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## METHODOLOGY OF INTERPRETING THE RESULTS OF THE INTERDISCIPLINARY LINGUAL-AND-ENERGETIC RESEARCH

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### **Abstract**

In this paper, the authors substantiate the specificity of a new method and methodological and technological procedures for a complex qualitative-and-quantitative description of the results of non-traditional interdisciplinary lingual-and-energetic studies of stochastic self-developing cognitive processes of human speaking-and-thinking activities. Methodological possibilities and rules of a comprehensive assessment of qualitative and quantitative aspects of these processes' self-development are described in the paper. Using a theoretical principle of preserving the utterance's emotional-and-pragmatic potential as well as the dimensionless *K*-criterion for defining the level of the utterance emotional-and-pragmatic potential, the authors work out the analysis method based on a psycho-energygram that presents the self-development of cognitive processes of speaking-and-thinking activities in the individual's spiritual sphere. The trajectories of the analyzed processes' self-development are considered from the standpoint of synergetic knowledge and thus are interpreted in the form of corresponding attractor structures with bifurcation points that acquire the cognitive status of concepts. The methodology described in the paper opens up new possibilities for a scientific quantitative description of the dynamics of self-developing processes of the individual's speaking-and-thinking activities. These activities are viewed by the authors in their direct correlation with the reasons that actualize qualitative and meaningful acts generated by psychic and physiological bases of a person's communicative behavior.

**Keywords:** cognition, speaking, thinking, synergetics, psycho-energygram.

### **1. Introduction**

This article considers the issues that are undoubtedly new ones, since the necessity to solve them is directly related to the cognitive conceptual foundations of speech energetics theory, whose results have been widely published in our works within a recent decade (Kalyta, 2007; Kalyta, 2016; Klymenyuk, 2010). Theoretically, this present research is underpinned by the ideas of cognitivism (Rogers & McClelland, 2014; Botvinick & Cohen, 2014; Bullmore & Sporns, 2009; McClelland, 2010) and cognitive linguistics (Evans & Green, 2006), behavioural and psychological theories

(Clark, 2013; French et al., 2011; Graves et al., 2010), emotional meaning-making (Foolen, 2017; Harkins & Wierzbicka, 2001; Krysanova & Shevchenko, 2019; Shevchenko, 2019).

In search of unconventional means of interpreting the results of the interdisciplinary lingual-and-energetic research, we built on synergetic theories (Hotton & Yoshimi, 2010; Tabor et al., 1997) and substantiated a universal synergetic model in the form of the pyramid that represents self-developing processes of speaking-and-thinking and thinking-and-acting generation that take place in the individual's spiritual sphere (Klymenyuk, 2010, p. 208–234). This pyramid enabled us to perform a comprehensive description of the qualitative aspect of these processes' self-development.

In its turn, using a new theoretical principle of preserving the utterance's emotional-and-pragmatic potential (Kalyta, 2007) and the methods of similarity theory we validated the dimensionless criterion known as Kalyta-Taranenko *K*-criterion (Kalyta & Taranenko, 2012a) for the quantitative evaluation of the level of this potential realization being the result of a stochastic self-development of cognitive speaking-and-thinking processes (Kalyta & Taranenko, 2012a). It was found out (Kalyta, 2016; Kalyta & Taranenko, 2012b) that on a three-level scale, marked in units of the *K*-criterion, a low level of actualization of the emotional-and-pragmatic utterance potential is realized within the range of values  $K < 30$ , its mid level fluctuates within  $K = 30–105$ , and the high level is marked by the indicators of  $K > 105$ .

We shall add here that the numerical values of the *K*-criterion, with sufficient accuracy for an experimental study, have to be calculated using the corresponding formula (Kalyta & Taranenko, 2012a, p. 479; Kalyta, 2016, p. 97) based on the data obtained with the help of the computer program *Praat*. Thus, we acquired a real possibility to perform a comprehensive qualitative description of the energetic features of speaking-and-thinking generation processes.

In this regard, there appeared quite obvious and natural necessity to substantiate a number of methodological and technological procedures related to a comprehensive qualitative and quantitative description and interpretation of the results of non-traditional lingual-and-energetic interdisciplinary studies.

Therefore, the aim of our theoretical search, whose logic is outlined below, is to justify methodological features of interpreting the results of interdisciplinary lingual-and-energetic studies of speaking-and-thinking stochastic self-developing cognitive processes.

## **2. Theoretical search results**

### **2.1. Methodological potential of the individual's spiritual being pyramid**

In this section, we will consider the general stipulations regarding the synergistic description of the interdisciplinary lingual-and-energetic research results, referring to the aforementioned model of the pyramid (see details in: Klymenyuk, 2010, pp. 208–234; Kalyta, 2016, pp. 42–50) shown in Fig. 1.

The high interpretative potential of this model is grounded on the synthesis of present-day ideas of systemic and synergetic approaches (Bak, 1996; Haken, 2006; Haken 2012; Lukanin, 2008; Martínáková-Rendeková, 2012; Penrose, 2016; Shiffrin et al., 2020; and others), whose main assumptions are put forward in our papers (Klymenyuk, 2010, pp. 75-97, 97–126; Klymenyuk, 2005, pp. 105-132, 132–163). The model presents the frontal section of the pyramid of the individual's spiritual being. The plane of the model includes three conditionally autonomous spheres of a person's spiritual being, namely: existential, mental and transcendental. The highest point (C) of the model imitates the consciousness of the individual.

The existential sphere (Klymenyuk, 2010, p. 208) indicates the realm of the unconscious in the human psyche. All cognitive processes occurring in this sphere are based on the individual's emotional type of thinking.

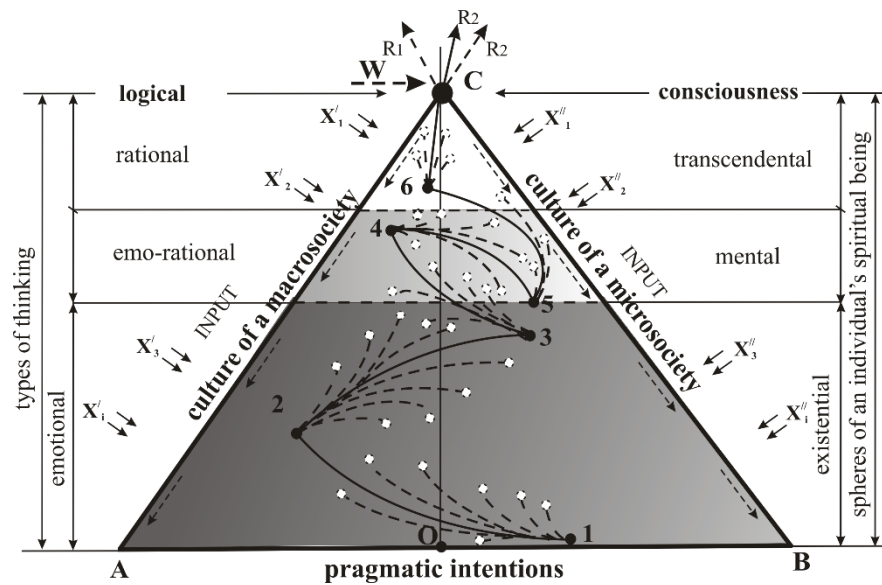


Figure 1. A universal synergetic model of self-developing processes of speaking-and-thinking and thinking-and-acting generation in the individual's spiritual sphere (first published in Kalyta & Klymenyuk, 2019, p. 15)

The subconscious sphere of the human psyche is divided into two spheres: mental and transcendental. Cognitive phenomena and processes whose self-development takes place in the mental sphere (Klymenyuk, 2010, p. 209) are related to the emo-rational thinking of the individual. The mental sphere of the person's spiritual life is characterized by a high turbulence in the flow of human thinking, since it's just here that the energy of the individual's genetically determined communicative and behavioral principles and skills are encountered with those which have been socially acquired as a result of his/her preliminary acquisition of the culture within the micro-society.

In the transcendental sphere (Klymenyuk, 2010, p. 211), cognitive processes are grounded on a rational type of thinking, which is not linked with ethical standards or a number of social taboos acquired by a person. As a rule, in this very sphere there occur creative cognitive acts of the individual's thinking processes.

Unlike the spheres considered above, the conscious type of thinking (point C), based on logic, is of a strictly dialectical nature and performs the function of tabooing. Taboos can be represented by logical contradictions, the individual's emotional state, various mental attitudes (ideological, ethical, aesthetic, etc.). It is necessary to point here that taboo factors can be excited and thus can emerge from the person's memory to the level of his/her conscious thinking from any spheres of spiritual life (existential, mental, transcendental). To initiate this process, it is quite enough for an emotional, mental or transcendental taboo concept with the energetic potential that ensures its transition to the level of consciousness, to pass from the individual's memory into the flow of his/her thinking.

Hence, it is quite obvious that the role of consciousness is to taboo the results of those self-developing acts that contradict the logic inherent in a definite person, as well as to materialize the results of his/her thinking that do not contradict this logic. As is seen from the model, the numbers 1, 2, 3, etc. mark the so-called bifurcation points, where the trajectory of speaking-and-thinking self-development usually changes its direction since the thinking process enters the chaos resulting in the emergence of a new order. The broken curve (1–C) depicts the general trajectory (its path and direction) of cognitive processes' self-development. This trajectory is traditionally termed as the

attractor structure. The very structure of an attractor consists of a sequence of partial attractors' generation and development (e.g. 1–2, 2–3, 3–4, etc.).

The white points in the model of Fig. 1 show the possible ways of a partial attractor's alternative development (see, for instance, the 1–2 attractor), which, entering the so-called cones of its attraction, increase the 1–2 attractor's energetic potential. We shall emphasize here that in the process of the model practical application, the images of alternative partial attractors and the trajectories curvature of partial attractors' development are most often avoided by cognitive scientists.

From the synergetic standpoint, the behaviour of any open self-developing non-equilibrium system, similar to the system modelled in this paper, can be characterized by the parameters of its state at bifurcation points at each specific moment of its development. At the same time, it is important to realize that it is the parameters of order that have a crucial influence on the strategy of speaking-and-thinking processes' self-development, depicted on the model by the 1–C attractor structure, as well as they determine the development of each of its partial attractor. Their number is usually limited by three complex factors being of a higher level of abstraction as compared to the parameters of state. In our case (see Fig. 1), the role of the parameters of order is performed by the individual's pragmatic intentions, and the cultures of his/her micro- and macro-societies.

Within the framework of a systemic approach, the complexes of factors that form the parameters of order can always be differentiated into disturbing and controlling influences. Thus, controlling input related to the culture of the person's macro-society can be qualified as:  $X'_1$  – interlocutor's speech behaviour,  $X'_2$  – his/her social status, etc., while disturbance input may come from:  $X'_3$  – the interlocutor's rudeness;  $X'_4$  – presence or absence of the third parties, etc. Similarly, the culture of micro-society as a parameter of order can comprise such controlling input as:  $X''_1$  – the individual's self-identification in the course of communication,  $X''_2$  – his/her readiness to understand vis-à-vis, etc., while disturbance input may include:  $X''_3$  – the acquired taboos of the ethnic norms of conduct,  $X''_4$  – spiritual values, exacerbation of the painful state of the individual's particular organ, etc.

We shall emphasize here the fact that regardless the nature of its origin (verbal, visual, tactile, etc.), any information (see vector W on the model) perceived by an individual from the external environment, enters simultaneously all the spheres of his/her spiritual being (see the dashed arrows). The materialization of the self-development of the person's speaking-and-thinking processes is indicated on the model by the vector R.

We also have to remark that on the model any bifurcation point is inherently a concept point that reflects the verbally expressed results of his/her cognition of a certain aspect or phenomenon of the outer reality, which are stored in the individual's memory. Therefore, in the process of modeling the representatives of a cognitive science as an interdisciplinary study get the opportunity to denominate these universal concept points with the necessary conventional notions of any level of abstraction.

Due to this, such notions may be designated, for instance, by the individual's conceptual sphere, the general picture of the world, the scientific picture of the world, the physical (chemical, technical, biological, social, demographic, cultural, pedagogical, linguistic, aesthetic, etc.) picture of the world, image-concept, gestalt-concept, frame, pattern, concept-scheme of actions, picture-concept, scheme, domain, as well as verbal, emotional, tactile, auditory, visual, olfactory concepts and the concepts of taste, smell, colour-and-sound, sound-and-emotional, smell-and-emotional, emotional-and-taste, emotional-and-taste-and-smell, colour-and-verbal, sound-and-colour, colour-and-music, phyto-and-visual, tactile-and-visual, taste-and-visual and a countless number of other concepts (Klymenyuk, 2017).



Finally, the development of 5–C partial attractor leads to the complete formation of the full 1–C attractor structure, whose self-development, being under the control of consciousness, materializes in the direction of the vector R. The vector’s inclination to the left of the OC axis shows that in the analysed example the culture of the individual’s micro-society determined the result of his/her speaking-and-thinking activities.

In the given example, we demonstrated the fluctuations in the general EPP of the individual’s speaking-and-thinking processes viewed only as one of the forms of lingual-and-energetic analysis of these phenomena. However, as shown above, the coordinate grid of the pyramid model (Fig. 2) also enables a quantitative description of the dynamic features of emotional and pragmatic potentials’ fluctuations in the course of the individual’s speaking-and-thinking activities.

To increase the clarity of such a description, we transformed the image of the pyramid model into a corresponding psycho-energygram (see Fig. 3).

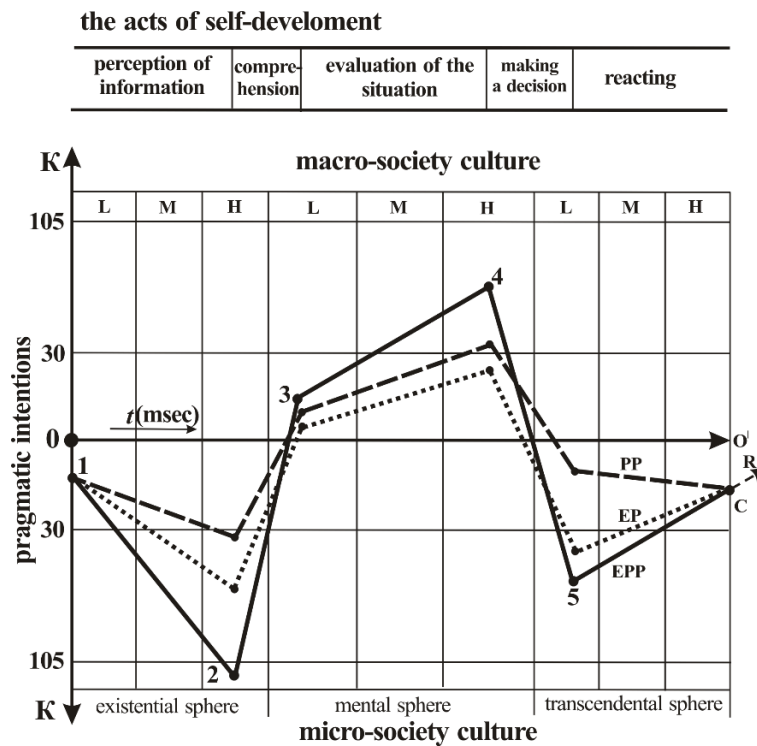


Figure 3. The example of a psycho-energygram of the individual’s self-development of speaking-and-thinking and thinking-and-acting cognitive processes

Here on the  $OO'$  axis we marked the time scale. Up and down from the point O, we respectively formed the  $K$ -criterion scale. On these scales, we additionally indicated the levels of EPP actualization (L, M, H).

On the coordinate matrix thus obtained, we build the 1–C attractor structure shown above in Fig. 2. Having carried out a quantitative description of the dynamic features of EPP fluctuations within this attractor structure, we proceed to the construction of two more attractor structures, each of which depicts self-developing processes of emotional (hereinafter – EP) and pragmatic (hereinafter – PP) potentials of the individual’s speaking-and-thinking activities.

The method of separating EPP into EP and PP is simple. To do this, using the *Praat* sound processing program and the  $K$ -criterion formula (Kalyta, 2016, p. 97), the researcher defines quantitative values of the dimensionless  $K$ -criterion for each bifurcation point of the considered concepts. Then, the experts in the field of linguistics and psychology, taking each EPP value thus

obtained as 100%, evaluate the percentage of the pragmatic potential (PP) out of this complex indicator. The results of the expertise evaluations are summarized in matrices and calculated according to the formulas (Klymenyuk, 2006, pp. 258–261).

Let us consider the procedure for calculating the values of  $K$ -criterion for EP and PP using the concept point 2 (Fig. 3) as the example. In this case, the researcher obtained the EPP values that equal 120 points of the  $K$ -criterion. At the same bifurcation point 2 according to the expertise data the PP makes up 40% (or 0.4 out of 120 taken as 1) of the total EPP of the concept's actualization of the individual's speaking-and-thinking activities.

Having performed simple calculations ( $120 \times 0.4 = 48$ ), the researcher can see that at point 2 the PP value equals 48 points of the  $K$ -criterion. Therefore, the EP value at this point will amount to 72 points ( $120 - 48 = 72$ ). In a similar way we calculate quantitative values of EP and PP at other points of attractor structures depicted in the psycho-energygram (Fig. 3). At the end of the procedure, according to the results of calculations, the attractor structures of the development of EP (a zigzag dotted curve line) and PP (a zigzag dashed curve line) are applied to the psycho-energygram.

At the same time, for the convenience of the analysis, a researcher can mark a chrono-scale of synchronous events above the psycho-energygram. In the example of Fig. 3, this is the scale of self-developing acts of cognitive processes. Let us note here that the content of the chrono-scale directly depends on the semantic loading of concept points. Thus, if phonoconcepts are the points of the attractor structure, then it is logical, for instance, to use classic intonograms as a chrono-scale. As to the concept points of the attractor structures self-development of the scientific picture of the world, it is logical to use the chrono-scale of changes in its socio-economic formations with the division of the scale into 50 years, etc.

Having the appropriate psycho-energygram, we get ample opportunities to describe the dynamic patterns of fluctuations in psycho-physiological energy in the processes of a person's speaking-and-thinking self-development in the unity of the emotional and logical bases of his/her psyche. At the same time, we acquire the possibility to statistically define the correlation of these bases with a huge number of socio-cultural, situational, psychological and physiological factors that affect these processes specificities.

Let us also dwell on another very important circumstance related to depicting partial attractors that describe on the model the trajectory of the self-development of instinctively and reflexively conditioned cognitive acts occurring in the individual's spiritual being. The main thing in this issue is that, both on the pyramid model and on the psycho-energygram, any partial attractor, indicating the reflexive or instinctive act of the individual's speaking-and-thinking processes, will necessarily develop on the OC axis.

### 3. Discussion

It is also worth mentioning that due to the high level of abstraction of the pyramid of the spheres of the individual's spiritual being as a conceptual model of scientific consideration of any phenomena, processes or events related to the person's speaking-and-thinking activities, the scope of its application is practically unlimited. This is quite logical since the communicative behaviour of people is always and inevitably based on their speaking-and-thinking activities.

It is rational, first of all, to test the high efficiency of using this model as a methodological tool for the interdisciplinary retrospective acquisition of new knowledge in such sciences as the theory of cross-cultural communication, cognitive science, psychology, philosophy, sociology, psychiatry, history, economics, political science, literary criticism, ethnology, etc. For achieving this, it is quite enough to carry out an adequate development of the target structure of the indicated research and objectively single out the parameters of order, within the meaningful synchronous spaces of which the researcher can get the facts necessary for the systemic differentiation of the inherent disturbing and controlling influences. The following notions and phenomena can serve in the function of such parameters of order, for instance, for *philosophy*



(sacred and scientific pictures of the world, knowledge and facts, faith and facts, faith and opinions, opinions and knowledge, etc.); for *psychology* (consciousness and instinct, duty and conscience, ideology and the objective reality, mentality and the individual's living standards, his/her social status and spiritual values, etc.); for *economy* (economic security of the society and the living standards of an individual, macro- and microeconomics, geopolitics and microeconomics, microeconomics and ideology, economic security of the society and patriotism of the population, etc.); for *history* and *historical figures* (an individual's sense of duty and moral convictions, his/her creative potential and social status, the creative search of the individual and opposition of the society and the like).

#### 4. Conclusion

In conclusion, we shall emphasize that the offered above methodology for modelling cognitive processes of the person's speaking-and-thinking activities is a complex interdisciplinary hypothetical construct that we developed taking into account present-day knowledge accumulated in the field of a number of psychological, linguistic and social sciences as well as using a systemic approach and the synergetic doctrine of the theory of chaos.

The prospects of the effective application of the substantiated systemic methodology grounded on the results of scientific assumptions' integration and unification of the terminology of disciplines related to cognitive science, consists in the possibility of using the universal conceptual-and-synergetic model, which depicts the self-development of speaking-and-thinking and thinking-and-acting processes' generation, for solving a wide range of multidimensional interdisciplinary problems that deal with various objects of study.

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## МЕТОДОЛОГІЧНІ ОСОБЛИВОСТІ ІНТЕРПРЕТАЦІЇ РЕЗУЛЬТАТІВ МІЖДИСЦИПЛІНАРНИХ ЛІНГВО-ЕНЕРГЕТИЧНИХ ДОСЛІДЖЕНЬ

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### Анотація

У статті авторами обґрунтовано особливості методолого-технологічних процедур та новий метод комплексного якісно-кількісного опису результатів нетрадиційних міждисциплінарних лінгво-енергетичних досліджень стохастичного саморозвитку когнітивних процесів мислення під час породження мовлення та мисленнєвого проектування дій людини. Розкрито методологічні можливості та викладено правила комплексної оцінки якісної і кількісної сторін саморозвитку зазначених процесів. На основі теоретичного принципу збереження емоційно-прагматичного потенціалу висловлення та безрозмірного *K*-критерію рівня актуалізації емоційно-прагматичного потенціалу висловлення у статті розроблено метод аналізу, базований на психо-енергограмі саморозвитку когнітивних процесів мислення під час породження мовлення та мисленнєвого проектування дій у духовній сфері індивіда. Аналізовані з позицій синергетичного знання траєкторії саморозвитку цих процесів інтерпретуються у вигляді відповідних структур-атракторів з характерними точками біфуркації, що набувають когнітивного статусу точок-концептів. Викладена методологія відкриває нові можливості наукового кількісного опису динаміки саморозвитку процесів мислення під час породження мовлення та мисленнєвого проектування дій людини в їх безпосередньому співвіднесенні з причинами реалізації якісних і смисломістких актів, що породжуються психічним і фізіологічним початками комунікативної поведінки особистості.

**Ключові слова:** когніція, говоріння, мислення, синергетика, психо-енергограма.

## МЕТОДОЛОГИЧЕСКИЕ ОСОБЕННОСТИ ИНТЕРПРЕТАЦИИ РЕЗУЛЬТАТОВ МЕЖДИСЦИПЛИНАРНЫХ ЛИНГВО-ЭНЕРГЕТИЧЕСКИХ ИССЛЕДОВАНИЙ

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### Аннотация

Авторами обоснованы особенности методолого-технологических процедур и новый метод комплексного качественно-количественного описания результатов нетрадиционных

междисциплинарных лингво-энергетических исследований стохастического саморазвития когнитивного процессов речемышления и мышледействия человека. Раскрыты методологические возможности и изложены правила комплексной оценки качественной и количественной сторон саморазвития указанных процессов. На основе теоретического принципа сохранения эмоционально-прагматического потенциала высказывания и безразмерного  $K$ -критерия уровня актуализации эмоционально-прагматического потенциала высказывания в статье разработан метод анализа, основанный на психо-энергограмме саморазвития когнитивных процессов речемышления и мышледействия в духовной сфере индивида. Рассматриваемые с позиций синергетического знания траектории саморазвития анализируемых процессов интерпретируются в виде соответствующих структур-аттракторов с характерными точками бифуркации, приобретающими когнитивный статус точек-концептов. Изложенная методология открывает новые возможности научного количественного описания динамики саморазвития процессов речемышления и мышледействия человека в их непосредственном соотнесении с причинами реализации качественных и смыслодержательных актов, порождаемых психическим и физиологическим началами коммуникативного поведения личности.

**Ключевые слова:** когниция, говорение, мышление, синергетика, психо-энергограмма.