

COMPLEXITY OF HUMAN LIFE

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Introduction

From experience everybody knows that life dynamics are complex. Life phenomena, events and processes emerge out of interaction of many interwoven factors.

Complex is the physical organization of human body, extremely complex is the emotional life of people, their thoughts, ideas and endeavours. Quite complex is organisation of human society, complex - tangled and interdependent are dynamic processes manifested in our planet, in our solar system and universe. So complex that contemporary science can see only a tiny little bit of this overwhelming COMPLEXITY. Experts from different branches of science hurry to divide this tiny bit into even tinier particles, to analyse some of them and draw conclusions, then to repeat or extend the analyses and to re-write these conclusions, then again to look at the particles and come possibly to entirely different conclusions, and so on.

To divide, separate and analyse - this is what science does very well. To unify, unite and synthesise into an organic and indivisible wholeness is not easy for fragmented approaches used by the scientific disciplines. It is easy for nature and she does this perfectly!

Chaos theory and complexity science try not to divide. Their mission is not to divide because at the focus of their research is INTEGRITY - interconnectedness, relationship and interaction of the myriad of complex dynamics, whatever their specific manifestations are. Chaos and Complexity try to understand characteristics and laws of behaviour that are common for all dynamic processes. And as far as non-dynamic processes simply do not exist in universe, chaos and complexity study something very fundamental, essential and vital for understanding unity of all existential forms.

What chaos theory teaches is that dynamics of complex processes are nonlinear and chaotic - small changes in the initial conditions of such processes may give birth to unforeseen transformations in future. Chaotic dynamics are ubiquitous - from the behaviour of molecules to the interaction of planets and galaxies, from the behaviour of cells to the interaction of people and civilisations.

It is not a problem at all to accept that dynamics of human life are complex and chaotic. What is problematic is to grasp that these dynamics are extremely susceptible to our actions, to our thoughts, stories, feelings, beliefs and attitudes. In an almost mysterious way, small changes in the flow of our thinking processes can bring forth radical transformations in the overall dynamics of our life.

In its physical manifestation individual life dynamics are dissipative - life starts, evolves, and then gradually (or suddenly) shrinks and stops.

Four Principles of Life Complexity

Dissipative dynamics of life follows four basic principles.

1. Principle of Attraction

The first is the principle of attraction: dynamic behaviour of life processes always gravitates to some relatively stable dynamic patterns called in chaos theory *strange attractors*. Being in the 'basin' of some strange attractor, life dynamics continue to be chaotic, that is, sensitive to initial conditions and, therefore, unpredictable. What is predictable is that dynamics 'stay' at this strange attractor.

The attractors of life dynamics are usually driven by human desires of different kind: desires for power, for love, pleasures, freedom, etc.

2. Principle of Fractality

The second is the principle of fractality: There is always some kind of nested similarity in chaotic dynamics. Chaos theory defines fractals as similar structures that repeat at different scales of generalisation.

If we consider, for example, complex dynamics of human health, we can see that individual health dynamics are not only similar to, but also nested in, the family health dynamics. Nested implies interdependence, that is, the individual health of a family member not only influences the state of health of the whole family but also reflects this state. Family health dynamics are similar to and nested in community health dynamics, which are similar to and nested in the health dynamics of society.

Of course, social health dynamics have not only physical dimensions but also environmental, economical, political, cultural, ethical and moral. The health of society as a whole both reflects and strongly influences health dynamics of the environment, which are similar to and nested in chaotic dynamics of the health of our planet (considered as an unified complex living organism), which are similar to and nested in the 'health' dynamics of the universe.

Nested dynamic structures are always open for mutual interaction - dynamics of each structure S are strongly influenced by the dynamics at least of two other structures: the one which is nested in S, and the other which envelopes S. For example, life dynamics of our environment inevitably reflect both the life of human society (internal dynamic structure), actively intervening with the environment, and the life of the planet considered in its integrity (external dynamic structure).

3. Principle of Emergence

The third is the principle of emergence. Complex systems are open for emergence of new dynamic patterns. When billions years ago complexity of the protein structures in the primordial soup increased, simple life forms emerged. With the increase of their complexity, different species appeared. So the inorganic matter gives birth to organic. And from the organic matter the realms of plants, animals and humans emerges.

4. Principle of Self-Organization

Emergence needs self-organizing forces to sustain it. Without such forces, no one emergent form can survive. In physical systems, self-organizing forces usually appear out of vortices.

Vortices are inherent in chaotic dynamics. The spiral turbulence of a whirlpool is driven by interacting streams of moving water, each stream with different physical (or/and chemical) characteristics. The spiral turbulence of a tornado is driven by interacting streams of moving air, each stream with different physical (or/and chemical) characteristics.

Whirlpools and tornadoes generate powerful self-organizing 'sucking' forces. Due to these forces, emerging vortical structures of whirlpools and tornadoes are sustained. And vice versa: due to vortical structures of whirlpools and tornadoes, the emergence of self-organizing forces is sustained. Thus, the nature of emerging forces is self-referential: self-organizing forces are both cause and effect of one and the same vortical (spiral) chaotic dynamics.

The spiral vortex of our galaxy, once emerged from the interacting 'streams' of ionised matter, has given birth to powerful self-organizing forces which continue to energise (create, sustain and destroy in never ending evolutionary cycles) the existence of all galactic formations.

The four principles of chaotic dynamics help us to navigate through the tides and ebbs of life.

Dynamical Autopoiesis

In 1973 Maturana and Varela introduced the concept of autopoiesis as an ability of biological systems to reproduce their organization in a co-evolving structural coupling with the environment. Changes in environment give birth to changes in species - both structural and behavioural, and vice versa: changes in species lead to changes in their environment. (H.Maturana, F. Varela, *The Tree of Knowledge*, London: Shambala, 1987).

1. Integrated Ecological Space (IES)

This vital interconnection (interdependence) between dynamics of living forms and their environment allow us to introduce the concept of the integrated ecological space (IES) where life dynamics of species and environment are considered *inseparable*. IES includes dynamics of all animated and non-animated forms in nature. Plants and rocks, volcanoes and animals, stars, planets and humans - they all change and co-evolve due to activity of the same natural forces. And their dynamics obey the same four principles of life complexity described above: principle of attraction, principle of fractals, principle of emergence and principle of self-organization.

2. IES Strange Attractor

Like the famous *butterfly attractor* of Lorenz, the basic strange attractor in IES consists of two inseparably connected regions ('butterfly wings') - one is the region corresponding to dynamics of non-animated environmental forms such as rocks, minerals, planets, stars, human-created forms; the other region corresponds to dynamics of animated living forms such as micro organisms, plants, animals, humans. Neither of these two regions has independent existence - complex evolutionary dynamics of living organisms are *structurally coupled* to the complex

evolutionary dynamics of non-animated environment. Moreover, *evolutionary dynamic trajectories* of some living forms pass to non-animated region of the attractor every time when death-bifurcations occur, and vice versa: *evolutionary dynamic trajectories* of some non-animated forms 'jump' into animated region of the attractor every time when life-bifurcations occur.

3. Chaotic Rhythm of Nature

Chaotic dynamics of all forms of matter in IES are driven by common self-organizing and self-propelling forces - the same natural forces which constantly emerge from the galactic vortices and energise quasars and stars, planets and comets, oceans and volcanoes, atoms and molecules. The same forces responsible for the growth and reproduction of species, for the pulsation of our hearts and the rhythm of our brain-waves. We cannot predict the rhythm of natural forces as we cannot predict the precise position of the Earth in its orbit, the outbursts of supernovas, the number of fruits on a tree, the number of offsprings of an animal, the exact amplitude of the next beat of heart, the occurrence of moments of death or birth. *The rhythm of natural forces is inherently chaotic.*

The strange attractor which holds chaotic dynamics of all possible forms of matter in the integrated ecological space supports a new form of autopoiesis that we shall call *autopoiesis of dynamics* or *dynamical autopoiesis*.

Dynamical autopoiesis characterises ability of all forms of matter to reproduce and co-evolve their dynamics in tune with the chaotic rhythm of the forces of nature.

Dynamical Autopoiesis manifests the unbreakable unity of all existential forms. Dynamical Autopoiesis illuminates a new perspective in understanding Evolution of Life. Depending crucially on ever existing chaotic dynamics of the myriad of life-creating, life-preserving and life-destroying processes in the universe, life evolution can never stop. It goes forever.

Seven Attractors of Human Life Dynamics

Chaotic dynamics of human life have their own *evolutionary trajectories* in the integrated ecological space. These trajectories reflect people's activity during their life time. Driving forces of this (quite diverse) activity are permanently emerging human desires of any kind.

According to the ancient Vedic literature, people's actions are usually directed towards achievement or acquisition of *power, knowledge* and *freedom*, as well as towards experiences of *love, pleasures* and *longevity*. Whatever an individual does, his or her actions are pulled towards one (or more than one, in parallel) of those six attractors.

There are enough experiential evidences supporting the ancient Vedic wisdom: it does not matter how diverse our every day life activity appears to be, it is inevitably driven (consciously or unconsciously) towards securing our long time survival (*longevity*), towards exercising *power* in various forms (acquiring of possessions and money, higher social status and prestige, advantage in force or skills), towards extending the degree of our *knowledge* (intelligence, education, cultural or spiritual enrichment). The thirst for *freedom* is crucial for opening spaces of new possibilities for realization of our skills, creativity, intellectual and artistic ability, talents,

dreams, etc. And, of course people's lives are powerfully driven towards the experience of *love* and a multitude of *pleasures*, some of which could be quite addictive and even threatening individual or social survival.

Longevity, Power, Knowledge, Freedom, Love, and Pleasure represent six dynamically stable patterns - *six chaotic (strange) attractors* in the turbulent flow of human life.

Usually human desires drive life dynamics to more than one attractors, for example: pleasure *and* love, or knowledge *and* power, or freedom *and* knowledge *and* long life. Although one cannot predict a specific life trajectory of an individual or group, one can find out the attractor (or attractors) at which this trajectory is located. Each attractor or combination of attractors strongly influence people's behaviour, emotions, mentality, moral, cultural and spiritual life.

There is only one *non chaotic (fixed)* attractor for human life dynamics - the attractor of death. As far as life dynamics of each individual are dissipative, they 'shrink' with time, gradually (or suddenly) stop to be connected with any strange attractor of life activity and fall into the fixed attractor.

Are We Destined to Follow Attractors' Dynamics?

Are we destined to spend our lives 'stuck' to some chaotic attractors and to do nothing but repeating one and the same dynamic patterns all the life through - pursuing power, pleasure, knowledge, love, freedom, longevity, and finding eventually only death?

Not very attractive perspective to such intelligent creatures as humans - to dance helplessly to the tunes of attractors' chaotic dynamics, blindly following an inherited self-organizing drive towards increasing complexity, criticality, and bifurcations, without being able to escape from this drive even for an instant.

Unfortunately, most of us do exactly this - simply 'stretching' and 'foding' their activity in the basin of some chaotic attractor without any specific direction, or forcibly jumping from one basin to another, without having even a slightest clue what is the purpose for all these stressful jumps, or frighteningly existing as trembling fractals near to the bottom of a huge and complex vortical structure furiously whirled by monstrous universal forces ungraspable by human mind.

The fight with gravitational forces of chaotic attractors, particularly when the forces have roots deeply in unconscious human psyche, is extremely difficult, if not impossible. The studies of alcoholism and drug addiction - complex phenomena with dynamics 'stuck' at the chaotic attractor of pleasure, demonstrate that fighting against addiction not only fails but has totally opposite effects: fighting intensifies the degree of attraction, that is, makes the attractor more robust and statically stable. The energy feeding the attractor puts into operation a special self-protecting and self-justifying mechanisms which produces impossible to untie 'double binds' eventually reinforcing the drive to addiction (*G. Batson, Steps to an Ecology of Mind, San Francisco: Chandler Publ. Co., 1973*).

And yet, it is possible for humans to become free from the repetitive patterns of attractors' dynamics.

Ways to Escape from Chaotic Attractors

The ways to escape the basin of an attractor are either

- to bifurcate to another (more powerful) attractor
- to exhaust the sources energising a chaotic attractor
- to transcend the power of attraction.

1. Bifurcation to Another Attractor

Human life dynamics can bifurcate from one attractor to another which appears to be more powerful for a certain period of time (or lifelong). For example, there are many practical cases showing how the attractor of love helps people with addiction. In these cases, the strength of gravitation towards the experience of a genuine love relationship becomes great enough to resist the temptation of the drug (or alcohol) consumption, dynamically related to the chaotic attractor of pleasure.

There are practical cases when the attractor of knowledge becomes more powerful in comparison with the attractor of pleasure. However, this can only occur at some earlier stages of addiction, when the brain of the addict is still able to function 'normally enough' in order to

- assimilate or explore in a rational way what has been written or said about the potential threat of going too far with the addiction, or
- exert some kind of self-analysis eloquently exposing to the addict the damages already created in his(her) emotional or intellectual life.

The main problem with the attractor of knowledge is that the logic of human reasoning can hardly resist the fire of emotions irrationally erupting from the attractor of pleasure where the seeds of every strong attachment (addiction) abide.

Stability of a new attractor crucially depends on its energy supply - for how long this supply will be higher than the supply of energy feeding the old attractor. For example, for how long the intensity of feelings and emotions, desires and passions, thoughts and realisations, related to the attractor of love (or to the attractor of knowledge) will keep higher in comparison with the intensity of still living desire to experience again the pleasure of an addictive. Reversible bifurcations, that is, bifurcations from new chaotic attractors to old ones happen quite often in the dynamics of human life.

2. Exhaustion of a Chaotic Attractor

Chaotic attractors are dissipative dynamic structures - they consume energy to keep going. When the energy supply decreases and stops, the attractor shrinks and disappears. When the rate of energy consumption by a chaotic attractor is higher than the rate of its energy supply, the attractor gradually dies.

In the examples with the addiction, if the intensity in manifestation of an addiction increases up to such degree, that the organism of the addict becomes unable to deal with the effects emerging as a result of this increase, then the addiction 'naturally' approaches the zone of its exhaustion. The addiction to nicotine usually leads to irreversible changes in the function of the respiratory

system that can eventually bring forth diseases which makes it impossible for the addict to continue. Similar is the picture with the exhaustion of the addiction to alcohol, drugs, gambling, and every other manifestations of the attractor of pleasure. When a gambler loses everything - friends, relatives, and every other means for self-subsistence, the gambling stops - chaotic attractor of pleasure received by gambling is exhausted. It is clear that such 'natural' exhaustion could be very disastrous for the addict.

To passively wait until chaotic attractors of life dynamics exhaust themselves is the most dangerous (in respect to human health) way to escape from their basins. This way of escape often lead to fatal consequences.

3. Transcendence of a Chaotic Attractor

The best way to overcome the pulling power of a chaotic attractor is to transcend its basin - not to fight with the attractor's dynamics, neither to yield to them and passively wait for their self-exhaustion, but:

- to be constantly aware of the forces operating at the attractor;
- to try to understand the source of energy that feeds these forces;
- to watch under what conditions (both internal and external) these forces become stronger and under what conditions they lose their potency.

A calm and indifferent observation of the interplay of forces, both emerging from and contributing to the attractor's dynamics, helps to discover that unique complement of internal factors (state of mind, emotional state, spiritual attitude and experience) and external conditions (surrounding nature, people, relationships and activities) which makes possible the transcendence of the attractor.

Transcendence of an attractor cannot happen without the following preparatory phases:

- A recognition of attractor's activity and its supporting sources of energy;
- A exploration both of internal and external factors affecting (strengthening or weakening) attractor's activity
- A gently seeding changes in individual's inner nature (emotions, thoughts, spirituality) so that to develop and strengthen individual capacity for self-awareness, alertness and self-control.

This capacity for self-awareness, alertness and self-control is decisive when transcending any chaotic attractor. It is a capacity that empowers individuals to become free from routine. It is a capacity for deliverance from any habit, from any mechanical and repetitive way of existence, from any addiction.

The capacity for self-awareness, alertness and self-control opens a new inspired way of living when the individuals themselves (and not the chaotic attractors) assumes responsibility for realization of the evolutionary dynamics of their own lives.

Example. Searching ways of transcending chaotic attractor of pleasure.

(1) Recognition of attractor's activity and its supporting sources of energy

The chaotic attractor of pleasure acts in the life dynamics of every human being. It is the most difficult for transcendence attractor. Its driving force is enormously powerful - its source is in the human search for happiness. Through experiencing pleasures people feel happy. The addicts look for happiness in very dangerous for their health pleasure-experiences.

(2) Exploration of factors affecting attractor's activity

Happiness comes spontaneously, so one cannot repeat it. Pleasure can be repeated. The more one tries to repeat the unrepeatable moment of happiness, the more one repeats the repeatable moments of pleasure, and the stronger becomes the desire for repetition of those moments. So, the desire for pleasure is nothing but our past experience in search of another repetition again.

Happiness is a deep personal experience which depends only on our inner emotional, mental or spiritual states. The experience of pleasures depends on something or somebody outside us. Such a dependence inevitably (earlier or later) brings pain. Dependence is always a misery and those who depend in their happiness on this or that, they are helping their own misery.

Any 'accumulation' of human pleasure (usually related to an excess in eating, drinking alcohol, use of drugs, gambling, sexual indulgence) has a tendency to become a vice (bad habits, a degrading practices, immoral ways of conduct).

(3) Seeding changes

The process of seeding changes starts with understanding the transient nature of pleasures, their unsatisfactoriness for the development and growth of personality, their self-propelling potency to impede inherited individual drive towards self-realization.

For alcoholic and gambler anonymous crucial for transcending the attractor of pleasure is the acceptance of a specific spiritual attitude leading to a deliverance from the addiction.