerns with natural and man-made systems, processes, ecological relationships, a the philosophical-linguistic involvement of Conceptual Art. All of these interests deal with art which is transactional;



## Triangulate your thoughts

**Agnes Denes**
**Dialectic Triangulation: A Visual Philosophy** 1970

*Dialectic Triangulation* is a simplification and systematic re-building of complexes of any subject or matter, through various methods, such as re-evaluation, re-grouping or division, at times starting with a single proposition, at others searching for the mean between two extremes. But each time it is the triangulation which institutes the interaction of a particular static state, being the activating force.

To use an example, if a person feels that within his knowledge he does not understand himself and his universe, and decides to attain greater knowledge, he has instituted a triangulation. His initiative, ‘the desire to know more’, being here the activating force between ignorance and wisdom.

*Dialectic Triangulation* is a building of progressive trichotomies, failing and succeeding in a dialectic method, each time arriving at a better thesis on a higher level—like changing scientific theories, which always advance and develop in complexity. By appraising the milestones in human knowledge and scientific achievement, we take inventory of it and of ourselves. A new curiosity and insight is born, a new awareness. And since this is an artistic probing, concrete facts are sometimes thrown into abstract corners, and abstract terms are concretized; each getting a sort of bath or soaking in the other’s fluids. It is an explorative evolutionary process, the way of nature and man.

**Types of triangulations:**

inanimate tri-groups representing all of a genus, class or category

re-grouping or classification

accepted facts, perceptual or ideational errors re-evaluated, their importance re-established or denied—new ones created whenever possible

arriving at a conclusion derived from two propositions

arriving at a mean between two extremes

the building of one proposition through dimensional complication into trichotomies

the building of one proposition through divisional trisection into trichotomies

pure idea groups activated by controversy

interdependent or progressive ideas becoming effective through successive stages of advancement

threefold theories interchangeable—threefold theories not interchangeable, and those forming argumentative conclusions

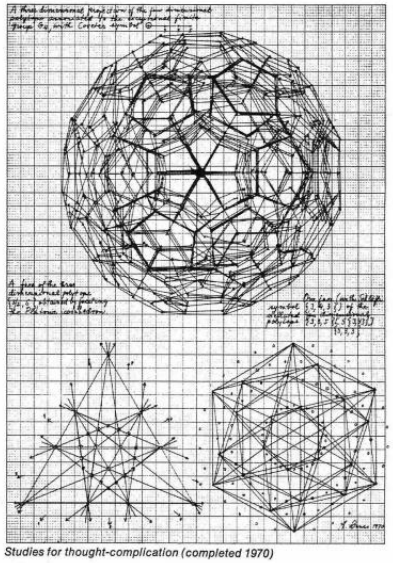
*Agnes Denes (right) programmed her computer display with the assistance of Theodor H. Nelson and The R.E.S.I.S.T.O.R.S. (from left) Peter Eichenberger, Lauren Sarno, John Levine (not present: Nat Kuhn).*

**Agnes Denes**
**Matrix of Knowledge & Trigonal Ballet** 1970
(Work for computer display) with assistance from Members of The R.E.S.I.S.T.O.R.S., Pennington, N. J.: John Levine, Nat Kuhn, Peter Eichenberger and from Theodor H. Nelson

Restoration of the triangulation concepts on the screen can be at best only partial, mentally confronting the participant with the challenge of comparing ideas and the visual consequences of a new structuring. The artist’s own structural conjectures are here shared with the viewer.

NOTE: Matrix of Knowledge schedules events in a triangular mesh. List structure is kept comparatively simple by rewriting the display file for each new incarnation of the picture.
Trigonal Ballet animates through a succession of frames to obtain its “infinite effect.”

The IDIIOM, a dynamic display with its own built-in computer, is on loan from Information Displays, Inc. of Mount Kisco, New York.

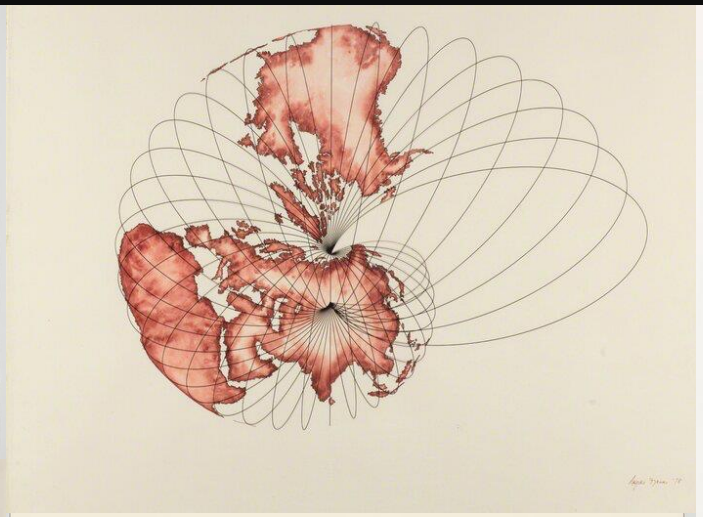


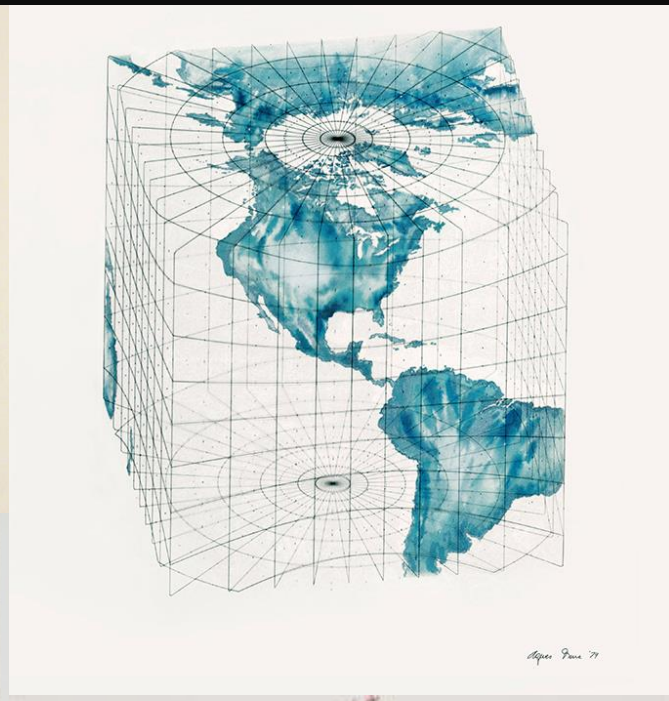
*Studies for thought-complication (completed 1970)*

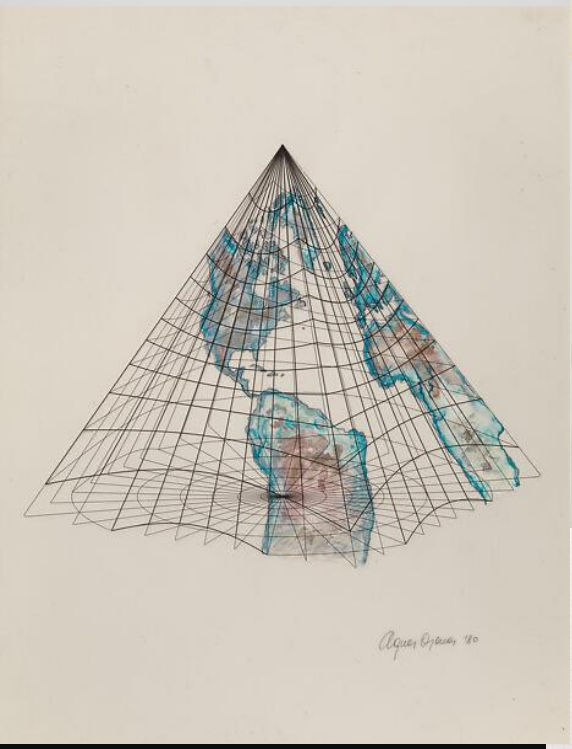


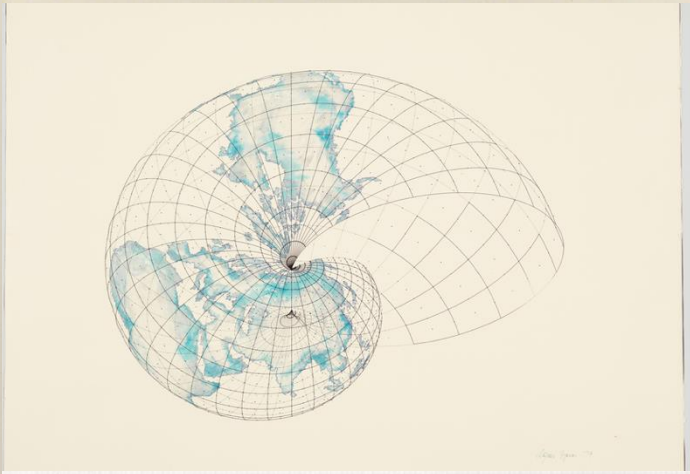
https://monoskop.org/images/3/31/Software_Information_Technology_Its_New_Meaning_for_Art_catalogue.pdf

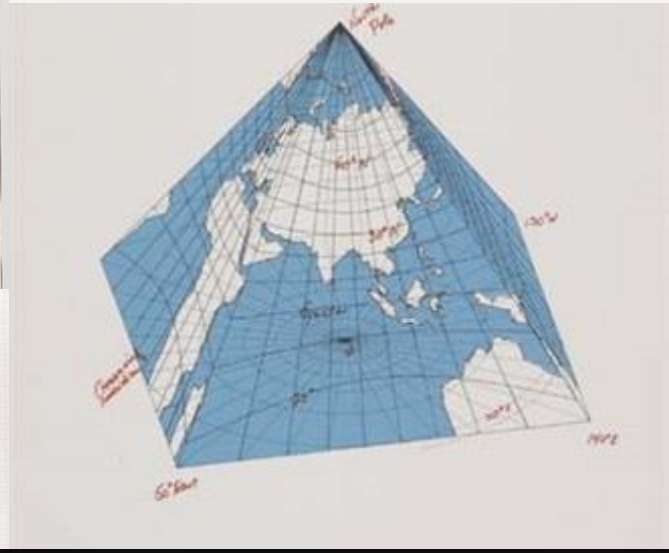
# Agnes Denes

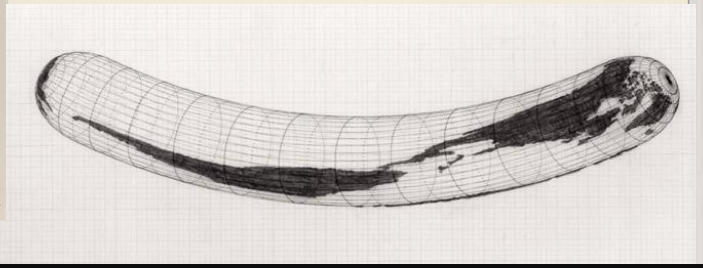






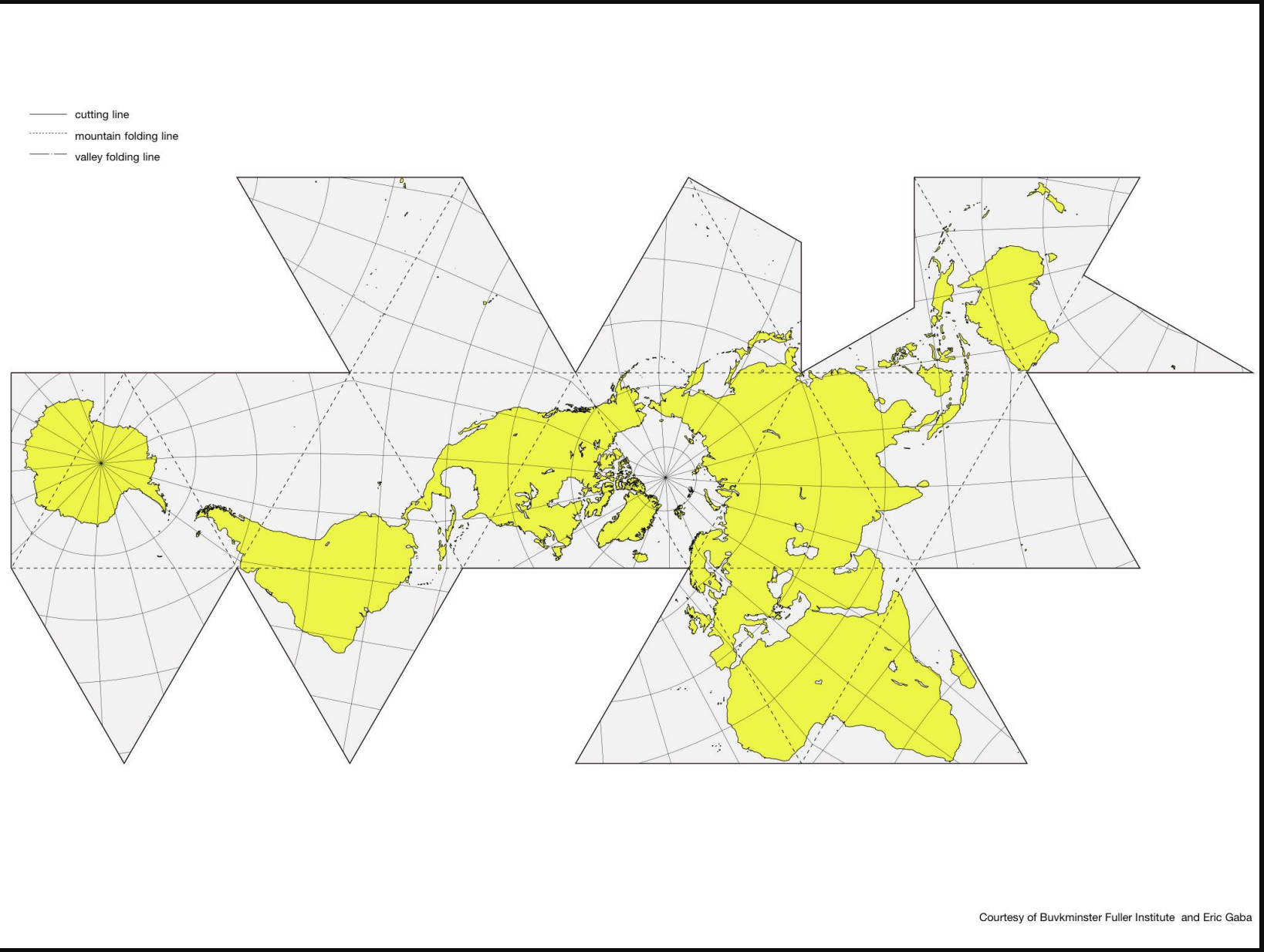






https://whitney.org/artists/345

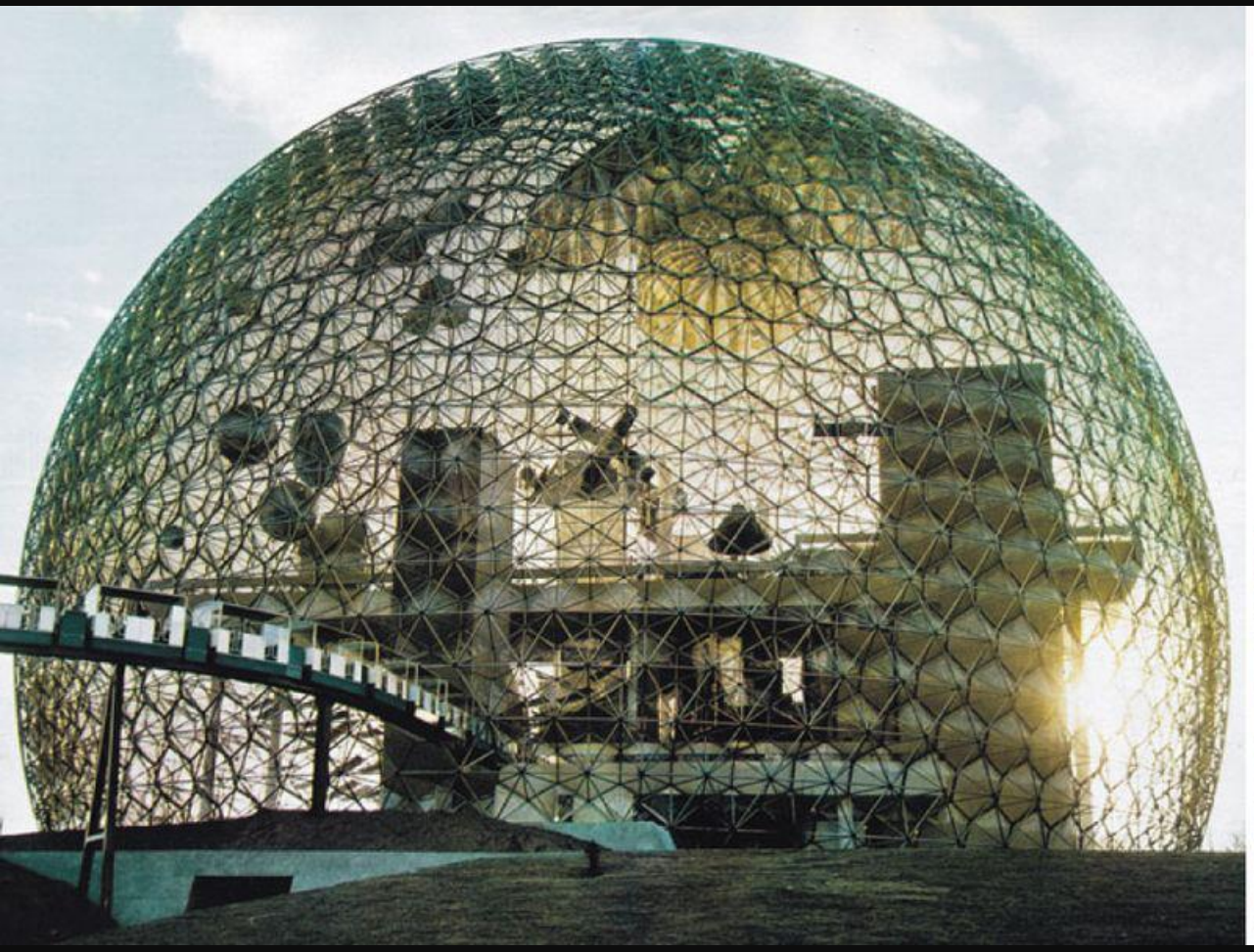
# Buckminster Fuller

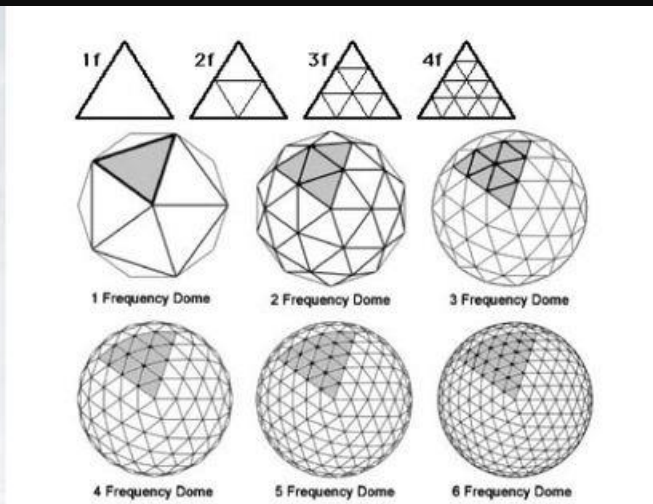



Courtesy of Buvkminster Fuller Institute and Eric Gaba

https://narukawa-lab.jp/archives/dymaxion-map/

# Buckminster Fuller






https://www.bfi.org/

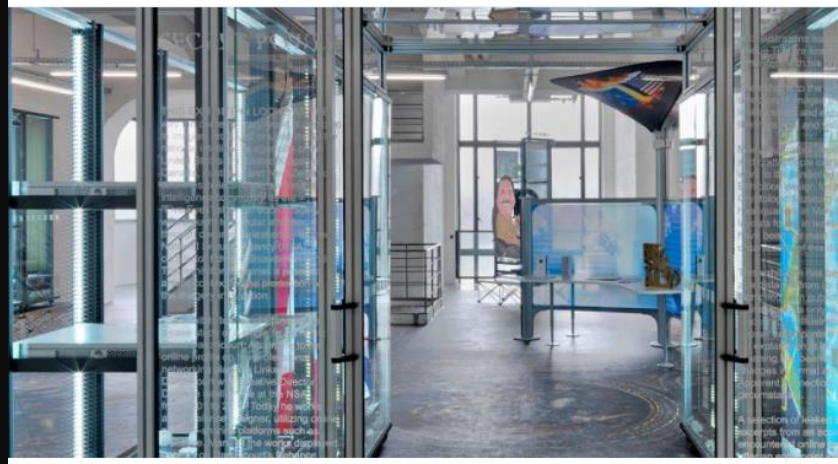
SYSTEMS ESTHETICS

30

# Art Versus Silicon Valley: Are Artists Losing the Conceptual Advantage?

As startups looks towards increasingly abstract schemes, where is the art that answers to today's deeply networked structures?

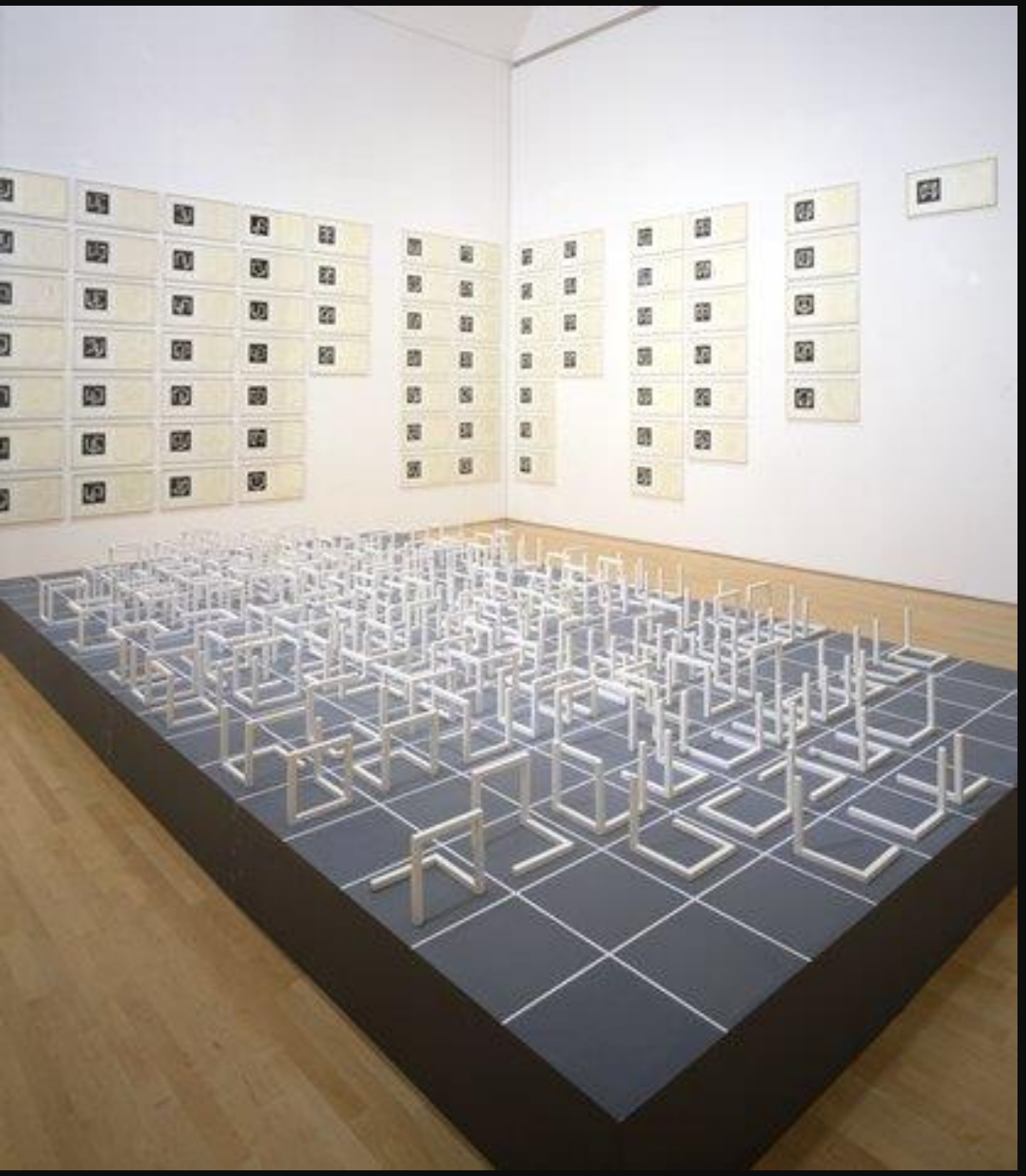
BY GARY ZHEXI ZHANG IN **OPINION** | 24 SEP 18

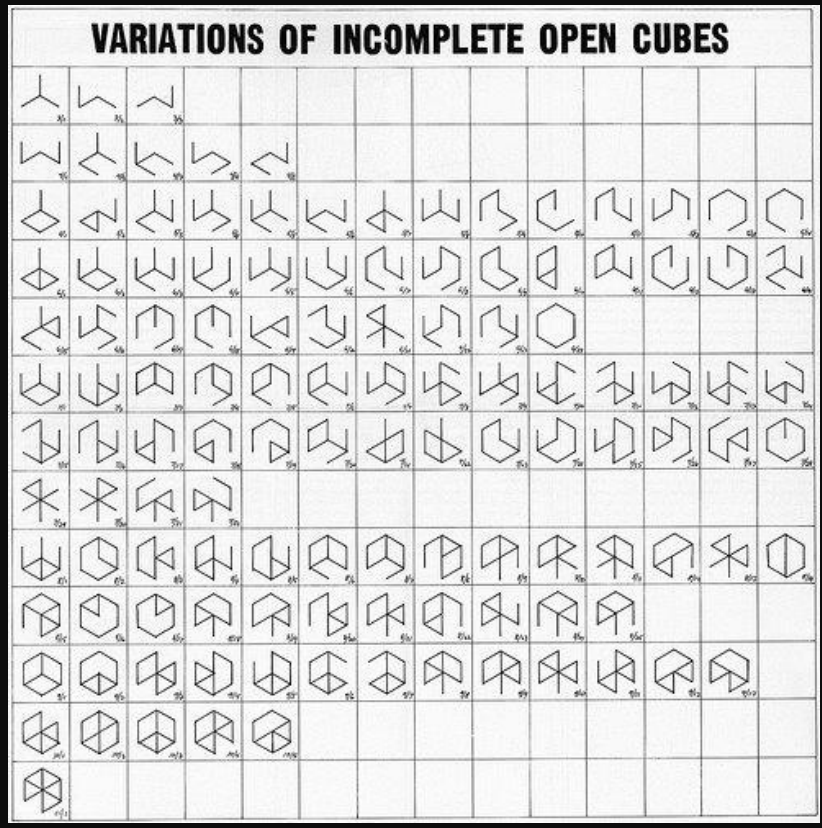


In 1968, the conceptual artist and critic Jack Burnham published an essay entitled 'Systems Esthetics'. Burnham began with an acidic critique of the modernist formalism of the day, championed by the likes of Clement Greenberg and Michael Fried, comparing the artistic contributions of 'formalist invention' to the '"new" car of the automobile stylist'. For Burnham, the progression of the modernist art object, like the release of a new iPhone, was all icing and no cake, promising transcendence but always circling back to the same. Instead, he felt that the artistic practice should concern itself with the deep structures forming the cultures around it. Writing at the dawn of the digital age, Burnham argued that information, not objects, would form the structuring paradigm of the emerging socio-cultural environment. He wrote: 'We are now in transition from an object-oriented culture to a systems-oriented culture. Here change emanates, not from *things*, but from *processes*.'

https://www.frieze.com/article/art-versus-silicon-valley-are-artists-losing-conceptual-advantage

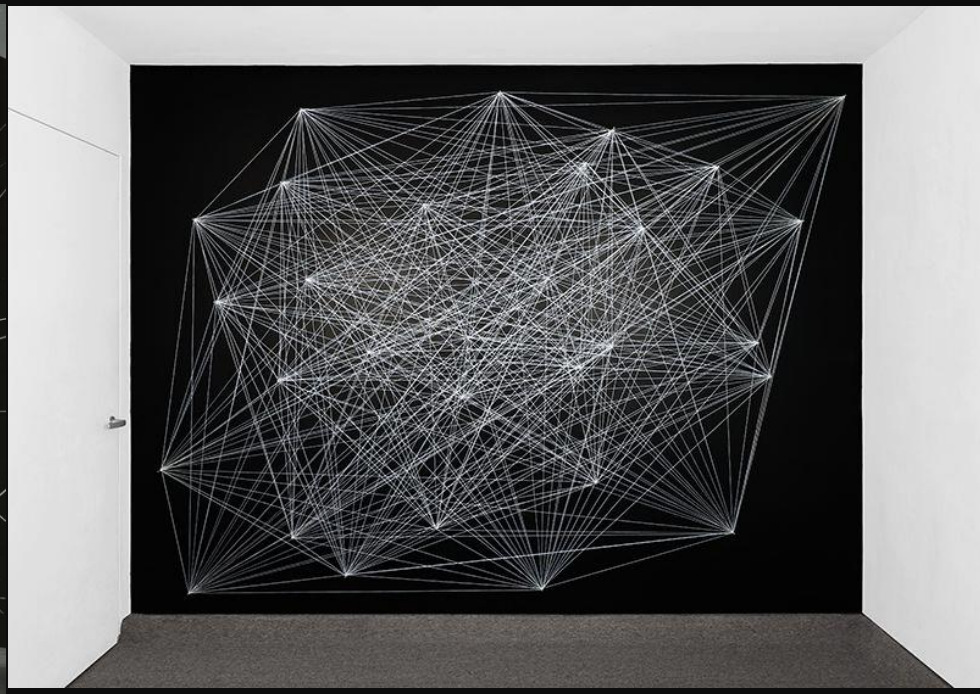
# “Variations of Incomplete Open Cubes”, Sol Lewitt (1974)





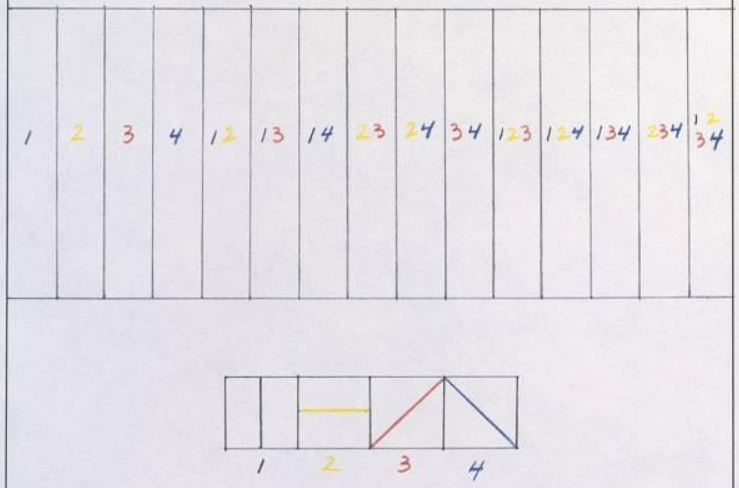

http://fiftytwopieces.blogspot.com/2009/03/sol-lewitt-incomplete-open-cubes-all.html

# “Wall Drawing”, Sol Lewitt (1976)



# “A Wall divided into 16 Equal Parts”, Sol Lewitt (1970)

## DIAGRAM




This is a diagram for the Sol LeWitt wall drawing number 49. It should accompany the certificate if the wall drawing is sold or otherwise transferred but is not a certificate or a drawing.

## CERTIFICATE

This is to certify that the Sol LeWitt wall drawing number 49 evidenced by this certificate is authentic.

A wall divided vertically into fifteen equal parts, each with a different line direction and color, and all combinations.

Red, yellow, blue, black pencil
First Drawn by: Chris Hansen, Nina Kayem, Al Williams
First Installation: Jewish Museum, New York, NY. June, 1970

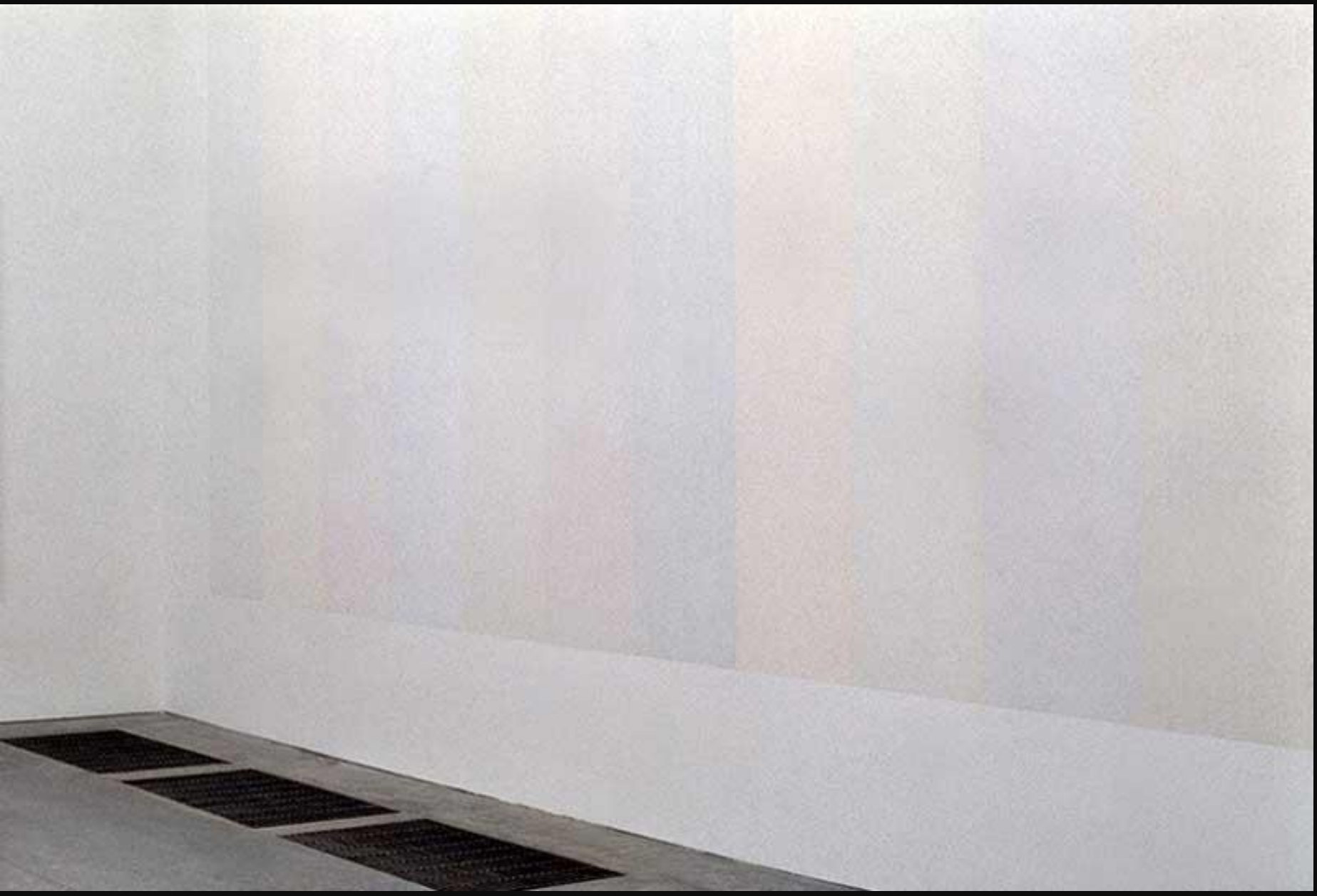
This certification is the signature for the wall drawing and must accompany the wall drawing if it is sold or otherwise transferred.

Certified by Sol LeWitt
Sol LeWitt


Date

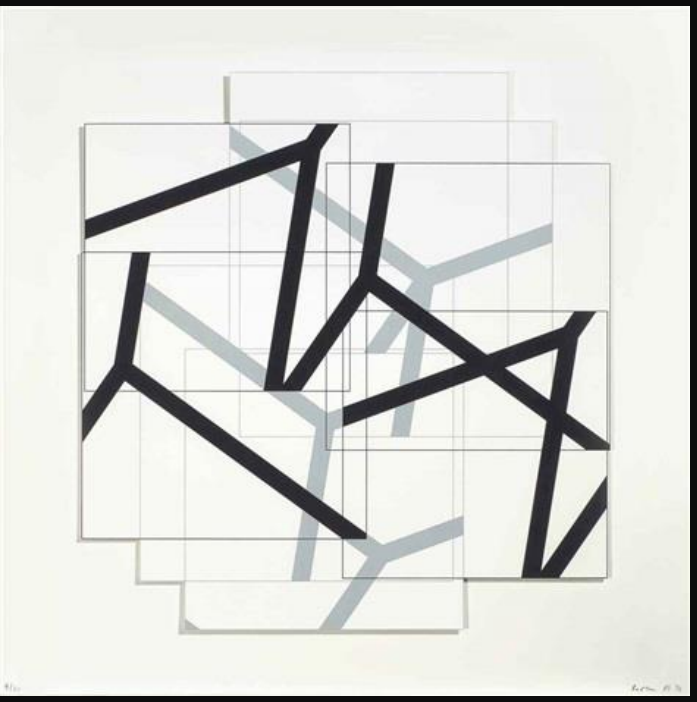
https://www.tate.org.uk/art/artworks/lewitt-a-wall-divided-vertically-into-fifteen-equal-parts-each-with-a-different-line-t01766

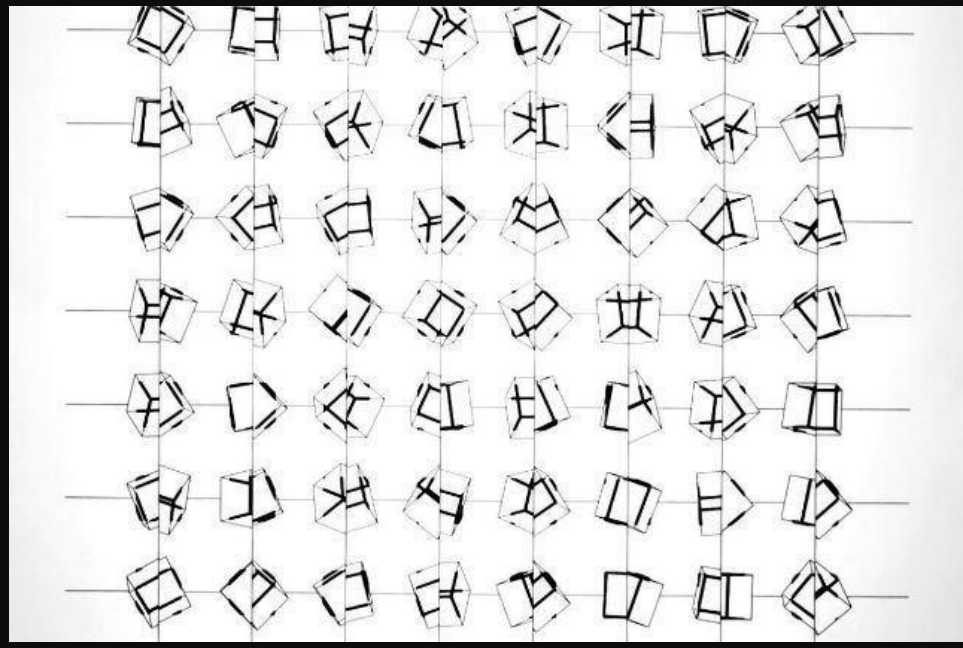
# “A Wall divided into 16 Equal Parts”, Sol Lewitt (1970)

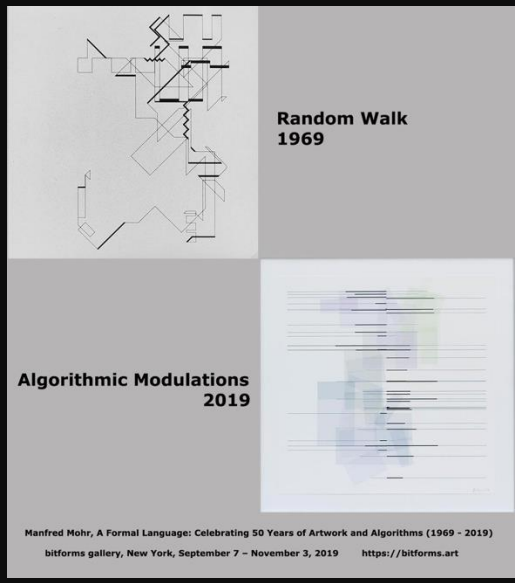


https://www.tate.org.uk/research/publications/tate-papers/14/ideas-in-transmission-lewitt-wall-drawings-and-the-question-of-medium

# Manfred Mohr (1938, computer-based art since 1969)

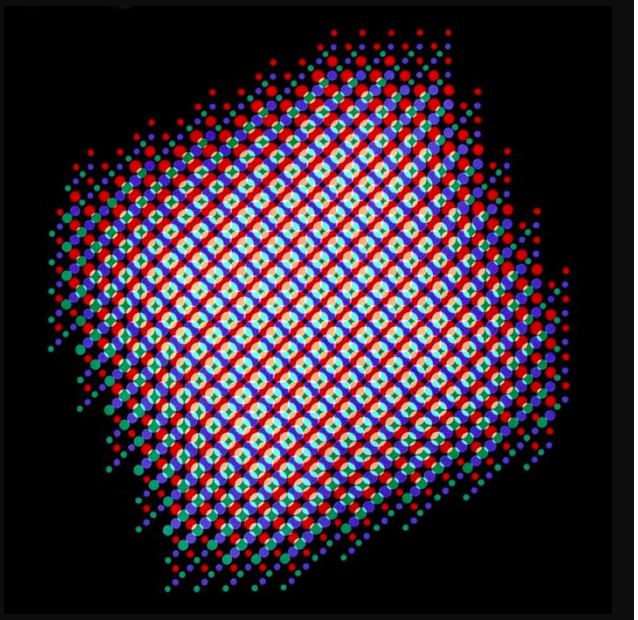


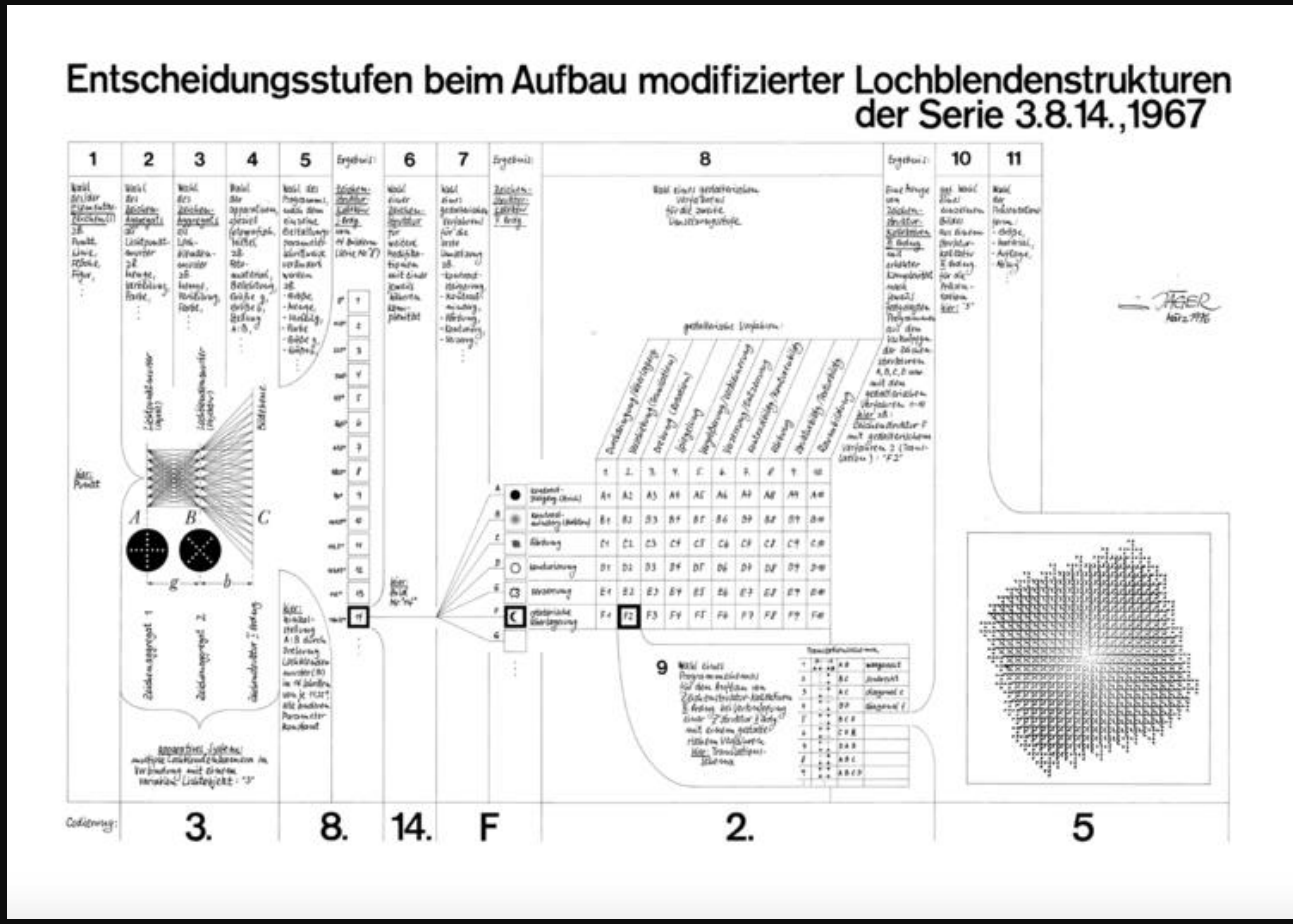





https://www.theguardian.com/artanddesign/2016/feb/12/manfred-mohr-the-man-who-taught-computers-to-make-art

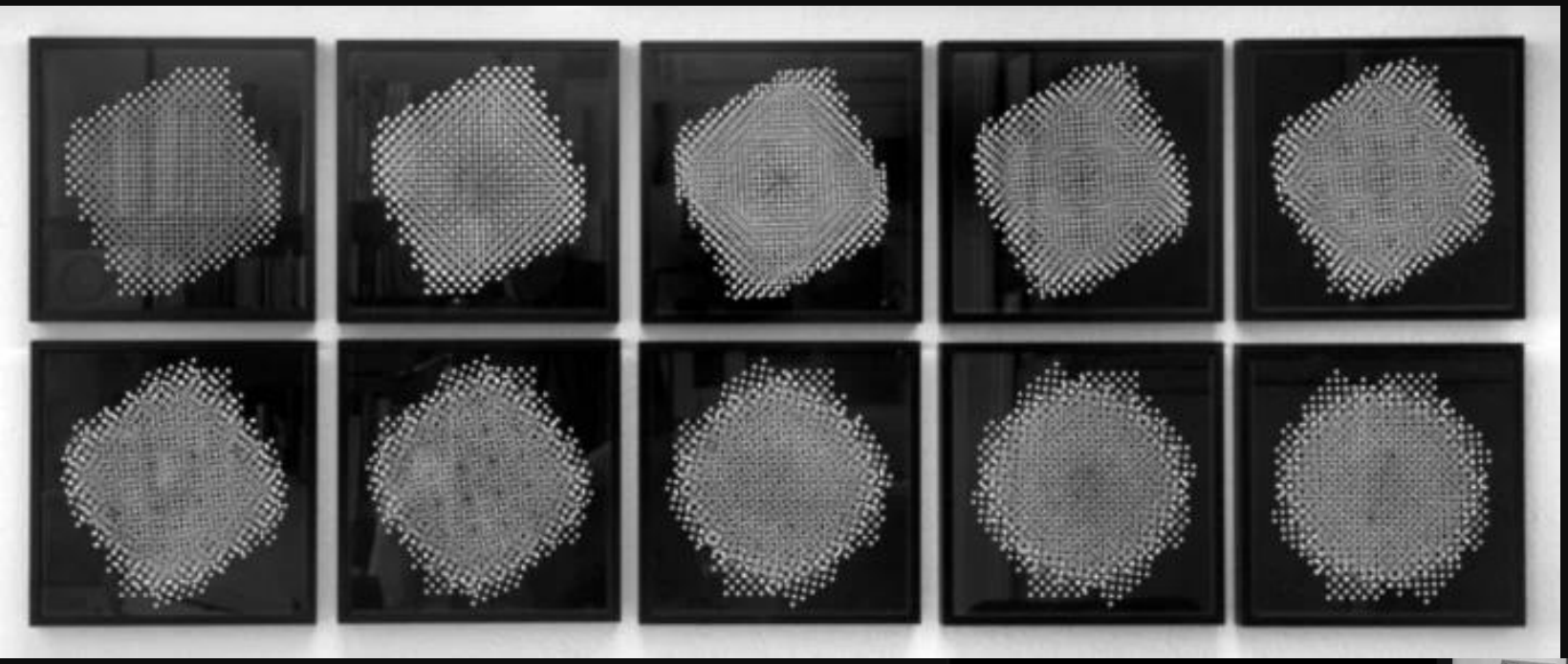
# Generative Photography: Pinhole Structures – Gottfried Jäger (1968)

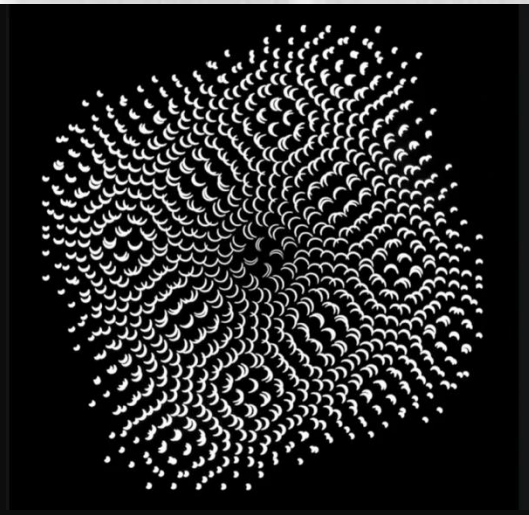





Decision-making stages in the construction of modified pinhole structures of the serie 3.8.14

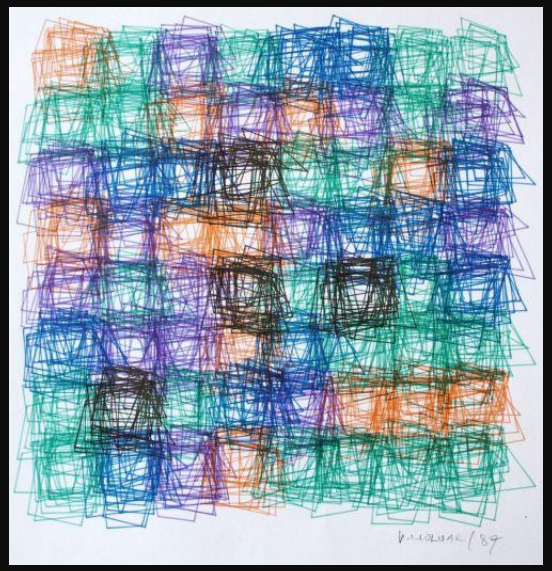
# Generative Photography: Pinhole Structures – Gottfried Jäger (1968)

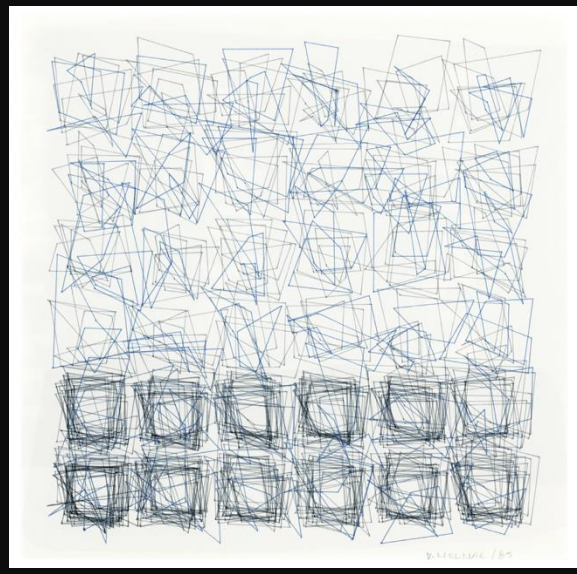


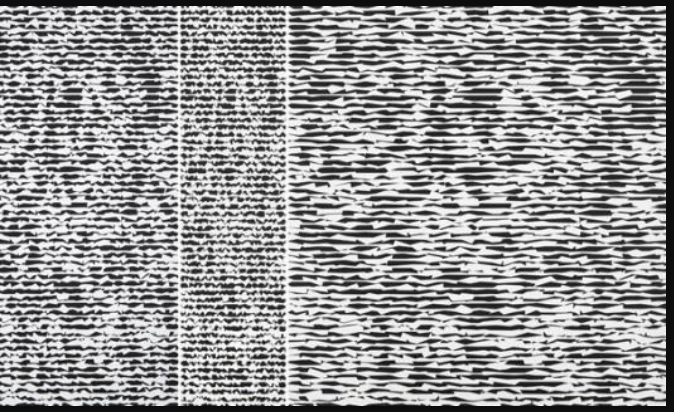


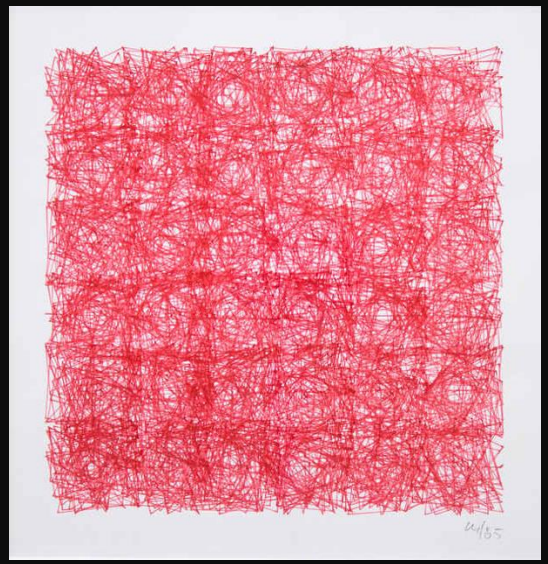
https://www.artnome.com/news/2019/8/18/generative-photography-an-interview-with-gottfried-jager

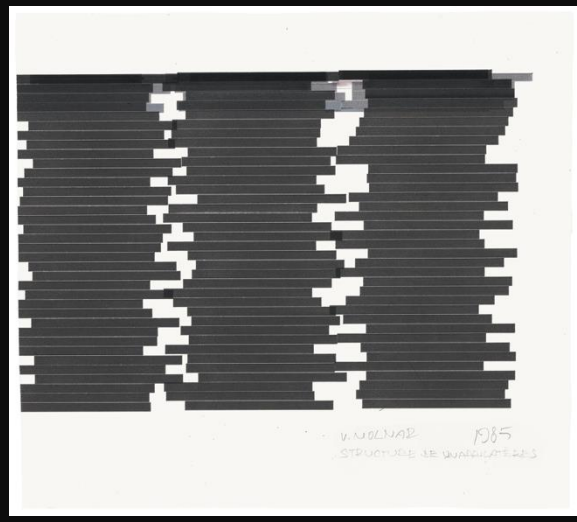
# Vera Molnar(1924-present)





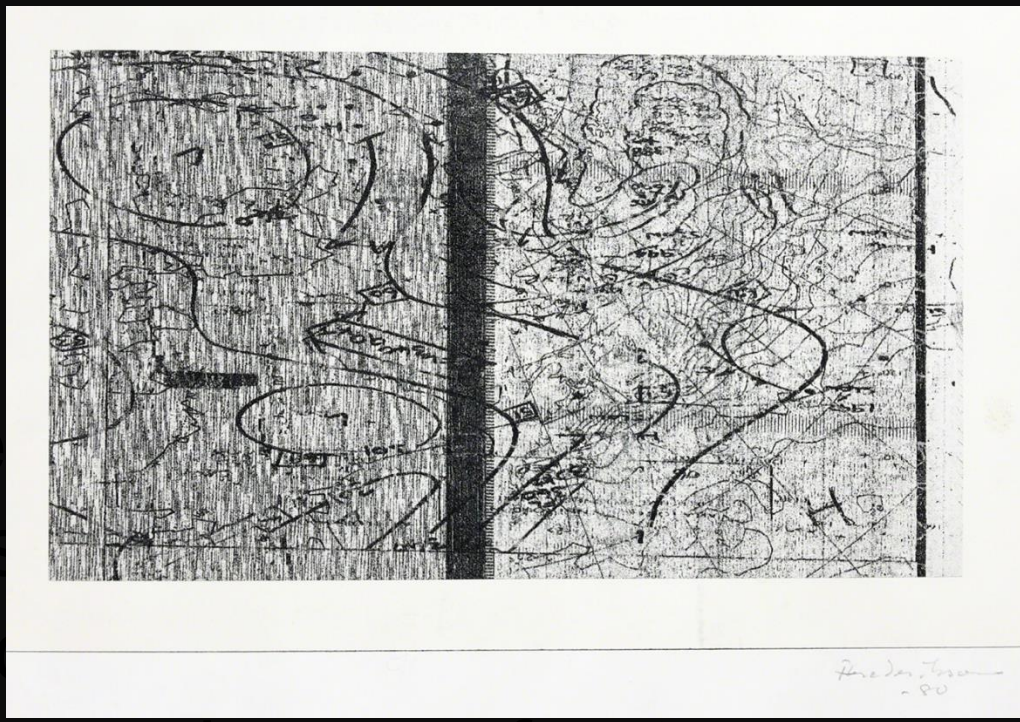


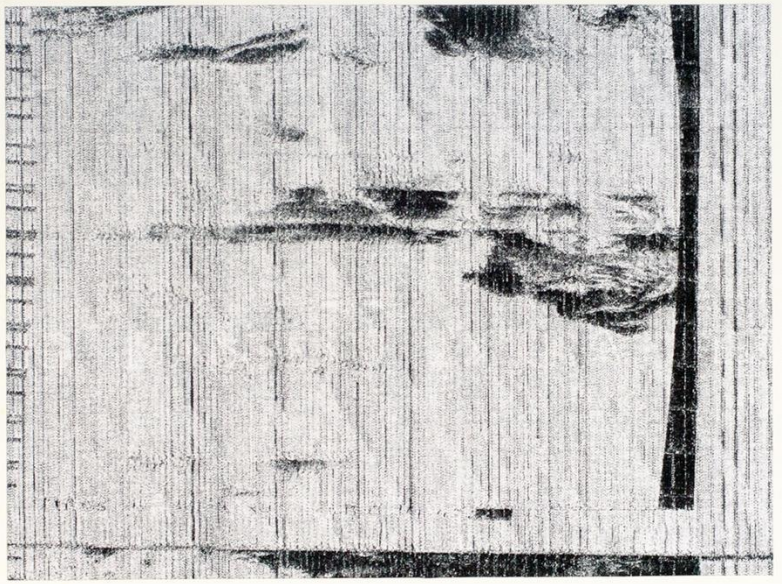




http://agenda.germainpire.info/view_entry.php?id=102846&date=20190307

# ElectroStatic Works, Lars Fredrikson(1968)

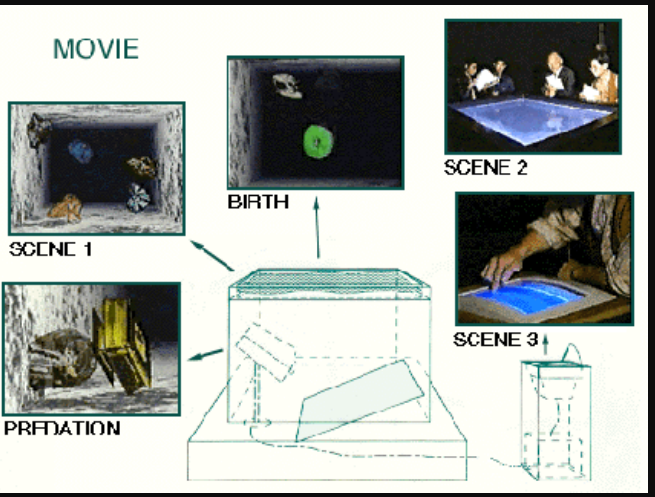




http://www.insituparis.fr/fr/artistes/presentation/8650/fredrikson-estate-lars

# ElectroStatic Works, Lars Fredrikson(1968)

# “A-Volve”, Christa Sommerer, Laurent Mignonneau (1992)





http://www.interface.ufg.ac.at/christa-laurent/WORKS/FRAMES/TOPFRAMES/A-VolveTop.html

# Karl Sims

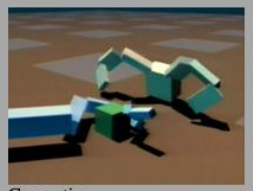
## Evolved Virtual Creatures

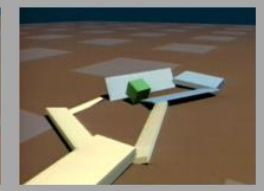
Karl Sims, 1994, 4:08


Swimming

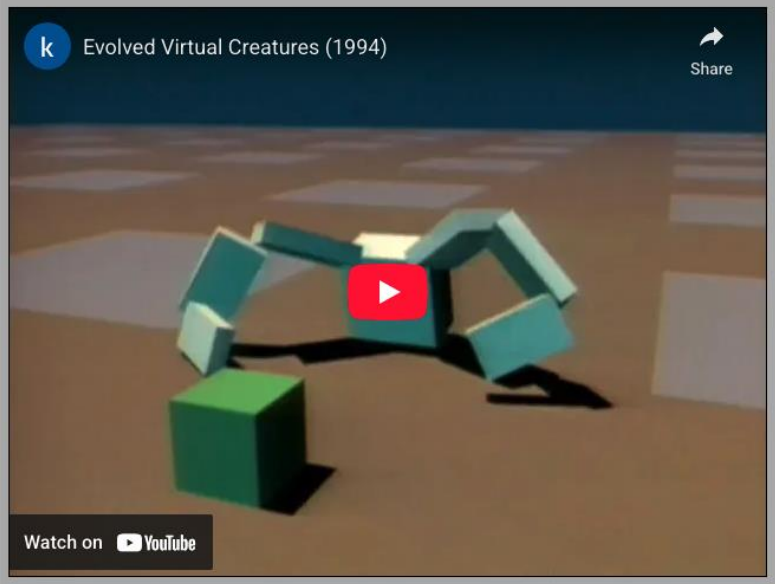

Jumping


Following


Competing

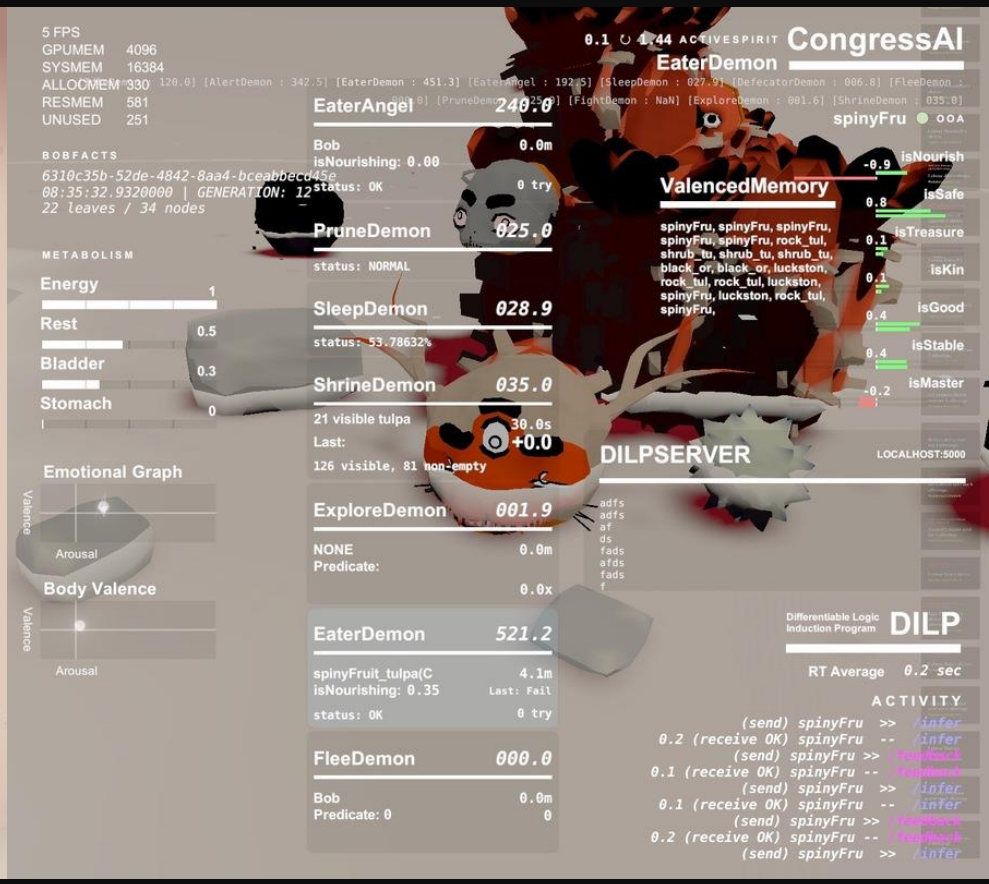


This video shows results from a research project involving simulated Darwinian evolutions of virtual block creatures. A population of several hundred creatures is created within a computer, and each creature is tested for their ability to perform a given task, such as the ability to swim in a simulated water environment, or locomote on a simulated land environment. Those creatures that are most successful at their task are selected for survival, and their virtual genes of coded growth instructions are copied, combined, and randomly mutated to make offspring for a new population. The new creatures are again tested, and some may be improvements on their parents. As this cycle of variation and selection continues, creatures with more and more successful behaviors can emerge. The creatures shown in this video are results from many independent simulations in which they were selected for swimming, walking, jumping, following, or competing for control of a green cube.




*Software and Animation:* Karl Sims
*Narration:* Eric Hansen, thanks to the Berlin VideoMath Festival
*Thanks to:* Gary Oberbrunner, Matt Fitzgibbon, & Lew Tucker
*Hardware:* Connection Machine CM-5

# Ian Cheng BOB (Bag of Beliefs)




https://iancheng.com/BOB | https://www.youtube.com/watch?v=gCnWhKJgc2g

# Additional Bibliography


- Jack Burnham (1968), "Systems Esthetics", in: *Artforum* (September, 1968
- Edward A. Shanken, "Art in the Information Age: Technology and Conceptual Art," in SIGGRAPH 2001 Electronic Art and Animation Catalog, (New York: ACM SIGGRAPH, 2001): 8-15; expanded and reprinted in Art Inquiry 3: 12 (2001): 7-33 and Leonardo 35:3 (August, 2002): 433-38

# Art in the Information Age: Technology and Conceptual Art

*Edward A. Shanken*

ABSTRACT

Art historians have generally drawn sharp distinctions between conceptual art and art-and-technology. This essay reexamines the interrelationship of these tendencies as they developed in the 1960s, focusing on the art criticism of Jack Burnham and the artists included in the *Software* exhibition that he curated. The historicization of these practices as distinct artistic categories is examined. By interpreting conceptual art and art-and-technology as reflections and constituents of broad cultural transformations during the information age, the author concludes that the two tendencies share important similarities, and that this common ground offers useful insights into late–20th-century art.

In the mid-1960s, Marshall McLuhan prophesied that electronic media were creating an increasingly interconnected global village. Such pronouncements popularized the idea that the era of machine-age technology was drawing to a close, ushering in a new era of information technology. Sensing this shift, Pontus Hultén organized a simultaneously nostalgic and futuristic exhibition on art and mechanical technology at the Museum of Modern Art in New York (MOMA) in 1968. *The Machine: As Seen at the End of the Mechanical Age* included work ranging from Leonardo da Vinci's 16th-century drawings of flying machines to contemporary artist-engineer collaborations selected through a competition organized by Experiments in Art and Technology, Inc. (E.A.T.).

E.A.T. had emerged out of the enthusiasm generated by *nine evenings: theatre and engineering,* a festival of technologically enhanced performances that artist Robert Rauschenberg and engineer Billy Klüver organized in New York in October 1966. E.A.T. also lent its expertise to engineering a multimedia extravaganza designed for the Pepsi Pavilion at the Osaka World's Fair in 1970. Simultaneously, the American Pavilion at Osaka included an exhibition of collaborative projects between artists and industry that were produced under the aegis of the Art and Technology (A&T) Program at the Los Angeles County Museum of Art.

Ambitious as they were, few of the celebrated artist-engineer collaborations of this period focused on the artistic use of information technologies, such as computers and telecommunications. Taking an important step in that direction, *Cybernetic Serendipity*, at the Institute of Contemporary Art in London in

protocols of computer software and the increasingly "dematerialized" forms of experimental art, which the critic interpreted, metaphorically, as functioning like information processing systems. *Software* included works by conceptual artists such as Les Levine, Hans Haacke and Joseph Kosuth, whose art was presented beside displays of technology including the first public exhibition of hypertext (*Labyrinth,* an electronic exhibition catalog designed by Ned Woodman and Ted Nelson) and a model of intelligent architecture (*SEEK,* a reconfigurable environment for gerbils designed by Nicholas Negroponte and the Architecture Machine Group at the Massachusetts Institute of Technology) [1].

Regardless of these points of intersection and the fact that conceptual art emerged during a moment of intensive artistic experimentation with technology, few scholars have explored the relationship between technology and conceptual art. Indeed, art-historical literature traditionally has drawn rigid categorical distinctions between conceptual art and art-and-technology. The following reexamination, however, challenges the disciplinary boundaries that obscure significant parallels between these practices. The first part describes Burnham's curatorial premises for the *Software* exhibition and in-