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The Dynamic and Systemic Principles of Synergistics in Functional Linguistics[1]

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Abstract. The present article describes the specifics, principles and methods of synergetics as a promising area of modern research. Synergetics is presented by the author as a holistic integral paradigm used in many sciences, which confirms its interdisciplinary and even universal nature. The object of this paradigm is the interaction of complex systems, and since the mere concept of "system" is widely used in many scientific fields, the relevance of synergetics is beyond doubt. The author describes the main characteristics of the structure and functioning of a system. The key concepts of synergetics and their explanation are also given.

Further, the article discusses the branches of linguistics that are based on the principles of synergetics – linguosynergetics and functional linguosynergetics as a variety of it. Since the study of text and discourse and their parameters as complex systems is of particular interest to many linguists, linguosynergetics has become one of the most in-demand scientific paradigms in this area of research. The author points out the objectives and tasks of linguistic synergetics, and functional linguosynergetics in particular, as well as their basic concepts, principles and methods. Attention is also paid to the functioning of linguistic means and the formation and interpretation of meaning depending on certain discursive space.

The author comes to the conclusion that, thanks to synergetics, language can be studied from specific angles, and the application of its principles greatly contributes to the theory of the evolution of language. Linguosynergetics provides ample opportunities for describing language/text/discourse as a complex, dynamic, open system, and functional linguosynergetics, in turn, helps describe the features of its functioning and evolution.

Keywords: synergetics, linguistic synergetics, functional linguosynergetics, system, language, discourse, structure, functioning, evolution

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The current stage of development of linguistic science includes many complementary theories offering their own interpretation of language phenomena. This would appear logical since, as F.M. Berezin emphasizes, "a single, even all-encompassing theory cannot provide a comprehensive description of language" (Berezin, 2000: 22). Nevertheless, attempts to create such a holistic integral paradigm continue to be made.

Many linguists agree that such a concept could be developed based on a synergetic approach due to its coherence, the all-encompassing unity of the areas of knowledge being integrated, and its evolutionary and holistic vision of the world (Bazylev, 1998); (Ponomarenko, 2006); (Halliday, 1978).

Once again, we observe an interest in the concept of a "system," one of the central terms of synergetics. We also see that the principles and laws of synergetics are in demand in other sciences. Rapid technological development, numerous scientific discoveries, and the emergence of new academic disciplines result in major changes in conceptualizing the term *system* and the possibilities of using it in research. And linguistics research is no exception.

Since reality around us is perceived as a dynamic conglomerate of systems (social, physical, chemical, biological, etc.), researchers strive to develop a comprehensive scientific view of the world based on laws that are common to both organic and inorganic nature, to create a complex systemic paradigm. This approach resulted in new scientific theories with their own research methods, which subsequently served as a foundation for synergetics as a single approach to studying various complex systems.

The purpose of this article is to analyse the most important achievements of synergetics and their relevance for linguistics.

Results and Discussion

Synergetics: Premises and Principles

The term "synergetics" was introduced by the German physicist Hermann Haken to denote an area of science that studies external and internal interactions between complex systems – their emergence, self-organization, development, and change (Haken, 2000). Crucially, describing the behaviour of such systems requires an understanding of environmental conditions, in which the system can remain stable and continue functioning. The degree of complexity in a synergetic system is determined not only by the large number of its parts, but also by the broad range of connections between them and by their ability to establish new connections with elements of other systems.

A system's "complexity" generally means the interconnectedness and interactions between a multiplicity of components, parts, and levels of the system, as well as their sequence and complex behaviour (Mainzer, 2009). When describing the characteris-

tics of complex systems, Robert C. Bishop lists large numbers of components, broken symmetry, hierarchy, integrity, integration, intricate behaviour, etc., as being crucial to such systems (Bishop, 2011: 111–112).

The complexity of a system is also manifested in its functioning. Therefore, analysing and describing it require new scientific methods, approaches, and perspectives. The successful application of synergetic concepts and methods to describe biological, physical, economic, historical, social, and linguistic phenomena has uncovered a similarity, if not universality, in the principles of the evolution of complex systems. Consequently, synergetics has made it possible to develop a broad range of interdisciplinary interconnections and is viewed as a conceptual and methodological foundation for an interdisciplinary synthesis of knowledge.

A unique methodological feature of synergetics is that it studies the development processes of a certain unity as a multilevel self-regulating structure. Synergetics provides for an integrated perception of the world, where everything is connected and is constantly changing. It represents reality as an open system that is constantly changing, non-linear, and possesses an endless choice of further development options.

Key concepts in synergetics are *integration, synthesis, interaction, coherence, openness, non-linearity, disequilibrium, dynamics, evolution,* etc., which are used to describe various complex systems, including language.

Applying synergetic methods and principles in new research areas is effective for understanding and describing a system's self-development: its principal stages and phase shifts, fluctuations, bifurcation zones, and other features. Since language is an open self-developing complex system, the synergetic approach to studying various aspects of its structure and functioning is not only possible, but would also appear necessary.

Below, we shall consider certain areas of linguistics based on synergetic principles.

Linguosynergetics: An Interdisciplinary Approach to the Study of Language through the Conceptual System and Methods of Synergetics

A multidimensional ontology of language makes it possible to use synergetic methodology in various studies. At the current stage, linguistic synergetics has two main branches: synergetics of language and synergetics of speech. Of special interest for many researchers is synergetics of text and discourse aimed at identifying those parameters that allow such a complex system as text/discourse to shape spatial characteristics and to reveal the principles of successful communication and means of communicatively influencing human behaviour.

The principal task of the linguosynergetics of language consists in identifying and describing its inner dynamic structure, explaining its mechanisms of change, including at bifurcation points (the branching off of its development path) in situations of restructuring and re-organization.

Synergetics of language is closely connected with historical linguistics. It aims to understand the main stages of the evolution of language, including the emergence of

language as such, its non-linear development (sometimes gradual, sometimes rapid), the coordinated behaviour of its components and sub-systems, the influence that external factors have on language structure, etc. Studying language within the synergetic paradigm also involves describing its features as an open self-organizing system: studying the system of language in its dynamic equilibrium (synchrony) and in the state of phase shift, producing qualitative changes in the organization and functioning of language (diachrony). Synchronic and diachronic approaches constitute two necessary, complementary, and interconnected research planes. It is certainly important not only to know the current state and functioning of the system under analysis, but also to identify its organizational principles, its "behaviour" at a particular development stage and outline the trends and possible evolution routes.

We see that synergetics offers a specific view of a language system; using the principles of synergetic analysis and synthesis makes it possible to contribute to the theory of evolution of language as a complex, dynamic, open, self-regulating system.

Traditional linguistics has described the equilibrium of the language system rather comprehensively. The linguosynergetic study of language at points of change offers an important addition to linguistics. Language is known to be in constant change; however, its various levels and sub-systems change at different rates. The principal task of linguistic synergetics consists in identifying, describing, and explaining the characteristics and inner dynamics of language and the mechanisms that allow it, while undergoing certain modifications, to continue to perform its communicative social functions.

Therefore, the use of synergetic principles makes it possible to model and interpret phase shifts in a language system, and to plot its possible changes depending on its multidirectional bifurcations and a multiplicity of potential attractors (the system's development goals). The synergetic approach is essentially dynamic and systemic since it studies speech as a systemic entity that is also flexible and evolving.

The Principal Notions of Synergetics and Linguosynergetics

The new approach to studying complex open dynamic systems entails introducing new terminology and revising certain concepts and notions. Below, we list the principal notions of synergetics used in the field of linguistics.

Closed/open system. A system is a totality of hierarchically organized components (elements, parts, sub-systems, etc.) and their connections, which have spatial and temporal boundaries and exist in a certain environment (Knyazeva, 2010); (Mainzer, 2009); (Ponomarenko, 2004). If the system as a whole and its components interact with their environment, it is an open system. An open system functions when information (energy) comes from its environment. Conversely, a closed system does not interact with its environment, which sooner or later results in the system's degeneration. Most "living" systems (including language) are open systems.

The open nature of the system of language is manifested in response to changes and as a reflection of society's social, economic, political, and cultural life and its sci-

entific and technological achievements. Language conveys new concepts, preserving them in its lexical sub-system. In a multi-ethnic society and amid global processes, language cannot help but change, but, like any other system, it strives for self-preservation. In order to preserve its form and functioning, the system can allow for internal and external fluctuations and deviations in the dynamics of its components only to the extent that the components remain subordinated to the whole, even while producing some chaotization (deviations from the system's initial parameters).

Linearity/non-linearity. Within the stability and equilibrium paradigm, linearity constitutes a sequence of causes and effects that are reflected in the system's proportionate and determined response to internal signals and external influence (Knyazeva, 2010); (Ponomarenko, 2004); (Ponomarenko, 2018). Non-linear systems are periodically subject to chaotization and are not always predictable since their behaviour is not determined by specific original conditions and cannot be defined through the common mathematical principle of "if X .., then Y ..." Describing the behaviour of such systems requires a multiplicity of variegated factors.

The synergetic paradigm is focused on non-linearity as the more important principle out of the *linearity – non-linearity opposition*. The notion of linearity is connected with the orderliness of a system's components, for instance, language elements in a speech chain. Non-linearity creates a reality that is more complex as regards a system's behaviour models, and also entails studying asymmetry, regularity, and irregularity. Non-linearity could be said to be the conceptual nucleus of the synergetic paradigm, which is also called non-linearity paradigm (Knyazeva, 2010: 48). The non-linearity of a language system depends on the features and functions of the system and the behaviour of each of its components, and the cumulative effect is symbolically expressed in the synergy formula of 2+2=5. This effect is manifested particularly starkly in speech when the overall meaning space of a speech product exceeds the simple sum total of the meanings of its textual components considered separately (Ponomarenko, 2004); (Ponomarenko, 2018).

Self-organization. The sequence of self-organization stages in a complex system constitutes its dynamics, its evolution. Self-organization in synergetics is simultaneously a process and a result of consistent interactions between multiple components and parts of the system intended to regulate that system's inner structure. Systems that undergo spatial, temporal, and functional shifts as a result of internal processes without outside interference are called self-organizing systems (Haken, 2000: 69).

Language is also a self-organizing system that changes and develops in accordance with the universal principles of the behaviour of a complex system developed in the general theory of synergetics. As a multi-component synergetic system, language is characterized by the complex behaviour of its elements, parts, and sub-systems.

The synergetic paradigm distinguishes microscopic and macroscopic levels of system description. The microscopic level includes studying elementary components and their behaviour in a given system, while the macroscopic level constitutes a description of the system's overall dynamics as a result of its interactions with the outside

world. The macroscopic structure can be described using macroscopic variables, or ordering parameters (Haken, 2000).

Ordering parameters are characteristics of a certain complex system. These are the systemic factors that govern the behaviour (order) of the system's components. Changes in parameter templates can signal structural changes in a complex system, and vice versa. In speech, ordering parameters are functional discourse connections that organize speech as a communicative event intended to achieve a set communicative purpose (or purposes) (Ponomarenko, 2004); (Ponomarenko, 2006).

Fluctuations and bifurcations. A fluctuation is a temporary change in a system, or a constant shift between two points, that can produce a certain deviation in the system's dynamics, including the loss of stability. Fluctuations may bring a system to a critical point called *bifurcation*, a ramification of sorts or a combination of the system's possible existence regimes. Subsequently, the system is subjected to local and global changes. Local changes entail constant changes of form amid the constant variation of a certain dynamic parameter or parameters. More complex global changes include phase shifts, critical isolated shifts where changes can be multiple and discrete largely due to simultaneously possible fluctuations on many levels of the overall system. Having passed a bifurcation point, the system arrives at a new state of stability (Knyazeva, 2010); (Ponomarenko, 2004).

An attractor represents a state that a system strives for during its development, regardless of initial conditions, a state represented as a point or a trajectory in the system's phase space[2]. This stable state is determined by a set of logical rules (positive and negative interactions) regulating the development of information in a self-regulating system. Essentially, an attractor is the final point of the system's evolution (Coffman, 2011: 300). In speech, an attractor is the speaker/writer's communicative purpose (Ponomarenko, 2004); (Ponomarenko, 2006).

A fractal. This term was introduced by the mathematician Benoit Mandelbrot to describe the "self-similarity" model at every level and/or on the scale of a complex system's structural organization. A fractal is a fragmented form that can be divided into parts where each or nearly each is a smaller copy of the whole (Mandelbrot, 2002). Self-similarity is the principal characteristic of fractals.

The system of language also has a fractal-like organization: elements of one level of language serve as building blocks for more complex combinations of a different level of language and, in turn, as a foundation for even more complex configurations at the next level of organization, and so on. The higher the level of combinations, the broader the range of possible options.

[2] The American Heritage Science Dictionary. URL: http://www.dictionary.com/browse/attractor (accessed: June 10, 2021).

Principal Characteristics and Features of Systemic Functional Linguosynergetics

Functional linguosynergetics is a branch of linguosynergetics that organically synthesized the synergetic methodology and the basics of systemic functional linguistics (SFL) developed by Michael A.K. Halliday's academic school. Several SFL points are important for functional linguosynergetics.

The goal of SFL is to study the conditions and processes of activating specific characteristics of language/speech/discourse depending on a particular communicative situation within a real verbal interaction (Fontaine, 2012: 143); (Khramchenko, 2019), (Khramchenko, 2015). SFL considers the functioning of language as a resource that creates meaning and interconnection between form and meaning and strives to combine structural (systemic) information and extra-linguistic factors into an integrated description. A language system is not autonomous and independent of outside factors – on the contrary, these factors determine such a system. Functionalists believe that "it is language and word that give form to the conceptual image of the world" (Mironova, 2021: 35). Such a view results in the search for answers to questions of what the purpose (design) of the speaker/writer is; what language means are best for achieving this purpose; what factors determine the choice of a particular language means, etc. SFL, therefore, is a theory fully founded on the concept of functionality of a language that is uses to describe the syntactic structure of language. Language is considered in action, with account for a specific communicative situation and is understood as a verbal and cogitative tool that implements extra-linguistic purposes and functions of communication.

According to Halliday, language meets three kinds of socio-functional need: first, understanding and interpreting what is going on inside and outside us; second, interacting with the real world by coordinating social roles and relations; third, creating meanings from the point of view of what is given and what is new (theme – rheme relations). Halliday calls these language functions meta-functions. They are ideational, interpersonal, and textual functions, respectively: the use of language involves using all three meta-functions at once (Halliday, 1978).

Choice is another important and fundamental notion in systemic functional linguistics. Paradigmatic relations are believed to be primary and to form the meaning potential of language by systematizing the principal components in interconnected systems of characteristics. Therefore, one of SFL's principal tasks is to determine possible variants of creating this meaning potential in real contexts and situations via available expression resources of language. Syntagmatic relations are viewed as an implementation of the system within the context of a certain statement (discourse), which determines formal and structural consequences of choosing a specific language function. Halliday stresses the importance of choice since text is "a continuous process of semantic choice. Text is meaning and meaning is choice" (Ibid.: 137). Language, therefore, should rather be considered as an exchange of meanings in interpersonal contexts, while functioning of language should be seen a meaningful choice, not as a

set of formal rules. We see that the systemic functional theory adopts the paradigmatic axis as its starting point for understanding the functioning of language.

Yevgeniya Ponomarenko laid the groundwork for the development functional linguosynergetics, and her work was continued by A.A. Kharkovskaya, D.S. Khramchenko, V.L. Malakhova, I.V. Savina, A.V. Radyuk, and others. The main principles of functional linguosynergetics include:

- analysing self-organization processes in language and discourse in close connection, with self-organization understood as mobilizing the function-and-meaning potential of all textual components,
- non-linearity of language and discourse in a non-linear environment (an ethnic group's history and collective consciousness, the consciousness of specific communicants, and the parameters of a communicative situation),
- active interaction between language and discourse and their environment,
- the determining nature of ordering parameters relative to the functioning of elements of the language and discourse system,
- elements directed toward an attractor (communicative purpose),
- the processes of optimization and information contraction that manifest themselves in the English language and discourse, which tends towards economy of speech (Ponomarenko, 2004); (Ponomarenko, 2006); (Khramchenko, 2015).

Another feature of SFL and functional linguosynergetics is their close connection with pragmatics, which determines the importance of interpreting meaning depending on specific discursive space. In other words, functional linguosynergetics analyses the way a particular meaning representing a pragma-semantic whole is shaped through the use of language means in a particular context, and considers the question of which additional factors affect this process. At the same time, discourse analysis primarily takes into account communicative situation (or the immersion of language space into reality, which determines the communicative use of language), the description of facts of language in relation to human activity, and the relations between a sign and those who use it with an emphasis on the sign's functions. This is conducive to the search for the communicative parameters of language, thereby providing not for an abstract exchange of information, but for a real communication process emerging from a multiplicity of components that include informative content and influence communication participants and their actions.

The ultimate purpose of using language is not merely to create or know "correct" linguistic structures/forms, but to shape a desired meaning space and handle certain communicative tasks. Therefore, functional linguosynergetics focuses on the functionality of language, since without a function, a structure becomes a scheme with little point to it (Fontaine, 2012). Nevertheless, to effectively activate and analyse language functions, we need to understand its structure. Therefore, systemic functionalists perceive language as a social semiotic system in which its purpose and form are always determined by context, situation parameters, and communicative objectives of communication participants.

Functional linguosynergetics uses various kinds of analysis, including analysis of expression, content, and context. Context provides the chief contribution to the process of shaping meaning. People do not speak and write in isolated sentences, they speak and write in meaningful units, texts, that are created within the space of a certain discourse and are subjected to its influence.

Conclusion

Although synergetics, with emphasis on matters of evolution and phase shift, is considered a relatively new stage in the development of the systems theory, it is interdisciplinary in nature and therefore combines many sciences that deal with open, dynamic, self-organizing complex systems and develop non-linearly in different environments. The interdisciplinary nature of synergetics lies in its synthesis of research methods developed and introduced in natural sciences.

Linguosynergetics, or linguistic synergetics, constitutes such an interdisciplinary research approach to the study of language. The use of synergetic principles in a study of language is not only possible, but necessary, since language meets every criterion of a synergetic system: it is an open, dynamic, non-linear, self-organizing system that has a multiplicity of interconnected hierarchic sub-systems and elements whose functioning is regulated by ordering parameters. This is a complex synergetic mega-system that changes and develops in accordance with the universal behavioural principles of a complex system identified in the theory of synergetics. The potential of linguosynergetics opens up borders for a comprehensive study of language as a synergetic system and allows us to expand our understanding of the nature, functioning, and prospects of language development.

Since the structure and organization of language determine its functions at every level, the emergence of systemic functional linguosynergetics as a study of the organization of a functional structure appears logical. Language is the source of meaning in numerous, constantly changing contexts of human interactions. The uniqueness of language lies in it being organized as a huge network of interconnected choices.

Functional linguosynergetics considers language as a system with meaning potential employed by its users to convey meanings by making a selection from an entire range of alternative language means. The shaping of a common meaning space of a speech product obeys the non-linearity principle (2+2=5), since the overall meaning, as a rule, is greater than the mechanical sum of meanings of all individual textual components.

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