

Chapter 5

The fight of life against entropy

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5.1 Introduction

In the previous chapters two levels of description have emerged:

- The level of macrocosm described by classical physics;
- The level of microcosm described by quantum physics.

Macrocosm, as a consequence of the fact that the universe is expanding, is governed by the law of entropy which forces time and causes to flow from the past to the future (mechanical causation: cause → effect). On the contrary, in the microcosm the expansive forces (entropy) and cohesive forces (syntropy) are balanced, and time and causes flow in both directions (supercausality: cause → effect ← cause), Einstein's famous *Übercausalität*.

The law of entropy implies that systems can evolve only towards disorder and destruction of all forms of organization; for this reason various biologists (Monod, 1974) have reached the conclusion that the properties of life cannot originate from the laws of the macrocosm, as these are governed by entropy and evolve towards heat death, disorder, and the annihilation of all forms of organization. Supercausality, and especially syntropy, which is observed in the microcosm, imply the qualities of order, organization, and growth which are typical of living systems. Life qualities could therefore be a consequence of the properties of the microcosm, of quantum physics.

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The question about when a structure moves from the realm of quantum physics to that of classical physics is still under discussion, but it seems to happen around (as suggested by Heisenberg, Neumann e Bohr) 200 Angström (1 Angström equals the size of the atom of helium). In 1935 Eddington suggested the existence of quantum-mechanic actions on living beings, observing the fact that synaptic membranes have dimensions inferior to 200 Angström (Eddington, 1935). Recently, Penrose (1999) and Bondi (2005) have observed human structures which are inferior to 200 Angström, dimensions under which processes are governed by quantum mechanics and therefore by supercausality.

The model which will be introduced in this chapter starts from the hypothesis that the properties of life originate in the microcosm, under the dimension of 200 Angström, where syntropy and supercausality are active; when living structures grow beyond the dimension of 200 Angström the conflict between syntropy and entropy starts:

- on one side life and its syntropical structures;
- on the other side entropy and the laws of the macrocosm which tend towards the annihilation of all the forms of organization and order.

According to this description life can be considered as a bridge which links together microcosm with macrocosm.

The conflict between life and entropy is well known and it has been discussed continuously by biologists and physicists. Schödinger (Nobel prize 1933 for physics), answering the question about what allows life to contrast entropy, concluded that life feeds on “negative entropy” (Schödinger, 1988); the same conclusion was reached by Albert Szent-György (Nobel prize 1937 for physiology and discoverer of vitamin C) when he used the term syntropy in order to describe the qualities of negative entropy as the main property of living systems (Szent-György 1977).

Starting from the hypothesis of a basic conflict between life (syntropy) and the environment (entropy) Ulisse Di Corpo presented in 1981 a model of “vital needs”.

5.2 The model of vital needs

The opposition syntropy/entropy, microcosm/macrocosm, lead Ulisse Di Corpo to the consideration that life needs to satisfy 3 basic types of needs:

1. acquire syntropy from the microcosm;
2. combat the dissipative effects of entropy;
3. solve the conflict between entropy and syntropy.

5.2.1 *Combat the dissipative effects of entropy: material needs*

In order to combat the dissipative effects of entropy, living systems need to acquire energy from outside and protect themselves from the dissipative effects of entropy. These conditions are known under the name of “**material needs**”, and include:

- In order to combat the dissipative effect of entropy:
 - The need to acquire energy from outside, for example with food;
 - The need to reduce the dissipation of energy, for example with a shelter (housing) and cloths;
- In order to combat the continuous production of waste, which is the consequence of the destruction of structures under the effect of entropy:
 - The need for hygienic and sanitary standards and waste disposal.

Material needs will not be discussed in this work, as they are already well known and studied in the field of economics and health. Nevertheless it is important to underline that when these needs are partially unsatisfied, pain is experimented in the forms of hunger, thirst, sickness, and, when they are totally unsatisfied, death is the consequence. The total satisfaction of material needs leads to a state of well being which is characterized by the absence of pain linked to material needs.

5.2.2 Acquire syntropy from the microcosm: the need of unity

Satisfying material needs does not stop entropy from destroying the structures of the living systems: cells die, and structures are destroyed; the living systems is therefore continuously called to repair the damages caused by entropy. In order to mend these damages the living system needs to feed on syntropy, which is the only energy which allows to create order and organization and to counterbalance the destructive effects of entropy.

In the introduction it was stated that the living system, in order to survive, needs to:

1. acquire syntropy from the microcosm;
2. combat the dissipative effects of entropy.

First of all, living systems need to acquire syntropy and only later, when they grow beyond the limits of microcosm and start conflicting with the law of entropy, they need to satisfy material needs. Material needs are well known to everybody, this is the reason why the description of the vital needs started from the material needs, even though, from a logical point of view, the need of acquiring syntropy comes first. This distinction is important as it leads to the hypothesis that two different physiological structures are needed: the first one, older, which acquires -E (syntropy) from the microcosm, the second one, more recent, which develops strategies capable to satisfy the material needs. This distinction can be observed in the living systems as:

- the autonomic nervous system, which supports the vital functions of the living system and which here is considered to acquire negative energy from the microcosm, feeding in this way the vital functions and the regenerative processes of the living system;
- the cortical system which develops strategies capable of satisfying the material needs.

It is necessary to remember that -E coincides with converging waves which concentrate energy. For this reason, when a good connection with -E is established, feelings of

concentration of energy (warmth) associated with well being are experienced in the areas which are governed by the autonomic nervous system (thorax). On the contrary, when the connection is insufficient, a lack of energy is experienced in the form of feelings of chill and emptiness associated with suffering. These feelings of suffering experienced in the area of the thorax are usually named anguish and can take the form of anxiety, fear, panic, and imminent death. Anguish is generally associated with neurovegetative symptoms such as nausea, vertigo, feelings of suffocation (Marcelli, 2000). These symptoms and feelings of pain signal a weak connection with -E. In other words:

1. when the connection with -E is good, positive feelings of warmth are felt in the thorax, the living system acquires a good quantity of -E (syntropy) which allows to feed the regenerative processes which repair the damages produced by entropy;
2. when the connection with -E is weak, negative feelings of chill and pain are felt in the thorax, and are usually named anguish; the living system does not acquire a sufficient quantity of -E (syntropy) and it is not able to satisfy the processes of repair, which usually repair the damages produced by entropy.

Point 2 suggests a correlation between emotional suffering and inefficiency of the immunitary system; when the connection with -E is weak and feelings of pain are experienced in the thorax in the form of anguish, the regenerative processes become less efficient and immunodeficiency is observed. This link between emotions and immunodeficiency is supported by the strong correlations which are observed between negative emotions and the manifestation of cancer.

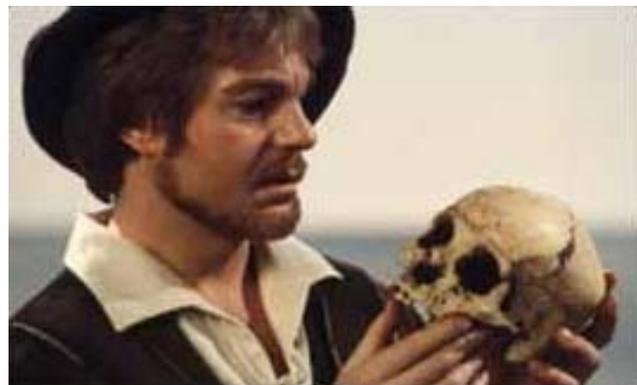
The need for a good connection with -E is felt as need of connection, of unity, and attraction, it will therefore be referred to as *need of unity*. When this need is not satisfied feelings of pain are experienced in the form of anxiety, anguish and pain in the thorax area. When this need is totally unsatisfied the system is not able to feed the regenerative processes and repair the damages produced by entropy: death may result.

5.2.3 Solve the conflict between entropy and syntropy: the need of meaning.

In order to satisfy the material needs, living systems have developed cortical systems which show their highest complexity in human beings. The cortical system produces representations of the environment and compares the living system with the environment.

This process initiates the conflict between entropy and syntropy: while entropy has inflated the environment towards the infinite (diverging waves), syntropy (converging waves) forces living systems to be finite and localized. Comparing the infinite of the environment (entropy) and finite of the living system (syntropy) produces a results which tends to zero:

$$\frac{1}{\infty} \rightarrow 0$$



To be or not to be, that is the question

In this equation **1** symbolizes the living system which is finite (syntropy), while ∞ symbolizes the environment which is infinite (entropy). The comparison between the living system (1, finite) and the environment (∞ , infinite) tends to zero. In other words, comparing ourselves with the environment which is infinite we become aware of the fact that we are equal to nothing. But to be equal to nothing is equivalent to death, a fact which is incompatible with life. It is therefore necessary to solve this conflict between being (1) and not being (0), a conflict which consumes energies and increases entropy. This conflict is generally felt as the need to give a meaning to life, for example:

- increasing our own value (through richness, power, achievement, etc.);
- finding a purpose in life, a finality (through ideologies, religion, etc.).

In living beings with highly complex cortical systems, this need is vital because, when it is not solved, it leads to the dissipation of energy, and in the most serious cases to death. The experiences of pain associated with this conflict are the feeling of being useless, purposeless, and valueless, which are accompanied with a reduction of energy (dissipation of energy, entropy), usually named depression, felt in the cortical area in the form of tension, and usually strongly correlated with anguish and feelings of pain in the thorax. This correlation is suggested by the fact that, from a mathematical point of view, the conflict between being and not being is solved when:

$$\frac{1 \times \infty}{\infty} = 1$$

Where the operator \times coincides with union, which is the property of $-E$ (converging waves). In other words, when we unite ourselves (1) to the environment, comparing ourselves to the environment, we find our identity (= 1).

This last equation permits to state that:

- when the need of meaning is answered increasing the value of the numerator (power, richness, achievement), the identity conflict is not solved, because whichever is the number at the numerator compared to infinite it tends to zero;
- a perfect correlation between anguish and depression must be observed, because when the unity (\times) is weak, anguish increases and also the identity conflict and depression. For this reason depression and anguish should be correlated in a nearly perfect mathematical way.

5.3 The crisis

When Ulisse Di Corpo presented his theory of vital needs he underlined the existence of a chronological order in the satisfaction of these needs. Initially humans have to answer material needs, which are more immediate, and only afterwards can they answer the needs of meaning and of unity. Part of humanity has now answered material needs and is experiencing material well being. This part of humanity is now forced to face the needs of meaning and unity and is undergoing rising feelings of depression and anguish. Di Corpo analyzes the strategies which are used by this part of humanity in order to avoid anguish and depression, among which: the judgment of other people, control, power, religion and addictions.

5.3.1 *Being judged by others*

As soon as we start interacting with others we discover that when we are judged positively depression and frustration diminish. Being judged positively is usually the first technique we use in order to give a value to our life. We feel the need to be judged positively and we cannot stand being criticized or judged negatively. Positive judgment is soon transformed into a need. But, in order to be judged positively, we have to meet the expectations of others; expectations which in time grow and become more challenging. We start playing parts, we use masks which we know are appreciated. The distance between our inner reality and our outward behaviour increases; other people see the masks we use, but they are not able to establish a contact with us, we feel isolated and lonely, distant, always more alien in this world. This isolation increases the conflict of identity and, as a consequence, also our need to be judged positively.

We enter a loop:

- the more we seek positive judgments, the more we use masks;
- the more we use masks, the more we feel isolated;
- the more we feel isolated, the more we feel meaningless;

- the more we feel meaningless, the more we need to be judged positively.

This loop increases the need and the fear of judgment.

In order to receive positive judgments it is necessary to be part of a group; without a group, without other people, it would not be possible to receive any judgment; this generates a deep fear of being refused, a fear which leads to accept any condition the group requires.

In order to appreciate how powerful the need of meaning can be and to what extent people can fear to be judged negatively by others, it is interesting to analyze a very famous study carried out by Milgram (Milgram, 1974). Milgram involved several hundred subjects in an experiment aimed to study to which point people could obey orders which were clearly wrong. He told the subjects that the purpose of the experiment was to study the effects of punishment on learning. Subjects were divided into couples: one person was the teacher and the other the student. The student was placed in a separated room and seated on a special chair which could send electrical shocks; he was given a list of names that he had to learn by heart. The teacher was told to check for errors and to send electrical shocks when the student was wrong. The teacher was asked to start from a 15 volt shock, increasing each shock by intervals of 15 volts up to a maximum of 450 volts. Every 60 volts a recorded voice reminded: "low shock", "medium shock", "high shock", "danger, extremely high shock". Milgram clearly explained that at the first wrong answer the teacher had to send the 15 volt shock, and at each wrong answer he had to increase the shock by 15 volts. When the list of names was long and difficult, the student was frequently wrong, and the teacher had to increase the voltage. At 75 volt the student started to complain about the pain, at 150 volt the student started asking to stop the experiment, but Milgram ordered to continue. At 180 volt the student started shouting because of the pain. If the teacher hesitated, Milgram ordered to continue, even when the student, at 300 volt, was desperately yelling, asking to be freed.

The purpose of the experiment was that of studying to which extent the teacher was capable of increasing the voltage and follow orders which were clearly wrong. The teacher did not know that the student was a colleague of Milgram and that he was not receiving any electrical shock. The teacher was placed in a different room and the yells and prayers of the student

had been recorded on a tape. A group of psychiatrists had calculated in advance that the teachers would have stopped obeying orders when the 150 volt shock was reached and the students started crying asking for help. The result was totally different; 80% of the subjects went beyond the 150 volt mark and 62% reached 450 volts. Nevertheless, Milgram underlined that it was not easy to obey. Many teachers seemed dubious, hesitated, and asked the experimenter to stop, but they continued when Milgram ordered to continue. Disobedience was easier when the student was in the same room with the teacher and when the experimenter was not in the same room. But when the victims were far away teachers obeyed in a prompter way. Only 30% of the teachers accepted to force the victims to place their hands on a metal plate which should have sent extremely high shocks; but if the victims were placed in an other room the obedience rose beyond 60%.

The vital needs model explains these incredible results, underlining the fact that, when people satisfy their need of meaning through other people's judgment, it becomes necessary to be accepted by others, and in order to be accepted people can even agree to cause the worst forms of suffering. This mechanism can turn "normal" people into the most cruel and violent machines.

5.3.2 *Religion and ideologies*

Religions answer questions about the value of life; this is probably the main reason why they have always been so important. But, when we look at religions from the outside, for example, when we examine religions which are different from our own, we often ask: "how on Earth can someone believe things like these!".

Because religions answer questions about the value of life, the need for religion can become so strong that people accept even the most fantastic and dogmatic explanations and become afraid of whoever could doubt them. We avoid people who belong to different religions and become intolerant. History provides an incredible number of examples of how the message of love, which is shared by all the religions of the world, when transformed in dogmas in a religion, becomes the motive for intolerance, hatred, killing, wars, crimes, and devastations.

When our need of value leads us to accept dogmas we develop contradictions such as, for

example, while even professing the love of God, we support persecution, torture and killing of whoever believes in a different religion. The Inquisition and Nazism are just two examples, but things have not changed much and, now, in the 21st Century we still witness people who give support to conflicts among religions.

5.3.3 Expanding our Ego

Typical examples are: money, popularity, power. We can expand our ego in many different ways, but the equation is always the same: "I mean more because I am worth more". This equation does not solve the identity conflict; whichever value we put at the numerator of the identity conflict equation, when we compare ourselves to the infinite of the universe we are always nothing. We can reach any level of importance, we can become emperors of the planet, but we continue to feel worthless and depressed. We can reach the highest forms of power, where life or death can be decided, but we continue to feel equal to nothing.

It is interesting to note that whenever we find a source of value we fall into a loop: if we seek our value through money we will always want more money, if we seek it through power we will always want more power.

Extending our ego leads to a permanent state of fear. We become afraid of losing our money, our popularity, our power.

Many psychologists and sociologists have suggested a specific need for power and domination, such as McClelland's nPow (Need of Power). The model of vital needs states that power and domination are secondary needs which originate from the unsatisfied need of meaning.

5.3.4 Addictions

Substances which produce sensations of inner heat such as alcohol, drugs, and tobacco can hide the feelings of pain which are felt by a person when the contact with –E is insufficient. When substances are used in order to answer the need of unity, we start experiencing the

need for the substance. Any substance which produces feelings of warmth in the thorax, and covers feelings of pain in this region, can lead to addiction. A typical example is alcohol which produces feelings of warmth and reduces anxiety. When used as healing it can lead to one of the strongest forms of craving and addiction. These substances reduce anxiety, and in this way they also reduce the experience of depression, providing in this way a meaning of life. But these experiences of reduced pain and depression are only temporary, as they do not solve the identity conflict. When the effects of the substance finish, pain surfaces again and pushes to reiterate the consumption. After a while this behaviour and consumption are needed only to "feel normal"; in their absence deep feelings of suffering are experienced.

5.4 Unity

The solution of the identity conflict requires that we unite ourselves with the universe:

$$\frac{1 \times \infty}{\infty} = 1$$

For this reason the satisfaction of the need for union also solves the need for meaning, and therefore it can be considered the main need, the passage through which humanity could abandon pain and distress and move towards a state of permanent love and happiness.

Depression, anguish and suffering tell us that our needs are answered only in part. The feelings of suffering can guide us towards more effective answers, while escaping them can block us and cause suffering to increase and degenerate into illnesses.

Illnesses and symptoms can, therefore, guide us towards a higher awareness of our needs. As long as we refuse to evolve and change, illnesses and symptoms will persist and grow. Healing starts when we decide to solve our suffering; healing is an evolutionary process which leads people towards a higher awareness of needs and more efficient answers. When the relations between suffering and unsatisfied needs are obscure, symptoms continue to emerge and, if we block them, they will tend to organize in forms which can gradually become

more severe. Suffering and illnesses are no more than indicators which inform us that change is needed.

Healing starts when we learn the language and meaning of suffering. The purpose of suffering, and illnesses, is that of forcing us back to our process of evolution. The final goal of evolution is unity, and in order to reach it we need to overcome the identity conflict and face all those situations that until now we have avoided. Our happiness depends on:

- 1) becoming aware of the importance of unity;
- 2) discovering that the cause of suffering and illnesses can often be traced back to the identity conflict;
- 3) wanting to discover our blocks, errors, and to overcome them.

Even if some forms of suffering might be dramatic, they are no more than an evolutionary stage in our path towards unity. When we discover that suffering forces individuals and societies towards higher forms of awareness and evolution, situations which had appeared dramatic before can become an incredible opportunity for growth and evolution.