

**Conference Science University of Paul Sabatier,
Toulouse**

Science, Fables and chimera: Strange Encounters

Fractals in Myths, Legends and Fables

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Museum of Naturel History of Toulouse

My greatest gratitude must go to Mr. Frank Giunta, President of Artship Foundation, San Francisco. For years Frank has unfailingly supported me in my work, as an artist.

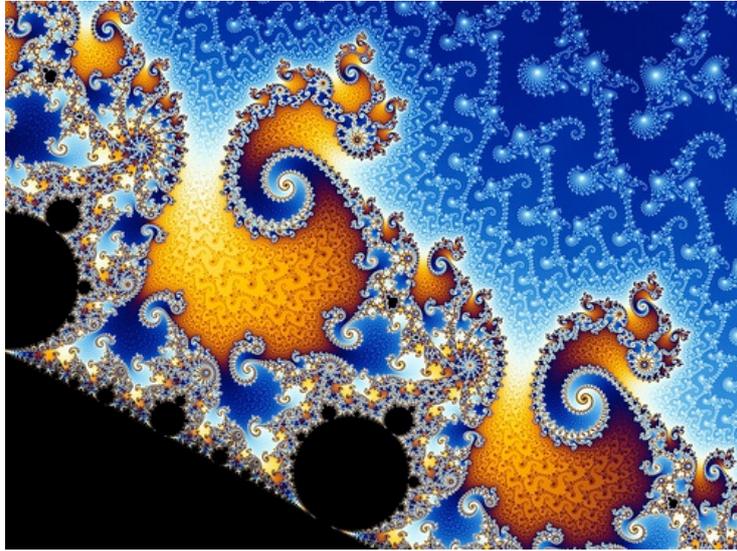
I am convinced that a better understanding of complexity depends upon our ability to have dialogues that are both horizontal and transdisciplinary.

I consider myself a humble self-made artist. My testimony is based on intuition, my approach on contemplation and poetry ; both my work and my approach are fueled by a deep questioning about the real and the sensitive world.

You will notice that my presentation is punctuated by questions for the simple reason that I have no intention to claim knowledge of disciplines with which I am not familiar.

I'm also used to saying that my paintings are doors that may open onto a threshold for others, but which remains forbidden to me.

The fractal world has become more and more familiar to us. Who would not be puzzled when looking at the informatic representation of the Mandelbrot's set ?



The Mandelbrot Set

Although Mandelbrot was the first to name and define the mathematical structure of the fractal world, and to reveal its beauty as a purely mathematical construct, fractal representations by human kind are very ancient.



Could this omnipresent world have been left unseen to the first humans' eyes ?

We are surrounded, constituted and determined by the fractal world which is visible all throughout the universe. These dynamic fractal structures explain a number of behaviors of the living and non-living worlds, at the border between order and chaos.

Indeed, the Australian Aborigines first represented fractal patterns (about 45000 years ago) and images belonging to Parietal Art (about 35000 years ago) are all inspired by fractal patterns.



Australian Aboriginal Painting



Parietal Art

These representations and fractal expressions have accompanied the history of mankind through its different cultural languages, at the crossroads of art and the sacred: repetitive music, songs, dances, paintings, architecture and also Mandalas, Zen gardens, Celtic knots, Hopi, Arabesques, rose windows...

In the 19th century, long after an intuitive or spiritual approach of fractal patterns had begun, science revealed the fractal world with a new geometry. And today, fractal mathematics is used in various domains such as biology, economics, the mechanics of fluids, demography, and communications.

After this brief introduction to the fractal world, we turn to the subject of this conference: myths, legends and fables.

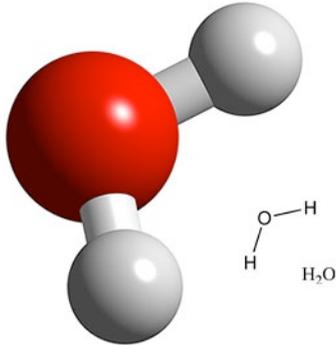


How to find meaning in chaos?

- Do myths, legends and fables go beyond reality? Are they simple interpretations of reality? Or, do they represent a part of reality itself?
- What is this part ?
- How do we establish a link between the fractal world, complexity, and what do myths, legends and fables teach us?
- What has my artistic experience taught me?

The theory of emerging properties shows that the structure of nature is the same as the process of writing: it is based on simple elements that combine into new ones whose properties are different.

E.g.: $H+O = H_2O$ (water is a solvent).



The dynamic structures of fractals are one of the languages of nature whose chaotic and ordered expressions represent its different styles.

Man does not stand apart from the fundamental laws of nature. Men also assemble simple things to create complex ones, always more sophisticated, whose properties are different. And when men blow the dust of charcoal to put the outlines of their hands on the rock, they create a representation of their presence in the cosmos.



Negative's hands
at Gargas

Does not the history of myths, legends and fables start as an imitation of this fundamental natural law? From the earliest times, we have known that these expressions are not still or static.

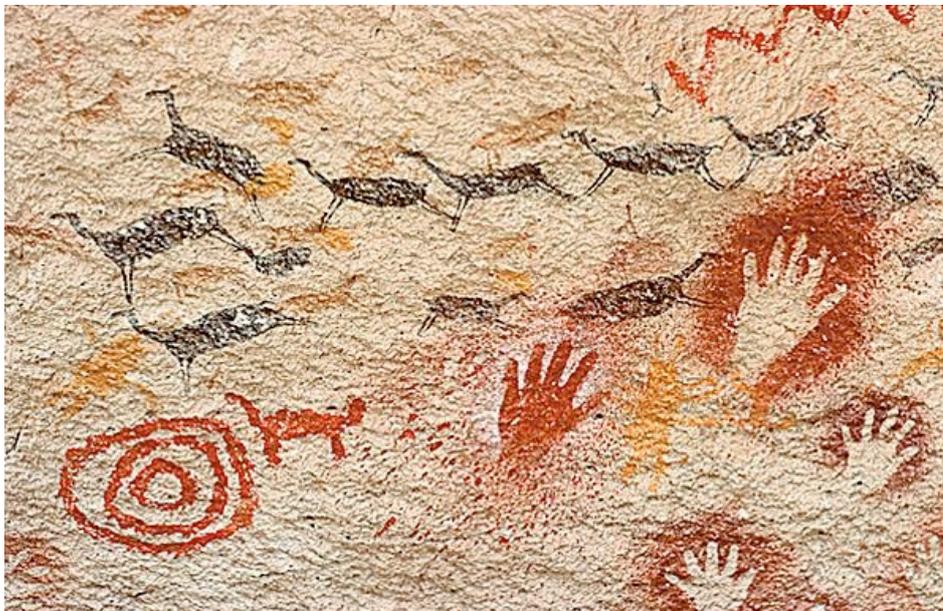
Their very nature is dynamic, and thus, the oral tradition is constantly evolving as the result of iterative narration. Couldn't we consider these expressions as new elements with new properties and the result of additions of other elements?

Isn't their structure the result of telling, which itself is the result of ideas and images that were built by countless stories that the story-teller remembers, that the audience enriches when they take part and thus, contribute to the story?

When myths, legends and fables are created, it is through a complex process that also unfolds the complex adventure of the history of mankind entangled with the complex history of the universe.

Whatever we may call it – a play-within-a-play, images repeated to infinity as with mirrors, or a ‘Chinese boxes’ structure, - this process has, undoubtedly, always been perceived by men.

What remains interesting is the adventure of complexity in these forms of expression that they *re-present* the cosmos as the initiator of surprise, of creation, of chaos.



Rock painting of Perito
Moreno in Patagonia

How does Man find meaning in this unpredictable world, through myth, legend and fable?

Man is surrounded by fractal expressions of nature that keep whispering to him in a language defining a passage from stability to chaos and from chaos back to stability.



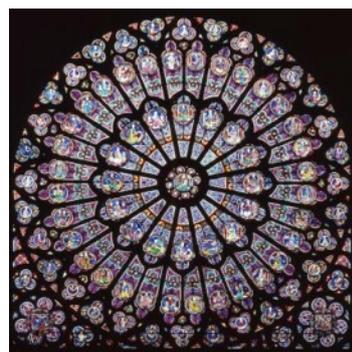
Man naturally and spontaneously had expressed or represented what he saw: spirals, waves, repetition, and self-similarity.



Aboriginal Art

Neolithic Tomb in Ireland

Zen Garden



Whirling Dervish

Rose Window
Chartres' Cathedral

Jackson Pollock

Shamanic rituals, repetitive dances and musical rhythms, trances and other hallucinatory practices may be interpreted as man's attempts at echoing his chaotic environment while trying to explore the realm of gods, of the dead, and dreams- in other words, chaos itself.



Runes support
Divination



Runis Rock



Hallucination



Dream Catcher



Trance of Hamar Women



Trance state



Radas Ritual Trance

Do not myths, legends and fables draw part of their imaginative world from these practices?

This is why linkages to fractal patterns may be observed in numerous tales, legends and myths, as, for example:



The Arabian Nights



The Myth of Sisyphus



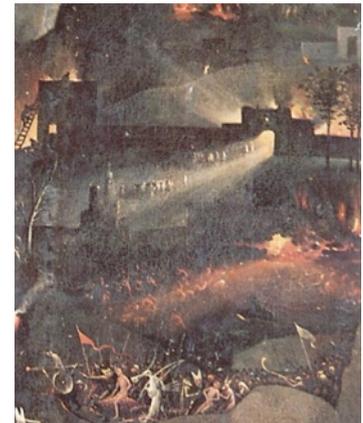
History of Tower of Babel (by Brueghel)



Labyrinths: the Kuna's



« The Milkmaid and the Pot of Milk »



Jerome Bosch's Apocalypses

- The Arabian Nights, is an example of a tale-within-a-tale
- The myth of Sisyphus is also a narration which, like the path of the sun, or the tides, shows that life in a never ending process and whatever man's effort to escape from the doom of work or death might be, it is always in vain.
- the History of Tower of Babel Tower (by Brueghel) emblemizes a model of growth that tends to infinity but finally reaches chaos
- More simply, the French poem « The Milkmaid and the Pot of Milk », describes a virtual economic growth resulting in destruction. («Don't cry over spilled milk»)
- Labyrinths of the Kuna, Hopi and Minotaur are among the best known of other fractal symbols.
- Apocalyptic references remind us of perfectly chaotic phenomena.
- Lastly, the myth of the Flood and Noah's Ark describe the passage of order into chaos and chaos back to order. Like a demiurge, Noah disrupts the original order, choosing separate, disparate elements that he re-assembles on the ark which becomes the matrix. In doing this, Noah creates order from this chaos of the flood.

Through the representations of a complex and chaotic world, do not myths and legends teach us how to survive ?

The possible content of fractal symbols does not provide ready made answers to everything, but it at least teaches us a better understanding of natural structures, principles and behaviors, so that we may be able to live within the complex and chaotic harmony of our environment as well as of ourselves.



Noah's Ark:
Fresco of Saint Savin Church



Australian Flood 2011



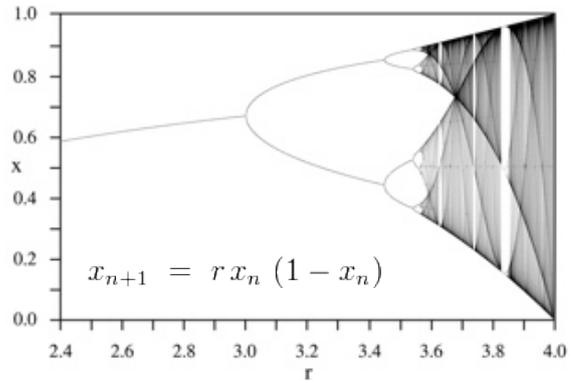
The Big Wave: Hokusai



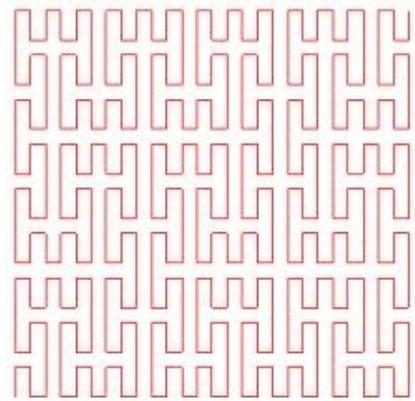
Tsunami Fukushima Japan 2011

Why for thousands of years, has man had an intuitive understanding of the chaotic and complex world, that scientists and mathematicians only recently have explained rationally? We've just seen that some myths, legends or fables describe models of exponential growth leading to chaos. In the middle of the 19th century, and with a simple equation, Verhulst explained the growth of a model which, after a certain number of forks, or « bifurcations », reaches a point where it starts behaving in a chaotic manner, constantly « hesitating » between destruction and infinite growth.

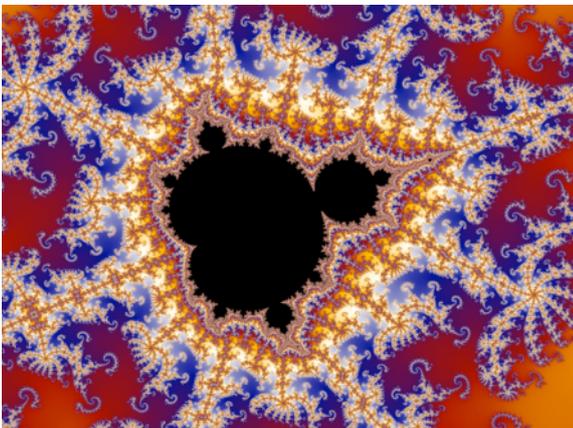
The Peano curve which is used for cell phone antennas, is one of the numerous applications that were directly inspired by the Kuna's Labyrinths.



Verhulst Equation (1840)
Explains chaotic system



Péano curve:
Cell Phone Antennae



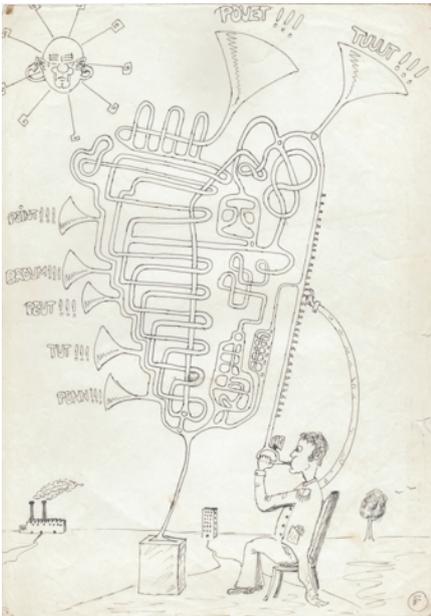
The Mandelbrot set



Binary Code

What has my artistic career taught me ? A fractal intuition.

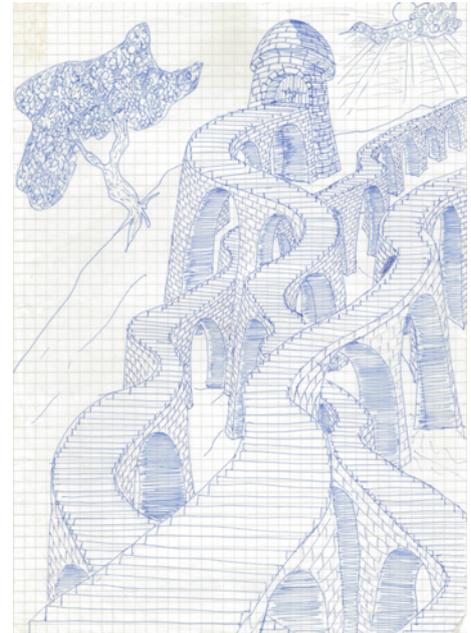
Indeed, as I proceeded to a sort of retrospective of my childhood drawings, I realized that right from the beginning, they contained spontaneous representations of fractal patterns.



Childhood Drawing:
The musician
Age 11

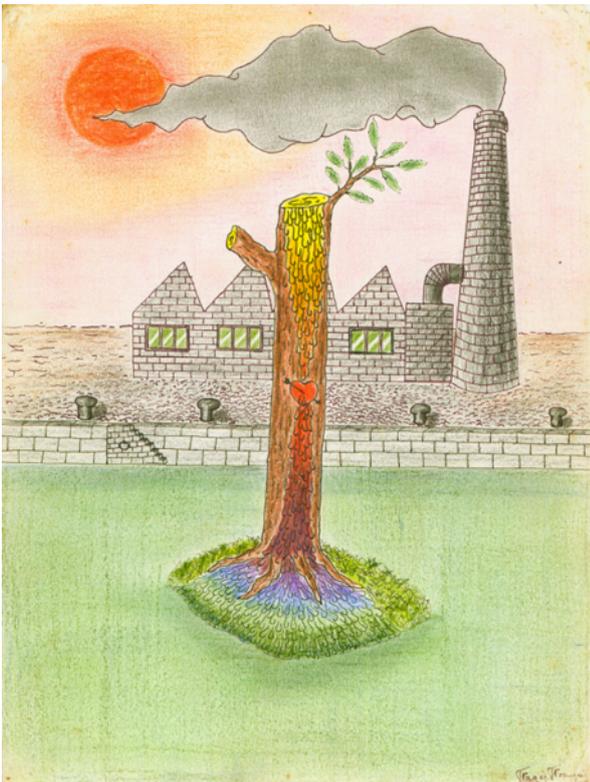


Aladdin
Age 13



Age 14

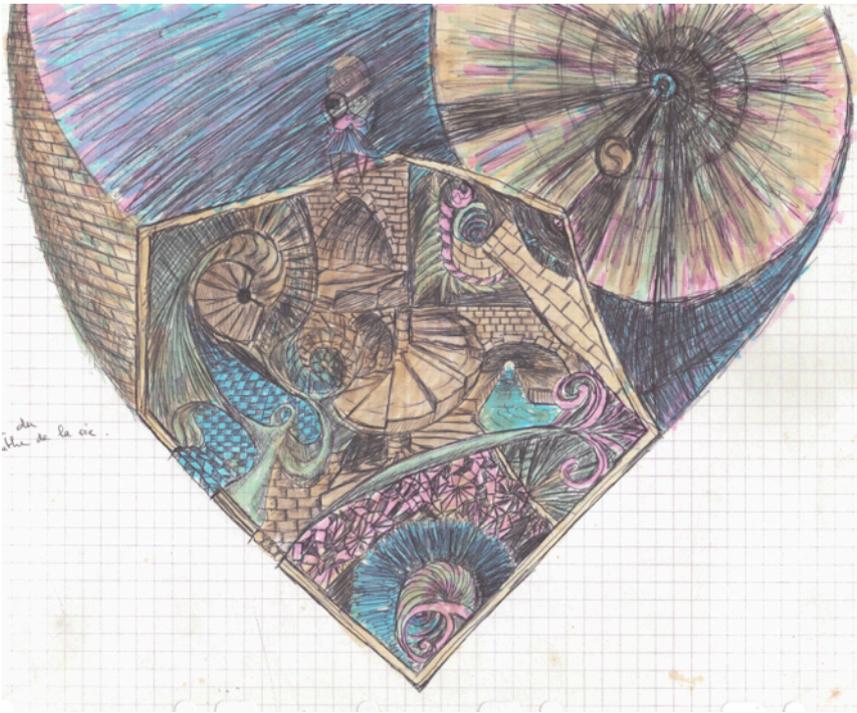
Of course, the question of the presence of Man in the universe has always been one of my major concerns. And the sensations, the emotions, the data that were refracted by the prism of a dreamy contemplative spirit constituted my imaginary world very early on.



Age 14



Age 14



Poem of the
Labyrinth of Life
Age 15



Apocalypse
Age 18

But it is worth noticing that fractals –spirals, labyrinths, swirls, and arabesques- spontaneously emerge into my drawings.

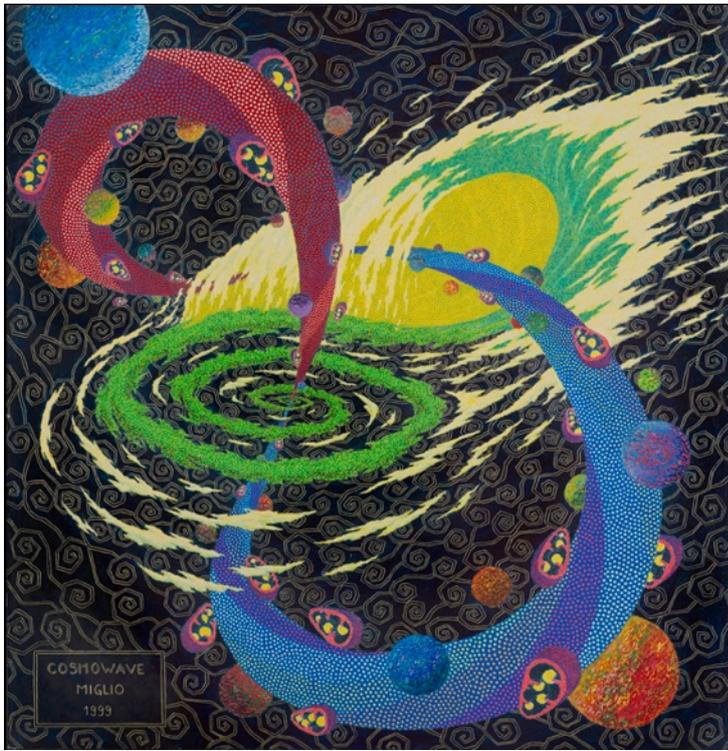


Cosmogony 1990 - 1993

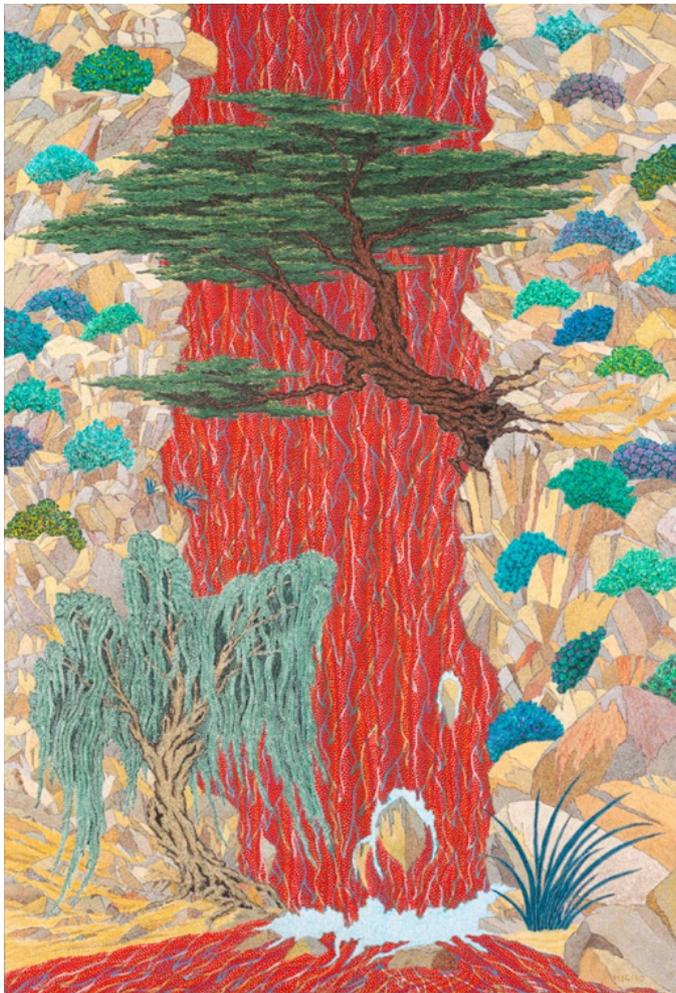
Butterfly Effect
1994



Red Wave



Cosmowave

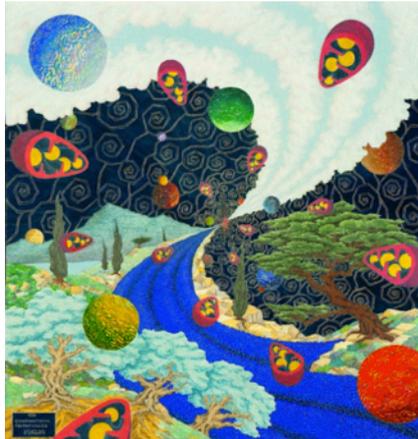


Slow Dance

Tryptic «Exploration I»



Holistic Vision



Union of Matrices



Gemmation

Tryptic «Exploration II»



I'm empty

Like the glass
I'm going to pour

That you're going to
drink

Now, the freedom of expression I've been able to maintain from academic constraints has revealed a link with many other pictorial forms of expression.

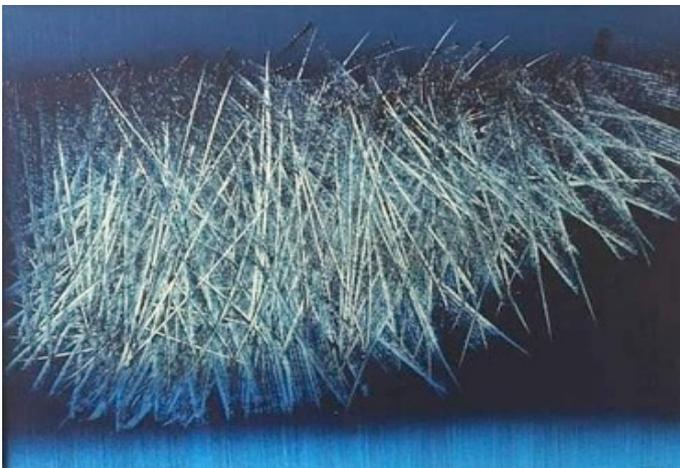
The fact that fractals have always been represented throughout times and cultures, the fact that they have been spontaneously expressed by children, or by people having mental issues, or by art brut, that they've been enriched by sacred symbolism and aesthetic virtues, make them the most widespread and universal form of expression.



Palace of the postman Cheval



Japanese Art Brut



Hans Hartung
1904 - 1989

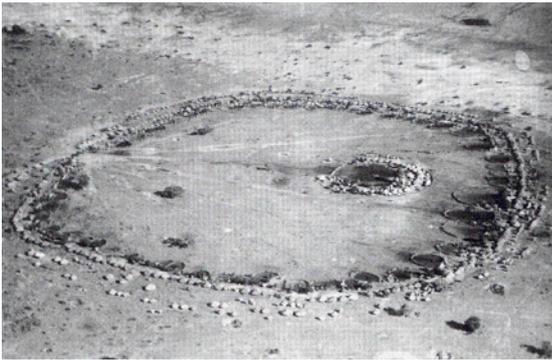
On the one hand; we can draw parallels between our conscious thoughts behaviors, subconscious mind, and forms of expression...

On the other hand; the basic structures of nature constitute not only the natural environment, but also all of our anatomic systems - circulatory, skeletal, respiratory, digestive and nervous systems.

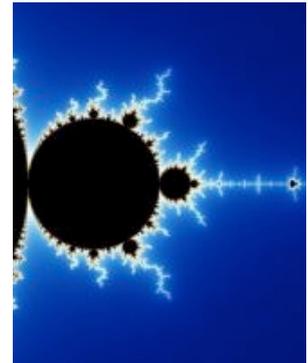
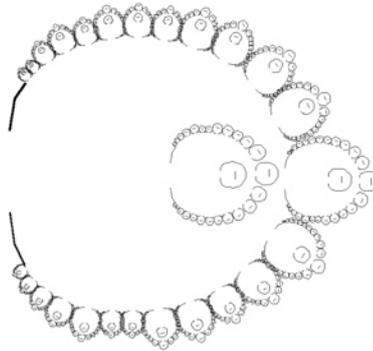
Our lungs, arteries, veins are perfectly fractal as of course are our brains.



This may suggest that Man has adopted an unconscious fractal behavior that may well be compared with Nature's, and that can also be imitated mathematically.



Village of Ba-ila



The patterns that can be seen in the village of Ba-ila look remarkably similar to The Mandelbrot Set.



... It is the same with the structures of leaves... we can compare them to the modern urban fabric...



...The Economy is a human activity that embraces the laws of complex dynamic systems.

CONCLUSION

Voluntary or not, this resonance proves that Man's intuitive understanding of Nature is much deeper and more profound than is generally admitted. « Truth sometimes lies beneath the surface of things ».

Over the years, I've tried to find meaning in the fact that my drawings and paintings seem to emerge spontaneously from my pencils, pastels, and tools, and finally show an interior world that is mine, and yet, at the same time, totally transcends me to the universal.

Through the light of understanding of the fractal world, I have established a link between my imaginary world and the real world around me.

I also think that while using different languages, artists, mystics, and scientists all share a common heritage and obey the same laws of nature when it comes to the creative and expressive processes.

The natural laws, including the fractal world, are the links that we can see between art, science and the sacred.

How could it be possible for these oral or written traditions to be apart from this common ground?

Long before scientific investigations, myths, legends and fables incorporated fractal patterns that give us a better understanding of our environment and a better ability to adapt through intuitive perceptions of non-linear dynamics.

The domains of science including geometry, fractal mathematics and the study of complex systems, provide a fertile field for investigation to study the origins of myths, legends and fables.

However, the challenges of new bifurcations in our societies and cultures offer new insights into human expression and behavior, and suggest the emergence of a new form of moral consciousness.

Invisible

You reveal yourself, at last
Unsuspected world
Both from the same cradle
Restricted by the same boundary
By the fractal door
Men of Endless doubt
Will enlighten
Your somber light

F. Miglio

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