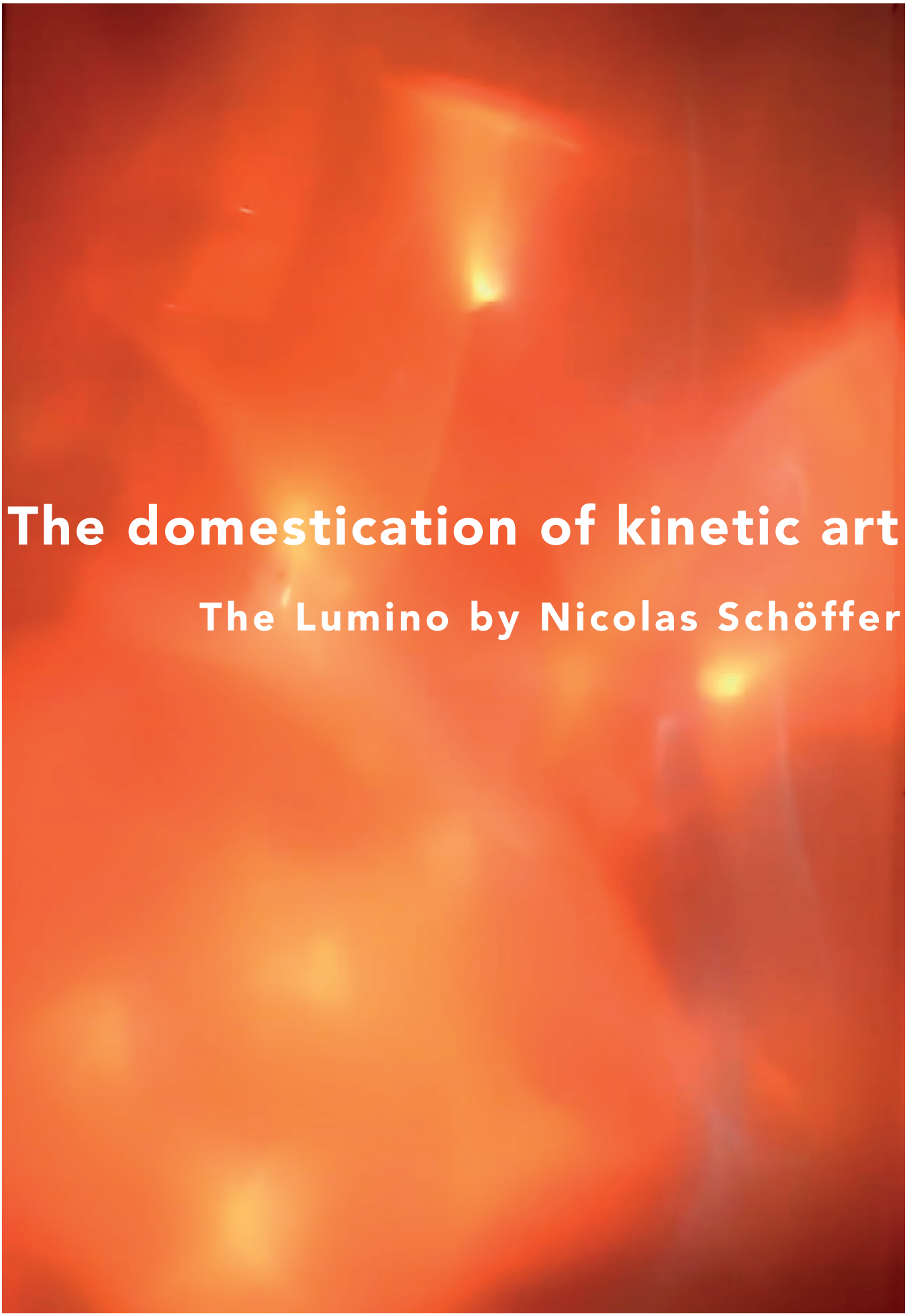

The domestication of kinetic art

The Lumino by Nicolas Schöffer

The domestication of kinetic art

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Travail théorique de Master Thesis

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Particular thanks goes to Nicolas Schöffer.

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Lumino. Nicolas Schöffer.

Preface

What is the «Lumino» by Nicolas Schöffer?
When I saw the *Lumino* for the first time, I was at a friend's house in Buenos Aires. He had often told me that he owned a singular French device which caught my curiosity. He said to me oddly: «the *Lumino* is a point in space that contains all other points. Anyone who gazes into it can see everything in the universe from every angle, each standing clear, without any confusion or blending[1]».
Once at his house, he made me sit on the sofa in the living room, he closed the windows, he turned off the lights and he switched on a mysterious television set placed a few feet in front of us. After a while, yawning, I said to him: «What a disillusion! All those tales about this gadget and..».
No way. My pantomime did not work. He was too attached to it to think about selling it.

1. BORGES, Jorge Luis. *El Aleph*. p.150.

March 22, 1966 N. SCHOFFER 3,242,330

APPARATUS FOR PRODUCING MOVING AND COLOR-CHANGING DECORATIVE LIGHTING EFFECTS

Filed March 6, 1963 2 Sheets-Sheet 1

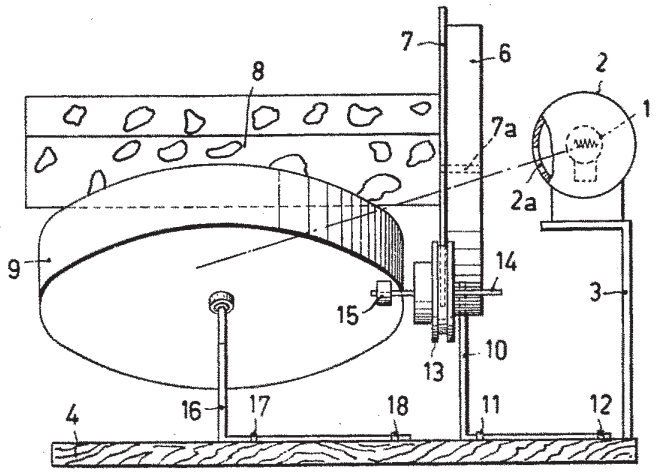


FIG.1

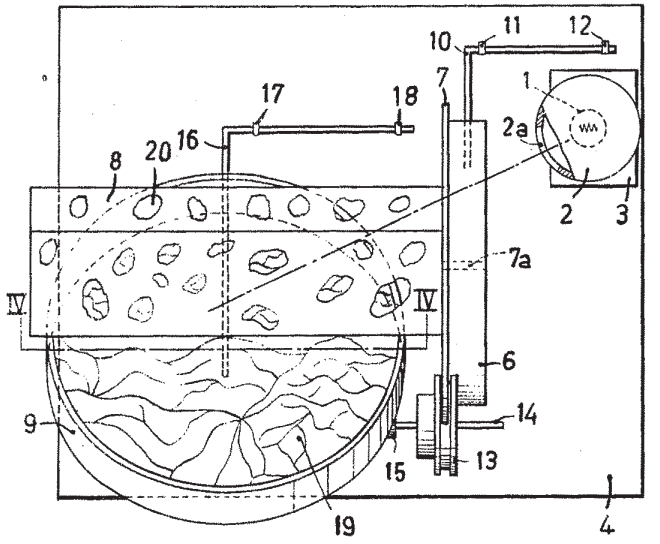


FIG. 2

INVENTOR.
NICOLAS SCHÖFFER
BY
Frank R. Trifari
AGENT

Apparatus for producing moving and color-changing decorative lighting effects. Nicolas Schöffer. Philips Corp. Patent «US 3242330 A». March 22, 1966.

Introduction

The *Lumino* by Nicolas Schöffer is a lumino-kinetic device, produced on an industrial scale by Dutch company Philips in 1968.

According to the patent, filed in March 1966, the device presents a source of light formed by an incandescent lamp. The lamp is housed in a structure, coated with black metal and chromium-plated plastic, where two motorized discs move different colored sectors and reflect light in different directions. To limit the intensity of the light beam, the device presents a translucent frosted screen, that can be replaced with other screens having different textures and creating different visual effects. The resulting structure of the device (23.5x26x21.5cm) looks like a rather small and curious television set.

Starting from the first lumino-kinetic art-boxes by Thomas Wilfred («Clavilux Junior machines») in the 1930s, continuing with the mass production of light box-games designed by Nicolas Schöffer («Minieffet» and «Varetra») in the 1970s and ending nowadays maybe with the commercialization of various luminotherapic products meant for home (light boxes), the *Lumino* represents a significant moment in the process to domesticate light and kinetic art.

The *Lumino*, a milestone in Nicolas Schöffer's artistic activity, is considered the first artwork produced on an industrial scale: in the '60s this first kinetic device enters into homes, as a common household appliance. Nicolas Schöffer designs a device for everyday life which is supposed to influence the viewer's psychology and behavior, offering a continually renewed audio-visual show. The aesthetics of movement, the synthesis of colors and light, the information aesthetics are supposed to interact with the human being reconciling him with the domestic space and, at the same time, conducting him gradually towards the utopian cybernetic city imagined by Nicolas Schöffer.

Painter, sculptor, urban planner, architect, designer, essayist and art teacher: analyzing Nicolas Schöffer's artistic career, art appears as a system that propagates in every field of human experience. Although his books expound his theories and some art historians,and experts of perception, have enriched his analysis, the *Lumino* itself, remain enigmatic, especially from the product design point of view. Adventuring into cybernetic and kinetic art's principles, but remaining loyal to Nicolas Schöffer's famous art definition(*cf.* page 13), we attempt to clarify if the *Lumino* could be considered as a froufrou gadget for the living room or a milestone in the «domestication» of kinetic art.

United States Patent Office

Des. 218,064
Patented July 14, 1970

218,064

COMBINED LAMP PROJECTOR AND SCREEN FOR PRODUCING VARIABLE LUMINOUS IMAGES

Nicolas Schöffer, Paris, France, assignor, by mesne assignments, to U.S. Philips Corporation, New York, N.Y., a corporation of Delaware

Filed Nov. 4, 1968, Ser. No. 14,444

Term of patent 14 years

Claims priority, application France May 10, 1968

Int. Cl. D26—*02*

U.S. Cl. D48—20

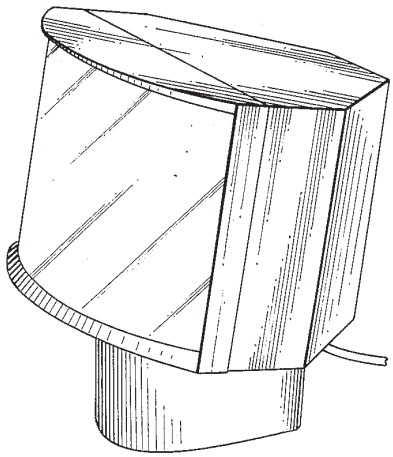


Fig. 1

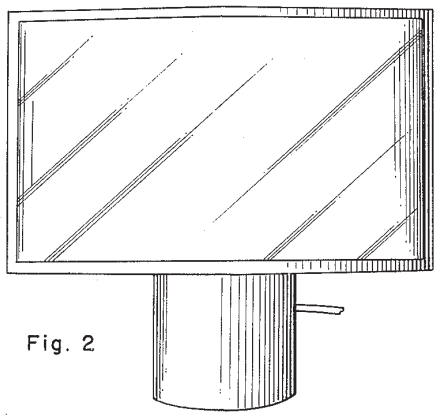


Fig. 2

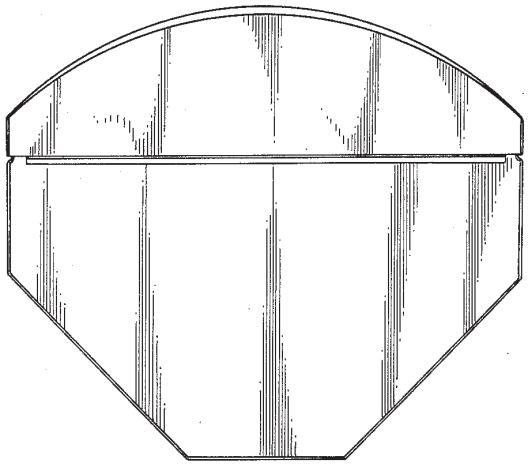


Fig. 3

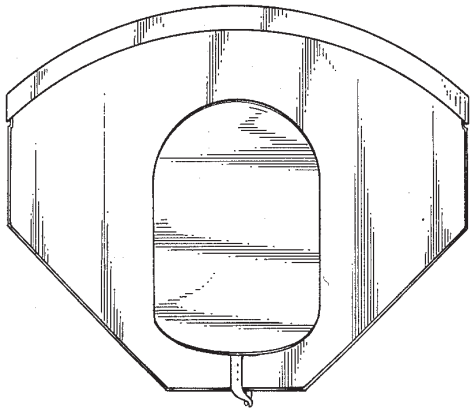
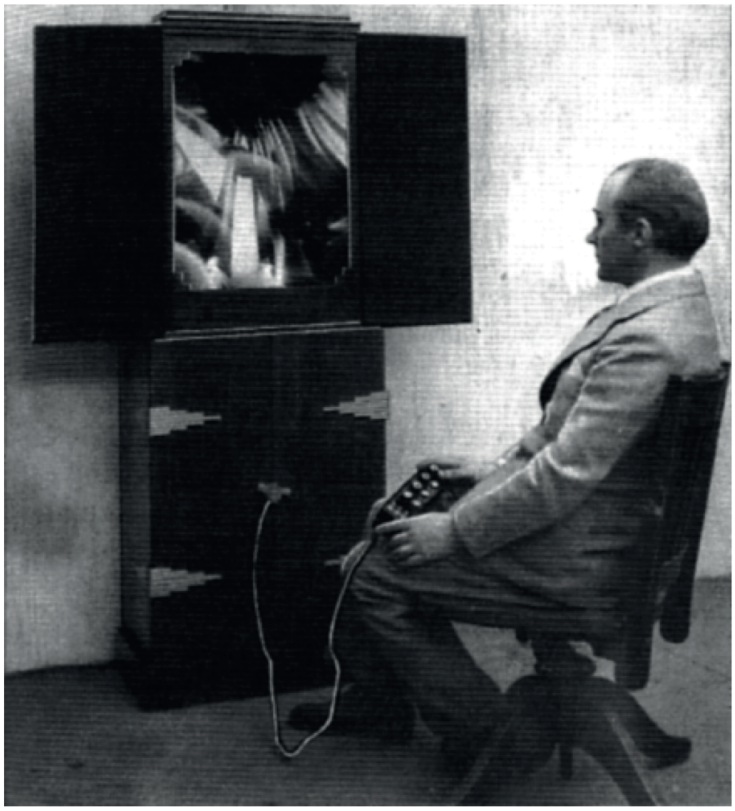
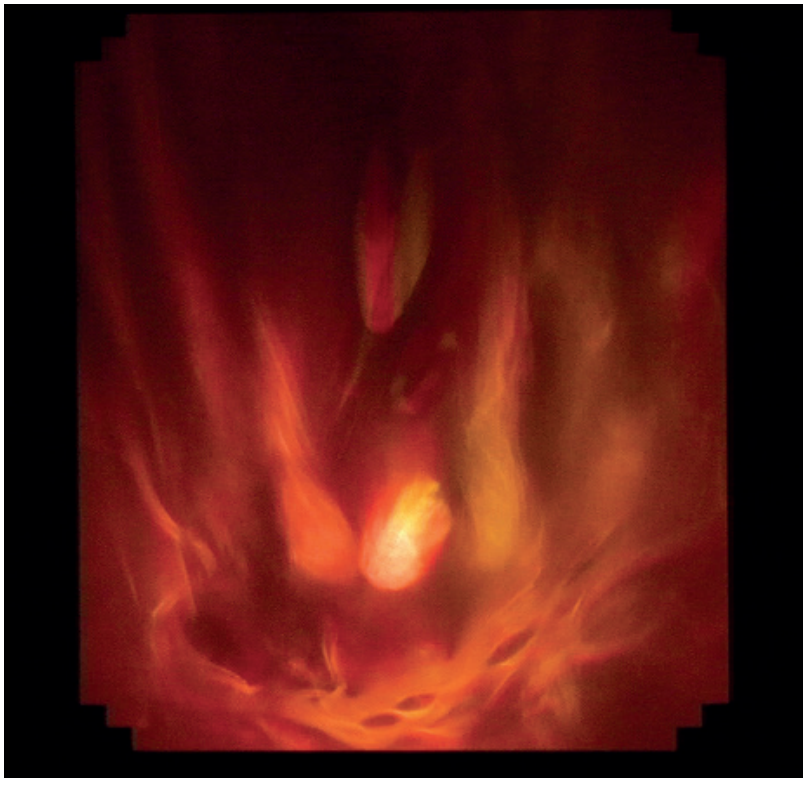


Fig. 4

Combined lamp projector and screen for producing variable luminous images. Nicolas Schöffer. Patent «US D218064 S». July 14, 1970.



«Clavilux Jr.». Thomas Wilfred.



«Art is the creation-invention, on the level of the mechanisms of thought and imagination, of an original idea having an aesthetic content that can be translated into effects perceptible to human senses. The occurrence and the ordering of these effects are worked out by a program in time or in space, or in both simultaneously, their components and their proportional relations being optimal, novel and aesthetic.
These effects are transmitted through visual, auditory or audiovisual signals to those who, accidentally or deliberately, become spectator-auditors of these effects.
The result is a process of fascination giving rise to a more or less profound modification of their psychological fields depending upon the aesthetic value of the creation.
This modification must be in the direction of transcendency, sublimation and spiritual enrichment through the complex mechanism of the human sensibility and intellect.
Thus, thanks to the creator's over-reaching faculty, aesthetic products having a strong impact penetrate through the multiple communication networks to social reality. In order to achieve this end, the creator must use a language and techniques which correspond to the true level of development of his time[1].»

Nicolas Schöffer

1. SERS, Philippe. *Entretiens avec Nicolas Schöffer*. p.7.

Backstage

An interpretative key to understand the origins of the *Lumino* could be the analysis of Nicolas Schöffer's artworks in the context of a singularly memorable year of the 20th century: 1968. Around that time, four fundamental events can help elucidate the production of the *Lumino* in the art historical, kinetic, cybernetic and design context.

The art historical context

1968 sees the crystallization of social protests, student uprisings and popular rebellions on an international scale. Massive protests against governments and political systems take place in the name of a radical transformation of society. In the United States social movements protest in favor of civil rights, against racism, against the Vietnam War and against mainstream ideologies (counterculture). In France, on May 13, student uprisings culminate in the largest general strike: social protests against De Gaulle's government totally paralyze the country.

The art world reflects these upheavals and protests. For instance, the police protects the buildings of the Venice Biennale, after activists try to occupy them to protest against some of the modalities of the Biennale. According to the demonstrators, art should be accessible to everyone and no longer tied to the interests of the art market. On the other hand, the Venice Biennale has become the world's prime commercial fair for modern and contemporary art. As consequences of these events, the official awards of the Venice Biennale are abolished after the 1968 exhibition in order to decry an elitist vision of it. They are re-established only in 1986.

Nicolas Schöffer follows this anti-elitist and radical tendency: he refuses any individualistic and subjective artistic conventions; they seem empty and meaningless to him. No identifiable reference, no entertaining narrative, no standardized emotion: the

Venice, protests in 1968.

artwork simply opens up a space where the viewer engages with and gives meaning to it. In fact, the indifference of the masses and a kind of general and diffuse hostility towards art are the symptoms of the need of a change and a renewal. Starting from Dada «anti-art» movement in the 1910s, the image of art and the artist, that has been building up for a long time, is radically questioned: the «bohemian» artist, who transmitted personal emotions and a personalized point of view of the world, if not quite dead, is moribund.

Art, according to Nicolas Schöffer, should explicitly be at the service of human beings[1]. Its experiments, obtained through the collaboration of science and art, should be available to everybody. Nicolas Schöffer, unsurprisingly, is inspired by the Bauhaus. This movement attempts to reconcile art and life through a functionalist and rational approach mixing different artistic fields and materials. For Nicolas Schöffer, «social» art should permeate everyone's daily life[2]. The very same orientation can be found in the Constructivist movement, that originated in Russia in 1913 and that refuses the cult of «art for art's sake» in favor of art as a practice directed towards social purposes. However, Nicolas Schöffer notes that the commercial system mediocritizes people by means of design and arts, without improving the social conditions. Artists should perturb the consumeristic society[3].

Nicolas Schöffer is one of the noticeable spokesmen of a break with the art of the past and, not surprisingly, given the political situation, he is the winner of the «Grand prize for sculpture» of the Venice Biennale in 1968 with «Prisme», an artwork created for the French Pavilion.

«Prisme». Nicolas Schöffer. Venice. 1968.

Kinetic context

In 1968 the historian of art and technology Frank Popper, in his book *Origins and Development of Kinetic Art,* recognizes kinetic art as a new category in art. Quoting Nicolas Schöffer's artworks in particular, he stresses the important opportunities offered by new technologies in artistic practice. Popper notices especially a singular tendency in visual arts clustering the kinetic devices that add light to movement under the name of «lumino-kinetic art»[4].

In the '60s, with the economic boom, technology, bearer of wealth and progress,

1. SCHÖFFER, Nicolas. *Le nouvel esprit artistique*. p.105.
2. Ibid. p.186.
3. SERS, Philippe. *Entretiens avec Nicolas Schöffer*. p.116.
4. POPPER, Frank. *The Place of High-Technology Art in the Contemporary Art Scene*.

invades the daily life: television sets and home appliances massively enter into the home network distribution. As the new technologies expand, artists start using them: the link between art and technology is a hot topic. This change seems to contradict C. P. Snow's theory, exposed in his Rede lecture *The two cultures and the scientific revolution* (1959), that «humanistic culture» and «scientific culture» tend to drift apart. Art has been inspired mainly by «literary culture» while the «scientific culture», that has put new technologies at the service of humanity and brought about a fundamental increase of knowledge, is foreign to it. Kinetic art is a representative attempt to bridge the gap as the artist becomes, in a way, a popularizer of scientific knowledge[5].

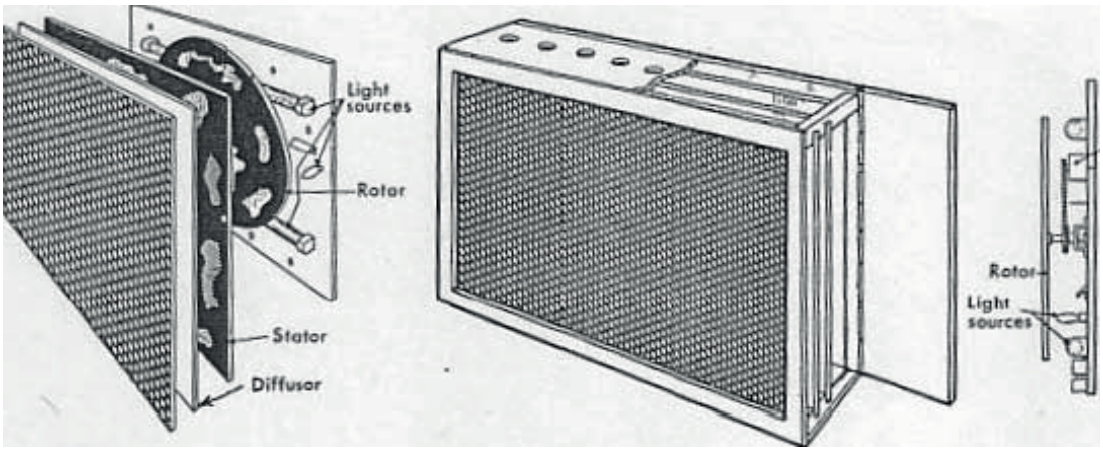
Thanks to the collaboration with Philips and to the teamwork it implies, Nicolas Schöffer has access to the scientific and technical knowledge that he needs. In this way, he can create pieces of art in movement[6] and he can set up experiments that explore the influence of new technologies on human perception. With Nicolas Schöffer, the metaphor of the scientist-artist, that uses a systematic, methodological and scientific-inspired approach applied to his different artistic practices, slowly revives.

At the same time, taking advantage of the economic boom and the support of a big company, Nicolas Schöffer introduces a new kind of product in the mass distribution circuit. The *Lumino* could be confused with a simple «abstract» television set, but implements scientific discoveries on human perception that kinetic artists have already tried to experiment in expositions and museums.

Before the 1968, other lumino-kinetic devices have been built to influence human nervous system. For instance, one of the precursors of the *Lumino* is the «Lumidyne System», a device built by Frank Malina in 1955. Frank Malina is a kinetic artist, who in 1967 founds Leonardo, an academic journal about applications of science and new technology to the arts. The «Lumidyne System» has many similarities and some formal differences with the *Lumino*: in both devices, the show has the same visual aesthetics; unlike the *Lumino*, the form of the «Lumidyne System» doesn't remind of television set, but it is a simple light-tight case with a translucent screen; the inside part of the «Lumidyne

5. In 1966, the curator of modern art Maurice Tuchman starts the program «Art and Technology» (A & T) to connect forty industrial companies in California with engineers and artists from all over the world. Four years later, the results of this collaboration are shown successfully at the Los Angeles County Museum of Art and the Osaka World Exposition.
In 1967, the organization «Experiments in Art and Technology (E.A.T.)» starts to develop collaborations between artist and engineers. The goal is to support artists' accessing to new technologies, as mediums and materials, and, at the same time, to experiment artistic practices on society.

6. The movement in artworks can be implicit or explicit. It is implicit because it can be interpreted as an illusory phenomenon: visual perception shows the difference between what the eye sees and what the viewer thinks he sees. In many cases movement does not really exist, its appearance is generated by the visual effects deceiving the eye. This illusion of kinetic art, especially used in Optical Art (Op Art), has its origins in the 1800s, in the painting of the impressionist artists who experience the movement in their paintings.
The movement can be explicit in the sense of a real movement through the use of mechanical actuators or natural elements such as the wind.



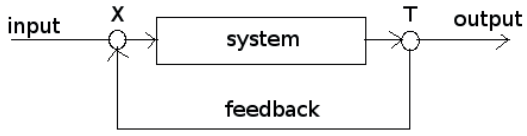
«Lumidyne System». Frank J. Malina.

System» has a more complex mechanical system given that it is composed of multiple rotors and mirrors; both devices hide an implicit function to change the viewer's state of mind. In 1955, Frank Malina states that he has studied Dr. G. H. Groharn's experiments on human visual perception[7]. In 1962, he discovers that a variant of his «Lumidyne System» is used by Professor A. Michotte at the Louvain University in Belgium for experimental psychological studies on the perception of motion and human emotional behavior[8].

Cybernetic context

In his book *Le Nouvel Esprit Artistique* (1970), Nicolas Schöffer states that artists should renew their techniques, by appropriating electricity, electronics and computer science, tools to create art[9]. The aim is not only to renew art but also to imagine new ways of getting in touch with the audience. Adding cybernetics to art, Nicolas Schöffer claims to create a solution to avoid redundant and repetitive artistic creations.

In 1968 an exhibition,later seen as the pinnacle of cybernetic art, takes place in London: the title is «Cybernetics Serendipity». In that occasion Nicolas Schöffer presents a mobile sculpture called «CYSP I» (1956) that is considered the first cybernetic sculpture in art history: light sensors and a microphone catch variations in the fields of color, light intensity and sound intensity that influence the movements of the sculpture. The mechanic system and the electronic brain are developed by Philips.

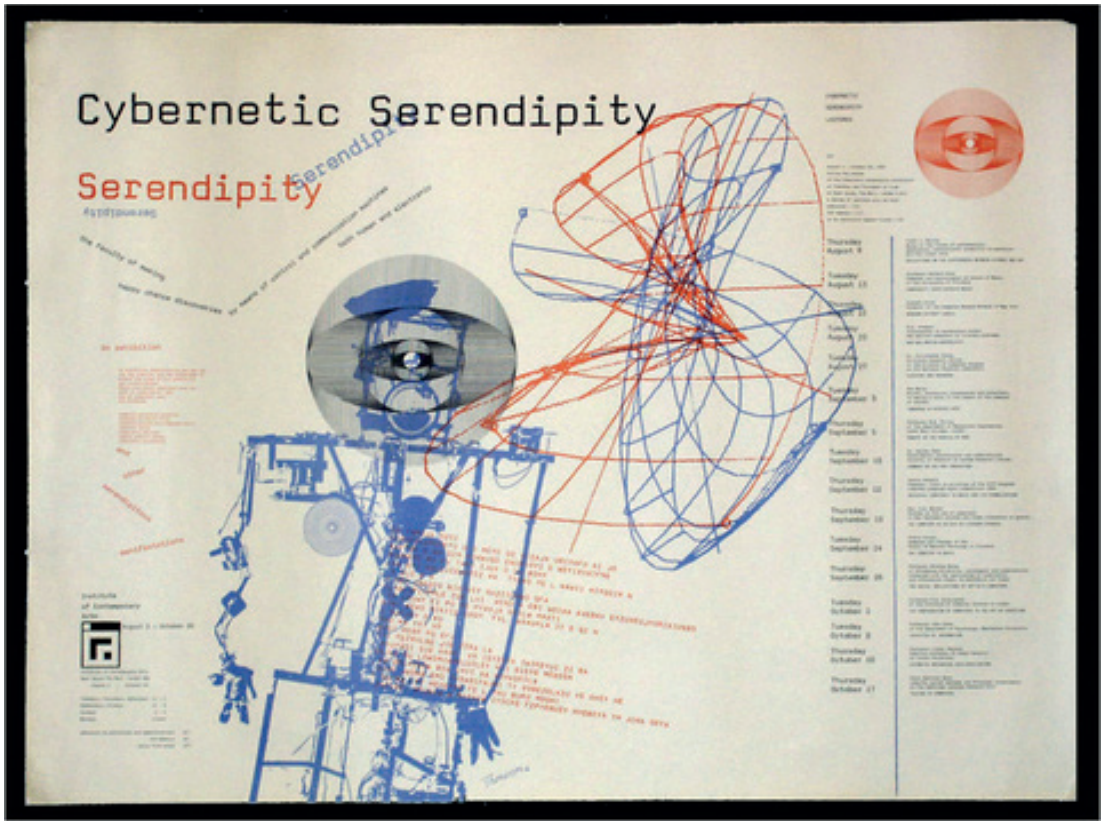


Feedback system. Diagram.

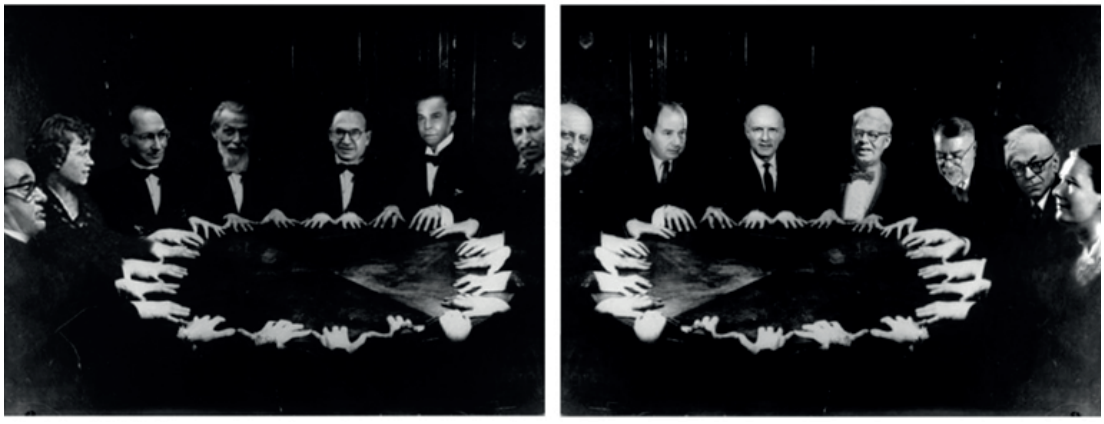
Cybernetics, according to the mathematician Norbert Wiener, is the science that studies the phenomena of self-regulation and communication both in natural systems and in artificial systems. During a series of conferences, historically remembered as the «Macy conferences», from 1946 until 1953, philosophy of mind, artificial intelligence, neuroscience, cognitive science come from cybernetics. The Macy conferences, have been a meeting point of some of the most important personalities of the «humanistic culture» and «scientific culture»: neurobiologists, mathematicians, engineers, psychoanalysts, biologists, anthropologists and economists. The basis of cybernetics is the concept of the feedback loop. Abstracting and modeling the characteristics of input and output, a system can be regulated through the gap between the effective action (output) and the planned result (action)[10]. For instance, during the World War II, Wiener uses cybernetic principles to create a system («Wiener Filter») for anti-aircraft guns: this weapon system fires predicting the future trajectory of the pilots.

7. MALINA, J. Frank. *Kinetic painting : the Lumidyne System*.
8. MALINA, J. Frank. *Electric Light As A Medium In The Visual Fine Arts: A Memoir*.
9. SCHÖFFER, Nicolas. *Le nouvel esprit artistique*. p.32.
10. DUPUY, Jean-Pierre. *Aux origines des sciences cognitives*. p.161.

«CYSP I». Nicolas Schöffer. 1956.



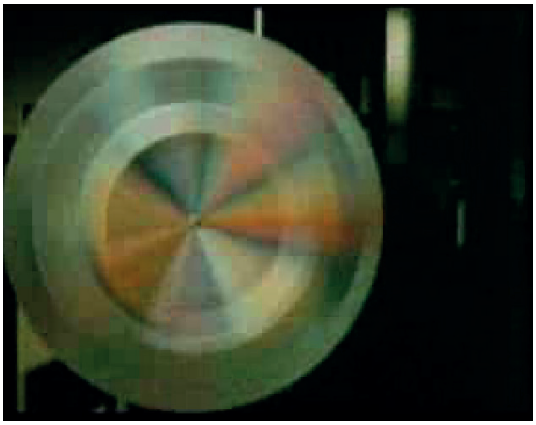
Cybernetic Serendipity. Cover catalog.

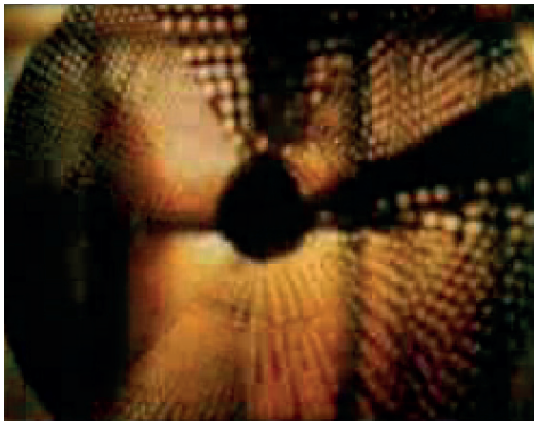


Cybernetic seance. Photo from 3rd May Conference 1947.

Around the table (left to right):

Rafael Lorente de Nó, Margaret Mead, Kurt Lewin, Warren S. McCulloch, Paul Lazarsfeld, Arturo Rosenblueth, Gregory Bateson, Ralph W. Gerard, John von Neumann, Heinz von Foerster, Lawrence K. Frank, Norbert Wiener, Heinrich Klüver, Molly Harrower.



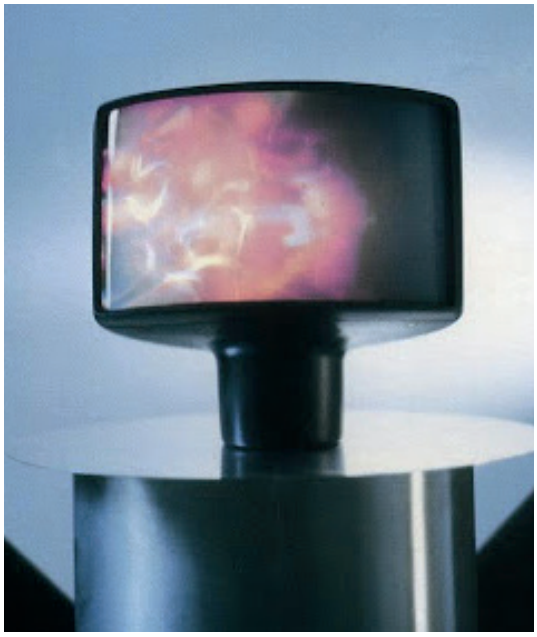


«Spatiodynamisme». Film (1958). Director Tinto Brass. Screenshots.

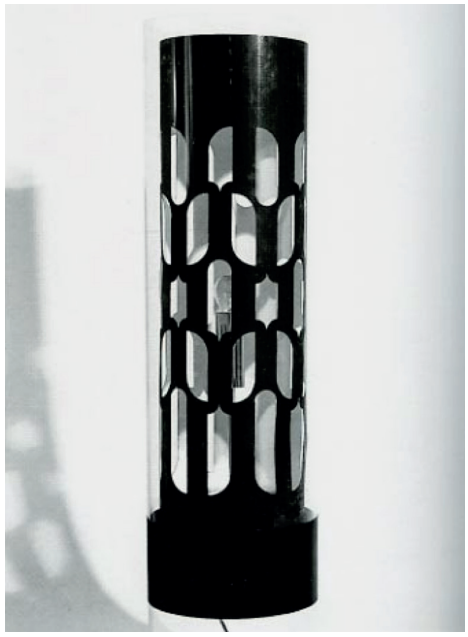
Using cybernetic methodology, Nicolas Schöffer believes that the renewed artistic materials are: «Space», «Time» and «Light». All three share a feature that artists should be able to grab: the «Dynamism». Starting from 1957 with «Lux» artworks, the association between cybernetics and the three «materials» become the focus of Nicolas Schöffer's research: «SpatioDynamisme», «ChronoDynamisme» and «LuminoDynamisme». In «SpatioDynamisme», he defines the material «space» and gives values to the potential energies present in it. In «ChronoDynamisme», he works on the material «time» and explores the changes on human consciousness using audio-visual arts. During his studies on «LuminoDynamisme», Nicolas Schöffer is interested in light as an influent element on the human visual perception. Human nature is profoundly phototropic: light, as a natural phenomenon, has always influenced human life rhythm. Exposure to some rays provides a sense of well-being, a beneficial effect to the state of mind and health. The light stimulates and develops human emotions[11]. In the cybernetic conception, which Nicolas Schöffer accepts, there is a clear reference to «circular causality» between personality and culture: the personality of individuals is influenced by the socio-cultural environment in which they live and the environment, at the same time, reflects the personality of the people who live in it[12]. Nicolas Schöffer's cybernetic devices, such as the *Lumino*, are supposed to change the psychology of individuals by the influence of audio-visual means: cybernetic systems try to establish a communication within the viewer's psyche and between his psyche and the surrounding environment. In particular, creating the *Lumino*, Nicolas Schöffer underlines the influential importance of home space on human perception in this cybernetic process. Changing human beings, society could change as well.

11. MÜNCH, LINHART, BORISUT, JAEGGI, SCARTEZZINI. *Effects of prior light exposure on cognitive performance, subjective sleepiness, and hormonal secretion in the evening.*

12. SCHÖFFER, Nicolas. *Le nouvel esprit artistique*. p.89.



Lumino. Nicolas Schöffer.



«Dream Machine». B. Gysin, I. Sommerville.

Design context

In 1968 Nicolas Schöffer's *Lumino* is produced on a large-scale: Philips sells fifteen hundred items in France and the Clairol company produces another twenty-five hundred, under the name «Dream Box», in the United States. Thus, Philips provides the possibility to «socialize» Nicolas Schöffer's art and to continue his mission, but ironically, at the same time, this collaboration inaugurates the profitable market of light therapy, that exists nowadays. For the Dutch company this collaboration represents a change in market ideology, shifting from a rational conception of lighting to a more emotional one. Quite obviously it is an opportunity to promote the company's public image and to create a laboratory to test bold consumer technologies.

From the '60s, industrial design takes a keen interest in the experiments of kinetic artists and starts considering the possibility of implementing a large-scale production of some of the devices exhibited in galleries and museums. But it is not the same thing to make a device for an exhibition and to mass-produce it as an everyday life object. Some kinetic artists are equally happy to collaborate with design companies who can translate and adapt the characteristic kinetic works, with their specific focus on time, space, light and movement, to the domestic constraints. As a matter of fact, many kinetic works remind, in their functionalities or aesthetics, objects or appliances already present at home. In many respects, aesthetics of kinetic art is inherently industrial. Some devices, described in the next paragraphs and chapters, are easily comparable to lamps («Dream Machine» by B. Gysin and I. Sommerville), to television set (*Lumino*), to paintings («Chromie No. 1» and «Chromie No. 2» by F. Malina), to kids games («Timor» by E. Mari), etc.. The '60s are full of exam-

ples, more or less successful, of partnerships between kinetic artists and industrial companies:

• Philips is the first to be interested in introducing the project «Dream Machine» by Brion Gysin and Ian Sommerville in the mass distribution circuit[13]. It is a kinetic light sculpture device which comprises a perforated cylinder placed on a record turntable and a light bulb housed in its center. Light, passing through the cylinder's holes at a frequency between eight and thirteen pulses per second (which corresponds to «alpha waves» (*cf.* page 30), can alter electrical activity in the brain. The viewer, looking in the direction of the device with closed eyes, may have chromatic dreamlike visualizations and/or visual hallucinations. After a first meeting, Philips drops the idea. In 1965, Brion Gysin also proposes his project to Colombia Records, without success. Some sources[14] claim that the main reason why the project is rejected is fear of lawsuits due to schizophrenic episodes that could be triggered by the device.

• Frank Malina, renowned for his «electric paintings»[15], designs an audio-kinetic device in 1962 - 1964 for General Electric Co. A market survey conducted by General Electric in the US, show that a large market is available for the mass production of an audio-kinetic device. Frank Malina makes two prototypes for this project: «Chromie No.1» and «Chromie No. 2». Both devices are light-tight case with a translucent screen at the front. «Chromie No.1» is a kinetic object in which an incandescent lamp, placed on the side of the case, projects a beam of light into a rotating color wheel and mirror's system elaborating abstract shapes on the screen. «Chromie No. 2» has the same structure and the same mechanism to project images on the screen, but it also generates sound whose intensity controls the diffusion of images. The main problem of these devices is the high cost of the materials for a large-scale production. Instead of the original project, the new president of the company proposes a low-priced record player for children and Frank Malina leaves the project[16].

• In 1962, the company Olivetti sponsors the exhibition «Arte programmata: Arte Cinetica, opere moltiplicate, opera aperta»[17]. At this time, the company is at the apex of the electronic design innovation and happily combines aesthetics, production and market. During the exhibition, Olivetti collaborates with kinetic artists in finding solutions for future devices to produce on an industrial scale. Some of these artists, such as Bruno Munari and Enzo Mari, work to create furniture with another Italian company, Danese. Influenced by the kineticism, many of their products are designed with «kinetic» forms, in other words structures which give the idea of movement. For instance, in 1964 Bruno Munari realizes the folding lamp «Falkland» which reminds one of an accordion pleat. Another example, realized by Enzo Mari in 1966, is the perpetual calendar «Timor» which has the gradual opening movement of a fan.

13. GEIGER, John. *Chapel Of Extreme Experience*. p.66.
14. ALLEN, Mark. *Décor by Timothy Leary*. The New York Times.
15. POPPER, Frank. «Tableaux Lumineux» from *L'art cinétique*.
16. MALINA, J. Frank. *Electric Light As A Medium In The Visual Fine Arts: A Memoir*. p.109-119.
17. *Dynamo, Un siècle de lumière et de mouvement 1913-2013*. p.45.

B. Gysin, the «Dream Machine» and William S. Burroughs. London. 1972.

«Falkland». Bruno Munari. Danese. 1964.

«Timor». Enzo Mari. Danese. 1966.

The total device

«Turn on, tune in, drop out»
Timothy Leary. 1967.

In the unpublished text *Le Destin de l'homme, c'est d'être continuellement prisonnier* Nicolas Schöffer states that human being is chained in a double prison: internal and external. The walls of this prison block human beings in a state of mind that does not allow him to get in touch neither with himself nor with the community that surrounds him.

A domestic device, such as the *Lumino*, is supposed to generate a daily process in the human unconscious that, he hopes, may begin to heal the conflicts between body, mind and surrounding space. It sounds «magic», but Nicolas Schöffer is well aware of scientific discoveries on human perception[1]. A kind of protocol is suggested to be respected to interact with the *Lumino*: turn off other light sources, sit nor too close nor to far in front of the device, stare at the device, focus attention on it. As during a shamanic rite, the *Lumino* is the magical tool to influence human state of mind and bring human beings into a state of altered consciousness.

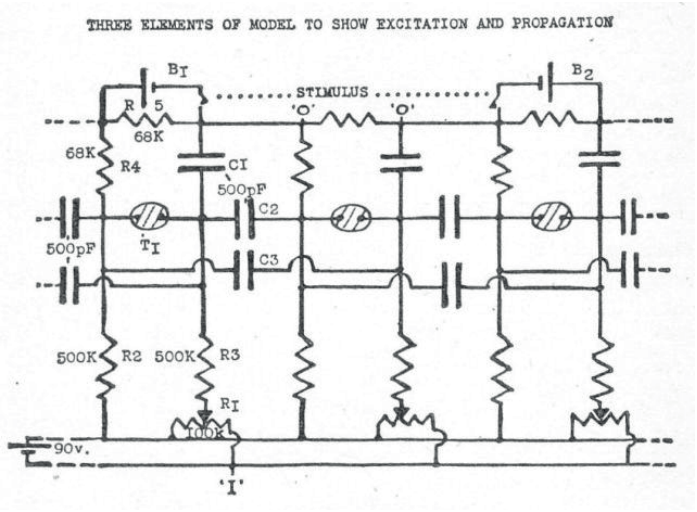
In the '60s Nicolas Schöffer begins to reflect about a «device of the self» that has two functions: to get in contact with mind of human beings and, at the same time, to connect them to the global cybernetic show.

«The device of the self»

The Nicolas Schöffer's *Lumino* hints at what has been called the «second-order cybernetics»: conceptually it is the transition between the first cybernetics by Norbert Wiener and the new cybernetics by scientist Heinz von Foerster.

Heinz Von Foerster is one of the youngest participants in the Macy conferences and in 1970, with the publication of the book *Molecular Ethology*, he revisits some of the principles of cybernetics: this split goes down in history as the «new cybernetics» or «second-order cybernetics». The novelty is the introduction of the idea of «not-trivial machines» capable, from a modest number of internal states and input, to generate, through combinations, high behavioral complexity. In fact, the first cybernetics is accused of «behaviorism» because the theorized machines are «trivial machines» that follow the fixed law of «stimulus-response».

1. ARNAULD, Pierre. *L'œil multiplié: l'extension cybernétique de la maîtrise perceptive.* L'ŒIL MOTEUR. p.8.



Circuit of Model Nerve. W. Grey Walter.

In contrast, the «non-trivial» machine is a «finite state automaton», which has an internal state capable of change as a function of inputs and past internal states.

Nicolas Schöffer, who is probably the first artist to introduce sensors into an artwork (light sensors and microphones in «CYSP I») and to create a «non-trivial» artistic machine, oddly designs the *Lumino* as a «trivial» machine. Nicolas Schöffer realizes a home device to get in touch with the mind of the user, but, surprisingly, the show performed cannot adapt itself to the state of mind of the viewer.

There are two possible explanations to this choice.

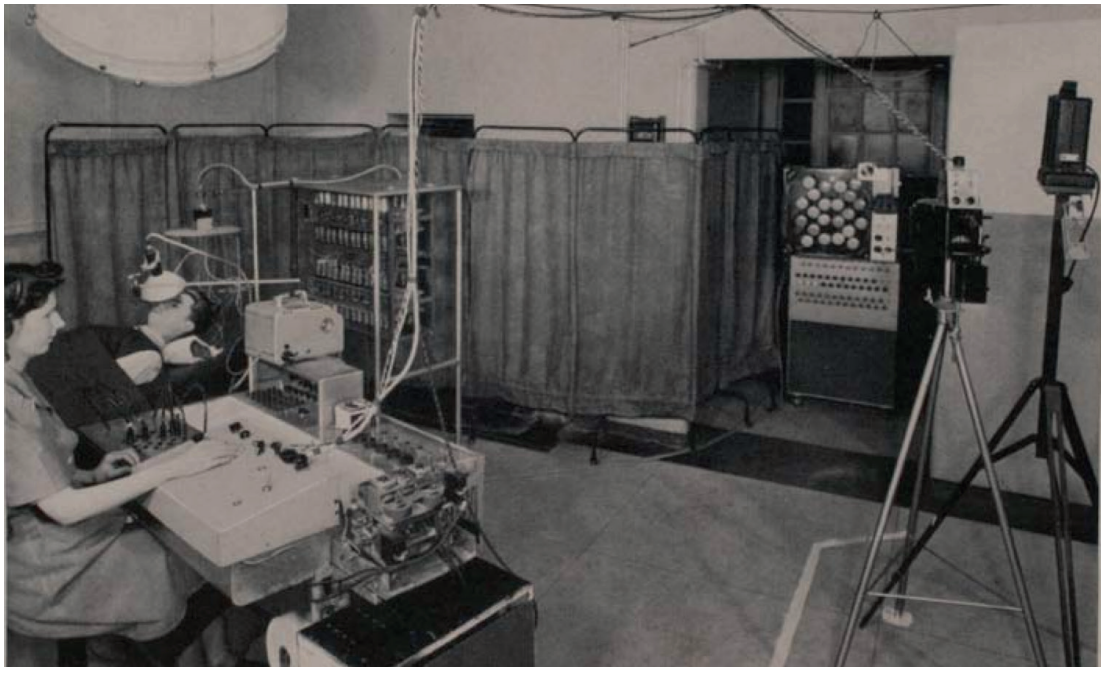
The first reason could be purely practical: to design a system perceivable to the user, the *Lumino* would need to be equipped with biosensors. In the '60s, in cybernetics, the robotician and neurophysiologist William Grey Walter's experiments are well-known. Using the Electroencephalography (EEG), a biosensored machine invented by the neurologist Hans Berger in 1924, Grey Walter discovers that the human nervous system can be affected by light stimuli causing stimulated brain activity and changing brainwaves. In his most famous book *The Living Brain* (1953), Grey Walter scientifically explains the metaphor of the human brain as a central motor connected to sensors[2]. In other words, the nervous system is a big computer linked to sub-unities through electricity. So, by modifying the patterns of electricity passing through the nerves, it seems highly plausible that one can influence human feelings and perceptions.

Until today the discovered brainwaves are:

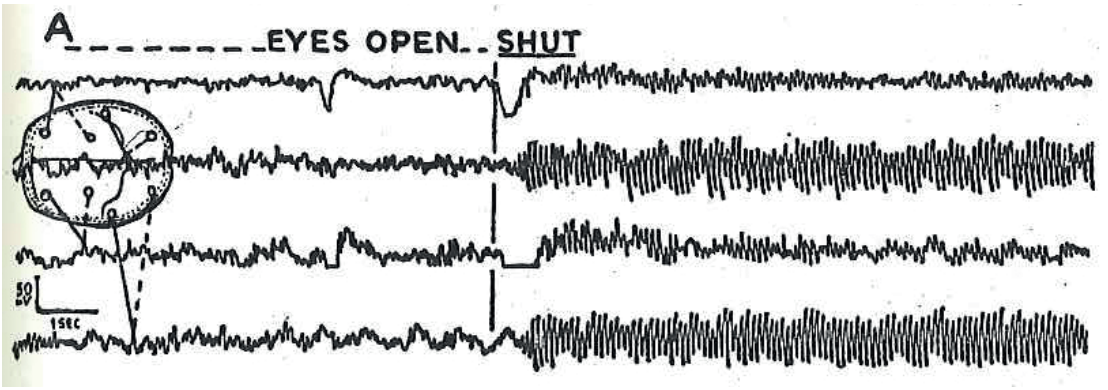
- Epsilon waves (0-0.05 Hz): they have not yet been heavily studied;
- Delta waves (0.05-4 Hz): they characterize the deepest stages of sleep or they are found when human beings do some continu-

2. GREY WALTER, William. *The living brain*. p.25, p.27.

W. Grey Walter and Electroencephalography.



The Toposcope Laboratory. W. Grey Walter.



Alpha waves record. W. Grey Walter.

ous-attention tasks;

• Theta waves (4-7 Hz): they are produced in the hippocampus and other brain structures between dreams or when human beings repress a response or action;

• Alpha waves (7.5-12/13 Hz): they are produced in the anterior lobe of the brain when the eyes are looking for a visual pattern to send to the nervous system and cannot find it in a clear way. For instance, most human beings generate alpha waves when, closing their eyes, the nervous system continues to search for a visual pattern to identify or when they observe a sequence of images that are displayed too fast to be clearly identified. Alpha waves can be seen in persons watching movies or television narratives in which they are fully engrossed, mostly unaware of their surroundings;

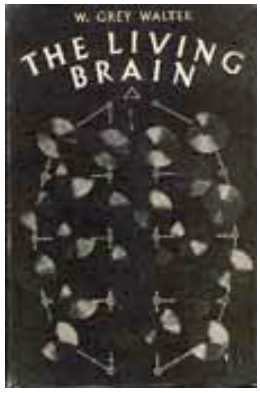
• Mu waves (7.5-12/13 Hz): they occur at the same alpha waves' frequencies, but they are detected over a different part of the brain, the motor cortex, when human beings intend to move;

• Beta waves (13/14-30 Hz): they correspond to normal conscious brain activity, ranging from calm and relaxed consciousness, to active thinking, focus, hi alert, anxious and panic;

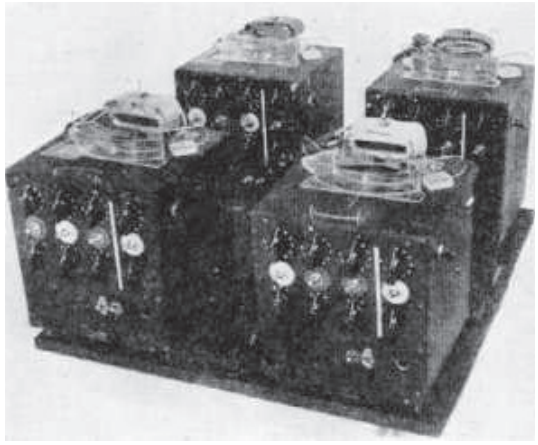
• Gamma waves (30-100+ Hz): they are produced in somatosensory cortex when human beings recognize objects, sounds, or tactile sensations during short-term memory.

The pioneers of the lumino-kinetic devices test empirically on the «patients-viewers» the first scientific researches on light of the '60s. The behavioral abstraction of animals and how they elaborate the «information» have induced the cyberneticians to elaborate analogies with the functionality of the machines: the «human system» is composed of «finite states» which could be influenced and controlled by external «stimuli». Probably, using W. Grey Walter's theories[3], the audio-visual show on the screen of the *Lumino* is supposed to generate Alpha waves in viewer's brain. The warm and relaxing pace of the domestic hearth is reproduced artifi-

3. ARNAULD, Pierre. *L'œil multiplié : l'extension cybernétique de la maîtrise perceptive.* L'ŒIL MOTEUR. p.8.



The Living Brain. W. Grey Walter. Cover book.



Ashby's «Homeostat». *Design for a Brain*.

cially modeling the material «light» and the ticking of the mechanical gears. In the '60s, biosensors are heavy, bulky, expensive and therefore difficult to integrate into an apparatus to use at home. Unfortunately for Nicolas Schöffer, the *Lumino* cannot detect the human «finite states» and accurately adapt the audio-visual stimulus.

The second reason could be that Nicolas Schöffer finds alternatives in the new theories that are accepted in the second cybernetics movement. The psychiatrist William Ross Ashby in the book *Design for a brain* (1952), stresses the importance of randomness in the learning process. Starting from the computer «Automatic Computing Engine» (ACE)[4] created by the mathematician, logician and computer scientist Alan Turing, Ashby creates in 1948 the «Homeostat». This project aims to demonstrate, using an evolutionary approach, how an entity, more specifically the brain, adapts itself to its environment. In a stable global system the Homeostat and its environment evolve, but, if during this evolution one of the essential variables changes, the Homeostat randomly changes its connections with the environment, becoming a new deterministic automaton. Hence the «human system» is represented as a complex set of elements and interactions that develops spontaneous properties of stability.

It is important to view the *Lumino* design from this perspective: an exploration of the relationship between the human brain and technology. In fact, the *Lumino* is a technology that holds a variety of random audio-visual programs that are supposed to influence human «internal states»: the machine becomes a «device of the self», a conscious gateway to the human unconscious. The mechanical conditioning could allow the human system to reach a stability, a kind of perfect calm. This state of mind could

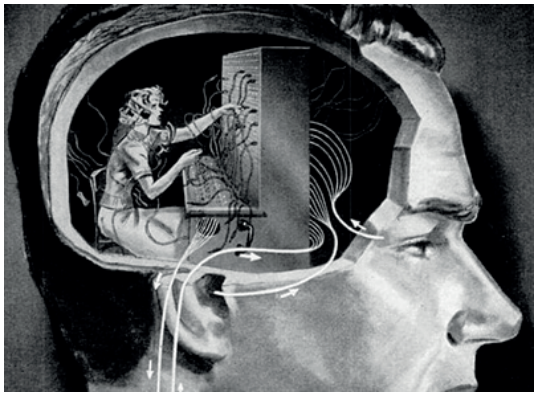
4. The ACE contains a fix stored-program in the computer hardware with a memory of 25 KiB, accessed at a speed of 1 MHz, and it could simulate the «Homeostat» machine, the first design idea for a human brain.

change continuously depending on internal or external human influences. Moreover, if the process was well-functioning, but static, the user could adapt to it and it wouldn't work no more. The *Lumino* illustrates the idea that stability itself is in flux because this device alters the essential variables of the system itself. Hence the system tends toward a new, a priori not known, stability.

The basic assumption is that the chance can be utilized for relaxing purposes. The *Lumino* is a programmed creation that launches a process along the time axis: the mechanical reproduction of a process of dynamic stability could be forced[5]. Nicolas Schöffer designs some suggestive shows in order to affect the nervous system in two phases: the first called «retinal disturbance» and the second called «neural disturbance».

The «retinal disturbance» supposes techniques of empathy to get in touch with audience. The artist Marcel Duchamp was one of the first to talk about this disturbance ironically calling it «frisson rétinien»[6]. The light rays, hitting the eye, produce a «sensation» and then the retinal nerves transfer to the brain which transforms it into a «feeling». In the specific case of the *Lumino*, the «soporific» feeling is accelerated and amplified by the boredom and monotony of the visual show. The techniques of perception become the medium to start an immediate «action» on the viewer: in addition of intensity/frequency of light and sound, even the movement is part of this first phase of action[7].

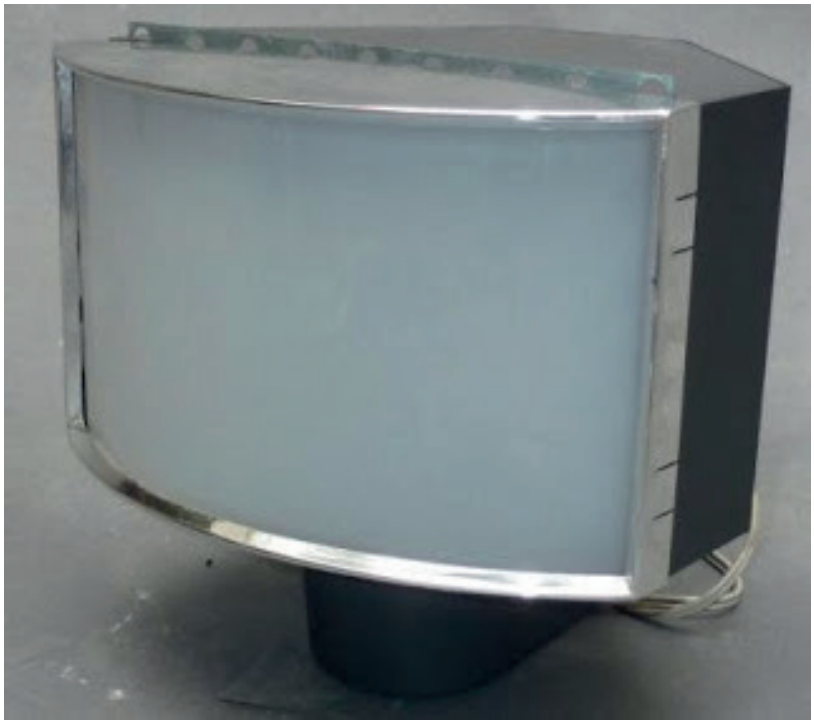
In the second phase the «neural disturbance» comes into play. Nicolas Schöffer designs this sensory experience as an action that goes deeper along the time axis: the audio-video stimulus is supposed to be programmed, ensuring human homeostasis. The techniques of moving light and repetitive sound rhythm have an influence on the nervous system and are able to adjust its behavior[8]. The continual metamorphosis of forms and colors causes kinesthetic effects, while the movement causes the enchantment. These techniques act on an important psychological process of the human brain: suggestibility. Suggestion is a form of communication, verbal or non-verbal, through which an individual is led to convictions, thoughts, feelings, remembrances or behavior by another person. In everyday life the human being is receptive to these techniques based on his degree of suggestibility, in fact some people are more suggestible than others. The most well-known techniques of manipulation may be those that



«Brain manipulation». Hypnotism in old time radio.

5. SERS, Philippe. *Entretiens avec Nicolas Schöffer*. p.12.
6. CABANNE, Pierre. *Entretiens avec Marcel Duchamp*. p.74.
7. SCHÖFFER, Nicolas. *Le nouvel esprit artistique*. p.131, p.164.
8. Ibid. p.89.

«Luminoscope». Nicolas Schöffer.



Lumino prototype. Philips.

use dialectics[9], but non-verbal and strictly audible and visual means are also used in advertisements, shows, video games, etc.. The *Lumino* is supposed to immerse the viewer into an «aesthetic contemplation», a «state of contemplation», in other words hypnosis. The common uses of the *Lumino* have many similarities with the characteristics introduced in theater at the end of the nineteenth century by Richard Wagner (electrification of the scene, orchestra immersed in the penumbra, chromaticism and melodic process in musical language) and documented by Paul Souriau in the book *La suggestion dans l'art* (1909), but that are also part of protocols of fascination used by hypnotists. The concentration of the gaze, fixed vision, sensory isolation, fusion of music and visual, etc.. are added to the new immersive techniques introduced in living rooms by television: the main one is the flicker effect, the change of intensity between lights and darks and the rate of switching from one sequence to another. The flicker is a phenomenon that can happen daily, for instance, looking out the window of a moving train or riding the bike and looking at the light that passes through trees[10]. As the succession of «0» and «1» in binary language to program machines, the alternation of intensity in light could be considered a cybernetic universal medium to communicate to all humanity[11]. At the same time the repetitive ticking of the mechanic gears of the *Lumino*, like the metronome's tick, can help to lull the mind of the listener into a state of deep relaxation: it is the kind of sound that could be used in place of traditional meditation mantra music[12]. W. Grey Walter always emphasizes the importance of sound patterns: «Music is proverbially connected with emotions and provides a thousand examples, among the daily patterns of our lives, that familiar things are comforting things». Light music invigorates the repetitive pattern of flickering. The *Lumino* is an artefact that mechanically imitates the gestures that have entered into the vocabulary of hypnosis and manipulation starting from Franz Anton Mesmer. Hypnosis, often used for anesthesia therapy, puts the viewer in a state of half-sleep relaxing the body, but, at the same time, causing mental tiredness: the brain continues to look for patterns hence, producing alpha waves. Through the lethargic state induced, the mechanical device immerses the human being into a dream-like dimension, but it also activates a channel to influence the nervous system without diverting the basic properties of brain function. As during a meditative seance of Ericksonian hypnosis[13], the user is consciously accompanied in an altered state of consciousness and hence, participating in the experience, opens up to the suggested

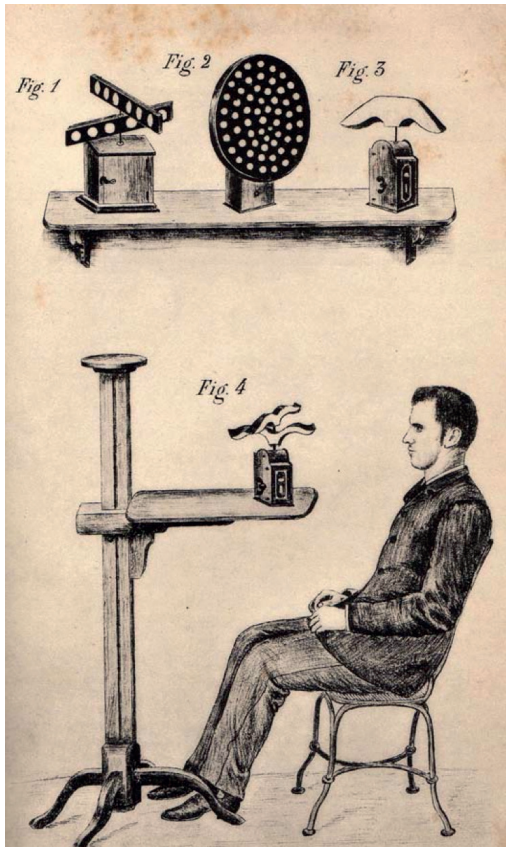
9. BEAUVOIS Jean-Léon, JOULE Robert-Vincent. *Petit traité de manipulation à l'usage des honnêtes gens*.

10. The alternation of chromatic light is one of the primordial natural phenomena that is recognized by human being, as stated by W. Grey Walter, «Regular or irregular, the alternation of day and night was probably the first time that impressed pattern in the human brain[...]».

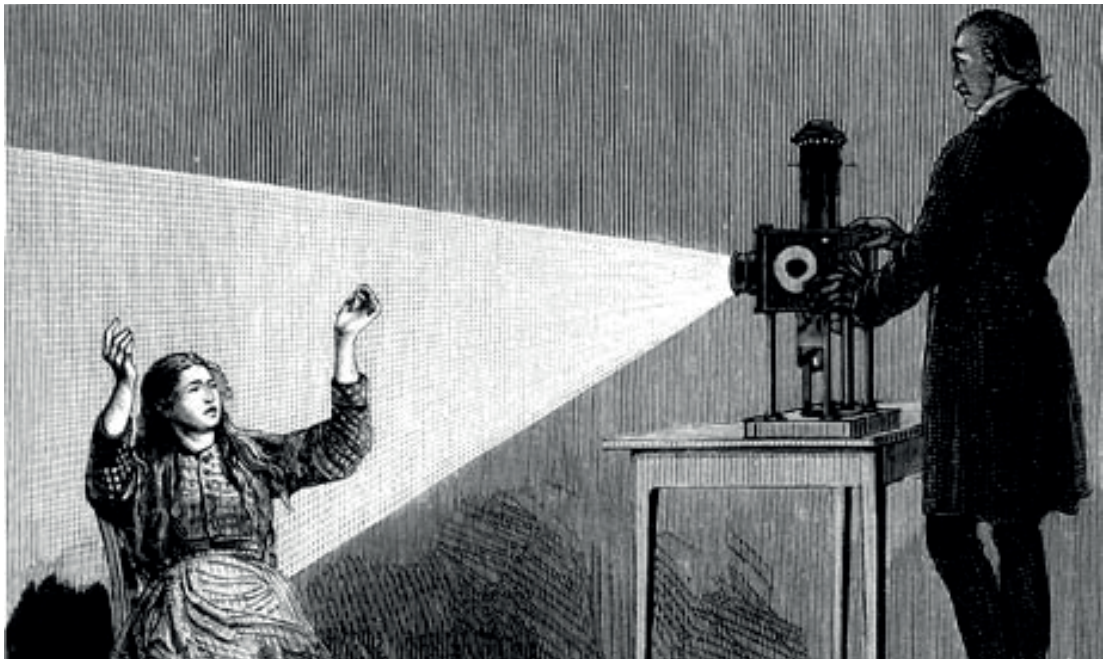
11. Like traffic lights in the futuristic city of the movie «Alphaville» (1965) by Jean-Luc Godard or the use of light in the experimental movie «the Flicker» (1965) by Tony Conrad.

12. GEIGER, John. *Chapel Of Extreme Experience*. p.26.

13. In the '60s the psychiatrist Milton H. Erickson introduces a new format in hypnotherapy characterized by indirect suggestion, metaphors and confusion techniques.



Lark mirrors: old devices to induce hypnosis.



Jean-Martin Charcot inducing hypnosis by a magic lantern.

audio-visual stimuli. The subject assumes the role of the patient in a fictional setting where the mind machine is the hypnotist, as in a role-playing game.

The hint to the second cybernetics could be interpreted in this context: Nicolas Schöffer is beginning to consider the human being as an «Homeostat» that, influenced by a «device of the self» using random audio-visual programs, can achieve the perfect «finite state» and reconcile itself to the domestic environment. Nicolas Schöffer, like a magician of suggestion, orchestrates the show designing a device to explore the relationship between artistic creation, domestic sphere and human psyche. The *Lumino* is conceived to disrupt the human unconscious creating a «new human being».

The global show

«I like to think (and
the sooner the better!)
of a cybernetic meadow
where mammals and computers
live together in mutually
programming harmony
like pure water
touching clear sky. [..]»

All Watched Over by Machines of Loving Grace. Richard Brautigan.

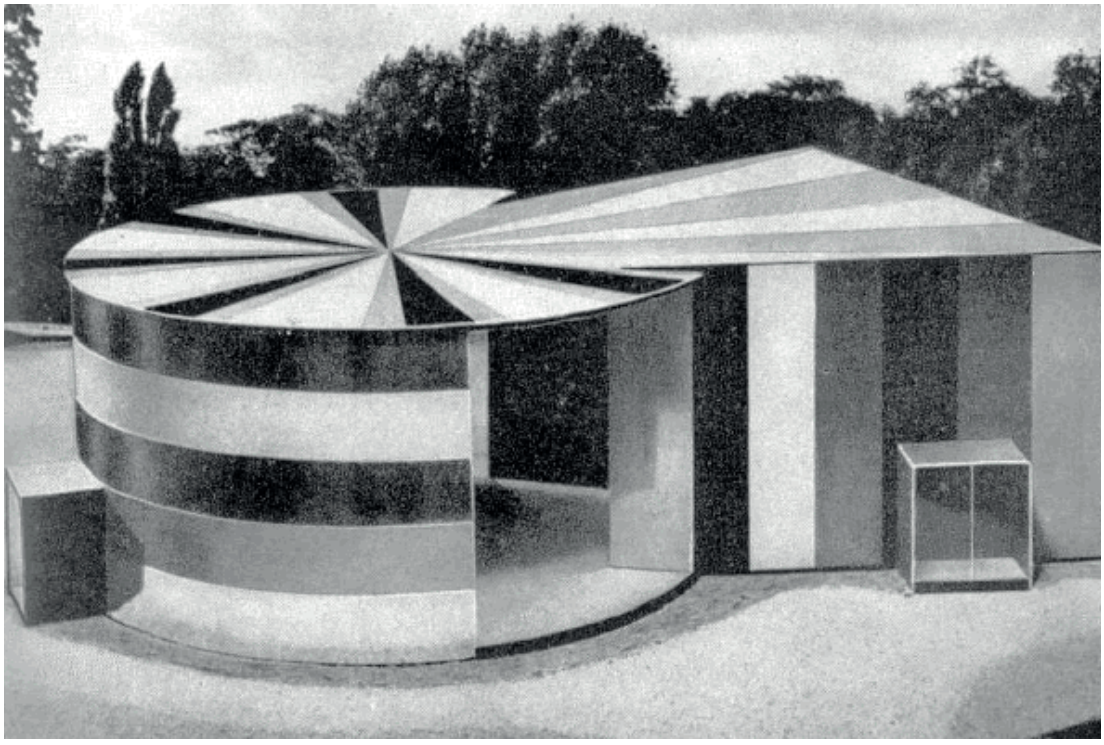
In 1967, the poet Richard Brautigan writes *All Watched Over by Machines of Loving Grace*, a tribute to cybernetics as an utopia. If cybernetics is an utopia, Nicolas Schöffer, pioneer of cybernetic art, is one of its emblems.

At the end of World War II, thanks to demographic growth and economic optimism, society is re-considering its own future and which models to follow to rebuild a new city on a human scale. Architecture and design are visionary and focused on the ideology of well-being: everything seems possible and progress is synonymous of happiness. The ultra-technological city and megalopolis, present in science fiction movies, seem to be the inspiration models for this new urban progress.

In 1969, Nicolas Schöffer publishes a book which is in line with this trend: *La Ville Cybernétique*. In this work, he theorizes the fundamentals of new urban habitat. The city symbolizes both the renewal of humanity through new technologies and the contradictions of an urban system no longer adapted to the needs of its inhabitants. The city becomes a laboratory for avant-garde artistic experiments in different scales: Nicolas Schöffer's artworks produce a visual show that, in different ways, spreads into small, medium and large spaces. Art should permeate every area of human life and should become «global». This intent of socialization of art allows Nicolas Schöffer to elaborate an experimental approach to theories on human perception: art acquires a political, scientific, therapeutic, social, philosophical and ethical dimension value.

The declared principle is to put the human being at the center of the urban project and to divide the city according to the involved human activities[14]. In this way, three types of cities arise: «working city», «leisure city» and «rest city». Using sensors to feed the feedback system, cybernetics provides the

14. Similar to the idea of one of the friends of Nicolas Schöffer, Le Corbusier. PINKER, Steven. *The Blank Slate*. p.170.



«Maison aux cloisons invisibles» in the cybernetic «rest city». Nicolas Schöffer. 1956.

rhythm that governs the space and the time of the city according to human needs[15]. At the same time, architecture becomes frontierless: the home imaginatively expands to the whole urban scale. Nicolas Schöffer's devices and installations have this mission: they want to create a connection between the human being and his environment, through a global show network.

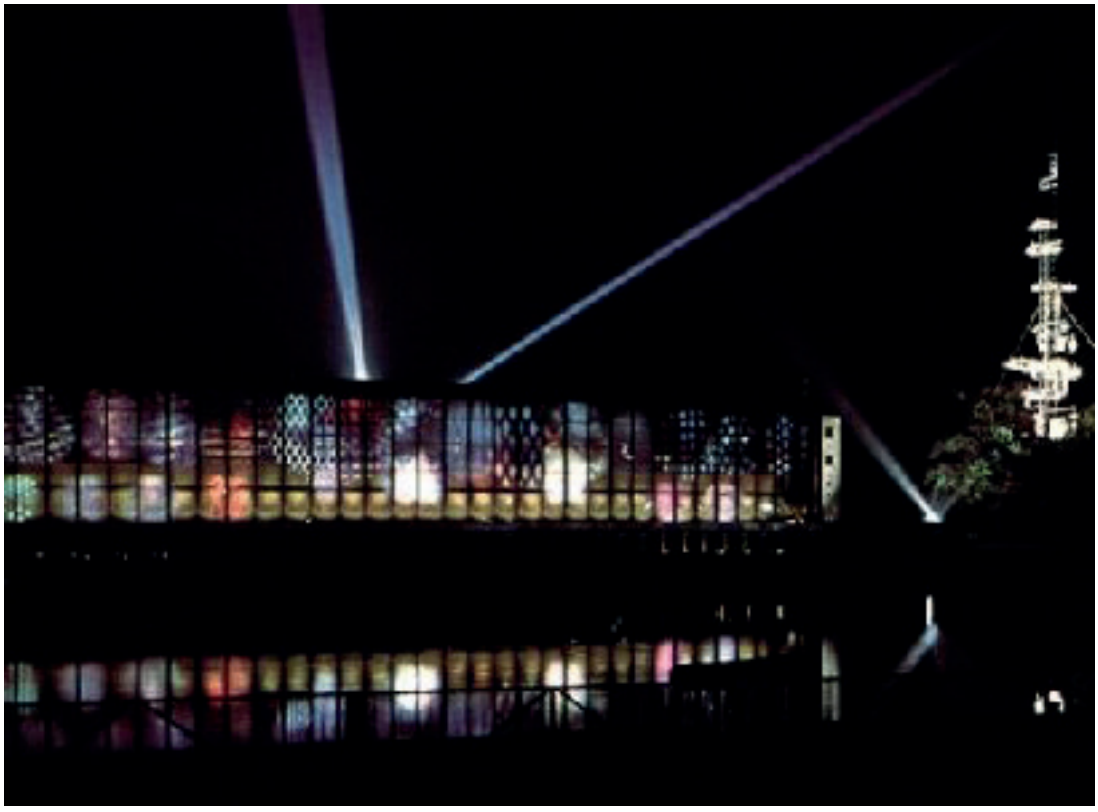
The global show starts from homes thanks to the *Lumino*, it moves on the car «SCAM1» made with the automobile company Renault, it obtains a playful dimension by the commercialization of five thousand devices of the «Minieffet» (commercialized by Editions Denise René), it enters into theaters with the interactive play «KYLDEX 1», it becomes an experimental television mass entertainment with the «Variations Luminodynamiques 1», it spreads its audiovisual message by the «Tour Cybernétique», it collaborates with Maurice Béjart for a choreographic dance with the robot «CYSP I», it gives a visual aesthetics to music thanks to «Musiscope» made by Philips, it generates a collective trance in the discotheque «Voom-Voom» in Saint-Tropez and finally, it wonders the audience with an installation «Spatiodynamique» at the Grand Central Station in New York.

According to Nicolas Schöffer, cities tend towards decay, they suffer from a sort of «audio-visual pollution», which should be

15. SCHÖFFER, Nicolas. *Le Spatiodynamisme*. Conference at the Sorbonne. June 19, 1954.

«Scam1». Nicolas Schöffer. Renault. 1973.

«Varetra». Nicolas Schöffer. 1975.



«Mur Lumière» and «Tour Cybernétique». Nicolas Schöffer. Liège.

«Variations Luminodynamiques 1». Nicolas Schöffer. 1961. Screenshot.

fought against in everyday life. The urban habitat is designed without any aesthetic plan, any coordination on architectural modules and any kind of study on proportions. Sensory shocks, which the human being receives daily, have serious effects on the nervous system[16]. Influenced by Bauhaus ideology, Nicolas Schöffer wants to merge the visual arts in a global plastic form, capable of positively influencing the citizens of the cybernetic city: the global show should create a collective choreography combining the movements of each person[17].

However, the global show is susceptible to become a totalitarian show. It is the paradox of wanting to establish a perfect society and consequently to actively achieve the opposite: a rigidly regulated stifling system. In 1961, Nicolas Schöffer pays personally the price for it and receives many harsh criticisms by press and audience, after the completion of the «Tour Cybernétique» in Liège and the broadcasting of the television show «Variations Luminodynamiques 1» (10 minutes): the attempt to address an explicit audio-visual program at a mass audience sets off reactions of rebellion and rejection. In Liège some wants to destroy the tower and in France the television audience writes incendiary letters to newspapers to protest against the «soporific» show (*cf*. p. 41).

The *Lumino* represents a turning point in the concept of the global show because it gives preeminent importance to the role of the viewer[18]. The buyer of this device is aware of the provoked effects on the states of mind (hypnotic effects or «waking dream») and they can decide when and how to use it. The awareness is a fundamental step to make possible a real process influencing the viewer.

With the oil crisis in 1973, the great economic growth, that supported all of these projects and provided for its large-scale diffusion, ends. Many cybernetic projects will never leave the galleries, the museums, the ateliers and thereafter will be labeled as «utopian». They will remain testimonies of what the cybernetic city and its global show would have been (ironically, looking at the cities of today and how they have developed, we could notice that the difference between an utopia and an achievable project, that looked like an utopia, is very thin[19]).

At the same time, Nicolas Schöffer's art could be considered «utopian» because it has the intention to change society and to create a «new human being». The utopian believes that the world of his time is essentially wrong and that it is therefore necessary to operate a complete change, according to the rules and principles that he lays down. Techno-scientific utopias, such as cybernetics inspired ones, claim to know the system (as a society, as a whole); they presuppose an understanding of what is good and what is

16. SCHÖFFER, Nicolas. *Le Spatiodynamisme*. Conference at the Sorbonne. June 19, 1954.
17. «This great collective and daily ballet of the city», SCHÖFFER, Nicolas. *La ville cybernétique*. p.36.
18. OBERBECK, K. Stephen. *Art and Technology: «Cybernetic Serendipity»*.
19. An interesting example is the Copenhagen wheel design project by the architect and engineer Carlo Ratti. Some special bikes are equipped by sensors to map pollution levels, traffic congestion, and road conditions in real-time. Using this cybernetic system, collected data from a single biker could improve the quality life of all citizens

11 OCTOBRE 1961

Ce qu'en pense Maurice Verdoux

● En octobre, sous la pluie...

Soirée agitée s'il en fut ! On attendait Molière, on trouva Guy Lux. Guy Lux et le sympathique M. Pouillet livrés au martyre du direct, de la décapotable, de la pluie, des micros qui ne marchaient pas, et des cameramen qui avaient perdu la clé du « champ ». Dieu, quelle aventure ! Si le bon M. Pouillet s'en tire sans une fluxion de poitrine, c'est que le bon Dieu est avec lui. Mais sans doute, à l'heure de la récompense, exigera-t-il une conduite intérieure...

Trois erreurs rattrapées de justesse, Dhordain furieux, Guy Lux intarissable... et un bien joli, bien curieux défilé de mannequins sous la pluie. La roue, ce mercredi-là, tourna... à l'épopée.

Shoffer

● A faire hurler !

NON, NON et NON à ces « variations lumino-dynamiques » qui ont bien failli me faire hurler de douleur (oui !) et de colère. NON et NON à ces « prouesses » délirantes et irritantes de pseudo-intellectuels de l'image, que l'on croirait (tant elles font mal aux yeux) patronnées en sous-main par le syndicat des opticiens. Impression, vingt minutes durant, d'avoir son récepteur déréglé, fou, en panne... Tout ça pour quoi. Pour rien ! Assez de ces « inventeurs », de ces farceurs, de ces « visionnaires » de l'écran. Assez de ces jeux hystériques ! Ce que veut, ce que réclame le téléspectateur, c'est de la bonne TV.

Vive la publicité à l'allemande !

Nous nous considérons comme des téléspectateurs privilégiés, car nous avons un poste à double définition : français-allemand. Ceci nous permet de choisir quotidiennement le programme susceptible de plaire et il est bien rare que nous soyons déçus.

Je comprends toutes les doléances des téléspectateurs français qui n'ont que la chaîne unique à leur disposition. Voilà sans doute la raison de la mévente des postes ! Sur les nouveaux appareils, on réceptionne même le deuxième programme allemand. Nous trouvons ceci inutile pour nous. Tandis que tant de gens se plaignent, nous sommes au contraire enchantés de posséder la télévision.

A propos de la publicité, il y a tant de controverses. Nous la trouvons charmante sur le poste allemand, si harmonieusement présentée, si variée, que jamais on ne s'en lasse. Les enfants, même, la demandent ! Nous ne comprenons pas pourquoi, en France, on s'y oppose si farouchement, pour la deuxième chaîne, par exemple. Elle passe à heure fixe et on est libre de la regarder ou non, mais elle est si amusante, entrecoupée de petits dessins humoristiques qui font la joie de toute la famille, de sorte qu'on l'accepte tout naturellement.

Mme FECHTER, STRASBOURG-ROBERTSAU.

A en juger par la lettre de notre lectrice, la publicité allemande est certainement plus drôle que celle que nous font subir le jus d'orange, l'acier français ou la Loterie nationale. Sans parler des compagnies d'assurances qui n'hésitent pas le moins du monde à intercaler leurs sketches idiots entre deux questions de « La Roue tourne ». Alors pourquoi pas de la publicité privée (donc forcément bien faite) sur nos écrans ? C'est tout l'illogisme de la R.T.F. et Mme C., de Paris, dont nous publions ci-dessous la lettre, ne nous contredira certainement pas.

11 NOVEMBRE 1961

Pourquoi pas tous les médicaments antimigraine ?

Shoffer

Décidément la publicité entre de plus en plus et, de plus, sournoisement, dans la meilleure TV du monde.

Après avoir suivi péniblement « La Roue tourne » dans les conditions les plus fâcheuses auxquelles le pauvre Guy Lux n'en pouvait mais et qui nous ont prouvé que les émissions de nuit sur le petit écran étaient difficilement supportables (même si le temps eût été clément), il nous fut offert, sans transition, ce chef-d'œuvre de MM. Schaeffer et X...

Un instant, ma famille et moi, nous nous sommes demandé si nous étions chez les psychiatres ; puis au bout de cinq minutes, chacun s'est baigné les yeux avec « optrex », puis a pris un comprimé de « nautamine » pour lutter contre le mal de mer qui nous envahissait. Après quoi, nous avons tourné le bouton, en continuant à tanguer.

A partir d'aujourd'hui, nous attendons de voir louer les produits cités, insidieusement glissés entre le jus de pomme et la Caisse d'épargne, et si j'en crois le mal de tête ressenti à mon réveil, pourquoi pas tous les médicaments antimigraine.

TELE PROGRAMME MAGAZINE
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5 NOVEMBRE 1961

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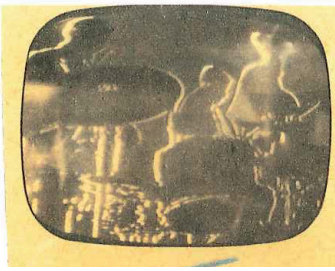
11 NOVEMBRE 1961



VARIATIONS LUMINO-DYNAMIQUES

De variations, pas (ou si peu). Dynamiques? Hum ! Lumineuses ? Oh ! là, là ! combien ! A pleurer. De désespoir (tant c'était mauvais), et de douleur (tant les yeux souffraient). M. Nicolas Shoffer, inventeur de cet étonnant procédé, a bien mérité de la recherche TV : il peut aller se coucher, comme tous les téléspectateurs l'ont fait.

Letters protesting against the «soporific» «Variations Luminodynamiques 1» show. 1961.

Nicolas Schöffer's atelier. Villa des Arts.

bad and pretend to define objectively what the human being of the future should be like. The developments in science and technology will adapt the material world to the human model. The artist is at the center of this utopia, because he would be in a privileged position to structure this cohesion of psyche and emotional world.

Starting from a global visual design of the whole city and following down to the domestic space, Nicolas Schöffer creates monumental objects, such as the «Tour Cybernétique», to small apparatus, such as the *Lumino*. The global show is attributable to the rules set in 1946 by the neurophysiologist and cybernetician Warren Sturgis McCulloch during the conference Macy «Finality and Form in Nervous Activity»: the properties of the system are present in its constituent elements and in their connections. According to this system design, the global show should have the same multilayered complexity. The approach is both «top-down» and «distributed», since the characteristics of the global show are found in single artworks by Nicolas Schöffer, which already contain the properties and intentions of the whole system. The complexity of the «system show» is divided into single artworks, acting separately or communicating with each other through sensors. It creates an aesthetic network which can create a new cultural dimension, working separately in different areas of daily life, such as in work, rest and leisure time. By «culture» Nicolas Schöffer actually means a new form of civilization where the human being is fully immersed in a bath of lights, colors and sounds[20].

The *Lumino* is a part of this smart network and plays a perhaps modest and yet crucial role in the show of the «rest city». This lumino-kinetic device has two functions: it displays a show on its screen and, at the same time, it projects lights and colors into the home space. Nicolas Schöffer believes that, modeling the aesthetics of human habitat, some positive psychic, energetic, physiological and morphologic influences on the human being could be generated. In the hearth and home it aims to create a kind of general dynamism that unifies the community and enlivens a whole city. What makes this possible is that it has a privileged access to the human habitat like another emblematic device: television set. This kind of device is so fascinating because in the «rest city» it influences «passivated» humans, ready to be manipulated. Satisfying the aesthetic needs of the masses means to provide a device capable of broadcasting an audiovisual program to fill the emptiness of the domestic space: the *Lumino* does that and at the same time, it imaginatively frees the human being from the home walls that imprison him. Television, although it occasionally presents some audiovisual shows realized by artists, is a medium whose mission is not exclusively artistic. In order to make a real cultural revolution, the consumer system should be reversed since, according to Nicolas Schöffer, as we have seen, it tends to make mediocritize the consumer. Especially in the domain of design, there is less an innovation in products than a sterile repetition whose sole purpose is to increase the productivity of companies. If the masses have only access to mediocre products, that they do not really need and that have no cultural value, there won't be any improvement of social conditions. Products could just feed the cycle of consumption and the capitalist economy. To change this process and the intellectual control, that is present at the base of the economic system, someone has to make available on an industrial scale an apparatus that can replace or complement television set. The *Lumino* is a small element that is supposed to be involved with the mission and the intelligence of a global system. In an utopian way, it intends to make a revolution: to change the world, changing the human perception of it.

20. HAHN, Otto. *Le pavillon français à la biennale de Venise*.

Kinetic and cybernetic aesthetics

Aesthetics of movement

Nicolas Schöffer is a pioneer and, like all innovators, he takes up utopian and complex challenges. One of the most interesting of these challenges concerns the process of «domestication of kinetic art», namely the application of the basic tenets of this art movement, in relation to a domestic and daily context from the point of view of functionality and aesthetics.

Aesthetics, in a sense quite close to its etymology[1], plays a key role in the design of these devices, in particular because it sets questions about the domestication of «movement». Various approaches to the domestication of kinetic art were attempted: in the '60s Bruno Munari and Enzo Mari produce household items having only the form of movement but not movement themselves; another approach is Brion Gysin's and Ian Sommerville's who want to offer to consumers their «Dream Machine» directly (issued) from art galleries without caring to adapt it to the domestic and daily context. (*cf.* page 23)

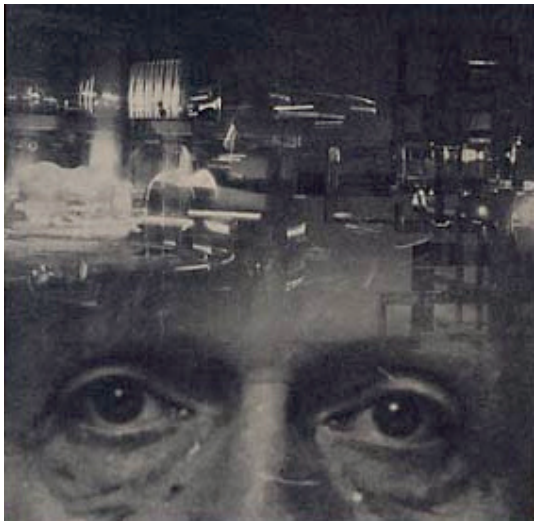
Nicolas Schöffer is apparently the first to design a kinetic device specifically for everyday uses. He takes into consideration the form of the object and at the same time the visual result in a domestic context[2]. Kinetic objects generate a specific type of aesthetic experience. This experience is actually a powerful sensory experience. Mostly it reactivates a Kantian conception of aesthetics, according to which aesthetic qualities such as beauty or sublime are at least in part sense perceptions; but they are also cognitive, as they convey a particular type of knowledge about reality. The knowledge is based on sensory experience as it impacts sensibility.

The kinetic artist takes up the responsibility to provide this experience to the spectator. The *Lumino* gives a daily recurrent aesthetic experience at home, involving two senses, vision and hearing. The reflective elements that make up the structure of the *Lumino* are the key to interpreting aesthetics of movement that is involved. Moving mirrors, lenses and reflective elements create an anamorphosis, distorts reality and could symbolize the uncertainty surrounding the interpretation of the world. The mathematical and economical concept of «Indeterminism», which Nicolas Schöffer picked up in John von

1. Aisthetikos = «esthetic, sensitive, sentient».

2. SERS, Philippe. *Entretiens avec Nicolas Schöffer*. p.149.

Nicolas Schöffer's portrait.



Nicolas Schöffer's portrait.

Neumann and Oskar Morgenstern's *Theory of Games and Economic Behavior*, is thus introduced indirectly in the artistic field: every form of abstraction of reality is performed at the probabilistic level as «certainty» disappears.

The anamorphosis also allows to trick the visual system as the perception of movement deforms the perceived outline of the kinetic object itself, which acquires an illusory elasticity. The object's form becomes ambiguous and variable depending on the angle from which it is viewed. If the viewer moves, his movement is added to the movement that affects the artwork[3]. This encourages an exploration of the limits of vision, through a kind of transparency effect: the object itself seems to disappear. At the same time, the show on the screen spreads colorful visual layers on the surrounding space, having the result to cancel the interior design of the home. In this way, even emptiness is set in motion.

The object becomes «informal», engaged in a sort of continuous metamorphosis, a perpetual temporal and visual artistic creation or recreation. From the industrial and commercial point of view, according to Nicolas Schöffer, it allows an «désaturation»[4] of the market because the product modifies itself in endless variations. Adding unpredictable movement, the artwork is formally «open»[5] to a variety of interpretations about its function and its aesthetics.

3. In many «op Art» artworks, the object is static, but the viewer's movement is prescribed.

4. SCHÖFFER, Nicolas. «L'avenir de l'homme, l'homme de l'avenir» from *La Ville Cybernétique*.

5. In 1962 the writer Umberto Eco, thanks to Bruno Munari's invitation, writes a text presenting the exhibition «Arte programmata: Arte Cinetica, opere moltiplicate, opera aperta» that becomes a manifesto of kinetic art: the concept of the «open work» is born.

«CYSP I» in movement. Nicolas Schöffer.

Since the mechanical movement system is hidden inside the device and since it is invisible to the viewer, the show displayed on the screen could give the sensation of pictorial animation or abstract cinema. The changes in visual programmed patterns play a predominant role in the show. Random time programs should harmoniously articulate the artwork's rhythm and cause a growing appetite for non-redundant visual information: the *Lumino* project is supposed to keep the viewer's interest awake in a state of aesthetic enchantment[6]. The rhythm of movement is a crucial point designing the experience: the mechanical slow movement can help to forget colors and forms of the animation, starting to think to other things.

The *Lumino* loses its function as a mere physical object and dissolves itself thanks to the dynamic projections on its screen, which is both a protective and a projective surface. The device, which the consumers, as they encounter it for the first time, could easily take for an ordinary domestic item (a television set, a lamp, a light decoration, a kids game, etc.), supposes a formal metamorphosis acquiring a new, yet uncertain, function. Through different techniques of movement, all kinetic works by Nicolas Schöffer are meant to disappear, become transparent and perform a visual metamorphosis, which should lead, for Nicolas Schöffer, to a self-canceling art. They become a more direct bridge between the idea that the artist wants to transfer and the effect perceived by the viewer than in traditional art forms. It is a kind of telepathic transfer «cortex to cortex» between the artist and the audience[7]. By doing so, the object goes through a metabiological cycle: it is born, it grows, it dies and it rises.

The viewer of the artwork should no longer be a passive aesthetic gazer, but become an actor of the show. This, of course, is part of

6. SCHÖFFER, Nicolas. *Sonic and Visual Structures : Theory and Experiment.*

7. SERS, Philippe. *Entretiens avec Nicolas Schöffer.* p.21, p.148, p.153.

the rhetoric of emancipation, characteristic of the '60s. The *Lumino* has the goal of creating a sensory experience that will be freely interpreted by the user. In everyday life, the system of symbols drifts out of our attention and loses interest. Nicolas Schöffer immerses the observer into an abstract world unseen by the naked eye. The kinetic aesthetics creates a sensory experience, an interaction, a participation which could hopefully re-educate the human being providing, a new critical and distanced stance toward the meaning of the system of symbols[8]. Watching the *Lumino* show, the system of symbols emerges as a system of communication based exclusively on fossilized messages: «the medium is the message»[9]. This idea is at the root of «information aesthetics».

Information aesthetics

«A world without information is a world without stimulations». Nicolas Schöffer.

The history of Abstract Art of the twentieth and twenty-first century is based on the exploration of the field of vision. The immateriality, the limits of perception, the formal reduction of the object, the effects of light, of colors and of forms are the focus of artworks ranging from painting to sculpture, cinema and audiovisual installations.

Abstract Art blends into kinetic art thanks to the innovative use of two materials: space and time. Kinetic devices are variable in time and they visually inscribe abstract forms in space. Conceptually, this process is a fusion between painting and sculpture because it becomes three-dimensionally plastic and, at the same time, prolongs and augments what the abstract painters have experimented with their art. Electronics, mechanics and computer science are the techniques that allow this transformation.

The *Lumino* is a kinetic device with a screen that projects an abstract visual show. The play of light and colors is not unfamiliar to the viewer because it is reminiscent of a phenomenon that has probably been present since «Homo Erectus» in the human habitat: fire. Light and colors in motion can be taken for an abstract representation of the flames of a hearth. In ancient times its function is essential because it allows human beings to warm, to see in the dark and to cook. The domestication of fire is one of the milestones of human evolution and over the centuries, this thermic and luminous technology has enabled the creation of devices able to exploit more and more of its qualities. In the twentieth and twenty-first century, in the process of urbanization that concen-

8. Speaking about the «aesthetic potential environment», another cybernetic artist, Gordon Pask, explains the very same concept: «Our internal representation of an image, our active perception, answers and begins an internal dialogue with that part of our psyche responsible for producing our immediate attention. [..] Adaptive or reactive environment allows us to externalize this discourse». REICHARDT, Jaisa. *Cybernetic Serendipity*. The computer and the arts, exhibition catalogue. p.34–35.

9. MCLUHAN, Marshall. *Understanding Media: The Extensions of Man*.

Lumino. Nicolas Schöffer.

«Lumia Domestica». Willie Williams. Wallspace. London. 2008.

trates and reduces living spaces, fire begins to gradually disappear from domestic daily life. Lamps, appliances, heating systems have replaced the role and function of the fire within the domestic sphere: for instance, in modern homes, the light can be provided by traditional lighting systems such as lamps or chandeliers, but, also, by electrical devices, intended for other purposes, such as television sets or computer screens. These appliances provide ambient and soft light that can redefine domestic spaces when no lights of greater intensity take precedence. In the electronic age, Nicolas Schöffer, having to design a familiar device intended for everyday and domestic uses, is inspired to revive the aesthetics of fire in an appliance. As we saw earlier, Nicolas Schöffer is particularly interested in television, which is the main reference to design the *Lumino*: it symbolically replaces the fireplace inside the homes and, at the same time, it can be considered a source of light. Thanks to a succession of lights and colors changing intensity and frequency, the *Lumino* reproduces the dynamic glittering glow of fire[10]. Nicolas Schöffer represents its ever-changing dynamics and its attractive movement

10. In the exposition «Lumia Domestica», the light artist Willie Williams references to Schöffer's *Lumino* using the same visual aesthetics for his artworks and placing them inside a chimney.

in an abstract way trying to synthesize forms and colors of a natural phenomenon: the research concerns the effects of this aesthetics on human states of mind. He hypothesizes that light wavelengths, color spectrum, perception of forms can cause different states of mind in the viewer's unconscious. He is convinced that the pure forms of nature using direct color, spatial rhythm and equilibrium of forms, hides sensorial truths that he seeks to reveal[11]. They contain within themselves the symbolic and emblematic values of a new less «alienated» reality. The visual show, that comes forth from the device, expands in space of the home: it provides an immersive sensory experience that «paints» with light «states of mind» in the domestic sphere.

Lumino special spherical version. Gift for Nicolas Schöffer from Philips.

Nicolas Schöffer tries to combine his artistic knowledge of Abstract Art with precepts of cybernetics. He attempts to create a system able to communicate with human beings using an universal idiom. This «language» is based on symbolic images of natural phenomena. In the domestication of kinetic devices, Nicolas Schöffer exploits the message-forming, quasi-decodable potential of fire. Gazing at the fireplace at home, human beings also feel a state of comfort, safety, peace and quiet. The *Lumino* aims at connecting mediums of Abstract Art such as light, colors and forms with cybernetic «information theory». The combination of these two fields creates the «information aesthetics».

In cybernetic ideology, everything rests on information theory and the consequent establishment of two new concepts in communication: «information» and «message». In 1948 the mathematician, electronic engineer and cryptographer Claude Shannon, a disciple of Norbert Wiener, publishes the book *A Mathematical Theory of Communication*, in which he analyzes the principles of information theory. In all systems, that have a certain amount of information, exist, with a certain probability, some messages. These messages can be of all kinds: numerical symbols, linguistic symbols, sound sequences, visual symbols, etc.. Semiotics is dependent on the degree of the organization of information. Disorder, complexity, redundancy of information leads to entropy; in other words, noise in the signal is what makes the messages more difficult to read or unreadable by the receiver: the more ordered the information is, the more understandable the message becomes. If a message is completely predict-

11. SCHÖFFER, Nicolas. *Le Spatiodynamisme*. Conference at the Sorbonne, June 19, 1954.

«Dubonnet» video-clip. Nicolas Schöffer. 1962. Screenshot.

able, it is simply trivial.

Nicolas Schöffer's intention is not to communicate a personal message by the *Lumino*, but rather multi-messages that will be open to interpretations that may emerge from the viewer's sensibility and experiences. This «open work» represents a real rupture with traditional art forms because the psyche becomes an interpretative tool of the artwork in a way that goes beyond classical interpretations. The *Lumino* helps to make a series of links to rich and complex messages, taking fairly ordinary primordial messages which come from the viewer's previous experiences. The complexity of interpretation comes from the connections in the memory network: the special ability of the artist consists in playing with sensorial experiences latent in memories. Opening the reading of the artwork to multiple interpretations, «aesthetic information» enriches the primordial message, the sign that the viewer perceives spontaneously on first contact with the artwork[12]. The term «poetic» is attributed to art when a kind

12. Nicolas Schöffer uses the same visual aesthetics of the *Lumino* for the advertising video-clip «Dubonnet», adding subliminal messages.

of retroactive loop is established in the art system, making references from primordial messages to complex messages and back. These messages are probably memories to the first natural elements present in the world when mankind starts its evolution. To return to our interpretations, maybe the fascination of flames persists in our days because fireplace represents human primitive dream to domesticate a natural phenomenon.

The *Lumino* project is based on the assumptions that the human brain virtually contains collections of images of previous experiences and could be influenced by the images themselves. Visual messages are at the origin of symbolic communication that is established between a device and the human being: symbolic language is the basis of the Human Computer Interaction. In 1978, the psychiatrist and psychoanalyst Jacques Lacan in the seminar «Le moi dans la théorie de Freud et dans la technique de la psychanalyse» states that «le monde symbolique, c'est le monde de la machine». From a cybernetic point of view, it is the utopian idea of abstracting models for machines using human beings and vice versa. One of the strongest criticisms that has been leveled at the cybernetic movement is this kind of abstraction that «dehumanizes» the human being and that makes him a «process without a subject», in other words it removes every individual consciousness to humanity. The *Lumino*, as many cybernetic-kinetic devices that have an abstract visual aesthetics, tries to establish a symbolic communication with the viewer, considering him as a machine. At the same time, Nicolas Schöffer wants to find the domestic «original message» in a «primordial symbolism», that is common to all mankind, in order to get in touch with human beings and achieve more profound self-knowledge.

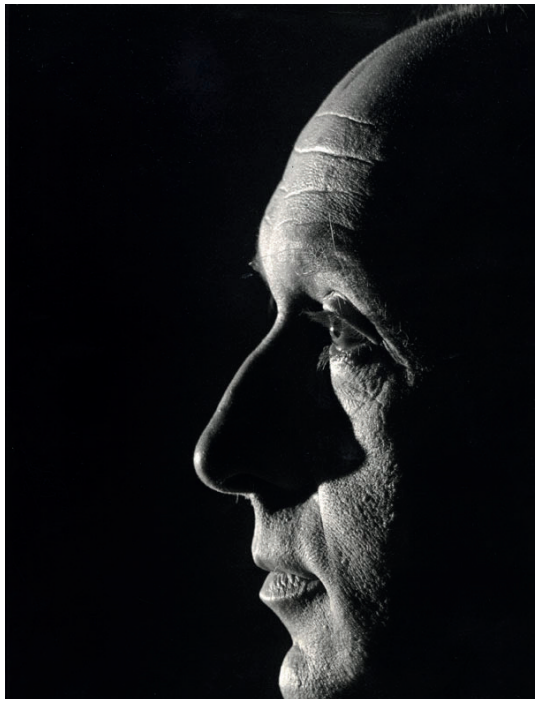
Conclusion

Almost fifty years have passed since Nicolas Schöffer bequeathed us his lumino-kinetic device. Even though nowadays, due to the technological evolution, the Lumino appears inevitably aged and has lost much of its «magic», numerous articles, reviews, exhibitions and conferences, still consecrated to it, show that it continues to fascinate and that it is not destined to oblivion.

In the process of domestication of kinetic art, the Lumino is an emblem of the tensions or even contradictions between the resulting product and the many reflections that led to its creation. Considering that it was manufactured/commercialized by a big company, like Philips, and that its production has never exceeded 4000 units, the Lumino project cannot be considered a real commercial success. Contradicting Nicolas Schöffer's original idea and expectations, the Lumino did not become an object present in most homes; but it was reproduced in multiple copies, and it did retain its artistic dimension. From a cybernetic point of view, a wired feedback loop came ironically into action: the Lumino was designed to socialize art and to get it out of galleries, but nowadays it is sold by galleries as a rare and expensive artwork.

Without a market analysis, it is difficult to objectively explain the failure of this ambitious project; we can just make some hypotheses. In the '70s the «Lumia», a light box produced and commercialized by the artist Earl Reiback in the United States, presents a similar case, but we don't have enough information about this device to make a reasoned marketing comparison. Being probably the first industrial lumino-kinetic device to

Nicolas Schöffer's portrait. Robert Doisneau.



be commercialized, we can presume that consumers had some understandable doubts about the Lumino: what, actually, is its function? Is it functional at all? Does it meet the needs of consumers? Do they really need it? Is it even aesthetically attractive? Is it well manufactured? Is it expensive? Has it been much advertised? What aesthetic and ideological universe lies behind it? etc.

The *Lumino*, an emblematic object of the '60s, raises still very hot topics. Cybernetics, often tagged as an utopian and potentially totalitarian system, returns unexpectedly in the cities and homes of the twenty-first century under the guise of a new «smart» technocracy. Appliances feature more and more state-of-the-art sensors to get in touch with the users and regulate with more precision their needs and desires, creating a smart domestic network. Perhaps technology continues to be seen as extension of the human body, as a tool to decode human states of mind and needs and, at the same time, as a channel for information from the outside world. Some devices, like personal computers and smart phones, are replacing broadcast television system inside the home, becoming more and more our companions in the «rest city» and connecting users to a global network[1]. It seems that public and private life may be starting to blend and that personal devices withdraw in ourselves: the hearth and home are probably losing their focal importance in everyday life.

The *Lumino* remains a milestone in lumino-kinetic art: Nicolas Schöffer is probably the first artist to place, at the center of a design project, a kinetic device that can enter every home and has a supposed utility in everyday life. Other apparatus have been created with the same implicit or explicit purpose, entering the domestic sphere thanks to their ambiguous functions and fascinating aesthetics. Rather than the «mind machines» that are supposed to create hallucinatory experiences and can cause schizophrenic episodes or nervous disorders (an unsuccessful and dangerous domestication of light if there ever was one), some lumino-kinetic devices, camouflaging as special lighting systems, have appeared in the market of lamps/appliances for the home. Taking into account its singular use of light and its relaxation function, the *Lumino* can be interpreted as a precursor of luminotherapic devices that are produced nowadays, for instance, by Philips itself. In spite of its lukewarm reception, Nicolas Schöffer has indeed succeeded in commercializing a device that tames kinetic art in a simply way, using the technology of the '60s and designing an original moving system to modulate light.

It was fascinating and instructive to discover Nicolas Schöffer's personalities and ideologies, through this analysis of the *Lumino* project. At the same time, it made me reflect on the problems and contradictions raised by his art. For me, his most important heritage lies in his stimulating reflections on the historical context, the design of a domestic artwork, the cybernetic systems, human computer interaction, kinetic and abstract art, hypnosis, neuroscience, psychology, the role of artist and art, aesthetics, the scientific

1. MITCHELL, J. William. *Me++: The cyborg self and the networked city*.

and technological progress, the collaboration between artist and industrial company.

Is the *Lumino* promising a less violent and tormented human future? Is it a simple gadget or an emblematic device? Is the sensory experience it induces fascinating or boring? I'll leave the final judgment to you. Ma aim has only been to try to understand the means and issues inherent in Nicolas Schöffer's Lumino project.

Lumino stock. Philips. 1968.

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