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## PROCEEDINGS

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# THE COMPLEXITY OF PRENATAL & PERINATAL EXPERIENCE: WHY TRAUMA AND HOW TO HEAL

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**Abstract.** Looking at our Pre/Perinatal Experience from the perspective of Modern Sciences and Theories (Complex Theory) that cast light to the ways that our Cosmos has come into being in general and how human life appeared and evolves, we can realize that the same Eternal Universal laws that govern Cosmos are to be found at work behind our Human Life Dynamics.

**Keywords:** *Prenatal, Perinatal, Trauma, Complex Theory, Consciousness, Evolution, Chaos, Emergence, Path Dependence, Self-Organization, Fractals, Hubs*

## HOW COMPLEX IS COMPLEXITY?

In Latin, the word *complexus*, from which the word *complex* derives, ***meant woven together, encompassing, made up of various interconnected parts***, while in psychology the word *complex* refers to ***a group of related, often repressed memories, thoughts and impulses that compel characteristic or habitual patterns of feelings, thought and behavior***. However, complex is also “*not simple*” or “*difficult to understand or deal with*”. It’s been quite a long time now that in science as well as in health, whatever we thought of as “difficult to grasp” we developed the tendency to “break down” in small parts to make sense of it. And this strategy of reducing and cutting down in our effort to understand has been a strategy we can see in other aspects of our life.

However, a number of sciences among which Biology, Chemistry, Computer Simulation, Economics, Mathematics, Physics and communications have developed and have proven theories that cast more light to the ways Nature functions when creating worlds even ***multiverses***, not just our Universe. Today, the Theory of Complexity has developed key principles that can explain **complex adaptive systems (CAS)** and **complex evolving systems (CES)** in more appropriate ways. And as the story goes, due to the synergetic work of a number of exquisite Scientists including Stuart Kauffman (1993, 1995, 2000), John Holland (1995, 1998), Murray Gell-Mann (1994), Peter Allen (1997), Brian Goodwin (1995, 1996), Ilya Prigogine (1985, 1989, 1990), Humberto Maturana, Francisco Varela (Varela & Maturana 1992), Mingers (1995), Gleick (1987), Luhmann Niklas (1986,1995), Steve Strogatz and Duncan Watts, complexity has ceased to be complicated and as the understanding is much better now it will be very soon when Complexity will become “**Simplicity**”.

Studying complexity helps us understand the nature of our world as well as the nature of the organizations we live in. And although a lot of work needs to be done to test how well and to what extent complexity principles can be applied to prenatal human evolving or adaptive systems, this is our initial effort to explore the metaphors, analogies and models within complex systems in the field of Prenatal Psychology.

What is more, it is our intention to introduce a conceptual framework, a way of thinking and a way of seeing the world of human experience from pre-conception to after birth and beyond, expanding our pre-conceived linear ways of looking at what is and what becomes to new nonlinear dynamic systems that can better explain how we might co-evolve from generation to *generation*.

## THE KEY PRINCIPLES WITHIN COMPLEXITY

All Natural Complex Systems, Human Systems included, present common characteristics or behaviors.

Table 1: Key Principles

1. Connectivity & Interdependence
2. Co-Evolution
3. Dissipative Structures
4. Exploration of the Space of Possibilities & Exaptation
5. Feedback
6. Spontaneous Self-Organization
7. Emergence
8. Path Dependence
9. Participation
10. Chaos, Coherence and Order

### CONNECTIVITY & INTERDEPENDENCE

Within any system all elements are interconnected. They interact with each other and with the environment in which they exist. Urie Bronfenbrenner, when formulating his Human Ecology Theory, has stated that human development is influenced by the different types of environmental systems (namely the *micro-system*, the *meso-system*, the *exo-system*, the *macro-system* and the *chrono-system*). Prenatal Pioneers including Peter G. Fedor-Freybergh (Mother/Baby Dialogue) Grigori Brekhman ( Wave Theory), the Turners (Whole-Self Prebirth Analysis Matrix), Lake (M-FDS), Grof (Matrices) etc., have spoken about the importance of the uterine environment and the interplay between the Maternal Environment and the baby conceived, in gestation and being born as well as the imprints that may stay with him later on as baby grows into childhood and adulthood.

The development of the (un)born child is the result or outcome of an intricate, intertwining of myriads of elements or information that may affect him. However, this affect does not have equal or uniform impact on all, and, each one of the human beings in the field, as this varies with the state of each related individual and system at a given time. The history and the constitution of the maternal system - in its expanded meaning - as well as the organization and the structure of it, will shape the (un)born baby in a unique way that is connected with the history, constitution, organization and structure of the (un)born child her/himself. A lot depends on how open or closed the two systems are and the interplay may lead to outcomes that might not be experienced as beneficial by all involved parts.

As all of us involved in Bonding Analysis or Empowering Prenatal Bonding have noticed, the way a mother or family perceives the (un)born child and the consequent ideas, thoughts, attitudes, emotions and behaviors that stem from this way are not necessarily empowering for the (un)born. As the baby may try to improve her/his opportunity in life, this may mean a worsening condition for others who cannot see the mutual benefits for both organisms in symbiosis.

## INTERCONNECTIVITY IS “CONNECTED” WITH A HIGH DEGREE OF INTERDEPENDENCE

The greater the interdependence the wider the ripples of disturbance may be as the “improvement“ in one part may impose associated “costs” or “losses” on another part within the same system or related systems. A failure to recognize the win-win aspects may trigger unnecessary friction.

Grigori Brekhman has spoken about the multidimensional communication between the maternal environment and the (un)born baby. Complex systems are indeed multidimensional and all dimensions interact with each other altering and changing to the best or the worst. Narrowing down research to one or some dimensions will prevent us from fully understanding the ways human beings become in the process.

What is more, as Complex Evolving Systems can adapt and evolve creating new order and coherence, it is important to see how the agendas of each part in the mother-baby system can work effectively as a team for the optimum outcome; or change the rules of interaction and act on limited understanding of what the system aims to achieve as a whole or adapt to self-repair and/or self-maintain. Different degrees of connectivity and/ or interdependence within the family systems as well as diversity, density, intensity and quality of interactions between maternal environments and (un)borns - later grown-ups - has been seen in Prenatal Psychology.

## CO-EVOLUTION

Kauffman has stated that “*Co-evolution takes place within an eco-system and can- not happen in isolation*”. According to Wright (1931, 1932) “*Each genotype has a fitness and the distribution values over the space of genotypes constitute a fitness landscape*”. Each organism can alter the fitness landscape of self and the fitness landscape of the other as it influences and is influenced. The evolution of the (un)born baby is dependent on the level of evolution of the maternal environment. The symbiotic phase calls all of us to think of co-evolution opportunities not only for the (un)born but also for the maternal environment. *Co-evolution*, that is the evolution of interactions, places a strong emphasis on the quality of relationship between the co-evolving parts.

Furthermore, we need to see this co-evolution process as an open system that does not follow a linear direction but is in constant interplay with all other systems at play. We are constantly influencing co-evolution and self-evolution. This viewing of things takes us to the new position of seeing the (un)born not as a passive receiver of influences but also as a fully participating, active agent of co-evolution and self-evolution with all responsibilities and rights connected to it. No individual, no part is powerless as each part reverberates through a very subtle web of inter-relationships and calls for greater “*sensitivity*” and awareness of responsible action.

It is also important to look at the element of *time* in co-evolution as two or more organisms can co-evolve **if they change in the same upward direction at the same time**. Can short-term adaptation in one part lead to long-term co-evolution? Can the rate of co-evolution be measured? As prenatal experience is a preparation and adaptation for functioning properly after birth, could the transfer of information, knowledge and above all wisdom from the maternal environment to the new human being allow her/him to better operate and function in life and allow the family bonds to stay strong and not fall apart? How can we all, in the wider context of

maternal environment, create the culture that will help the child/human being to not only survive but also thrive? And, how can all of us, in the same context, by doing so evolve as well?

As professionals in the field, it is part of our mission to see how our constituent aspects can evolve together in an interconnected, interdependent way within an ecosystem and allow the ones that come to our clinics learn how to harmoniously co-create their environment in ways that are to the mutual benefit of all stakeholders, removing any barriers that interrupt creative interactions and **teaching** - when needed - how to make space for the new person to make their contribution and develop the appreciation of what each member/human being can bring to the system and the willingness to accept what is offered to her or him.

## DISSIPATIVE STRUCTURES & EMERGENCE

Dissipative structures are ways in which: *“Open systems exchange energy, matter or information with their environment; and, when pushed “far from the equilibrium point” they can create new structures and order”*.

As Nicolis and Prigogine (1989) said: *“By applying an external constraint, we do not permit the system to remain at equilibrium”*. When, we continue to apply such a constraint, there will be a critical point when the equilibrium will disappear and a new structure (order) will appear. This new structure is the result of a self-organizing process of the system in its effort to continue existing even after having pushing far beyond its own equilibrium state losing its own old structure/order and, at the same time, assuming a new one better equipped for the new environment-hopefully of a higher level.

The new form is usually of **unpredictable and uncontrollable nature**. It is behind all forms of creation in our Universe and it is the factor that makes each one of us stay aghast at the variety of forms energy can take.

At the same time, there is not one and only one possibility for the new form to emerge as there are several solutions that may lie ahead for the same **“parameter values”**. But, which one is to be taken? Which solution will be selected and which path will be followed? This is what gives *the specific system a “historical dimension” kind of “memory” of what had happened at that specific moment which affected its further evolution* as Prigogine (Nicolis & Prigogine, 1989) has also said. The past symmetry was lost but the emergent behavior presents coherence, the result of micro-level interactions of the participating parts, even against entropy as shown by Prigogine.

In Prenatal Psychology, one of the most significant fears that surfaces is the fear of death; the fear of the unknown which is also the fear of life Otto Rank spoke of. Is the key to understand this, to this specific dissipating structure, that lead to the emergence of new forms? If, yes, then our teachings and our support systems may take new avenues of development as we dare to lose identity and traditional known forms and schemata to enter the world of all new forms and all new identities open ahead or just the one that is responsive to the new order parameter values.

Spotting the **bifurcation points**, that is *“the forks in the Road”* can be most significant acts. It is at that point, when all possibilities are present simultaneously and what remains to create the new is the decision through the dynamics of fluctuations as the system scans the new territory and makes its efforts to stabilize again becoming a “historical object” depending on the decision made.

As the Turners have shown in their Whole-Self Prebirth Analysis Matrix (W-S PAM), there are a lot (22) of bifurcation points in our primal experience from pre-conception to

postnatal. At each of them, the (un)born human organism is educated and makes decisions depending on the information it gets from the environment in mother's consciousness, and these decisions shape their future. Our prebirth environment experiences become our history and our future; and, what makes the difference between living entities is the current state (our individual present experience) and that of the maternal environment. **Our present is the keeper of all destinies.** Before any decision is made final, the alternatives are sources of innovation and diversification, endowments towards the direction of exploring the space of new possibilities in terms of behavioral patterns and relationship modes.

Dissipating structures, the creative force at work, and the act of "**autocatalysis**" can be seen not as catastrophe of form (which is as the symmetry is broken) but at the same time, creators of new multiple solutions open in front of us. It is then the "**hysteresis**" based on the past history of each one of us which will lead to new self-organized forms of higher wisdom, thus called **evolution**.

When analyzing our primal experience and **Primal Health System** (this interaction of nervous, endocrine and immune system as a whole system) we can trace the critical points of our prebirth history and it is here where there is a vast possibility for all Health Advancement, freeing not only our proteins on a biological level from synthesizing this or that form of life, but, our destinies as societies and nations, as Humanity from self-reproducing patterns of lower level Health and civilization. Professionals in the field of Prenatal Psychology are invited to act as catalysts and also as enabling/empowering infrastructures offering their support at such critical points in our process.

It is also important to bear in mind that **form emerges**. It is not imposed and there are no end states. This remembrance can help us make decisions away from eugenic practices. It is good to maintain our intentions as life developers, or better say, as **life evolutionaries** who can shape outcomes in the generations to come. But, there will always be unexpected outcomes, too, which may surprise us, and which are entitled to the rights of being and becoming as part of the ways energy chooses to manifest.

## **EXPLORATION OF THE SPACE OF POSSIBILITIES & EXAPTATION**

Complexity makes it clear that each and every living entity needs to be always scanning the environment so that she/he can spot the optimum possibilities present in the environment which can guarantee either survival or thriving experience. This scanning is a never-ending process as all systems are characterized by an unsteady element which makes them changeable. We need to have a level of intellect/ intelligence to spot the changes and strategies which will allow us to make micro flexible adaptations to it, so that we can safeguard what is optimum for us at every given moment. It is not an act we are called to do once and then rest, but, a process that calls for active participation in continuously, rapidly changing ecosystems.

Flexible adaptation calls for empowering new ways of looking at things and seeing things. Stephen J. Gould and Stuart Kauffman (2000) have used the term "**exaptation**" to describe the act of "seeing a novel function for a part of an existing entity. It is the quality much appreciated today in research, applied Science, innovation, art to mention just a few.

Asking our clients, our children, our colleagues, our partners and ourselves what new good use of the existing resources can you spot in the here and now, and how can you make it work so that it can open up new survival and/or thriving possibilities is a habit that we could develop towards this direction. That exploration of the "**adjacent possibility**" can take us to the

identification of the “**building blocks**” at our disposal, so that we can better create what we can be and become. The “**endogenous mechanisms**” that can be triggered can be critical as to the success or failure of the system to find new ways of making a living and/ or thriving. And as many in Prenatal Psychology have clearly shown, *the higher the primal stress, the lower the functionality of our Primal Health System*. Removing what may block such successful exploration of possibilities in the vicinity and empowering the human being to wisely scan, spot and bring to form resources present in the now and here can be one of the major priority learning tasks of educators in all fields, parents and teachers included apart from Psychotherapists.

Perhaps, it is not surprising that our world today is faced with metabolic challenges, name them diabetes or obesity, but, also making our world a sustainable living experience. Questions like “*how can it be better than that?*” can make a huge difference in the direction of exploring optimum possibilities.

## FEEDBACK

Each system depends on both negative and positive feedback gained from the environment. Any negative feedback that reaches the system contributes to the stability of the system and becomes the conservative force, the stabilizer of its existence. Any positive feedback creates an amplification condition, and renders the system sensitive to dissipating structures and a new coherent order. There is a sort of non-stop “**dance**” between change and stability in complex systems. When things do not work new ways are to be found. Once the ways serve the system well, there is a tendency to maintain the equilibrium gained.

In Prenatal Psychology, it is important to look at human (maternal - (un)born baby) interactions that influence potential action and behavior from either side and work with the feedback exchanged between or among the participating parts, as well as the ways this feedback is interpreted by them as part of the degree of connectivity, time and space as well as the light encapsulated in the system and how this is connected with co-evolution of all involved.

## PATH DEPENDENCE

In physic-chemical systems, we can observe “**bistability**” the phenomenon that Prigogine has named as such when “*under the same boundary conditions, it is possible that several stable states can exist*”. The specific path that a system will follow is based on the past history (our past becomes our future) and it is highly unpredictable as the past not only of human beings can be traced in the long held information carried by the ovum from time immemorial but also of our Universe the creation of which, and the forces at play at the time, are lost and still not uncovered. The interplay between negative and positive feedback, stability and change seems to be similar to the game as children we used to play when we were divided in two teams and pulled a rope we as part of the team in our direction trying to get the other team to lose hold of the rope and so to win.

The insight we gain as to how our neural system communicates information, but, also the ways network communities function together with the insight we got from the work of Prof. Albert Laszlo Barabasi and his findings on the ways hubs work in knowledge transfer - the same stands true of human cells where hubs are found allows us to even attempt to predict outcomes using Barabasi’s equation  $P(k) = Z(k) - \lambda$ . This simple law describes our complex interconnected

world and gives an insight on the patterns followed by each system. Clusters may at first attract little interest but as they gather force they may lead to the tip point where the dissipating structure will appear; the rope will be left to one team; a path will open in front of the system for it to follow. Expansion or constriction, the two polarities are both possible as the two paths at the far-edge lost stability in the middle.

As Path dependence can also be used to enable further developments it would be very wise to bear in mind a Salutogenic focus of thinking and acting: Health breeds Health, Civilization breeds Civilization, Evolution breeds Evolution and Wisdom breeds Wisdom. Let us focus on this direction, being brave enough to dissipate forms that are not conclusive to those, so that every day we can create new paradigms in this direction.

## **SPONTANEOUS SELF-ORGANIZATION**

Darwin and Wallace have spoken about natural selection in which a “**single force**” sets to motion processes that dictate who is going to stay, and who is going to change, and in what ways. Kauffman argues the Darwinian point of view and speaks about the three characteristics of self-organization, emergence and order, as a whole together with natural selection are necessary for evolution. Emergence is a whole that needs to be studied as such, and not as separate parts. It is related to the parts and forces that have worked behind, but synergy -the end outcome- is greater than the sum of the parts. We need to look at the ways life organizes itself and new order emerges to get the deep understanding of who we become, of Health and dis-ease or breakdown as part of a self-organization stage, so that, a new emergence comes out not necessarily in the form of evolution but also as a form of mal-adaptation.

Observing the forces at play when analyzing Primal Experience can discover the energy and the ways it synthesizes to emerge and “feed” missing information, so that the human being can have more opportunities to self-organize who she/he is towards evolutionary paths and not mal-adaptive ones.

Fundamental structural development in the form of novelty is very different from superficial change in this direction. We, working in the field of Prenatal Psychology need to provide for both: **Breadth and Depth**. **Breadth** in the meaning of allowing sufficient diversity for spontaneous self-organization to happen, making space for heterogeneous groups and relevant information to exist or research or act as catalysts and **Depth** in the meaning of peeling off the layers, getting to the issues underneath lost in time and space immemorial.

## **PARTICIPATION**

The Universe (Versus Uno/ Towards the One) is entirely participatory. Schrodinger in his ‘cat experiment’, has shown that it is the act of observation that determines the cat’s wave function and makes it alive or dead.

Each one of us is an active participant in co-creating what happens through our continuous interactions. **We create the present and the past as a result outcome of what or where we choose to look at or look for.**

Living in fields we are the receptors of connections and relationships across space and time, and at the same time, we influence these fields with our choices. We are both Individuals

and Universe, parts and wholes, Gods and Humans, Immortals and Mortals. Luis's saying "*L'Etat c'est moi*" can be seen in this light and undertake a new meaning: That of bearing responsibility for our choices and decisions as these can influence the whole world. In Greek, the word '*ἄτομο*' which describes the individual is also a word that describes "what cannot be divided".

In complex theories, where fields intersect even for a split moment, particles come into being. Is this the moment of conception? Is conception the historical moment when the fields of the two genitors intersect? How can this understanding create a difference to the medical world researching into infertility or technology - assisted conception? And how can this understanding make things different when exploring rejection issues prenatally? Are there "conception accidents"? Nothing exists separately to our awareness. In our modesty, we are creators with unpredictable outcomes in the years to come.

## CHAOS AND ORDER

Chaos Theory (Gleick, 1987) examines those forms of complexity in which order co-exists with dis-order at the edge of chaos (Chris Langton -Waldrop 1992, 1994). Chaos, another Greek word «*χάος*» describes the "infinity of space of formless matter supposed to have preceded the existence of the ordered Universe, the void at the beginning of creation impregnated with all life forms. Does this mean that everything that is already exists in us? The chaos exists within us packed full with all possibilities. The order is already present as is the disorder. How to set our integral boundaries within us, as we explore the space of possibilities in and around, makes the order (or even disorder) visible within our personal environment, the group or network we belong to and the humanity in general.

## FRACTALS

How to work with non-linear dynamics in all and each one of us can give rise to extraordinary intricate behavior as the one seen in the beauty of a fractal or the turbulence of a snowstorm. Spotting the family, or societal fractals created from repeated patterns evident at many levels of scale, and making visible the strengths of the cause and the consequence of the effect when working with the non-linearity of our primal life, and who we later become as adults can help us distinguish not falling off "**over the edge**" but being "**on the edge**" where order and chaos meet to manifest.

As Prenatal Psychotherapists, we can escort our fellow humans as they observe what is happening within and around them; as they discover the unintended consequences from actions of the past to the best of intentions; being there for them holding open the paradox; teaching them how to move from "either or" solutions; attitudes to what if "both and" can co-exist, supporting the person to walk the infinite space of possibilities opening up even at the smallest changes introduced to their systems as they can lead to major changes in the long run.

As Prenatal Psychologists, we can be present as our fellow humans "**flap their wings**", as other butterflies, to initiate attractors like the one in the equation of Lorentz that may take them to new heights - or lows. We can be there as they understand how they start the motion of the

pull-push oscillations in their love affairs, and how they work under the same mathematical formulas as everything else in Nature leading to Heavens or Abyss.

By applying chaos theory to human primal experience and what comes out of it is a tool that invites us to

- Think Differently
- Search for a simpler way
- Work on a multi-dimensional level enabling frameworks that facilitate this
- Re-focus our attention
- Appreciate wholeness
- Synchronize dissimilar individuals
- Bring Science to Real World
- Find our Links in the outside world
- Spot the hubs and use the ones to create values away from those that spread viruses within families or societies
- Spot the breakdowns in the system that cause disease and enhance Health
- Know that Humans, as everything else in Life, can be unpredictable and move beyond formulas and equations presenting paradox developments or failures

## CONCLUSIONS

Working within Prenatal Psychology, complex theory can challenge our preconceived ideas of how life co-evolves from generation to generation; how our patterning and order shows over time; the coherent forms we have developed through repeated interaction within non-linear dynamic systems; the Attractors to which we are drawn; the ways we may flip our behavior from one pattern to the next, making the sometimes huge quantum leaps that lead us to either heights or lows on our paths.

Furthermore, it is part of our mission as Prenatal Psychotherapists to support a process so that all parts involved (maternal environment and (un)born child) can become co-creators retaining autonomy, but creating synergy based on mutual trust and mutual understanding far from self or other judgments that undermine optimum life continuity.

Teaching and sharing of knowledge and past wisdom with children, adolescents, grandparents and pregnant couples but also educational institutions, economic enterprises, social structures and national or international organizations can facilitate decisions that tip towards paths and emergent forms that honor life in evolutionary manifestations.

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