

Syntropy, the Law of Complementarity and Unity

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Abstract

The first law of thermodynamics, the law of conservation of energy, states that energy is a fixed quantity which cannot be created or destroyed, but only transformed. The new thermodynamics (Di Corpo and Vannini, 2012) states that energy can be transformed according to entropy (*en*=diverging, *tropos*=transformation) and to syntropy (*syn*=converging, *tropos*=transformation). When the transformation is governed by entropy energy diverges and it becomes unavailable, when the transformation is governed by syntropy energy concentrates and becomes available. An example of syntropy is provided by living systems which concentrate energy and make it available in the form of bio-masses, gas, coal, and petrol. The new thermodynamics shows that life increases the proportion of syntropy, whereas physical/mechanical systems increase the proportion of entropy and reduce the availability of energy. Since the total amount of energy remains unchanged, energy can be represented as the sum of energy in the syntropic state (concentrated) and of energy in the entropic state (dispersed):

$$\mathbf{Energy = Syntropic\ Energy + Entropic\ Energy}$$

Since energy is a fixed amount, it can be replaced with the number 1 and the equation changes into:

$$\mathbf{1 = Syntropy + Entropy}$$

which shows that entropy and syntropy are complementary parts of the same unity:

$$\mathbf{Syntropy = 1 - Entropy}$$

$$\mathbf{Entropy = 1 - Syntropy}$$

The law of complementarity regulates the interaction between the visible reality of entropy and the invisible reality of syntropy, and has incredible implications which allow to design innovative solutions and applications.

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Introduction: the visible and the invisible

The new thermodynamics states that cause and effect relations are governed by the law of entropy and constitute the visible side of reality, whereas retrocausal relations (i.e. effects that precede their causes) are governed by the law of syntropy and constitute the invisible side of reality. It also states that the entropic side of reality is visible since we can see its causes, whereas the syntropic side of reality is invisible since we cannot see its causes.

Therefore we would experience forces and entities that we cannot observe directly but which exist objectively, independently of any human perception. One such force is gravity. Let us look at a very simple example. Suppose we hold a small object like a pencil between our thumb and forefinger and then release it. We observe that it falls to the floor and we say that the force of gravity causes it to fall. But, do we actually see any downward force acting upon the pencil, something pulling or pushing it? Clearly not. We do not observe the force of gravity at all. Rather we deduce the existence of some unseen force (called gravity) acting upon unsupported objects in order to explain their otherwise inexplicable downward movement.

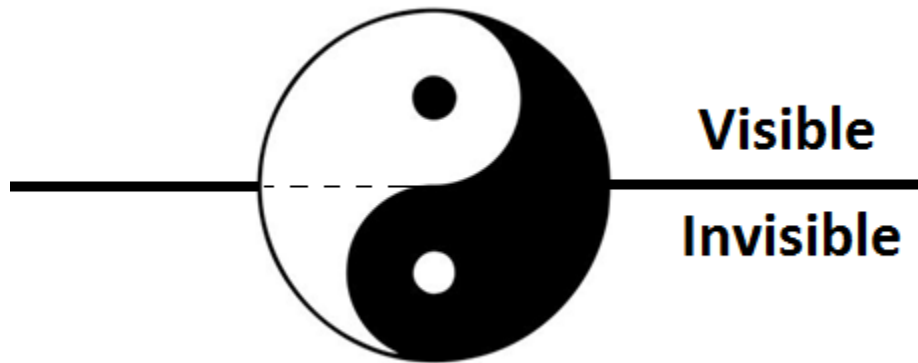
The new thermodynamics states that half of the forces acting on reality are entropic (diverging) and visible and half are syntropic (converging) and invisible. It also states that nothing takes place without the interplay of both these forces: visible and invisible. Thus we constantly experience observable effects that have unobservable causes, behaviors that cannot be explained observably and phenomena in the visible reality that arise from the invisible reality.

The law of complementarity in history

Humanity has always known about the law of complementarity. Three examples are provided by the Taoist philosophy, Hinduism and the a-causal properties of synchronicities according to Carl Gustav Jung.

- Taoist philosophy

In the Taoist philosophy all aspects of the universe are described as the interplay of two complementary and fundamental forces that constantly interact between themselves: the *yang* principle which is divergent, and the *yin* principle which is converging. These two forces are part of a unity, when in the visible reality one increases the other decreases, but their balance remains unchanged. This law is masterfully represented in the Taijitu symbol, that is the union of these opposite principles, the yin and the yang, the diverging and converging forces whose combined action moves the universe in all its aspects: the sexes, seasons, day and night, life and death, full and empty, movement and repose, push and pull, dry and wet, etc.



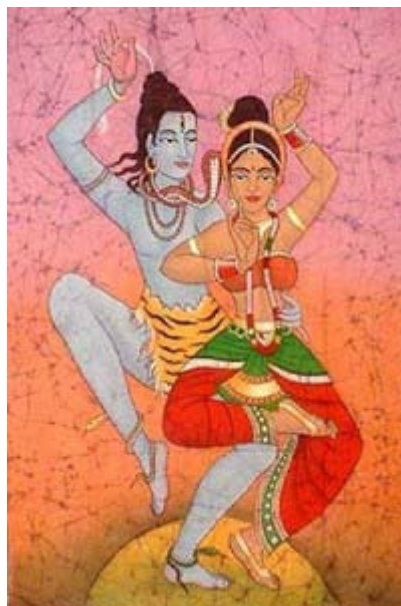
*Symbol of the Taijitu and the visible and invisible reality.
Black represents yin (syntropy) and white yang (entropy).*

In the Taijitu the yang principle is represented by the white color and coincides with the law of entropy, whereas the yin principle is represented by the black color and coincides with the law of syntropy. The Taijitu is a wheel that rotates constantly, changing the proportion of yin and yang (syntropy and entropy) in the visible and the invisible sides of reality.

The Taijitu shows that a principle of the law of complementarity is that *opposites attract each other*. This law is well known in physics, but it is also true at the human level where people on opposite polarities are attracted to each other. Since the balance of these opposite forces remains unchanged the Taoist philosophy suggests that *the aim is to harmonize the opposites*, thus creating unity.

- Hinduism

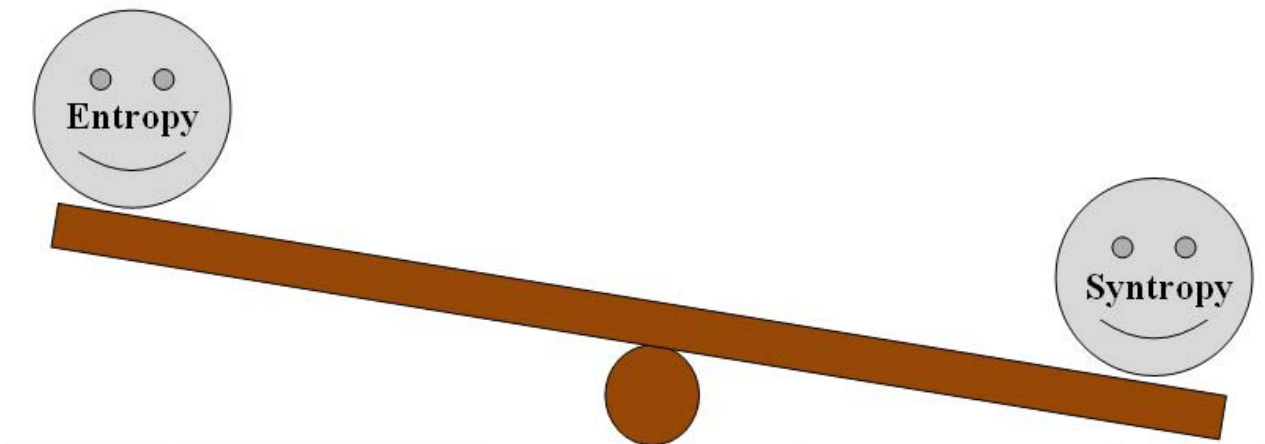
In Hinduism the law of complementarity is described by the dance of Shiva and Shakti, where Shakti is the personification of the female principle and Shiva of the male principle. They represent the primordial cosmic energy and the dynamic forces that are thought to move through the entire universe. Shiva has the properties of the law of syntropy, whereas Shakti has the properties of the law of entropy and they are constantly combined together in an endless cosmic dance.



Endless cosmic dance between Shiva and Shakti

How the law of complementarity provides a way to affect the invisible reality

We prefer to represent the law of complementarity as a seesaw with entropy and syntropy playing at the opposite sides. This representation shows clearly how the principle of complementarity works.



Entropy and Syntropy constantly transform energy playing at the opposite sides of a seesaw

This representation tells that when entropy goes down syntropy rises and when entropy rises syntropy goes down. Consequently the visible reality of entropy can directly affect the invisible reality of syntropy, since by reducing entropy we increase the invisible properties of syntropy. Entropy is the tendency towards dissipation, suffering and death, whereas syntropy is the tendency towards cohesion, wellbeing, harmony and life. The law of complementarity suggests that if we want to increase wellbeing (syntropy) we just have to lower entropy. This can be easily done in several ways and, according to the law of complementarity, it affects directly the invisible side of reality increasing syntropy, wellbeing and health.

Living systems naturally tend to reduce entropy and to increase syntropy and when entropy increases the alarm bells of suffering are triggered. For example:

- psychological and existential suffering such as lack of meaning in life, depression, anxiety, panic attacks and existential crises;
- conflicts, tensions, lack of communication;
- inability to manage our everyday life;
- economic crises;
- increase in private and public debt.

The law of complementarity suggests that in order to overcome crises and suffering we simply need to lower entropy. This automatically increases syntropy and wellbeing. When we diminish entropy, when we optimize, automatically syntropy rises and starts to manifest itself according to the invisible rules which govern this plane of reality. These rules are for example: anticipation, intuition and choosing advantageously.

- Anticipation

Robert Rosen (1934-1998), theoretical biologist, professor of biophysics at the Dalhousie University, pointed out in his book "*Anticipatory Systems*" (Rosen, 1985):

"I was amazed by the amount of anticipatory behavior observed at all levels of the organization of living systems (...) systems that behave as true anticipatory systems, systems in which the present state changes according to future states, violate the law of classical causality according to which changes depend solely on past or present causes."

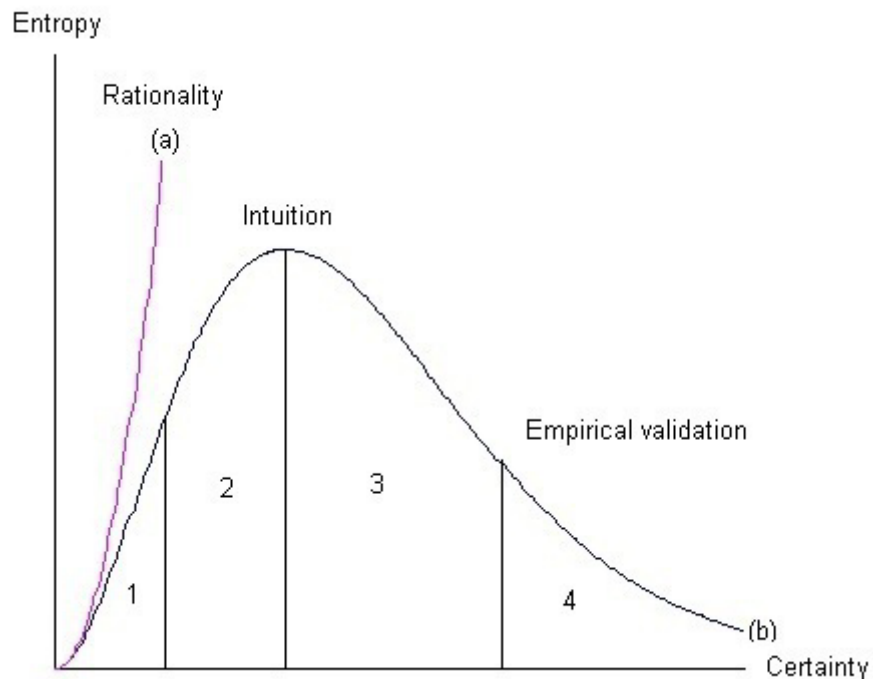
Anticipatory reactions in living systems can easily be tested experimentally. For example, since syntropy is a force that supports life and moves backward-in-time, the parameters of the autonomic nervous system which supports living functions should react in advance to stimuli (typically, skin conductance and heart rate). Experiments on pre-stimuli reactions show that the parameters of the autonomic nervous system react in advance to future emotional stimuli. These experiments show that syntropy acts mainly on the autonomic nervous system, and is felt as positive feelings of warmth (since it concentrates energy), and when it is low or absent in the form of negative feelings of emptiness and cold. When we follow feelings of warmth and wellbeing syntropy increases guiding towards advantageous choices. According to this hypothesis we stand in the meeting point of information arriving from the past and in-formation arriving from the future in the form of feelings of the heart. We are consequently forced to choose between logical-rational thinking (forward in time information) and what the heart tells us (backward-in-time in-formation). The rational-logical thinking is based on the visible reality which is perceived as "certain", whereas feelings of the heart are based on the invisible reality which is perceived as "uncertain". Thus the tendency is to choose according to the logical-rational thinking of the head penalizing the intuitive thinking of the heart, increasing in this way entropy and decreasing syntropy. Blaise Pascal stated that "*the heart has its reasons which reason knows nothing of.*"

- Intuition

Syntropy is felt in the form of feelings of warmth and well-being in the area of the autonomic nervous system of the heart. These feelings guide towards advantageous options and solutions. To better understand the role of these feelings in the acquisition of new solutions it is worth quoting how Henri Poincaré used to describe intuitions (1854-1912). Poincaré noticed that when faced with a new mathematical problem he began using the rational approach of the conscious mind that allows to become aware of the characteristics and elements of the problem. But, since the options tend to be infinite and it would take much time to evaluate them all, some other type of process starts operating leading to select the correct answer. Poincaré named this process *intuition* and considered it a process which is fundamental in the production of qualitatively new information. "*The genesis of mathematical creation is a problem which should intensely interest the psychologist. To invent is to choose; but the word is perhaps not wholly exact. In mathematics the samples would be so numerous that a whole lifetime would not suffice to examine them.*" Poincaré came to the conclusion that the process of discovery can be divided into four phases:

- 1) *Aconscious phase* which requires a period of work during which we become aware of the elements that constitute the problem.
- 2) An *unconscious phase* in which the elements are recombined on the basis of intuitive processes which lead to the solution. The solution produced by intuition is highlighted by an emotion of the heart, a feeling of *truth* that draws the attention of the conscious mind, thus leading the solution to arise to the conscious level of the mind.

- 3) *A phase of formalization.* What the unconscious presents to the conscious mind in the form of an intuition is not a final or complete argumentation, but rather a starting point from which the conscious mind can work out the details.
- 4) *A phase of validation* in which the formalized concepts are translated into hypotheses and verified.



The role of intuition in the reduction of entropy

Since intuitions guide towards solutions and advantageous options it reduces entropy. When choices follow only rational processes neglecting the heart entropy continues to increase (as illustrated by line a) and we lose direction and orientation.

- Choosing advantageously

The neurophysiologist Antonio Damasio has found that people with decision-making deficits, who are not capable of performing advantageous choices, have a poor perception of their emotional experiences (Damasio, 1994). This deficit is common in people who have lesions in the frontal lobe of the brain or use substances such as alcohol, drugs and anxiolytics that "anesthetize" the perceptions of the feelings of the heart. However, people with decision-making deficits have normal and intact cognitive functions: memory, attention, perception, language, abstract logic, arithmetic ability, intelligence, learning and knowledge. They respond normally to the majority of tests, and their cognitive functions are intact and normal, but they are not able to decide appropriately for anything that concerns their future. A dissociation is observed between the ability to decide on objects, space, numbers and words and the ability to decide advantageously for the future. On the one hand, the cognitive functions are intact, but on the other hand these people are unable to use them advantageously in the decision-making process. In neuropsychology this deficit is referred to as dissociation between cognitive abilities and their use: on one hand the cognitive functions are intact, but on the other hand, the patient is unable to use them profitably. Damasio found that deficits in decision-making are always accompanied by alterations in the ability to feel emotions and feelings, whereas cognitive abilities are intact. These people are emotionally neutral, they never

have a hint of emotion, no sadness, no impatience or frustration, no positive or negative emotional reaction, they lack concern for the future, they are unable to plan for the future and make an effective program for the hours to come, they confuse priorities and lack insight and foresight. Individuals with decision-making deficits are characterized by knowledge but not by feelings. Damasio shows that somatic sensations of the heart are primarily useful in the decision-making processes. These sensations take the form of an acceleration of the heartbeat, followed by a sensation in the lungs, in the form of a contraction of breath, and muscles. In normal subjects, who decide advantageously, Damasio observed that emotions help to orient rationality, leading it to an appropriate space in which the tools of logic can efficiently help the decision-making process. Neurological damages associated with decision-making deficits suggest that there is a set of systems which orient thinking towards the future, towards an end, and this set of systems would be at the basis of deciding advantageously and would be guided by emotions and feelings that are experienced in the form of signals from the autonomic nervous system.

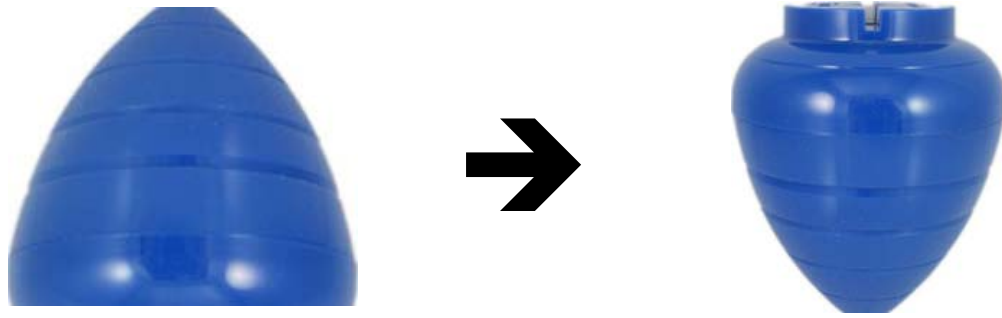
Final consideration: the need for a new economic paradigm

The tendency of life to decrease entropy creates a paradox with neo-classical theories of economics which are based on the assumption that demand will always increase, since people are unsatisfied and want always more and since the population size will always increase. On the contrary the law of complementarity states that after a period of growth people discover that wellbeing and health require a contraction in consumptions. This is probably one of the reasons of the crisis we are now witnessing: neo-classical economic theories are based on the assumption of endless increase in consumption, which is proving to be wrong. Facts are showing that this assumption is true only in developing or under-developed countries, whereas in developed countries population and consumptions automatically tend to stabilize and then to decrease.

According to some estimates of the Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat the peak of the World population size has been reached a couple of years ago, and now the World is starting to experience a natural decline of the population size. But, who supports neo-classical economic theories continue to pretend that the size of the population will continue to increase and suggests that the World population will reach 30 billion people by the end of the century.

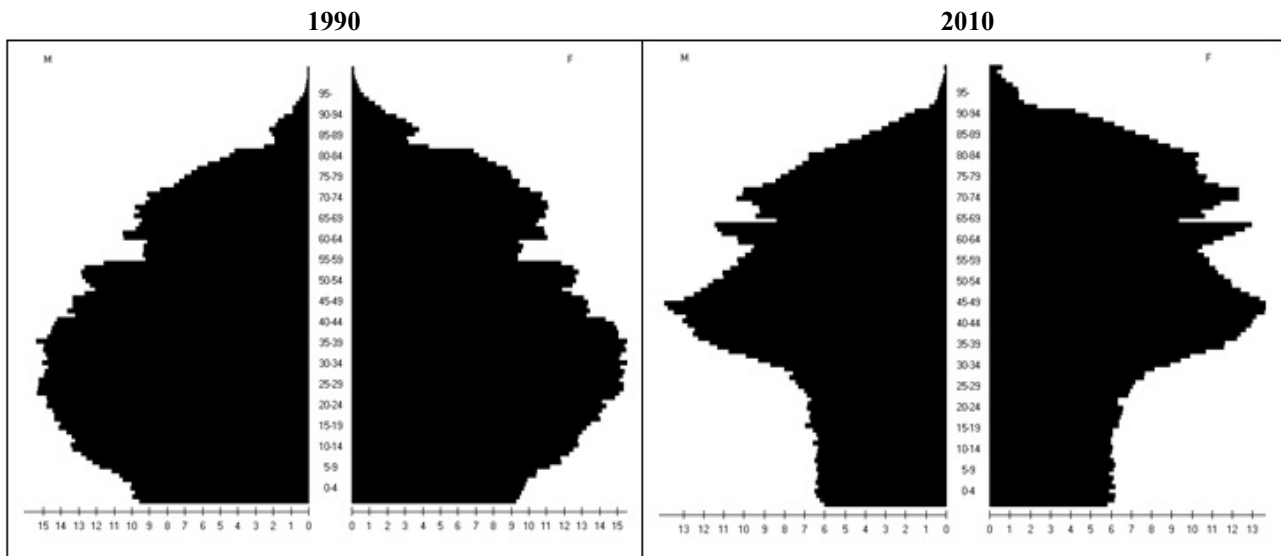
Either way, the transition from under-development to developed is always accompanied with dramatic changes in the demographic structure of the population. The demographic structure of the population can be exemplified using the age pyramid representation. The name age pyramid comes from the fact that until few decades ago the population structure was similar to a pyramid: many young people and few elderly one. The age pyramid is divided in two distributions: on the left that of males and on the right that of females. This representation allows to describe with one image the population structure and its dynamics and future scenarios.

Age pyramids show that when a country shifts from a state of under-development and enters a state of development the age representation shifts from that of a pyramid to that of an inverted pyramid.



When a country shifts from a state of under-development and enters a state of development the age representation shifts from that of a pyramid to that of a spine top.

Since the young and the adult population are the main source of consumption, their contraction automatically decreases consumptions. The demographic age structure with a high proportion of young and a low proportion of elderly people supported the neo-classic economic theories based on the assumption that consumptions will always increase. The new demographic structure, where young people are becoming rare and elderly people are becoming the majority, tells that we are headed towards a decrease in the demand of products. Furthermore, we are now witnessing a sudden increase in the death rate of elderly people and this growing number of deaths among elderly people is flooding the market with properties which are not finding an adequate demand since the number of young adults is decreasing.



Age pyramid transition in Italy in the last 20 years

The same demographic trends starting to show in newly developed countries, such as China and India. The decreasing size of the population implies the decrease in consumptions and this trend will last for almost other 20 years. The belief that we will get out of the financial and economic crisis when consumptions will start growing again is a false belief which leads the World towards unsustainable scenarios which increases crises and risks of a meltdown of the financial and monetary systems.

Probably it is now time for the shift from economic theories based on the assumption of the increase in consumption and wealth to a new economic paradigm based on the decrease of consumption and the increase of syntropy, wellbeing and health.

References

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