

SCIENTIFIC RESEARCH METHODOLOGY AND BUSINESS CYCLE IN THE VISION OF CONSTRUCTAL THEORY

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Abstract

How do we define a crisis? Etymologically the word comes from the Greek and means: to decide, turning point. The crisis is the moment of truth, a line between the past and the present. The failure caused by the crisis makes the world, in two successive moments of time, no longer look alike. During the crisis, the changes are wide and deep. But there are difficult aspects of a scientific and empirical nature in: delimiting the duration of the crisis; in determining the economic aspects that are considered important and whose qualitative and quantitative evolution must be followed; and to determine the frequency of occurrence of these turning points so that the changes are not too superficial or an effect of gradual evolution. The moment of truth is a challenge. It creates a tension that requires adaptation, the old problem-solving techniques become useless. If new adaptation techniques are innovated and emerging, the crisis is over. But the line between success and failure is gray. Success can only be temporary and the crisis reappears. There are various ways in the literature to define a crisis depending on: frequency of occurrence, duration, magnitude, depth and impact. Some economists study rare and large-scale crises, other economists study frequent and small-scale crises. Most crises are the culmination of gradual changes. Tensions accumulate over long periods; they gain critical mass and are observed at that moment, followed by the reaction of decision makers and ordinary individuals to the pressures that gave the pot to boil. We will use the narrative argument in the article. A crisis is usually identified by the values of GDP over the next two quarters. Is the GDP indicator correct for tracking crises? It can be artificially increased through consumer loans. Are the values that this indicator takes for two quarters enough to characterize a crisis? In China, the symbol for crisis means: danger + opportunity.

Keywords: economic crises, economic cycles, empiricism, apriorism, hypothesis

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1. Introduction

We live in troubled times. It seems that the old theories about economic cycles and crises are no longer valid. We should have a great crisis now; crisis predicted by all great economists. And yet this crisis is stubborn not to happen. GDP has fallen, but the economic calamity is not occurring properly according to economic theory. Economically

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we are on the border between the living and the dead. We are neither in crisis nor out of the gray area. What awaits us: a major crisis or a lost decade.

In this article we try to understand the period through which we go through a new theory: Constructal Theory. The theory is constructed by Professor Adrian Bejan of Duke University. Also in this article we try to lay the methodological foundations of this theory through the prism of the scientific philosophy of another great Romanian: Lucian Blaga.

C.T. it is originally built in thermodynamics; based on a mathematical intuition. Everything is a flow; like the basin of a river or the branches and roots of a tree. There are two types of flow: laminar and channeled. Channel flow occurs according to fixed mathematical ratios between: channel types; channel dimensions; speed and mass of flow between different types of channels. The mass and velocity ratios are fixed between the diffuse flow and the laminar flow in the channels.

Flow forms a system with a certain architecture that constantly evolves towards a lighter and wider flow; towards a coverage of an area as large as possible. The resistances form the type of architecture and configuration. Flow systems are composed of hierarchical levels. The system tries to overcome the resistances and distribute them evenly. The system is constantly adapting and changing its configuration, constantly evolving. The engine of a flow is as important as the braking system (flow resistances)

But the most important aspect of the presented theory is the S-shaped evolution of a system. That is, slow growth then accelerated then slow again. S-shaped systems overlap. The main flow is taken over by the new system, but the old system does not disappear, but it will contain a diminished flow. There are no collisions with a wall, ie catastrophes; no system disappears, it will contain flow, but in small quantities. The high flow will be taken over by the new S-shaped system that overlaps the old one.

Our analysis begins with laying the methodological foundations of C.T. These bases are in the methodological analysis of Lucian Blaga. He said clearly that the new theories will be architectural, constructivist theories and with holistic pretensions, based on mathematics, but which are based on a magical-mythical thinking.

At the end of the introduction we say that we do not believe in the current definitions of crises based on GDP, its statistical dimension, its definition and the lengths of time taken into account in the current definition of crises.

2. Problem Statement

A direct explanation of crises: the macroeconomic system evolves faster than the systems of which it is composed or there is an asynchrony between the evolution of systems at different hierarchical levels. The organization of a system emerges spontaneously from the actions of individuals.

Innovation (more precisely the rate of occurrence, the mode of spread, the cumulative effects) is a major cause of crises. Innovation breaks the old order, the old connections, the old flows and modes of production and implicitly creates other relations and systems of production and distribution. In the transfer from one mode of organization to another (it takes time) some will certainly suffer.

The flow of the system is relative. Flow is compared to something, and man's perception of the change in the flow system is related to how man perceives time.

The price expresses a quantity of volume of mass (commodity) that is transferred (in act or potential) from one entity to another or a service (which is performed in act or potential). The service is a work that is carried out and consumes fuel. Money is the expression of movement, it is a registered movement or a potential act of movement that is registered prior to its actual execution.

Money is: a power of motion preserved, stored, generated in one place and used in another place. Usually the power of movement exceeds the consumption needs in the place of occurrence, so it is used elsewhere. In this way money moves the power of movement in areas where it does not exist. Money is the only means of storage, preservation of the power of movement.

The banking system is the way to spread the power of movement. Without money and the banking system the movement would be much reduced as during the barter.

The elimination of private property and free initiative during communism reduced the movement within the flow system. In fact, it was an attempt to force a return in time to a stage that had been overcome. Evolution is in logical stages, once a stage is completed there is no return to it but there is a transition to a new stage of development, necessary in terms of the logic of evolution. Communism tried to flow upstream

Wealth is given by the flow, by the movement in the channels and not by the quantity of goods that stagnate. The price difference works like flow switches. Being a good businessman means noticing a possibility to speed up the flow in a certain area and access a flow switch, to unlock it. To see a business opportunity is to identify a flow switch before others.

Jevons paradox: the more we create engines that consume more fuel efficiently (consumption per unit of good produced / transported), the higher the fuel consumption is.

All financial innovations (new types of currency, the use of ATMs, the use of information systems), agreements between states, the single currency in the EU; they did nothing but submit to the immutable tendency to move goods or mass, more easier, faster, over greater distances.

The evolution has an S-shape. It starts with a slow growth, the growth rate is increasing, then at a certain inflection point the growth rate increases sharply. From the second inflection point the growth rate is decreasing and the growth is slow.

3. Research Questions/Aims of the research

To explain the evolution and existence of a good Adrian Bejan introduces two curves. The S-shaped curve of the income from the asset and an investment curve (for simplification at 45 degrees on the coordinate system). The two curves overlap and intersect in two places. On the first side (up to the first intersection point) the investment curve is greater than that of income. Then, between the two intersections, revenues are higher than investments. After the second intersection, we return to the first situation, ie investments exceed revenues even if investments are increasingly attracted due to the reputation built previously.

For a start, a product is difficult to enter a market, it has obstacles to remove. Obstacles range from prejudice, habits to old opposing producers. Gradually a product conquers a market, a territory. During the beginning, the product is subject to modifications, tests of any kind, adaptations to various tastes, etc.

In the beginning, the investments exceed the income that this product brings. Profits are negative.

Over time, the product brought to market attracts the confidence of investors and buyers for various reasons. The right investment curve intersects the S-shaped curve of income and from that moment the profits become positive and accentuate. Profits attract more and more investment, but the product reaches its maximum capacity and its sales decrease. The law of decreasing returns appears. The second intersection of the increasing investment curve with the income curve takes place on the final part of the S. So negative profits are happening again.

If investors do not realize that they have to stop investing and direct their investments to another asset then the losses increase and increase as it passes. It takes the appearance of another good, product to stop the bleeding of money.

If instead of the product in this argument we introduce certain branches of the economy we have at least the explanation of the crisis of 2001: the dot-com crisis and the last crisis of 2008 the real estate crisis. In light of this theory we will probably now have a crisis in the car industry (so I think from the existing data)

There are two points in the S-shaped evolution of a product, at these points a critical mass is reached. The first point where a product manages to conquer a market and gain the trust of investors and the second point where buyers turn to other products, have other expectations.

Why invest in a product, industry? Future profits are anticipated. Why a product (industry) is no longer wanted? There can be several explanations: there is the law of decreasing returns; more profitable ways of doing business are foreshadowed; the old system becomes frozen and freezes for the new ones; tastes change; more is wanted.

Every product, political system, economic branch at a certain moment freezes, freezes and leaves no room for innovation. He builds a fortress in which he no longer allows access to anyone, so that he has absolute priority over the good of the business or anything else. Envy gets control. So the S-shaped curve begins to enter its final side. As long as an economic branch, economic system is flexible and leaves room for adaptations, compromises, evolution is possible. The strict, exclusive rules that stifle the new are the sure way to the end. Those in the city do not want to let others in, and those outside have no choice but to build another city.

All economic branches (oil, cars) at the beginning are effervescent, with many competitors, with many products in a permanent change and adaptation. Then there are few competitors, competitors who try to create artificial barriers to entry into their field. Towards the end, the products are few and with reduced changes over time.

4. Research Methods

Empiricism is a mistake. Man's spiritual horizons cannot be restricted to utility and sensation. Empiricism is a funny perversion of sensation and an exaggeration of its importance as a basis for the feelings of the spirit. Empiricism is an exaggeration of the importance of logistical rules as the only reason for the functioning of the mechanism of the spirit.

Although it may seem strange, magical thinking penetrate scientific thinking with all the seriousness of scientists' thinking. Scientists believe that various particles and their

motion produce consciousness. But in this way the particles acquire a power similar to Religious Miracles. If we do not think from the beginning mythical and magical materialism; this - materialism could not enter our minds. This type of thinking is activated immediately when too many unknown variables appear. Scientific certainty occurs when the researcher reaches a point where he thinks he is reaching the Absolute.

Pragmatism is also a mistake because it breaks the logic and values of science and sticks it only to successful actions.

Some thinkers (Kant) believe that knowledge is given by intuition through the senses and thinking through the concept. Only these two sources ensure a certain knowledge. But nevertheless the indivisible act of the human mind must be recognized: thinking and intuition at the same time.

There are aspects of human thinking that have their starting point in concrete, but are totally achievable only in the logical plane. That is, they become unachievable in concrete and fulfilled only in logic. The thinking mechanism has a concrete beginning and an abstract ending. Example: physical point without dimensions; the economic man.

The main difference between scientists and primitive people is the accent that the scientist puts on the senses (observation and experimental); as a tribunal of the certainty of knowledge. Primitive man does not believe in the senses.

There are two major obstacles to true knowledge: pure intuitionism and extreme positivism.

At the moment there is a rebirth of architectural, configurationist theories. These are theories about hidden connections in the world and are of the morphological type, meaning they want to discover the whole from the analysis of a piece of reality. This is the Constructal Theory. To admit the existence of architectural theories represents the opening of the door to magical-mythical thinking.

True knowledge (during its construction) is not completely subject to logical principles. Logical principles change knowledge only after the concepts have been outlined and the palpable reality has been arranged according to the concepts. Intuition gives concrete reality, and the categories of reason arrange the material of sensations into abstract concepts, inventory reality and establish the types of connections.

The discoveries that were too new for a certain period (unprepared in advance) did not affect or disturb the consecrated theories. This clearly indicates that concrete reality is viewed through the lens of an existing theory. More precisely, old ideas explain new facts, and old concepts are real dynamic centers of thought. A theory with only empirical potential is a theory that explains nothing, it is without value.

In the process of knowledge in all sciences, including mathematics, different paradoxes appear (antilogical aspect, contradictions), which each science hides. Usually to explain is either to identify the cause, or to reduce that something to something of a general level. Classically it is considered that the effect is related to the cause without an analogy of content. That is, there are two successive moments of time of a phenomenon, which necessarily appear. C. T. with a magical thinking at its base, he suspects that the effect by its essence contains something analogous to the essence of the cause.

In fact, in science when we talk about something that is rational, that something is the object of thought and is related only to logic. The rational appears when the irrational

is simplified, when the rules appear in the darkness of chaos. Reducing several phenomena to a single concept, or reducing phenomena to a single one, is rational. But only the simplification itself is rational, not its product. Simplifying the irrational only moves the problem to another pocket, moving the limit of the irrational a bit. The irrational does not disappear through the rational; it is not replaced. The rational is just a simplification, a numerical reducibility and not an overlap. The rational is a relationship between the irrational. Simply put: the irrational is rational by numerical simplification, not by conversion. Knowledge is meant to simplify the unknown through abstraction. Example. Visual phenomena replaced by the theoretical construction of waves of a certain frequency. The knowledge of images is replaced by the knowledge of waves, but it does not show the truth of this phenomenon.

There is always a leap of faith in science and scientific theory. That leap that the world is more than what we perceive through the senses and the explanation of this world. The truth is profound.

Man does not only have senses and is not limited to feeling and observing but he acts to change the world around him. He changes the world and he changes himself. It produces tools to dominate nature and it produces tools that produce tools.

In antiquity in science, mathematics is used rudimentarily and little. Ideas on the intimate composition of the structure of nature, tangentially attack mathematical hypotheses. Plato imagines corpuscles with geometric shapes, Aristotle tries to find some laws of nature associated with mathematics, and Archimedes alone combines observation and experiment more systematically with mathematics. But Archimedes does not have a conscious and methodical approach to combining different methods with mathematics. In Plato, the world of Ideas (of which mathematics is a part) is known dialectically and by ecstatic visionary methods.

Modern science, starting with Galileo and Newton, has only one scientific method, which is to couple any kind of theoretical action with mathematics; in the form of methodological couples. The expansion of current knowledge is in fact the coupling of any method with mathematics. In current science, it is not the simple empirical observation, as in ancient science, but the experiment combined with mathematics. It is desired to identify a strong link between certain parameters of nature. Scientific law is the ratio of the variation of two parameters that have a certain connection between them, and the ratio has a mathematical expression. Thus, the experimental coverage of the law is indirect and a little unclear.

In this way relational concepts appear, concepts that express connections without a direct empirical expression. These relational concepts are used to open the empiricism for thinking because they correspond to elements that exist in reality, but secretly and not openly. The hypothesis is a theoretical construction that aims to reveal elements belonging to the transempirical area of existence with the help mainly of image concepts.

The hypotheses want to enter a secret area of existence where they advance through approximations one after the other; with a high degree of uncertainty and very common changes. In Western science, a supermethod is used: reducing concepts to images and combining them with mathematics.

In ancient science, abstract theorizing was used in terms of laws, a plan in which concepts are identified. Aristotle's physics uses for the movement of bodies an image rooted in psychology: nostalgia for natural places. Goethe uses combinations of light and dark to indicate the appearance of colors. In modern science, concepts such as images located on a transempirical plane are used. All kinds of science seek the essence of reality. Aristotle seeks the essence of a thing, modern science seeks the essence of relationships. Imaginary theorizing is used only in conjunction with mathematics.

Analogies are widely used in science. With these, knowledge is enriched related to phenomena and their substrates. The very interpretation of people's deeds in the social sciences is done by analogy with the facts of our personal lives. We project our intimate experience on the surrounding reality. And in antiquity the analogy was used: in Plato based on the visionary ideation, in Aristotle on removing and delimiting the concepts from the empiricism.

Newton draws an analogy between the movement of the Moon around the Earth and the fall of a body on the earth. The moon does not fall, but Newton sees an identity between its movement and the fall. Einstein sees many analogies between phenomena that apparently had none. But in modern science analogies are formed only in conjunction with mathematics.

Modern science has detached itself from empiricism, theories have almost lost touch with empiricism, and are even in contempt for pure empiricism. But at the same time the hypotheses are verified directly (rarely) or indirectly (most of the time) on the path of empiricism and experiment. The value of a hypothesis is to anticipate phenomena implicitly included in its concepts. But most of all, the value of the hypothesis depends on anticipating completely new facts that were not initially related to its concepts.

From the very beginning it was considered that there is no reliable information except by forcing reality to enter the patterns of mathematics. But the use of mathematics has fertile results only in combination with other methods, and mathematics does not replace the values and virtues of the various methods used. The various methods used in science penetrate mathematics, and mathematics adapts to the various requirements of the methods. Example of organizing facts and empirical knowledge in logical forms. But the rationalization of empiricism can be exaggerated along the lines of logic. Reason artificially fixes the world and eliminates the paradoxes and contradictions that give life to science.

Modern science, in reality, often uses hypotheses that ridicule empiricism and have nothing to do with direct empiricism but only at most indirect. Example: treating motion in theory. Compared to ancient science, the relationship between theory and observation is indirect and lax. A fact identified by the senses can fall under various interpretations. Many facts are identified only after the construction of a theory, otherwise it would have remained unknown. New facts are taken from various theories losing their anonymity and are verified with the help of experience.

Simply expressing a hypothesis in mathematical format is not enough. That hypothesis must enter into a system of relationships that confirms it. The hypothesis must withstand the attack of various methods, united only from the perspective of the supramethod: that of the couple with mathematics. The set of methods decides on a

hypothesis. These methods are driven by the Western scientific method, ie the couple with mathematics.

Regarding the intuition of science, I. Kant best expressed the connection between theory and intuition: "a concept without intuition is empty, an intuition without concept is blind".

A great mathematician Poincare suggests that in today's science mathematics is so used because in an event a large number of basic elements and phenomena that are similar intersect. Mathematical concepts are relational hypotheses, while in antiquity generic concepts were used. At the moment, there is a transition between two opposing scientific methods: maximum methodological expansion and the purism of the unique method.

Common sense differs from the scientific spirit because it does not understand the dynamism of existence, its constitutive dialectic and implicitly the contradictions that appear. In fact, common sense is close to the ancient spirit of Aristotle. Empiricism and the belief in the existence of essences that can be taken out of reality and thus the constitution of concepts bring common sense closer to Aristotelianism. The mind in common sense and in Aristotelianism focuses only on empiricism and the construction of conceptual classes.

The connection between common sense and modern science is lax. Because modern science focuses on movement and the dialectical and contradictory aspect of movement. These are hard to catch by common sense.

Modern science is not satisfied with the simple empirical identification of a phenomenon experimentally, but wants its theoretical identification, even if something empirical is lost in this way. The experiment is not only used to clarify and expand the empiricism but its purpose is to deepen it, to detect the inner mechanism of the world in order to control it. Experimentation is not a simple interpretation of facts but a manipulation of facts to dominate them and understand the DNA of reality.

Without theory-oriented experimentation, not all scientific achievements of modern science could have been possible. Modern science has transferred empiricism to a theoretical level, and transferred theory to supra-theoretical levels. The supermethod of modern science is the couple with mathematics. Failures were experiments that only wanted to expand the empiricism using only the inductive method. Conflicts broke out when scientific methods that used the qualitative experiment of the ancient type overlapped with the mathematical type experiment (of current science). Modern science aspires to replace simple empiricism, and the ancient experiment only wanted to extend simple empiricism.

In order to achieve a successful experimental method, the scientist must leave the contemplative attitude; because the limits of reality must be forced, and the experimental method must be conquered. The experiment occurs when knowledge wants to dominate nature, Cognitive theoretical attitude is insufficient is necessary and a practical attitude compared to nature.

As I said (and I emphasize) there are two types of experiment:

The ancient type experiment of common sense that widens the empiricism. It is a qualitative experiment that leads to certain laws of nature that are in fact empirical regularities.

The experiment of modern science that not only amplifies empiricism, but also replaces empiricism. Thus appear the mathematical laws that have great necessity and generality. It is an experiment that takes into account the dynamic and dialectical nature of reality and the interdependence of phenomena and investigates phenomena in terms of their efficiency.

5. Findings

The economic world is wandering between Chaos and Rigidity.

Chaos represents the lack of rules in the economy, the impossibility of creating connections between nodes - individuals. It is the world of pure competition, of the absolute lack of cooperation, each for himself, man becomes a wolf for man. It is impossible to build flow systems in such conditions. There is no well-being, only survival.

Stiffness is a frozen rule that can no longer be changed: a stage of frozen evolution due to bureaucratic rules and mastery of the forces of the absurd. Example: communism and former Asian social systems (China). The result is a system of flow stuck in eternity until external conditions change and destroy it or emergent events from within that destruct it. An example is the system based on the fiat currency which self-destructs through the abusive use of the ability to issue such a currency.

The particular and detailed properties of the flow system are emergent and irreducible to the properties of its components (nodes, individuals). General anticipatory descriptions of system development can be given, but not in detail. The whole influences the parts of which it is composed by descending influence, and each part of the system must be explained and described by its relation to the whole. Example: an individual has no absolute metaphysical value; from an economic point of view, it is described and understood according to the added value it brings to the system (trade, studies, profit, salary), only in this way it acquires significance.

Using the theory we can find out at a general level what will happen to the system to give it the general characteristics: it will try to expand; to cover the entire surface; to transport more and more efficiently; to adapt to change. But we will never be able to predict how he will do it. Where the innovations appear, what kind of innovations appear, how the system will change, what new properties will appear; these will remain unanswered questions. Short example: if we combine 5 chemicals through the theoretical formulas we have we can find out the composition of the new resulting substance and probably some general properties, but the rest of the characteristics of the new substance can only be given by describing observations and experiments on the new substance. That is, we cannot anticipate them from the properties of old substances.

System outline: freedom of nodes - emergent properties - final goal: the developed FLUX.

Cycles and crises must be explained from the following perspectives:

The configuration of the system during the cycle and the changes that occurred after and during the crisis.

Location. Where exactly the innovations in the system appear, innovations that generate a new cycle and where exactly in the system appear the problems that give rise to the crisis.

Intensity. It is necessary that any change for better or worse reaches a critical mass to give rise to a significant change, a change that can spread in the system at a certain rate and visibly change the architecture of the system. As I explained, the changes have a certain distribution and change the system on certain hierarchical steps. The accumulation of minor changes, invisible to rational analysis, can bring about total changes in configuration.

Frequency. The time that elapses between changes. It is important to establish measures in advance to reduce the negative impact of change.

The economical flow system can also be described by the following characteristics:

It is open. It suffers from outside influences and influences the environment in which it is submerged.

It can turn into a chaotic system due to uninspired and forceful interventions. Chaotic represents random.

This is nonlinear. Unimportant, small inputs lead to large unpredictable changes.

It is a system with emerging features. Based on self-organization, it regulates the flow of energy and information both indoors and outdoors.

Relationships, connections are the key to the development and evolution of the economic system. Relationships based on freedom of movement.

There was a lot of talk about energy in this article. Energy from the point of view of T.C. signifies potential for power of motion. The money, as I mentioned, is the stored power of movement (preserved, stored). Following these meanings, information is a pattern of energy to which a symbol (sign) is attached, so information is a pattern of the power of movement potential.

One idea that has never been emphasized enough is that a system is all the more stable and capable of adapting and evolving as its components are more differentiated from each other, and as many and more lasting connections are established between them.

Characteristics of a viable flow system:

Flexibility. Connections between nodes - individuals have many degrees of freedom so that they (as a result of changes), can change, break, redo or appear in new places and between previously isolated nodes.

Adaptability. There is no change in the environment that cannot be assimilated by the flow system. Some architectural changes, in response to the changing external environment, take time, but the system never stops flowing.

Coherence. The flow system changes its architecture only for the purpose of a more efficient and productive flow. Architectural changes are directly related to the purpose.

Consistency. One change attracts another. An architecture emerges naturally from the previous architecture and not as in communism a (foreign) architecture is superimposed by force over the naturally evolved system in that area.

An energy flow passes through the system, ie a potential of the power of movement.

The flow system is stable in instability. It constantly tends to a larger and more efficient quantitative flow and cover - wet as much of the surface as possible.

6. Conclusions

In this chapter I will try through a small effort of geometric imagination to unite the most important theories about cycles and crisis.

I will start by defining the problem in Marxist terms which are in fact Hegelian terms

Thesis: gold and the independent banking system. Without Central Bank and political interventions

Antithesis: Central Banks and the system of fiat currencies. The system is regulated by bureaucratic decisions at the center

Synthesis: Electronic money issued by several economic agents

The synthesis turns into a thesis and the cycle resumes in other ways.

Next I try to express at the level of geometric representation the Marxist Theory, C.T. and Konradiev's Theory of Long Cycles.

Marxist theory sees the evolution of the world as a spiral wrapped in a cylinder. We return to the same stage, but to a higher level of wealth.

C. T. sees evolution as a succession of overlapping "Ss". There are no endings for the "S" end. It extends indefinitely, but the main flow is taken by another S superimposed over the first.

Long Wave Theory sees evolution as an upward trend wave. Unification in geometric description of the three theories: A cylinder of a certain thickness and height (depending on the type of cycle we are thinking of: 12 years, 25 years, 50 years, etc.). A spiral that wraps around this cylinder. Once it has reached the position near the starting point, the cylinder thickens (a new cylinder of different sizes overlaps the old one; the line between the two cylinders is a fragmentation point) and a new spiral starts. The old spiral remains to rotate indefinitely at the point of separation between the two cylinders.

The disassembly of the cylinder and its design in the two-dimensional plane for a classical representation (like the globe in horizontal projection) is done in two stages. The first is identical to the Constructal Theory, the next stage is the graphical representation of the Long Wave Theory.

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