Generative Artist *behind* machine

Prof. Enrica Colabella
Generative Design Lab Politecnico di Milano University, Italy
www.generativeart.com
enrica.colabella@generativeart.com

Abstract:

Sapere aude!/ Dare to know!
Orazio, (Epistole I, 2, 40)

The main aim of this paper is to identify difference and similitude in characters of generative artists, after more than 20 years of experience in different fields on GA processes.
Investigations about:
1. relationship between computers and creativity following the hypothesis that the knowledge process might run toward a *flat* vision in young digital users
2. the need of scientific references for re/discovering from past generative tools and engines for preserving the cultural human vision in 3d, as a character of our evolution of species.
Main reference: the invention of perspective, the first experimental science for painting and architecture
3. rediscovering dialectics about *quantity and quality, abstract and figurative* in art

Premise:
Ars sine scientia nihil est
Jean Vignot, 1392

Attributed to Paolo Uccello or Piero della Francesca Study of a Chalice, c 1450 – 1470, pen and brown ink over ruled stylus and compass, 349 x 243 mm, Uffizi

In our digital time the main character of an artist might be *generative.* It depends by this main condition in using the attribute generative:
in the significance in which art becomes a way of reaching a complete synthesis as possible between the disappeared past and the alive real.
This significance follows also the scientific using of biologic world.

1a: Ars
GA is the art of connections. More logic connections are you able to perform, more you are crossing complexity. Connections are generated from the 3 main structures of our heart: *Memory – Intellect – Will.*
So a process is generative when from the starting point to the results it is able:
1 - to structure impressions as an open artificial *memory* system, through the definition of aims by gaining through tools in open dynamic connections.
2 – to perform an idea/code as a possible first expression in evolution.
Designing a software*, intellect* is able to perform the translation from impressions as an idea into expressions as variations.
3 - *Will* is necessary for gaining emotions in people hearts. Will is the main tool of connections. More will we should be able to put on our table of work, more we might gain emotions in art users.

1b: Scientia
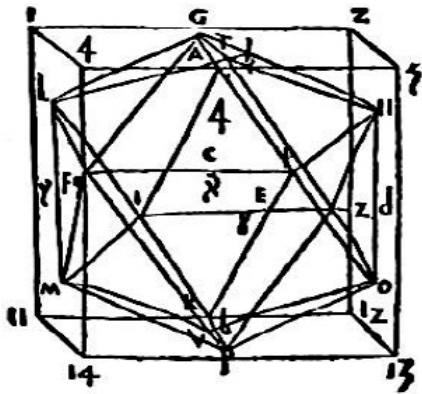
Woodcut: Perspective study,
Piero della Francesca, De perspectiva pigendi*, c. 1480*

The first experimental science is perspective, by following *Decio Gioseffi* **[1].**
It might be that perspective was known to artists before *Brunelleschi* time of Renassaince. There are a lot of studies around this hypothesis. It is real possible, being perspective a tool following a *natural vision* for representing reality.
But the great invention by *Brunelleschi* with his *tavolette* (small tables)) and by *Piero della Francesca* with *"De perspective dipingendi"* applied in his wonderful drawings and artworks were able to define a new experimental science.
In the Italian 400, *Piero* is the inventor of "*La Pittura Chiara"*, as the site in which the light of day seeps and seems to disperse the opacity of symbolic color. *Piero* is called *the poet of shapes*; his poet's task, as *Bonnefoy* says in *"Afterword",* is to turn the works of the self *"into the flame that consumes them, and to love, first and foremost, the light from this flame".*
He defined methodology and tools useful for endless representations with infinite inside. In this way our imaginary vision can be strongly connected with reality in transfiguration; by performing drawings with our imagination too inside

1c: Il *Disegno,* an ancient tool for art

Il Disegno is the Italian word for drawing. It is a more complex term, able to connect drawing and design. About the significance of *disegno,* the Tuscan painter and architect Giorgio Vasari wrote in the II edition of *"Le vite dei più eccellenti pitturi, scultori ed architettori".* 1568:

*"...Seeing too that from this knowledge there arises a certain conception and judgement, so that there is formed in the mind that something, which afterwards, when expressed by the hands, is called disegno, we may conclude that disegno is not other than **a visible expression and declaration of our inner conception and of that which others have imagined and given form to in their idea."***

In this words it is very clear the structure of a generative process that is complex for the reason that it starts from the world of imagination as an idea for becoming *real* through words and drawings, that we translate in algorithms for machines. These are *neo-logoi*, able in representing the transformations of past in an adaptive resonance caching the chromatic variations of vision. This generative procedure follows the *green endless* variations of Nature in the different seasons in the cosmic tour. With this procedure the generative artist qualifies that art starts by the act of perceiving connections. So the investigation with will and curiosity is the basis of his identity building.

The great master is *Piero della Francesca*. He is the great connector of endless ambiguities, of the multiple interpretations and of the ancient tools that coexist more and more with *neo-logoi*, for disclosing them in the evidence of their representations.

This happens in his artworks as in "*the stolen letter"* by Poe, left in evidence, without ambiguity, neither any clear or dark and without deceptive artificial shadows.

Everything in *Piero* is represented in a shine of endless beauty, real generator of wandering, closed to hand and infinitely distant, He performs a drawn pictorial reality as mirror of infinite, that it is in each of us. This complex procedure is represented by *Piero,* that is a collector of the human science of the numbering from Pythagoras until his own time, faithful custodian and shiny visionary experimenter of the poetics of the geometric forms. *Piero* connects the science of the space with the logos, where the meaning is not the dominion of the space but the purity of the sound.

The sound produces ideas, that take forms following the generative concept defined by *Leopardi in Zibaldone:*

" An idea, without words or way of experience, escapes us or it errs around us in the thought as indefinite or bad known also to us, that have conceived her. With the word she takes shape and almost visible sensitive and circumscribed form."

We thing by speaking.

Our thought formalizes it with words.

In *Piero's* artworks the infinite generative purity of the sound of word is veiled among the folds of spaces of harmony.

2 - Quantity versus Quality
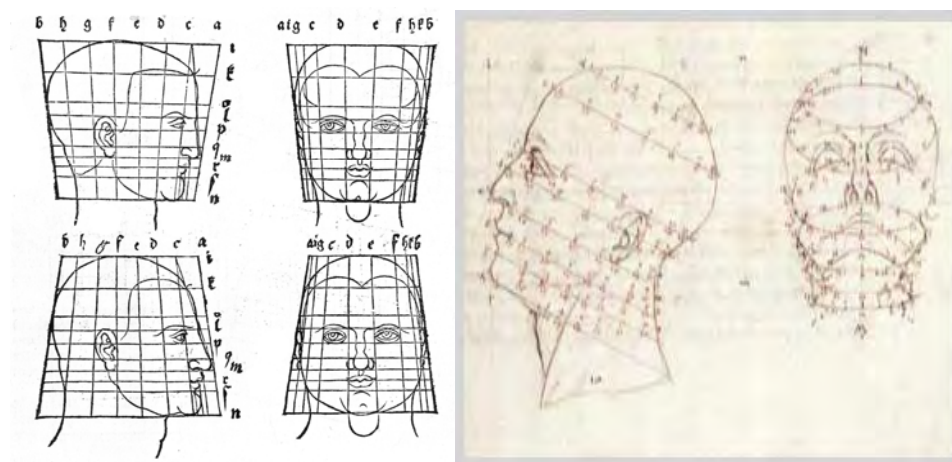
1 – Durer, analytic definition of quantity 2 – Piero della Francesca, visionary definitions of quality

Differences between Durer analytic approach in illustrating heads circumscribed with a box and for movement the use of plans and elevations and a drawing of heads by Piero della Francesca with the definition of endless logic interpretations, all belonging to the same head configuration.

2a - Over "Divide et impera"

By over classing a rhetoric question of power, Decio Gioseffi in in his paper "Filippo Brunelleschi and the Copernicus turning. The geometric formalization of Perspective. The beginning of the modern science" talks about the role of perspective's discover for the foundation of the modern science. He defines this role as immensely greater in front of the opinion of several people. It is the first mathematic systematization of a "physic" law that can be extended indefinitely, of general validity and verifiability.

But n ' 600 century we see that the division between values quantitative as real at all effects and qualitative as subjective considered of any scientific value , was yet performed by Boyle, Locke and Galileo. In this vision of the world it is considered real only what is miserable as a quantity. More to this division is added the great synthesis made by Newton in "*Philosophiae Naturalis Principia Mathematica",* 1687; where, *de facto,* **quantity** becomes what is explicable with a mechanic model. We have to wait a long time for the fusion between quantity and quality after an hard and complicate iter for gaining appreciated verifiable results toward the middle of the last century . When it is very important to focus that various sciences, that in past time were divided and not related, tried to perform connections in new sites, passing the secular antithesis. **This synthetic vision becomes as a revolution in the concept of machine.** We can assign the data of 1943 when the collaboration between the physiologist *Arthur Rosenblueth* and the mathematicians *Julian Bigelow* and *Norbert Wiener* gives as result the paper *"Behavior, Purpose and Teleology",* published in *Philosophy of science* **[2].** It is with this well known paper that was founded cybernetics or the science of government with the fundamental results:

1- Cybernetics enters in a new site different from that qualitative of biology and from that quantitative of mechanicism

2- The control of every machine is founded on the information's quantity

3- The organization becomes auto-organization in base of the possibility that have the effects in back aging with causes.

The same mathematics changes and also logics is putted in discussion. Ashby wrote:"Man doesn't think logically but **dynamically**"". The effective operation of the machines of new type does not allow anymore a distinction able to generate an insulating process between quantity and quality. Once the quantity becomes seen as its process of evolution, quality becomes an integrant part of every organization both natural and artificial.

2b - Abstract/figurative from Masaccio until Cezanne
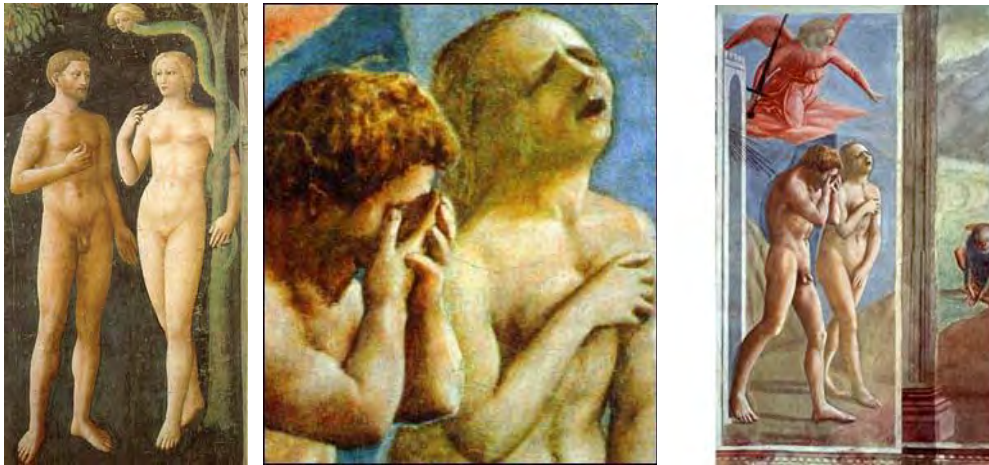
Adam and Eve by Masolino in absence of perspective and Masaccio's perspective in humanistic vision in Cappella Brancacci, Florence.

Masaccio made a real revolution in painting by performing people and space as Vasari defined " *Sembrano reali, quanto il vivo (They looks real as the alive)".* His life is very short, he lived only 27 years, but he leaved an indelible sign in art. All artists of his time and for many centuries, Michelangelo too, went to see his revolution in Cappella Brancacci for learning how to apply at the best the new science..
This painting was defined by Longhi "*una folgorazione fiigurativa"(a figurative lightining)*; for the contrast between abstract and figurative .Here they became a clear and indelible sign of the complexity in art.
.
With Veermer, Cezanne was a great follow of Piero science. His poetic art in painting is prefigured in " *An unnown masterpiece.* Here Balzac had foreseen that painting could happen to overcome itself in something gigantic of which nobody was able to discover the significance. Balzac is the poet of life. *The human comedy* is the identification of the eternal human characters in the same abstract vision of the identical as an human coding, that repeats singularity in infinite variations. And it is this identical, coding that is represented in *An unnown masterpiece* . **The identical human coding is not figuration but abstraction**. So it is the code of every

character of his comedy that as in the real life meets similar and dissimilar for representing a comedy of which the artist is the craftsman as mirror of the true life. The angling of the vision continually changes, at times it overlaps to the character when the intensity of the emotion is strong, at times it is distant, at sidereal distance when extraneousness is strong and the coldness and the indifference dominate the feelings of the artist. This crossing the variations from the intensity connected to the author *proximity* performs the character of the poetic result in **art. Only this variability of the distance in time and in space it is performed about the human life**. It is enough here quoting *Infinito* by Leopardi, for finding again in our vision the memory and the infinite in our imaginations; as an endless music with the timbre variations.. Their performances are expression of the endless variability.

About Cezanne, Longhi sets Piero as his main reference for his main phase, almost a watershed, of a way of painting that he defined *"of perspective synthesis of the form and of the color"* Longhi,(idem, pag.76) and that he defines "Paul Cezanne, the greatest artist of the modern age" Longhi. (idem, pag. 106).

IN ART ABSTRACTION IS THE WORD THAT IDENTIFES THE MATHEMATIC PROCESS SURRENDING THE RESULT. The dialects that open the beginning of '900 abstract against figurative is the result of the lost of the center in science of the human vision toward a false emphasis of technology, that become the new center with money of humanity.

"Art is the Queen of all sciences communicating knowledge to all generations of the world"
Leonardo da Vinci

3 – The characters of a generative artist

1 - Computers and words sounds

Computers are necessary, but they are not enough for gaining a *really* generative art expression.. After having focused our ideas as logics, we can translate in algorithms our first steps of discovering possible new representations of the world.

Ideas are totally abstract. So it is very not congruous to a generative system to perform them only as algorithms especially if we stay in the starting point of our generative experience around a new investigation.

Algorithms are logic interpretations. They are the translations in computer language of geometric matrices. These tools are very ancient and very useful for identifying the process since its origin, ,in fact we can call them in a better more open way numbering structures as generating tools for performing our idea/vision.

Je ne peux entendre la Musique de l'être
Je m'ai reçu la pouvoir de l'imaginer.
Yves Bonnefoy, Dans le leurre du seuil (1975) **[4]**

3a - **How to become today a generative artist.**

The main condition is that other people recognize you generative as artist. You may affirm: " I am a generative artist", but for experts this is not enough. But where and how is it possible to recognize *really* the generative attribute of quality in an artist?
 1 – By performing aims as characters.
Without aims it is not possible to design tools for gaining the prefixed aims.

2 - By generating *neo-logoi*

Words in a generative structure follow their most adaptive significance. They are sounds for performing characters. Musical sounds in open systems, but real tools for a performing aim.

We can delaine three main sub-conditions for performing *neo-logoi, as tools for our times:*

    1- to work following scientific procedure

    2- to be visionary, open and adductive

    3- to gain results following a poetic vision

These conditions perform the main structure of a generative process. Here random works but not as protagonist. Every result is fixed in the artist memory as a precious element of experience. The image of this generative process might be a tree performed from a double direction. One is performed starting from heart, as we said, between **memory, intellect, will;** the second direction is connecting with the first through an abstract structure between **vision; memory; imagination. Memory works as connector of the double structure.** It is delineated in progress a working process between *impressions* and *expressions* for generating *emotions*. So the main aim in a GA process is to generate emotions and the main tool is *the performance of a singular emotional vision*, so as always the work in art is performed. If we go back in Renaissance we see Leonardo working at the beginning of his experience in art at the *bottega of Verrocchio* for learning tools and methodology but in the same time for focusing clearly in his mind in his own vision, as a *poetic point of view* in progress.

3b - The language of a generative artist is mathematics

This is the only one that machine can understand. So numbering is the main structure of a creative mind exercise for generating artworks. But numbering are in primis sounds. Sounds run in a creative mind connecting fragments of visions, from memory, walking with imagination, fixing them in a *"digital reality"*. These processes are able to connect also differences between disciplines, in a discovering that can start also from words for performing an algorithmic structure.

Generative is an artist able to experiment a transformation from past to a new vision of world, following an open adaptive character performed in mind as the main aim of his expression process. In our digital technology time, the challenge is in affording computer devices for generating our poetic recognizable vision.

.A GENERATIVE ARTIST performs *an artificium* as expression of his own impressions following an emotional tonality.

This is not a question of figurative or abstract art. The process of recognizing belongs only to the expression of a poetic vision or not. We perform our singular *"poetic"* vision of the world around us in our infancy. This is performed as a singular proper expression of the impressions that gained our mind in singular adaptive way, learning us in recognizing *the reality* all around our vision.. This is the quoting of the so many reminds to our infancy time expressed by a lot of poets, scientists and philosophers.

So if we procede in fractal way from reality to art, we can affirm that each generative artist build a specular artificial world following his singular impressions encoded in infancy. In art is not a question to recognize reality or to see an abstract result. Each result in art is also abstract, because it belongs to a singular hidden vision of reality as a singular code, expressed at different scales.

Vision; memory; imagination work with their 3 sisters: a mirroring memory with

will and intellect. We can see these words metaphorically as a river on which the generative process might run sometimes on calm transparent waters. other times on dark stormy ones, but following always a possible direction of experimentation. This needs two important tools:

1 a vision performed in characters by gaining with an idea/ code/hypotheses

2 logical interpretation, abductions from the real world expressed by concrete tools for performing rules of connections between elements of the generative process.

4 - The generative process, experiences

. Following *Yves Bonnefoy*, we can affirm that...*" word does not save, sometime it dreams..".* *"For this reason we have always preserve and spread the principle of hope, that is the heart of life. Poetry is the hope in the language".*

 So we can define generative an artist able to collect experiences following a performing vision for focusing in progress knowledge and responsibility in answering to the human aesthetic needs.

But it happens that when all are artists, as easily it can be affirmed in our time shaped only by the dominion of the appearance, nobody is an artist. This deduction doesn't belong to the true reality. The art changes techniques, tools, poetics, but a need inextricable of the human mind remains as a not cutting necessity in expressing our tale with figures, words, sounds as the impression of our own vision of the reality.

 It is art **the necessity to translate the reality in thing,** for escaping things out of the frailty of life, as precariousness that any technology and scientific discovery can never compensate, living in every human being the conscience of his own precariousness

Abstract and figurative in a whole: ***poetry in prose***

The origin of the main structure of a generative art process is identifiable in the structure of ***poetry in prose.***

This is very ancient. It can be discovered in the structure of the fable. The sounds of voices in fables telling are able to perform the children minds as full of imagination. Fables configure a double site: one connected to real world, the second one able to describes an imaginary world, but able to configure the reality. This is strongly similar to the creative process in generative art. It tales the connection between a possible vision as idea/code to an open algorithmic structure. This connecting is able to generate a set of endless variations There is ***a similarity*** between the open system of the voices of telling and the variations of a generated reality . What is strongly identifiable is the code of tales, able to repeat variations during century of the same fable telling. . I investigated about the code of fable in my GA paper *"Mater Matuta"*: **.[5]** This fable process was systemized as popular voice connected to poetry in French, 1664, in *Maximes* by Francois La Rochefoucauld . This work opened a new line for preserving in written works the popular sapientia, able to be generate similar but always in new ways during centuries. Poetry in prose are also *"Le operette morali " * by G. Leopardi, *performed as a connection between myth and real world.* This process is still alive today in globalization, by preserving cultures through their mater

tongue.

This double center of the connection between real vision and imagination performs all the opera by Piero della Francesca. He was the most important author of performing logic geometric structure as experimental science over all the world. His structure art is very similar to the art of poetry in prose. I selected one great example for describing the complexity of the world by *Piero: La Flagellazione*, the most discussed site in art as mystery able to generate endless interpretations, also for mathematical questions .

Piero della Francesca, *"La Flagellazione"*

Talking about this work but with reference to the whole painting by *Piero*, the poet *Bonnefoy*, has spoken of "*strategy of the enigma*" .

Longhi to his students proposed *…""Here it is the intent to arrange in front of you, in the space, a construction of human bodies immovable that is in architectural relationship…* " (Longhi, idem pag. 77).

Longhi spoke of "*the rest of the color*" (Longhi, idem pag. 79) *for intending that the color, in Piero, never has the tendency to offer a convulsive and dramatic vision of the world, but on the contrary a serene vision, consequential from the idea that a rationality and a beauty cosmic, absolute, unperturbed dominate on it and they direct the events of it, also those more dramatic and bloody.*

"Therefore,by writing , by painting and by calculating, Piero is a real theorist. His same painting does not show   a theory of style or a practice of it, but it expresses the whole of his technical, scientific and philosophical knowledge, that founds it".

The monumentality of the characters of *Piero* is not aching and heroic as that of *Masaccio.* They are serene and situated in a context of rational and spiritual harmony of the world. The world painted by *Piero* is *"a new world , in front of the frescos by Masaccio"* (Longhi, idem, pag.420), a world where the perspective is not an arm with which man, hopelessly heroic, tries to affirm himself in the world ,but that in which, found again the serenity. He accepts the laws of the world, of the cosmos, of the universal reason.

This incredible small picture was rediscovered after many centuries, in 1839, in the sacristy of the Duomo of Orvieto by *J. D. Passavant,* but only in 1860 was restored in Italy, losing the significance of the script for possible interpretations: *" Conventur in unum*". In our time after a lot of studies on this Piero's artwork, the truth of his great

authority inside the perspective science in painting is well known over all the world. *Venturi, Longhi, Berenson, Ragghianti, Battisti, Kemp, Gombrich* and many others scientists, historic writers and artists dedicated to *Piero's* opera very interesting studies and books.

In my humble interpretation, *Piero* described also the double structure of fables. One, on the right, is the description of the reality of his time. On the left, the second part is the vision of the sacred world in J. Christ flagellation. The quoting : *"Conventur in unum"* might be a demonstration of this hypothesis configured by me. So I can affirm that Piero is also the great translator of the art of fable telling into the science of painting. Piero is the father of all generative artist, for his great science that connected all the scientific knowledge on poetics, on geometry and on all sectors of mathematics from *Pitagora, Averroè* until Franciscan knowledge with his incredible unique attitude to art and science. It is not possible to talk of art without science, as *Piero* teaches to us still today.

The writer Aldus Huxley in *" The best Picture"* defines *"La Resurrezione" by Piero* as the best painting over all the world, by defining it *"an experiment of composition so strange and so winner from the beginning"*. With these words he recognizes the complex science that is possible to discover in infinite congruous interpretations.

La resurrezione by Piero, fresco, S. Sepolcro

Going Forth by day, Bill Viola, 2002

the art of the Game, Michael Brown

From cinema to digital technology

The ancient structure of fable was still alive with the advent of cinema.

In the first public exhibitions cinema created only shock in its visual configuration. Insofar the vision was always correlated by the music that a pianist elaborated on a preexisting musical trace. The vision collective image and *alive* music shaped an artificial world but strongly connected with the reality by reminding to the tales world . A sonorous poetic vision of great beauty. With the sonorous in movie the relationship

changed completely. And with the new technologies it is performed a total new site of communication, where rules of connections are very arbitrary.

1 - In *B. Viola* video-tapes exhibition in Getty Museum at LA, 2002, the plasma video-panels is defined by the same dimensions, proportions, frames, compositions, colors of *Piero*. A video quotes explicitly *The Resurrection.* This is a great experimentation of technological tools. The main aim is to render alive the artwork, by using real persons and environment. This process works by gaining the perfect reproduction of the reality of the *Flagellazione* as quantity, but missing an abstract interpretation as quality, In fact the perspective complex system designed by *Piero* as hidden structure by discovering Is not interpreted. In the video projection on a wall, reminding to *Piero's fresco,* the movement gain spectators in a new world as a game cloned from art, without emotion. The inquietude is the only feeling able to destroy any imaginative interpretation. The video is a new reality where only technology is the winner. To experiment in art is really very important, but to discover a poetic similarity is the heart of every experiment.

2 -Browne painted this tribute to Eric Cantona based on *Piero's* painting.
Only a double game!

5 - A letter to a young artist:
I am imagining a young generative artist on his table behind his machine, trying to realize a generative process. His computer looks like a dish on his table waiting for some food. He can catch around, for putting down the most easy and fast food, by copying and pasting data for gaining a randomly solutions for his hungry moment.
But sorry hungry for what? Is art a necessity of his as real tool for his surveying? Or is he trying to full empty spaces of his mind for trying to give a significance to his life, that can be acclaimed from other people. So it seems that a GA process can gain a fast recognized result, spending time in a random exciting way. Appearance, this is only an appearance.
A moment of exaltation, without any trace. No art is gained.
But thanks to *the lighting birds*, it might be that the process of discovering a poetic sound is opening a window in a small site of his heart.

References:

[1] Decio Gioseff*i "Perspectiva artificialis, Per la storia della prospettiva; spigolature e appunti",* Univ.Triestre, 1957

[2] Arthur Rosenblueth, Julian Bigelow and Norbert Wiener, *"Behavior, Purpose and Teleology",* published in Philosophy of science at:
http://courses.media.mit.edu/2004spring/mas966/rosenblueth_1943.pdf

[3] Roberto Longhi, "*Piero della Francesca*", Sansoni, Fi, 1927/1962

[4] Yves Bonnefoy*, Dans le leurre du seuil,* Mercure de France, 1975

[5] Enrica Colabella,*""Mater Matuta",* Generative Art Conference Proceedings, Milano,2000