

LINGUISTIC SYNERGETICS: ORIGIN, KEY CONCEPTS AND APPLICATION

The article advances linguistic synergetics as a new interdisciplinary research approach to language studies. It starts with a brief outline of origin and development of synergetics that was to become the methodological basis of linguistic synergetics. Then the article covers application of synergetic principles to linguistic research with special emphasis laid on the two principal branches – synergetics of language and synergetics of speech. Finally, key concepts of synergetics useful for linguistic analysis are listed and regarded in detail. Synergetics is seen as a unified approach to various complex systems study that originated within sciences. It promotes integrity of methods elaborated in various disciplines and variety of models to represent complexity of organic and inorganic systems. Successful application of concepts and methods of the synergetic approach to the description of biological, physical, historic, social, and even economic phenomena has revealed similarity, if not universality of principles of evolution of complex systems. As a result, synergetics has made it possible to launch a wide variety of interdisciplinary interrelationships. Investigation of language within the synergetic paradigm is determined by features of language as an open self-organised synergetic system. Multidimensional ontology of language has made it possible to employ synergetic methodology in the various studies of language. At the present stage, linguistic synergetics includes the following two principal branches – synergetics of language and synergetics of speech. The main task of linguistic synergetics is to reveal, describe and explain the mechanism of the inner dynamic structure of a language using research principles of synergetics as a paradigm of complexity. Key concepts of linguistic synergetics include ‘a closed / open system’, ‘linearity / non-linearity’, ‘self-organisation’, ‘dissipation’, ‘order (control) parameters’, ‘fluctuations’ and ‘bifurcations’, ‘stability (equilibrium) / instability’, ‘an attractor’, ‘a fractal’.

Key words: synergetics, linguistic synergetics, complex systems, dissipation, non-linearity, fractality, self-organisation, order parameters.

Домброван Т.І. Лінгвістична синергетика: витоки, ключові поняття та аплікативність. У статті лінгвосинергетика позиціонується як новий міждисциплінарний напрям лінгвістичного пошуку. Надано короткий історичний огляд виникнення та становлення синергетики як концептуально-методологічної бази лінгвосинергетики. Окреслено основні напрями сучасних досліджень у межах лінгвосинергетичної парадигми. Розглянуто ключові концепти лінгвосинергетики.

Ключові слова: синергетика, лінгвосинергетика, складні системи, дисипативність, нелінійність, фрактальність, самоорганізація, параметр порядку.

Домброван Т.И. Лингвистическая синергетика: истоки, ключевые понятия и апликативность. В статье лінгвосинергетика позиционируется как новое междисциплинарное направление лингвистических изысканий. Проводится краткий исторический обзор возникновения и становления синергетики как концептуально-методологической базы лінгвосинергетики. Очерчиваются основные направления современных исследований в рамках лінгвосинергетической парадигмы. Рассматриваются ключевые концепты лінгвосинергетики.

Ключевые слова: синергетика, лінгвосинергетика, сложные системы, дисипативность, нелінейность, фрактальность, самоорганізація, параметр порядка.

A bit of history. The early years of the 20th century witnessed a revival of the concept ‘system’ known since ancient times. It was a great number of scientific discoveries, the rise of new scientific disciplines (such as genetics in biology,

thermodynamics and quantum mechanics in physics and others), as well as rapid development of new technologies, that brought about significant changes into our understanding of the system and its ubiquity.

The outer world began to be seen as a dynamic conglomeration of systems – biological, chemical, physical, social, etc. Researchers were eager to construct a comprehensive scientific view of the world based on laws common for both organic and inorganic nature, or put differently, to create a new complex systems paradigm. New scientific theories were suggested (such as General Systems Theory, Quantum Theory, Irreversible Thermodynamics Theory, Instability Theory, Dynamic Chaos Theory, Catastrophe Theory, Phase-Transition Theory, the theory of bifurcations, the theory of Autowave Processes, the theory of oscillation, to mention but a few) within which new concepts and methods of investigation were developed, which later on provided a foundation for synergetics as a unified approach to various complex systems study.

Cybernetics is also considered a precursor of synergetics. In the words of Norbert Wiener (1894-1964), the founder of this interdisciplinary science, cybernetics is a theory of 'control and communication in the animal and the machine'. The word is of Greek origin meaning 'governance, government'. Cybernetics focused on negative-feedback-based complex systems of causal-chain circularity, i.e. automatic systems capable of restoring their stability within a desired range regardless any disturbances. It is within cybernetics that the notion of 'homeostasis', meaning invariability and balance of states, came to be applied not only to living beings, but also to technological systems. This notion is seen as one of the most important aspect of a system, necessary for maintaining its stability and functioning.

Unlike cybernetics studying relatively balanced, stable, homeostatic systems, synergetics focuses its attention on hysteretic, i.e. evolving, positive-feedback-based complex systems. The notion '*hysteresis*' (from Greek "lagging behind") means a delay in the production of an effect by a cause [11, 478]. In other words, it's a history dependence of a system. To predict such a system's behaviour, it is necessary to know the 'history' of all external influences upon the given system.

The term '*synergetics*' (from Greek 'coherent action') was coined by the German physicist Hermann Haken in the mid-1970s to name a science of complexity, dealing with principles of emergence, self-organisation and self-regulation of complex systems of various ontology – human-made (artificial) or natural (self-organized).

But what is understood by '*complex systems*'?

A naïve assumption is based on a description of a complex system as having numerous components connected to one another. However, this interpretation is insufficient for research purposes: "A modern definition is based on the concept of algebraic complexity" [9, 4], i.e. includes a sequence of data describing both the interconnected network and cooperativity of the system's elements and their complex behaviour.

Robert C. Bishop considers it more informative to characterize complex systems phenomenologically and lists the following most important features in these characterizations:

- *Many-body systems*. Some systems exhibit complex behaviour with as few as three constituents, while others require large numbers of constituents.
- *Broken symmetry*. Various kinds of symmetries, such as homogeneous arrangements in space, may exist before some parameter reaches a critical value, but not beyond.
- *Hierarchy*. There are levels or nested structures that may be distinguished, often requiring different descriptions at the different levels (e.g., large-scale motions in fluids vs. small-scale fluctuations).
- *Irreversibility*. Distinguishable hierarchies usually are indicators of or result from irreversible processes (e.g., diffusion, effusion).
- *Relations*. System constituents are coupled to each other via some kinds of relations, so are not mere aggregates like sand grain piles.
- *Situatedness*. The dynamics of the constituents usually depend upon the structures in which they are embedded as well as the environment and history of the system as a whole.
- *Integrity*. Systems display an organic unity of function which is absent if one of the constituents or internal structures is absent or if relations among the structures and constituents is broken.
- *Integration*. Various forms of structural/functional relations, such as feedback loops couple the components contributing crucially to maintaining system integrity.
- *Intricate behaviour*. System behaviour lies somewhere between simple order and total disorder such that it is difficult to describe and does not merely exhibit randomly produced structures.
- *Stability*. The organization and relational unity of the system is preserved under small perturbations and adaptive under moderate changes in its environment.
- *Observer relativity*. The complexity of systems depends on how we observe and describe them. Measures of and judgments about complexity are not independent of the observer and her choice of measurement apparatus [6, 111-112].

A complex system manifests its phenomenal richness; consequently, it requires new ways of scientific analysis, as well as a new framework of categories. Synergetics promotes integrity of methods elaborated in various disciplines and variety of models to represent complexity of organic and inorganic systems.

Successful application of concepts and methods of the synergetic approach to the description of biological, physical, historic, social, and even economic phenomena has revealed similarity, if not universality of principles of evolution of complex systems. As a result, synergetics has made it possible to launch a wide variety of interdisciplinary interrelationships, among them mathematical physics, mathematical history, social government, neurosynergetics, meteorology, geodynamics, prognostics, to mention but a few. The new disciplines, in their turn, require specialists with a profound knowledge of complex systems methodology. Otherwise, as Cliff Hooker points out, people whose education does not include relevant competency in complex systems are excluded from science, policy and large scale business or find themselves increasingly dependent on those who have it [10, 6].

Nowadays, the necessity of integration of different sciences calls for no argument and most scholars agree that the future of science lies within interdisciplinary research of complex systems. In the words of George Malinetsky, the 21st century is bound to become a century of re-establishment of holism and deep understanding of common problems [4, 42]. It is interdisciplinary orientation that helps scientists think globally, i.e. beyond the borders of particular disciplines.

Synergetics is regarded a new stage in the development of the theory of systems with a special emphasis on issues of evolution and phase shifts. Being interdisciplinary by its character, it integrates a variety of sciences dealing with open, dynamic, self-organising complex systems, developing non-linearly in different environments. Interdisciplinarity of synergetics is in the synthesis of methods and research techniques elaborated and implemented in natural sciences. It is a holistic perception of the world in which everything is interconnected and is in a never-stopping change.

Methodological peculiarity of synergetics consists in the study of development processes as a multi-stage (self-)regulation of a certain structural unity. Synergetics has changed our world outlook by representing reality as open, ever-changing, non-linear, and infinite in the choice of alternatives of further development.

Scholars agree that synergetic principles set up a heuristic scheme for complex systems modelling both in sciences and in humanities to solve technological, ecological, social, political and other problems. It is seen as a conceptual-methodological basis for interdisciplinary synthesis of knowledge, a sort of bridge between various spheres of scientific activity. In the words of Hermann Haken, "Synergetics is very much an open-ended field in which we have made only the very first steps. In the past one or two decades it has been shown that the behaviour of numerous systems is governed by the general laws of synergetics, and I am convinced that many more examples will be found in the future. On the other hand we must be aware of the possibility that still more laws and possibly still more general laws can be found" [9, 14].

The key concepts of synergetics are integration, synthesis, co-operation, coherence, non-linearity, dynamism, and evolution. They can be used to describe various complex systems, including language. Expansion of synergetic methods into new areas of research is effective for highlighting self-development of a system – its main stages and phase-shifts, fluctuations, bifurcation zones, and other features. Since a human language is an open self-developing complex system, a synergetic approach to the study of various aspects of its structure and functioning is not only possible, but seems absolutely necessary.

Linguistic synergetics. Linguistic synergetics emerged in the 1990s as an interdisciplinary approach to language studies through the concept network and methods of synergetics. The methodological and conceptual basis of linguistic synergetics is constituted by philosophy, linguistics, and synergetics, which reflects an integrative character of linguistic synergetics, uniting methodologies of sciences and humanities.

Multidimensional ontology of language makes it possible to employ synergetic methodology in the various studies of language.

At the present stage, linguistic synergetics includes the following two principal branches – synergetics of language and synergetics of speech. Obviously, any scheme is sketchy as it aims at simplification and generalisation of the information. In other words, it is hardly possible to embrace and/or project all possible aspects and paths of investigation. The above mentioned spheres can further be detailed. No doubt, new subjects research is underway.

Synergetics of speech (or performance) can further be subdivided into text synergetics, discourse synergetics, idiolect synergetics and synergetics of speech deviations.

Text synergetics aims at establishing the text parameters which enable such a complex system as text to spontaneously form its spatial characteristics. Among the pioneers of this approach to text studies are Galina Moskalchuk and Konstantin Belousov.

Discourse synergetics is dealt with in the works by Lidia Pikhtovnikova, Evgeniya Ponomarenko and very few others. One of the tasks in discourse synergetics is to reveal the principles of successful communication and the ways of verbal (communicative) influence on human behaviour.

Idiolect synergetics comes closely to social linguistics and is directed to studies of peculiarities of language use by a person belonging to a certain social group. Within this approach, lie studies of individual styles of writers, poets, playwrights and other men-of-letters. In this sphere work Elena Fomenko and Elena Semenets.

Synergetics of speech deviations has much in common with psycholinguistics and is to disclose the mechanisms of speech impairment. Much has been done in this field by Raymond Piotrovsky.

Synergetics of language deals with principles of language change and development. It is closely connected with historical linguistics. It aims at understanding main stages of language evolution, including emergence of language, peculiarities of its non-linear development (gradual at times and sometimes fast), coherent behaviour of its components and subsystems, the impact of external factors (including language contacts) on language structure, etc. A wide range of data has been presented within fascinating research into pidgins and creoles.

Investigation of language within the synergetic paradigm is imperative and determined by features of language as an open self-organised synergetic system. Here, subdivision into synchronic synergetics (see works by Saniya Yenikayeva) and diachronic synergetics (see my works) is highly conditional and merely theoretical, for a language system is permanently dynamic.

Distinguishing between synchronic and diachronic approaches means temporary singling out the study of language system in its dynamic equilibrium (synchrony) and that of in the phase transition state, causing qualitative changes in the language's organisation and functioning (diachrony).

Synchronic and diachronic approaches represent the two indispensable, complementary interrelated planes of research process. And it is hardly possible to show a preference for one at the expense of the other.

No doubt, it is essential to know the contemporary condition and the ways of functioning of the analysed system or its subsystem(s). However, it seems

considerably important to penetrate into the history of the system's emergence and changes, to disclose principles of its organisation, to account for its 'behaviour' at such and such stage of development, to outline tendencies and possible ways of its development in future. As I see it, diachrony represents a paradigm of synchronic (vertical) sections, thus resembling a kind of genealogic tree of the system's states. Diachronic synergetics is sure to offer a new angle on the dynamic language system, while implementing new principles of the synergetic analysis and synthesis will make it possible to contribute to the theory of complex systems evolution.

Linguistic synergetics is a new stage in the investigation of language as an open self-regulating system. The system's equilibria are fully described within conventional linguistics and its branches, while linguistic synergetics aims at the study of language at the change point, in the situations of restructuring and reorganisation caused by external influence.

Language is known to undergo changes constantly; however, its various levels and subsystems are changing at a different rate. In spite of any changes, language remains capable of performing its communicative functions in a society not only among contemporaries, but also between generations.

Consequently, the main task of linguistic synergetics is to reveal, describe and explain the mechanism of the inner dynamic structure of a language using research principles of synergetics as a paradigm of complexity. Diachronic synergetics, in particular, aims at modelling and interpretation of phase-shifts of the system, as well as at projecting possible variants of its change depending upon many-directional bifurcations and a variety of potential attractors.

Key concepts of linguistic synergetics. A new approach to the study of complex open dynamic systems facilitates the introduction of new terminology, as well as reconsideration of 'old' concepts and notions.

Below are given key concepts of linguistic synergetics which were introduced into it from synergetics. However, they do not make up a comprehensive list but include only the notions widely employed in linguistic synergetics, namely: a closed / open system, linearity / non-linearity, self-organisation, dissipation, order (control) parameters, fluctuations and bifurcations, stability (equilibrium) / instability, an attractor, a fractal.

Let us consider them in brief, in order of appearance.

A closed / open system. A system is usually defined as a set of hierarchically organized components (elements, parts, subsystems, etc.), having spatial and temporal boundaries and existing in a certain environment. If a system interacts with its environment by exchanging information, energy and matter with the latter, then such a system is called open. An open system is only able to function due to energy input from its environment. On the contrary, a closed (or isolated) system does not exchange energy or matter with its environment. Most natural systems are open. So are social systems.

A human language is an open system as well. The open character of language manifests itself in reflecting the social, economic, political and cultural life of the society, as well as the scientific and technological advances of the time. Besides reflecting, language transmits the new notions by saving them

in its lexical depository. Language contacts, as a rule, result in various borrowings. Nowadays, mass media and the global net have considerably accelerated information exchange. Under the conditions of multinational society and global migrations of the population language cannot but change, but only to a certain degree, for any system, including language, seeks self-preservation. To retain its form and functioning, the system may only allow insignificant fluctuations, i.e. such deviations in the dynamics of its components that do not lead to disorder and chaos but preserve the subordination of the system's components.

Linearity / non-linearity. In the paradigm of stability and equilibrium *linearity* was an idealistic image of simplicity and cause-consequence determination displayed in the system's proportional reaction to the external disturbance. It deals with homeostasis of a system and agrees with the superposition principle. The word 'linear' comes from Latin *linearis* meaning *resembling a line*, as a straight line is a graphical representation of mathematical solution of the relevant differential equations. Designed, i.e. human-made, systems, for instance telecommunication and signal processing, hydrodynamic models, electricity and optics models, are all linear and can be represented by linear equations.

However, most systems of the world are *non-linear*, chaotic and hardly predictable. In other words, their behaviour is not determined by certain initial conditions, nor can it be defined by the familiar principle "If X..., then Y...". The behaviour of such systems can be described algebraically by specific equations with a few or many unknowns. The graphical representation of mathematical solution of such differential equations is a curve.

The synergetic paradigm focuses on non-linearity as a more important notion out of the two in the opposition 'linear'/'non-linear'. Non-linearity is recognized to be primary as compared with linearity. It helps us see the world as much more complex from view of systems' behaviour patterns. It also allows defining a hierarchy of complexity levels, as well as envisages investigations into asymmetry, regularity and irregularity.

The term 'non-linearity' came into the conceptual network of synergetics from mathematics where it is defined as a particular type of equations with numerous variables and unknowns, which widens the spectrum of possible solutions depending upon the variables and/ or coefficients.

The synergetic paradigm outlines a philosophical aspect of non-linearity which is revealed in the set of alternatives of evolution routes and change rates depending upon the environment characteristics, as well as irreversibility of evolution [1, 50]. As is seen, the notion *non-linearity* has widened its meaning from the narrow, specialized term to a philosophical concept. Nowadays, non-linearity is a conceptual nucleus of the synergetic paradigm which is also referred to as a paradigm of non-linearity [ibidem, 48].

Non-linearity of a language system is revealed in dependency of features and functions of the system on behaviour of each of its component. The notion of linearity is probably applicable if we want to denote order of language elements in a speech chain.

Self-organisation. A non-linear environment is considered a necessary condition for self-organisation of a synergetic system. Sequences of acts of self-

organisation of a complex system constitute a 'history of life' of the given system, its evolution.

In synergetics, self-organisation is both a process and a result of coherent interaction of numerous components and parts of a system aimed at regulating the inner structure of this system. Self-organisation is characterized by spatial, temporal, spatial-temporal and/or functional shifts and rearrangement of the given system. Correspondingly, systems which can acquire macroscopic spatial, temporal, or spatio-temporal structures by means of internal processes without specific interference from the outside, are called self-organising systems [9, 69]. Self-organising systems are found both in organic and inorganic matter.

The phenomenon of self-organisation of complex systems has been successfully studied in physics, chemistry and biology. While researching complex self-organising systems, a Belgian physical chemist Ilya Prigogine defined dissipative structures and formulated Dissipative Structure Theory, and a German physicist Hermann Haken introduced the notions 'order parameters' and 'slaving principle'.

Language is also a self-organized system that changes and develops in compliance with the universal principles of the complex system's behaviour revealed within the theory of synergetics. Like any synergetic system, language is a multi-component system characterized by complex behaviour of its parts and sub-systems.

The term '*dissipation*' is used to designate irreversible processes of internal energy degradation and /or transformation in thermodynamic open systems. A dissipative system exchanges energy and matter with its environment. Examples of dissipative systems are diffusion, friction, emanation, cyclones, hurricanes, turbulent flows, lasers, and so on. Ilya Prigogine also coined the term 'dissipative structure' to denote a dissipative system having dynamic regimes and characterised by anisotropy. Language is a dissipative system as well, which is clearly seen in the dynamic character of its vocabulary – new words constantly come into the word-stock, and at the same time other words and expressions become obsolete and come out of use.

Scientists working in the synergetic paradigm distinguish between microscopic and macroscopic levels of description of a system. The microscopic level includes investigating into elementary components and their behaviour within the given system, while the macroscopic level is a description of the whole system's dynamics as a result of its external interactions with the outer world. Needless to say, macroscopic changes of a complex system, whereby new structures or new functions occur, are the focus of special attention: "This restriction to qualitative, macroscopic changes is the price to be paid in order to find general principles" [9, 13].

H. Haken suggests describing the macroscopic pattern of a system with the help of certain macroscopic variables called the *order parameters*. The latter govern the behaviour of the microscopic elements and parts by the 'slaving principle': "In this way the occurrence of order parameters and their ability to enslave allows the system to find its own structure" [ibidem].

Order parameters are not abstract mathematical notions; they are physical

characteristics of a certain complex system. Changes within the parameter pattern may signal a structural change of the complex system, and vice versa. Order parameters are considered the key to explanation of the system's behaviour, for they allow reducing complexity of the system under study, which makes it easier to understand the ways of a complex system. In a language, order parameters are grammatical categories of morphology and syntax. The history of the English language shows that language development is based on changes within parameter pattern of the linguistic mega-system.

Fluctuations and Bifurcations. A fluctuation is understood as a temporary stochastic change of a characteristic of a system or continual switching from one point to another, which may cause a certain variety in the system's dynamics, including even the loss of stability.

Fluctuations can bring the system to a critical point called 'bifurcation', i.e. a peculiar branching or junction of the system's possible regimes of existence. The term 'bifurcation' was introduced by the French mathematician and philosopher of science Henri Poincare in 1885.

Bifurcations are of two main groups – local and global, leading the system to local or global changes, correspondingly. "There are many dynamically different ways in which this can occur, broadly classified as either local — where the form changes continuously as some dynamical parameter or parameters continuously vary — or global changes that involve more complex shifts. Among the latter are phase transitions (e.g. gas to liquid, liquid to solid, or reverse), including critical point transitions (e.g. simultaneous transitions among gas, liquid and solid states), where changes can be discontinuous and incomputable, essentially because fluctuations on every scale up to that of the whole system are simultaneously possible" [10, 26-7].

Bifurcations are called 'soft' if they lead the system to a new state smoothly and steadily; and 'catastrophic' if the transition occurs suddenly. In any way, bifurcations characterize the instability of the system's state.

Stability / Instability. Instability is a peculiar state of an evolving complex system in which it reveals sensitivity to external disturbances. On the contrary, stability is a state of equilibrium of a system.

Scientists distinguish between static and dynamic equilibria: "Static equilibria require no energy input or output to persist, e.g. a crystal at rest. Dynamical equilibria typically require an irreversible ordered energy (negentropy) flow to sustain them, e.g. water flow to sustain the wave structure of river rapids, together with appropriate waste (degraded or entropic) outputs, e.g. turbulent water. For living systems there is water, food and hydrogen or oxygen input flow to sustain them and heat and chemicals as waste outputs" [10, 23].

If a system is instable, then slightest fluctuations may lead through irreversible bifurcations to drastic changes in the structural organisation of the system and, thus, to an increasing complexity of the system's dynamics on the whole [3, 131]. However, the same fluctuation may be ignored by the system if the latter is at equilibrium.

Attractor. An attractor is another concept that came to synergetics from natural sciences and is widely used in description of evolving open systems. It de-

notes a state or a behaviour pattern toward which a dynamic system tends to evolve, regardless of the starting conditions of the system and represented as a point or orbit in the system's phase space [5].

James A. Coffman suggests the following interpretation of this notion: "The total set of positive (activating) and negative (inhibitory) interactions within a system can be described as a 'regulatory network' that constrains the development of information in a logical (and hence predictable) manner. An important property of such networks is that they often are the source of self-organizing 'attractors'. An attractor, which is a stable state toward which a developmental trajectory is inexorably drawn (e.g., the phenotype of an organism), is established by the regulatory network architecture; that is, by the set of logical rules (positive and negative interactions) that regulate the development of information within a self-organizing system. In essence, an attractor is a final cause accessed by the regulatory network, which is in turn a formal cause established by organization that developed via the selective agency of autocatalytic cycles" [7, 300].

It is assumed that an open non-linear environment conceals in itself a set of certain structural types (attractors). Once a system has chosen one of the possible trajectories of evolution, the other routes, so to say, are closing down. Since the environment itself is subject to changes, then the whole set of potential ways of development can change, too. That is why certain attractors may never come to life [see: 2, 110].

The theory of dynamic systems distinguishes the following three types of attractors: 1) point; 2) periodic, and 3) strange, or chaotic. A point attractor is a single-state attractor. A periodic attractor includes a set of states with definite orbits. A strange attractor is characterized by a chaotic, never-repeated behaviour.

Fractals. The term '*fractal*' was introduced by the French and American mathematician Benoit Mandelbrot (1924-2010) in 1975 to describe a pattern of self-similarity at every level and/or scale of the structural organisation of a complex system. The word is of Latin origin meaning '*broken*'.

The concept of self-similarity is usually illustrated using analogy to zooming in with a lens on digital images to uncover finer, previously invisible, new structures. Within fractals, zooming in reveals the same pattern, not a new structure: a segment of a fractal-scaled structure is a replica of the whole structure. In other words, one and the same pattern is repeated at various levels of the structural organization.

Scholars agree that fractals are difficult to define in an exact way, although self-similarity is recognised as the basic feature of fractals. However, self-similarity is not a homogeneous phenomenon. Kenneth Falconer (2003) points at the following types of self-similarity:

- *Exact self-similarity* that is identical at all scales; e.g. geometrical fractals, such as *Koch snowflake*;
- *Quasi self-similarity* that approximates the same pattern at different scales or may contain small copies of the entire fractal in distorted and degenerate forms; e.g. *the Mandelbrot set's satellites are approximations of the entire set, but not exact copies*.
- *Statistical self-similarity* that repeats a pattern stochastically across scales;

e.g. randomly generated fractals, or natural fractals, such as the coastline of Britain.

- *Qualitative self-similarity* is revealed in a time series.
- *Multifractal scaling* that is characterized by more than one fractal dimension or scaling rule [8].

There are several types of fractals, among them being mathematical (geometrical) and natural. Mathematical, or geometrical, fractals are abstract, computer-generated and practically infinite. B. Mandelbrot (1983) described geometric fractals as being 'a rough or fragmented geometric shape that can be split into parts, each of which is (at least approximately) a reduced-size copy of the whole'.

Why are fractals so numerous in the outer world?

To find an answer to the question, scientists focussed their attention on a most important peculiarity of fractals, namely their ability to considerably compress the volume of the object having a self-similar structure. In other words, a fractal-patterned object takes up a smaller space but at the same time its length tends to infinity (for example, a coastline can be measured with the help of fractal geometry).

One of the ways to cognize various phenomena of the outer world is so-called 'fractal analogy' with the help of which synergetics explains the fact that certain structures are repeated at different stages of the system's evolution.

What about the language? Has a language system a fractal type of organisation? The answer is positive. I argue that the similarity patterns within the language system (I mean here English as the subject of my special analysis) are represented by the Subject-Predicate structure (S-P) which verbalizes a proposition as a unit of knowledge. A proposition represented by an S-P structure can be found not only on the level of the sentence, but also in formation of words and word combinations.

Language system is based on the fractal principle: elements of one level of a language are the building material for more complicated combinations of another level of a language and, in their turn, serve as foundation for even more complex configurations on a next level of organisation, and so on and so forth. Thus, phonemes are united into morphemes, the later are joined into lexemes (or words). Words are combined into collocations and sentences, and then a text emerges. It is noteworthy that the higher is the level of combinations, the wider is the range of possible alternatives.

Let me explain what I mean.

Any human language (here, only languages of the Indo-European family are considered) uses a limited number of letters, e.g. the English alphabet contains 26 letters, while the Russian alphabet has 33 letters, etc. The number of letters of this or that language is always hundreds of thousands times less than the amount of words formed out of these letters. At the same time, a language word-stock serves for constructing, in fact, an infinite number of sentences. While it is possible (although not at all easy!) to count and collect words in dictionaries or to create an enormous corpus, like *The British National Corpus*, it is far from possible to do the same with sentences and texts, even in the modern age of technology and computers.

Obviously, the notion of fractality is applicable to language as an evolving, developing, changing and ever dynamic complex system. Using terms of synergetics, it is possible to state that a language structure is based on a fractality principle where a fragment resembles the whole.

Conclusion. Linguistic synergetics is a new multidisciplinary research approach to language studies. It has already revealed the synergetic features of language and has made it possible to widen our understanding of a human language. A human language can be defined as an open, dynamic, non-linear, self-organizing system with all its hierarchical subsystems and elements coherently interconnected and controlled by governing parameters. It is a complex synergetic megasystem that changes and develops in compliance with the universal principles of the complex system's behavior revealed within the theory of synergetics. The heuristic potential of linguistic synergetics has not yet been fully revealed. No doubt, new and most interesting investigations into language as a synergetic system are coming soon.

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DOMBROVAN T.I. LINGUISTIC SYNERGETICS...

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