

A MYRIAD OF VIBRANT PHENOMENA

THE HIDDEN WORLDS OF AUDIOVISUAL ART-SCIENCE

Lecture by Marco Mancuso / Digicult

In his "On the Nature of Things", Lucretius denies any sort of creation, providence and original beatitude, stating that man broke free from his condition of ever present need through the use of techniques, which are transpositions of nature. The gods do exist, although they neither created universe nor they care about men's problems. Lucretius affirms that all our knowledge about nature shows us the universe as infinite, made by complex forms and composed by atoms. It follows natural laws, regardless of man's needs, and can be explained without resorting to deities.

Between 1899 and 1904 the German philosopher and biologist Ernst Haeckel published *Kunstformen der Natur* (*Art Forms of Nature*), one of his best known works and a symbol of his zoological research and philosophy, centered on the observation of marine micro-organisms as well of various natural species and animals. The complete volume, consisting of over 100 lithographs, each accompanied by a short descriptive text, obtained a great success even among the non-specialist public and among some *Art Nouveau* artists, committed to find new models to be used in the nascent industrial design and in architecture. In this regard, the volume lends itself to multiple assessments: as a zoological work depicting the evolution of organisms, as a work of art and as a work of aesthetics that focuses on seeing and perception as a way of knowing. Aesthetics, as the science of beauty, intent on understanding the nature in relation to art.

The tables of the book, according to a geometric arrangement of the drawings, are based upon the microscopic siliceous skeletons of radiolarians and diatoms, the umbrellas of the jellyfishes, the tentacles of sea anemones and spirals shells of molluscs. These illustrations depict therefore the law that regulates natural energy phenomena: the evolution, the fact that organisms are formed and transformed over time, according to genetic relationships of descent, from a common original type. In other words, by analyzing the tables of his rich classification, it is wonderful to see how nature is not only capable of spontaneously creating veritable art forms, but also of establishing a direct connection between a certain algebraic and geometric aesthetics, starting from a fundamental unit/core and reaching a more complex entity, a consequent evolutionary practice of adaptation.

Moreover, one of the most currently fascinating mathematical theories is no doubt the theory of fractals: according to the definition of its recently passed away discoverer, the Polish mathematician Benoit Mandelbrot (1975), who started his research from the fractal structure found out by French mathematician Gaston Julia in 1920, fractals are geometrical figures characterized by a repetition to infinity of a same pattern on a more and more reduced scale. Nature is in fact filled with forms very similar to fractals, which don't follow in any way any of the rules of Euclidean geometry. A coastline, the branches or the roots of a tree, a cloud, the snowflakes, the zigzag lightning bolts and the leaf venation patterns: these are only a few examples of fractal forms spontaneously creating in nature.

Among these ones there is the spiral, the fractal form par excellence. The procedural, generative, hieratic and evolutionary element can therefore be considered the key of this thought, turned to a modern "computational ecology": almost 40 years of study, analysis and research have passed between Alan Turing's revolutionary theories about morphogenesis (the capability of every living being to develop complex bodies starting from very simple elements, using self-assembling processes without an external guide), which followed those by bio-mathematician Thompson D'Arcy in his work *On the growth and form* (1917), and more recent studies (1980-

1985) on genetic algorithms (a particular kind of evolutionary algorithms utilizing mutation, selection and other recombination techniques in order to guarantee a certain number of abstract representations of possible solution for optimization to become better solutions). Those researches were meant to point out the almost computational characteristics of Mother Nature on one hand, while on the other they confirmed the analog/digital machines' capability of simulating and replicating complex natural phenomena.

These examples show clearly how nature is characterized at the root by a matrix of numbers and mathematical expressions involving a series of physical, optical, chemical-physical, electromagnetic and nanometric phenomena influencing its forms, species, colours, sounds and structures. If science is considered an organic complex of knowledge obtained through a methodical procedure, capable of providing a precise description of the real aspect of things and the laws by which the phenomena happen, and if the rules governing such process are generally called "scientific method", then the experimental observation of a natural event, the formulation of a general hypothesis about such event and the possibility of checking the hypothesis through subsequent observations become fundamental elements in modern scientific research.

All of this is really evident in some video works that have been collected within the screening *Hidden Worlds*, a critical reflection upon the existing connection between audiovisual art, energy and science on the borders of cinema, video and digital. A project that was born from a lecture held at Science Museum in Naples in 2008 followed by the curatorship at *Sincronie: music and astronomy* festival in 2009. *Hidden Worlds* doesn't some pioneering works which were not possible to include in the screening, like the studies on Cymatics carried out by naturalist Hans Jenny that explain how every existing sound can be reproduced starting from a waveform visualizable through precise geometrical forms, depending on the medium used. Moreover, some Mary Ellen Bute's works like *Abstronic*, that examine the expressive potentialities of the electrons flow within a cathode ray tube, shooting the film with a number of abstract animations to the rhythm of music. And Johnny Whitney finally, who with *Permutations*, applied his "Computational Periodics" theories to the field of computer graphic, obtaining a "series of harmonic events in the audiovisual introduction", where a specific simulation of a musical progression can be achieved through the multiple superimposition of graphic objects.

What it is today recognized as "immersive art-science" is a form of creative expression meant to rise above the notion of art as abstract representation, in behalf of a multi-sensorial experience. The purpose here is to create aesthetical fascinating objects and also to invite the public to go beyond ordinary perception's border. Immersivity awakens a synesthetic awareness both in the mental and in the physic space. A myriad of vibrant phenomena, usually beyond the observer's reach, are instead made reachable through an accurate psychophysical conditioning.

video Lecture

The following works will be projected in their uncut versions or extract during December 9 and 10 morning introductions:

- Hans Jenny *Cymatics Soundscapes* (1967, Switzerland)

col., sound 7' 15".

Cymatics, or the science studying the wave phenomena, was firstly analyzed by the Swiss doctor and naturalist Hans Jenny (1904-1972). This scientist carried out experiments with inert dusts, solids and liquids for over 14 years. He turned them into alive and fluctuating forms which reflected models and patterns similar to nature's, art's and architecture's. Such patterns were created by using simple vibrational waves (pure tones) present in the audible field: what the public observes is then a physical representation of vibration, or also the way sound propagates in specific geometrical forms through a medium composed from time to time by different materials. For more than 25 years, poet, producer and editor Jeff Volk has been making cymatics popular by producing all the books and videos that witness the experiences made by Swiss scientist Hans Jenny, and distributing them through its Macromedia Publishing. For this exhibition, the extract number 4 from *Cymatics Soundscapes* DVD has been chosen.

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- Mary Ellen Bute *Abstronic* (Usa, 1954)

col., sound, 7'

In 1954 Mary Ellen Bute began using oscilloscope patterns to create the abstract forms and figures typical of her films. She claimed to be the first artist capable of combining "art and science" through her so-called Seeing Sound films. Her two most important works (*Abstronic* first and *Mood Contrast* later) point out how music's electronic images are natural phenomena happening in the sub-atomic world, captured by a Cathode Ray oscilloscope and filmed with a camera. Although the images captured by Bute's cathode ray tube are all in all simpler and weaker if compared with the same period Norman Mc Laren's (*Around is Around*) and Hy Hirsch's (*Divertissement Rococò*), the use of hand-made colourful backgrounds and superimposed to the electronic animations of the musical themes and animations supplements united to some trick, such as diffraction mirrors, make her works full of depth, dynamism and rhythm in relation to music.

Courtesy of The Museum of Modern Art/Film Stills Archive. Music:

"Hoedown" from Billy the Kid by Aaron Copeland and "Ranch House Party" by don Gillis.

Oscilloscope patterns over drawn backgrounds.

- John Whitney *Permutations* (USA, 1971)

col., sound, 7'07"

One of the most important aspects of John Whitney's production is the utilization of what he defined as "Computational Periodics". In other words, the achievement of a "series of harmonic events in the audiovisual

presentation", where a specific simulation of a musical progression can be achieved through the multiple superimposition of graphic objects in order to create symmetries and counterpoints similar to the ones concerning rhythm and music. When John Whitney was called to the IBM laboratories as an artist-in-residence, thanks to the aid of Dr. Jack Citron he got in contact with a subroutine bookshop of FORTRAN language by the name of GRAF (Graphic Additions to FORTRAN), born with the purpose to support some of the IBM 360's characteristics. Through this bookshop, Citron and Whitney worked to the realization of *Permutations*, whose kinetic rhythms and phase relations created by the points movement produce perceptive effects strictly linked to tension modulation in music. According to Whitney himself: "In *Permutations* each point moves at a different speed and moves in a direction independent according to natural laws quite as valid as those of Pythagoras, while moving in their circular field. Their action produces a phenomenon more or less equivalent to the musical harmonies. When the points reach certain relationships (harmonic) numerical to other parameters of the equation, they form elementary figures.

- Semiconductor Magnetic Movies (USA, 2007)

col., sound, 4'47", 16:9 widescreen

The secret lives of invisible magnetic fields are revealed as chaotic and ever-changing geometries . All action takes place around NASA's Space Sciences Laboratories, UC Berkeley, to recordings of space scientists describing their discoveries. These recordings add to a series of sound materials, captured with a ELF-V LF radio recorder, a tool capable of converting ground level natural radio signals into sound frequencies. These electro-magnetic signals interferences are the product of turbulences triggered by solar winds combined with ionization in the upper atmosphere, climatic electrical storms and even Earth's molten core. The purpose is to show graphically the magnetic field in chaotic movement through the use of digital software, for a new and fascinating aesthetics of turbulence.

A semiconductor film by Ruth Jarman and Joe Gerhardt shot at the NASA Space Sciences Laboratory, UC Berkeley, California, USA. An animate Project Commission for Channel 4 in association with Arts Council England.