

Nataliia Tokareva, Maryna Tsehelska, Olena Ilienکو, Nadiia Morhunova, Alla Krokhmal

**ABSTRACT**

The work is devoted to the analysis of metacognitive resources of modeling text messages using projective-recursive technology in teaching English. The authors highlight the essential dimensions of communicative discourse and text as its basic element. The resources of cognitive-discursive and fractal modeling of texts in the plane of implementation of metacognitive activity of foreign language learning subjects are considered. The effectiveness of the integrative model ILDA in measuring the multimodal development of bilingual academic literacy of education seekers is proven. The role of recursive mechanisms in organizing thought-speech patterns and providing productive feedback in bilingual communication situations is substantiated. The experience of using metacognitive schemes of various types in teaching English for the formation of text creation skills is presented. The effectiveness of the use of metacognitive schemes in the logic of projective-recursive technology of teaching English is proven.

**KEYWORDS**

Metacognitive modeling, communicative discourse, cognitive-discursive logic of text creation, fractal modeling of texts, text messages, projective-recursive technology, metacognitive schemes, foreign language learning.

**11.1 CONCEPTUAL PRINCIPLES OF MODELING TEXT MESSAGES AS METACOGNITIVE FORMATIONS**

The deployment of variable matrices of the globalized world order of the modern information society in the unstoppable dynamics of the present, the expansion of the design and resource capabilities of the metacognitive activity of a person of the 21<sup>st</sup> century determines the change of paradigmatic vectors of mastering a foreign language. The main direction of the systematic assimilation of language material is currently training in the congruent perception of logical-semantic constructs and grammatical schemes of a foreign language and the creation of a polymodal communicative discourse. Therefore, foreign language teaching should be directed (and this is proven by the analysis of scientific sources [1–4]) primarily at the integrative dimensions of text creation.

Considering the content of text creation through the prism of a systemic combination of communicative-functional, systemic-structural and cognitive-discursive scientific paradigms, we note that the communicative discourse itself in the fleeting realities of life is expressed by scientists (for example: N. Tokareva, G. Kress, T. Van Leeuwen, M. Heinemann, W. Heinemann, F. Hermanns, J. Kijko, etc. [1–12])

as a complex sociolinguistic and psycholinguistic phenomenon designed to provide metacognitive modeling of the global information space in the coordinates of the speech-thinking, affective-volitional, axial segments of the semiotics of the subject-subject life of the individual.

In the context of the topic we are studying, the conceptual ideas of critical discourse analysis by N. Fairclough, regarded by adherents of discursive psycholinguistics as a theoretical basis for a comprehensive analysis of the system of a person's use of linguistic resources and general social practices of self-realization for modeling text messages, can be considered interesting. N. Fairclough refers the concept of "discourse" to semiotic systems and interprets it as a way of using language and the social practice of its use, which means the meaning of communicative experience based on certain worldview positions and intellectual culture of the individual [6]. Communicative discourses, according to the researcher's scientific views, participate in the creation of social identity and social relations (in accordance with the knowledge and systems of internalized meanings) of speech subjects, which determines the understanding/analysis/production of text messages in logical-semantic unity with the sociocultural continuum of life-creation. A speech act (or a discrete model of communicative discourse [1, 2]) in the three-dimensional concept of N. Fairclough is interpreted as a coherent communicative event (a specific case of language use), consisting of three dimensions:

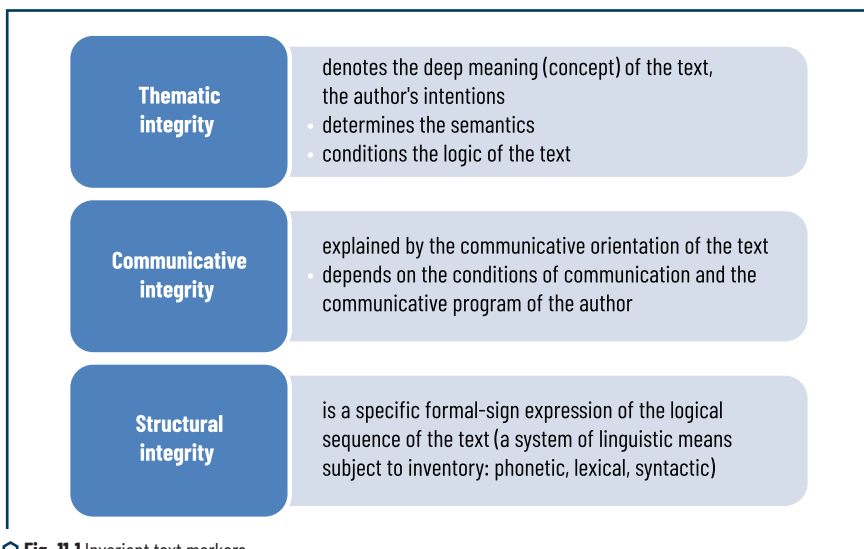
- text (oral or written speech, visual image or their combination), defined by a certain linguistic structure (dictionary, grammar, syntax of a sentence or complex semantic wholes) of a message that is perceived by the agent of speech or transmitted to the addressee;
- discursive practice, which involves the generation and perception/understanding of texts; the analysis of discursive practice focuses on identifying the features of the use of accessible discourses by communication subjects to model a text message and its interpretation in the process of perception;
- social practice of interpersonal contacts, which is prolonged by the formation and formulation of text messages accessible to speech agents [6].

The dimensions of a speech event are closely related to each other: the formal-linguistic characteristics of the text influence the formation (articulation) of the text construct and the features of its use in the cultural-social context [6], which contains both discursive and non-discursive elements. It is also worth considering the dynamic nature of communicative discourse, prescribed in the critical discourse analysis of N. Fairclough, the dimensions of which provide not only for the fixation of a psycholinguistic fact, but also for the possibility of flexible change of discourse in the process of modeling new combinations of the subjective experience of the speech personality in patterns of interaction. Thus, the communicative discourses internalized by a person determine the basic coordinates of the person's reflection of the picture of the world, the center of which is the subject of speech him/herself – the speech personality: the discursive formations of the speech segment are woven into the personalized processes of subjective perception, preservation and transmission of information, into the processes of verbalization of meanings and text creation.

The achievements of N. Fairclough are reflected in subsequent scientific research by linguists and psycholinguists, in particular in the studies of R. Brinker, S. Pappert, H. Cölfen, G. Kress, T. Van Leeuwen, M. Heinemann, W. Heinemann, F. Hermanns, J. Kijko, N. Tokareva, etc. [1, 5, 8, 9, 12, 14].

In the modern psycholinguistic space, it is generally accepted to treat discourse as a complex communicative phenomenon, the components of which are the text and extralingual factors (background knowledge, views, attitudes, goals of the addressee) [13]. Thus, based on the dichotomy "discourse – text" consonant with the continuum "process – result" [1, 6, 8, 9, 11, 13, 16], text (from Latin *textum* – "link", "connection", "fabric") should be considered as a basic element of discourse, which is created according to conventional rules accepted in a certain communicative sphere and is interpreted as a completed message of a certain content, which is organized according to the model of a functional style and is characterized by its distinctive features.

Invariant features of the text are mainly [1, 5, 10, 13] considered to be markers of thematic, communicative and structural integrity (**Fig. 11.1**).



◉ **Fig. 11.1** Invariant text markers

Accordingly (and we fully agree with the statement of K. Serazhim in this point) for competent understanding or production of the text, the recipient or author of the text must understand it as a symbolic order of contents, correlate the text with reality, with his/her knowledge and ideas about it [13]. Analytical decomposition, fragmentation of elementary cognitions of perception for further expression of thought, awareness of meanings and expansion of semantic denotations, understanding of essential markers of abstractions and other operations with signs allow a person to go far beyond the boundaries of objective denotations of sensations and perception and model a holistic representational-sign system of text constructs. Metacognitive textual formations, thus, format the basis of a person's mental development, determine the congruence of reflection and self-expression, mark a person's attachment to socio-cultural and historical values.

Accordingly, the process of text creation appears as a metacognitive dimension of speech activity (Fig. 11.2), and not just a linear transcoding of semantic denotation into a text message.

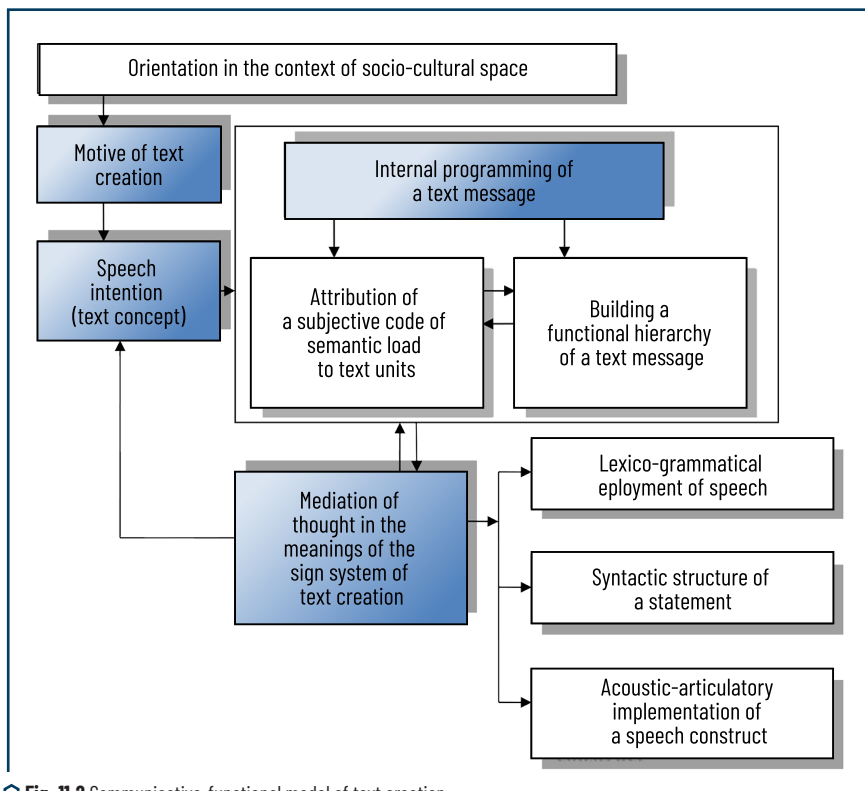


Fig. 11.2 Communicative-functional model of text creation

The driving force of modeling an expanded text, according to the theoretical concepts of the activity approach, is the motivational component, which determines the formation of a pragmatic type of text message. The motive means the need to convey certain information to another person, establish contacts or affective discharge; the motive causes the formatting of the message idea as a diffuse (general) logical-semantic scheme of the predicted statement.

Recoding of the idea and production of the generative scheme of a text message (logical-grammatical form) occurs using the internal speech programming mechanism, which includes the original idea in the system of language grammatical codes and actualizes the grammatical matrices of building a text statement previously learned by the subject of speech. Internal, "operational" mechanisms of speech activity determine dynamic markers of modeling a text message, in particular, the speed of planning a text

construct, automaticity of response, analytical comparison of the result (text) with the intention, hierarchical organization of the message, etc. The most typical case of metacognitive modeling of a text formation code is a secondary visual image-scheme of the message. External speech unfolds in the format of the aforementioned, its constructs determine the subjective significance of the statement and determine the general logic of a text formation, which can vary widely depending on the nature of the text message and the psychological characteristics of the speech activity subject.

Grammatical and semantic dimensions of the implementation of the internal program of a text message express the translation of the idea (logical scheme) of the statement into an objective continuum by replacing the units of the subjective code with a set of semantic features of the sign (word, picture, graphemes, etc.), creating a complex of hierarchically organized units of the objective-speech code. At the stage of syntactic design of the text construct, a linear distribution of the code units of the statement is carried out, the place of each element of the complex of hierarchically organized units in the syntactic scheme of the statement is determined, grammatical meanings are assigned, a set of semantic and acoustic-articulatory features is determined (syntactic prediction). The implementation of the syntactic control function ensures the coordination of the created version of the statement with the program, context, situation, if necessary, a return to previous stages and correction of the speech product occurs. Acoustic-articulatory realization of a text message connects speech formation with the voicing of an utterance [1, 7, 16]. And therefore, the text appears as a product of speech activity with a clearly defined psychological contour: the psychological conditions of the integral conception and implementation of speech (system hierarchy of predicates), individual-psychological and activity features of the subject of speech are objectified in the text message. Text creation itself occurs through the mediation of such metacognitive mechanisms as: comprehension (establishment or reproduction of semantic connections of the message, establishment of semantic supports or creation of equivalent replacements, etc.), anticipatory reflection (in the form of probabilistic prediction), mechanisms of memorization and specific mechanisms of speech generation (operational, sense-forming, phonational, etc.). Thus, speech appears as a means of self-expression, conscious identity of the speech personality in the coordinates of sociocultural interactions of the information environment.

A special mode of producing text messages included in a life situation for the purpose of communication is the acquisition of a foreign language (Second Language). In a complexly structured bilingual environment of a combination of constructs of the native and foreign languages, foreign language texts are built by the linguistic personality according to a similar metacognitive model of subject-subject interaction. At the same time, the culture of bilingualism requires the expression of parallel (rather than sequential) activation of all levels of text creation with a coherent representation in time of all links (planning, programming, internal linguistic organization of the content plan) of speech. Mastering bilingual skills is based on the coherence of vectors of lexical-grammatical and semantic competencies (such as memorizing and understanding speech constructs of a foreign language – Lower Order Thinking Skills (LOTS)) and the ability to analyze and compare language constructs, model text messages (Higher Order Thinking Skills (HOTS)) in an interdisciplinary language space.

In general, a wide range of linguistic, psycholinguistic and psychological studies indicate a different continuum of analysis of foreign language text messages. The most widely used interpretations of texts are:

---

standardized coherent sequences of verbal and non-verbal signs that together perform the communicative function in a foreign language space (R. Brinker, St. Pappert, H. Cölfen, M. Heinemann, W. Heinemann [5, 10–12]), as well as formations characterized by relevance, efficiency, practical orientation, secondariness, intertextuality, despecialization, orientation on the recipient's background knowledge, conciseness and cyclical repetition of topics, and functioning against the background of their doublet terminological descriptions (K. Serazhim, J. Kijko, L. Makaruk et al. [1, 13–17]).

In the context of this study, a text message is considered by us as a syntagmatic linguistic construct, coherent in content and form, that represents a certain thematic discourse, contains the necessary lexical and grammatical material and expresses the communicative ability of a linguistic personality to conduct a dialogue (or polylogue), and in particular – in a foreign language. A linguistic personality, accordingly, appears not only as a carrier of linguistic competence, but also as a carrier of the intellectual (metacognitive) ability to create new knowledge, text formations on the basis of the accumulated experience of mastering a foreign language.

## 11.2 POLYMODAL CONCEPTS OF TEXT CREATION IN METACOGNITION DIMENSIONS

The complexity and nonlinearity of mastering a foreign language in the globalized sociocultural space of a bilingual (or even multilingual) information society consistently fits into the linguosynergetic paradigm of the development of multimodal language competencies of the individual (H. Cölfen, F. Hermanns, M. Halliday, J. Kijko, N. Tokareva, M. Tsehelska, L. Makaruk, etc. [1, 3, 5, 7, 14–17]).

Among the productive strategies for understanding and independent modeling text messages in a foreign language, models of invariant-variative text creation based on the extrapolation of cognitive-discursive and fractal approaches attract attention. The most expressive metacognitive strategies for producing text messages are presented in the system of cognitive-discursive logic (M. Halliday, G. Kress, T. van Leeuwen). The result of discursive activity is the generation of a text (or a complex syntagmatic construct), which is created according to the conventional rules adopted in the bilingual communicative segment of linguistic discourse in accordance with the preferences of the modern sociocultural space [7–9]. Thus, the text modeled by means of a foreign language appears as the result of the integration of metacognitive processes (perception – memorization – comprehension and structuring of information) [2, 3] and discursive practices in the continuum of a certain contextual modality of different types of mental representation of meanings [8, 18]. Therefore, text creation, according to the philosophy of cognitive-discursive modeling, is considered as a sign process that encompasses at least three dimensions:

- syntactic, which denotes markers of analysis and interpretation of determinants of the logical-semantic sequence of the text, fixes the connections between syntagms in the structure of the general sign system of the text;
- semantic, within which the connection between the features of the systemic-functional metaphor and its meaning (the internal sense-forming plane of the thematic construct) is reflected in the structure of the sign process;

– pragmatic – fixes the relationship between the sign and its interpretative variations in the structure of the speech process [18].

In this context, we share the opinion of N. Nolubenko in it, the starting point for identifying implicit meanings and activating mental mechanisms of implication (inference), replenishment (restoration) and modeling (metaphorization) of the denotations of a text message is the correlation of the explicit denotation with the intended content of the communicative act [18]. This becomes especially important in bilingual situations that require analysis, subjective assessment and coding/decoding of language symbols and signs, semantic and grammatical structures of a text message, taking into account the socio-cultural context reflected in the thematic field of the speech message. Accordingly, the discursive (or more precisely, cognitive-discursive) format of relevant analysis and production of texts in a foreign language involves the delineation in the text formation of such contextual circumstances as: time, location, event/action, participants; it is also worth considering additional categories of semantic structures, in particular: the domain of activity, the role of the discourse participants, social relations between the participants [18]. Therefore, any text acquires individual expressiveness, genre originality not so much due to the ability of the linguistic personality to operate with lexical-semantic formants of the language (LOTS), but rather due to the competent metacognitive modeling of textuality that reflect the system of knowledge, views, thoughts of the personality (HOTS), express the variable codes of his/her worldview.

The principles of fractal modeling of logical-semantic structures of text messages also open up a wide scope for understanding the problematic aspects of nonlinear systems of psycholinguistic knowledge, highlighting text creation as a way of visualizing complex phenomena, as well as as a tool that facilitates the understanding and perception of the large-scale invariance of linguistic phenomena (for example, the study of polymodal resources of text creation in the works of J. Kijko, L. Makaruk, et al. [14–17]).

The philosophy of the fractal approach (the term "fractal" (from the Latin *fractus* – crushed, fragmented) is used to denote self-similar structures, in which individual parts are to some extent similar to the whole, and the structure of the whole is reflected in its parts, is based on the recognition of the co-dimensionality and recursion of fractals, the extraordinary structures of which can be reproduced using recursive procedures. The extrapolation of the fractal approach to text message modeling denotes the metacognitive level of texts as units of the language system, which is based on the principle of invariant-variative taxonomy of text messages:

– universal invariant (logical-semantic, grammatical and/or syntagmatic scheme of text architecture) specifies the dimension of multi-scale recursive information self-similarity of the textual mode, reflects the general pragmatic characteristics of a text formation and established rules;

– variable content of the message expresses the text design, testifies to speech-thinking differences in the methods and means of modeling texts (microstructural dimension of the fractal perspective), demonstrates different configurations of author's comprehension and interpretation of content descriptions, addition of a given or own story, formulation of a conclusion or provision of an argumented assessment, etc. (macrostructural dimension of the fractal perspective) [14, 15].

This creates the necessary prerequisites for the reconstruction of both universal (invariant) mechanisms for producing texts in a foreign language (Second Language), and authorial (variative) sentences

---

independently modeled by the subject of linguistic activity (in particular, when learning English as a foreign language). At the same time, traditionally fixed foreign language teaching programs have become oriented towards the passive-mechanistic architecture of formatting experience, which reflects primarily the completeness and accuracy of perception and reproduction (recall) of information in the LOTS coordinates, rather than the development of competent solutions to semantic, problematic tasks in the discourse of the language being studied (in the continuum of HOTS). At the same time, only the awareness of the resources of metacognitive activity by the foreign language education student guides the modeling of cognitive-discursive reality, allows coherently to perceive, store and reproduce information, consciously plan and predict the results of cognitive actions, generate vectors of a winergetic worldview taking into account invariant-variative scenarios of speech activity [3, 4, 14, 18]. Therefore, learning a foreign language in the realities of the cross-cultural cycle of civilization development first of all requires the recognition of the axiomatic scenario for the development of the language consciousness of education applicants, the formatting of the individual's metacognitive skills – the ability to independently build the semantic structure of a speech utterance, understanding the textual constructs of a foreign language and coherent modeling of one's own utterances [3].

Recognizing metacognitive activity as a basic predictor of the regulation of intellectual activity by foreign language learning subjects, as the fundamental content of the development of text production skills in the coordinates of the taxonomy of cognitions, it is worth considering the following groups of critical markers, such as:

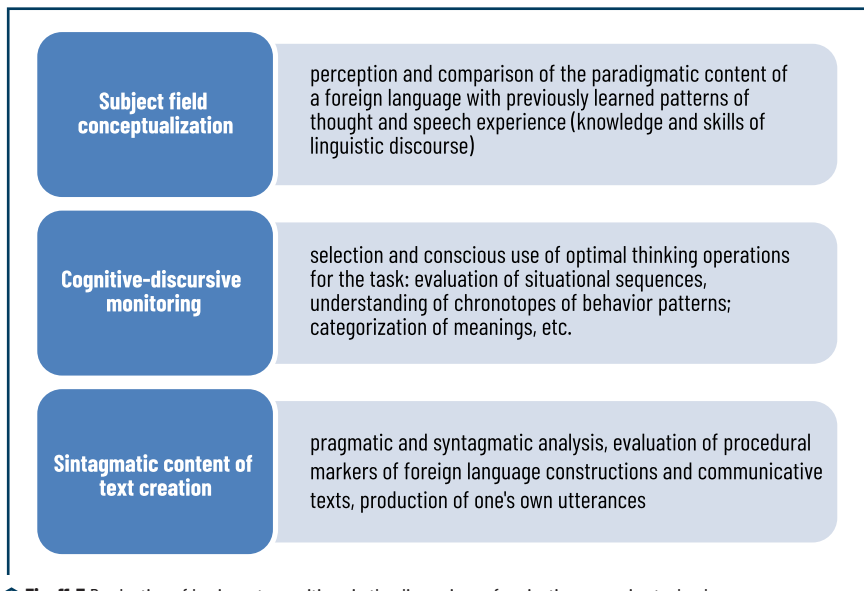
1) metacognitive knowledge: awareness and metamemory of the individual regarding his/her own identity, understanding of the principles of the world order, universal knowledge about human interaction. An important role is also played by the understanding of the cognitive (or educational) task, its contextual characteristics and available solution strategies. The level of students' awareness of the systemic and functional resources of metacognitive regulation of cognitive experience determines information processing strategies, dimensions of planning, monitoring and control, awareness of markers of critical evaluation and cognitive reflection;

2) metacognitive skills: skills of self-regulation, monitoring and control of interactive aspects of cognitive processes, the individual's ability to make a decision and choose effective metacognitive strategies for solving a problem. In particular, the skills of metacognitive information processing are considered by R. Tarricone [19] as a necessary condition for effective teaching of students of different age groups.

At the same time, it is worth recognizing the coexistence in the modern bilingual space of numerous scientific and didactic explorations of foreign and domestic scientists on identifying resources for optimizing the content formation of academic competencies in a foreign language. In particular, the systematic scientific linguistic and psycholinguistic developments of the authors of this project (for example: [1–4]) prove the validity of projective-recursive technology in organizing English language teaching in the mental space of cultural dialogue.

Taking into account active scientific discussions in the field of defining the logical sequence of metacognitive modeling of the bilingual experience system of language consciousness carriers, we consider it quite appropriate to specify the conceptual segment of the research paradigm. We consider recursion (from

the Latin *recursio* – "return") as a predictor of metacognitive activity of educational space subjects, which allows building an individual cognitive map of a person's cognitive experience, creating "embedding" of some ideas into others on the border of objective stimuli (external educational instructions and repetitive fractals of foreign language discourse) and subjective (internal, internalized) schemes of understanding [2, 3]. In this context, mastering a foreign language expresses not only the reproduction of a foreign language segment of experience, but also directs students' cognitive interest to the balanced production of informative constructs in order to achieve the planned goal (Fig. 11.3).



◊ Fig. 11.3 Production of basic metacognitions in the dimensions of projective-recursive technology

Thus, the cognitive-discursive paradigm of learning a foreign language and the projective-recursive technology of building metacognitive skills in the context of the above appear as a tool that opens up a fractal-recursive psychological reality for a person, contributes to the development of personal reflexivity and the improvement of the resourcefulness of communicative feedback, necessary for the implementation of metacognitive monitoring and assessment of the acquired language experience by students, and its rethinking in the perspective of bilingual text creation (Second Language) [3].

The metacognitive potential of projective-recursive technology is visualized most clearly in the architectonics of polyvector integrative studies of text creation in a multimodal perspective (for example, the research by G. Kress, N. van Leeuwen, J. Kijko, N. Tokareva, M. Tsehelska, L. Makaruk, and others [3, 8, 15–17]). The Content and Language Integrated Learning (CLIL) system model, which reveals the multimodal perception of a foreign language as a tool of cognition (language of learning), a means of communication (language

for learning), and a subject of study (language through learning), is recognized as an example of the systemic-functional content of the integrative approach in the practice of teaching English, taking into account the concepts of metacognition. CLIL allows not only to guarantee that students master the lexical and grammatical level of a foreign language, but also stimulates the internalization of foreign language culture and the development of students' metacognitive abilities (D. Coyle, Ph. Hood, D. Marsh [3, 20]), which to a certain extent harmonizes the synergies of the mental, cognitive-discursive and perceptual-interactive segments individual's cognitive activity.

Original results were also obtained when applying the Integrated Literacy Development Approach (ILDA) model in the practice of teaching English, which is based on the integrative unity of lexical-grammatical, syntagmatic, cognitive-discursive, genre and interdisciplinary codes of foreign language acquisition in a bilingual educational space. The ILDA philosophy was built taking into account cognitive psychology (primarily Bloom's Taxonomy [2, 4], P. Tarricone's Taxonomy of Metacognition [19]), systemic-functional linguistics (in particular, the conceptual positions of M. Halliday's theory [7]) and the principles of projective-recursive technology with the involvement of metacognitive reference schemes (N. Tokareva, M. Tsehelska [2]) with a combination of the theory of multimodal metaphor (S. Forceville [21]) and systemic-functional visualized grammar and/or syntagmatics (G. Kress, N. van Leeuwen [8]).

The ILDA logical-semantic scheme actualizes the need to expand the metacognitive and communicative significance of the convergence of verbal and non-verbal ways of encoding information in text format. In the scope of this study, we aim to focus primarily on the combinatorics of lexical and grammatical resources of text creation and metagraphemics of non-verbal messages in the system of ergonomic use of metacognitive schemes in teaching English as a foreign language.

### **11.3 MULTIMODAL RESOURCE OF METACOGNITIVE SCHEMES**

Symbiotic scenarios of information flow collage in the modern dimensions of postmodernity determine the increasingly widespread use of polycode formations, and in particular – in the system of teaching a foreign language in a bilingual environment (for example: Ukrainian as a native and English as a foreign). The multimodality of linguistic discourse, as recognized by linguists (see research: G. Kress, K. O'Halloran, V. Smith, S. Forceville, L. Makaruk [8, 17, 21, 22]), expands the boundaries of speech, increases the semantic continuum of text messages due to additional visual and/or audio semiotic modes (symbols, images, compilation of fractals, etc.). The most represented in the glossary of multimodality is the recognition of this phenomenon as a form of presentation of certain information and the creation of a corresponding discursive meaning through a combination of resources: printed text, situational experience, diagrams and drawings, audio recordings (speaking), etc. [22]. In the context of this research project, we are absolutely agree with the opinion of L. Makaruk, who notes that in the architectonics of the multimodal meaning of a text construct, the following factors are worth paying attention to: the selection of lexical units, their graphic representation, the involvement of appropriate illustrations and their location, etc. The indicated resources contribute to the construction of the original text (poly-coded textual), facilitate the perception and

understanding of the text – in accordance with the priority principles of modern text creation: ergonomics and visualization of content in conditions of rapid life creation [16, 17]. This once again confirms the dynamic nature of the language functionality (as an open mobile system) in the context of socio-cultural evolution of social development, because in the space of total globalization and digitalization of the world order, language acquisition (and a foreign language in particular) moves away from the fundamentalism of sequential processing of linear printed text and is directed towards recognizing the relevance of a multi-vector format for understanding multimodal (or polycode) text information at the level of substantive understanding of a holistic text message.

The polymodal taxonomy of mastering the skills of producing texts in a foreign language allows for an integrative approach to the text creation system, combining the theoretical-deductive and empirical-inductive continua of message creation in the context of bilingualism. The theoretical-deductive aspect allows for the acquisition of the normotypical paradigmatics (invariant scheme) of foreign language speech maxims. While the empirical-deductive approach expresses the variability of linguistic constructions, taking into account the author's intention or situational vision of the message design.

An example of successful metacognitive modeling of text messages in the dimensions of English language learning is the metacognitive schemes developed by the author team (Fig. 11.4) – a formalized visualization of the fractal structure of the invariant and the variable possibilities of deploying the syntagmatic structure of a text message.

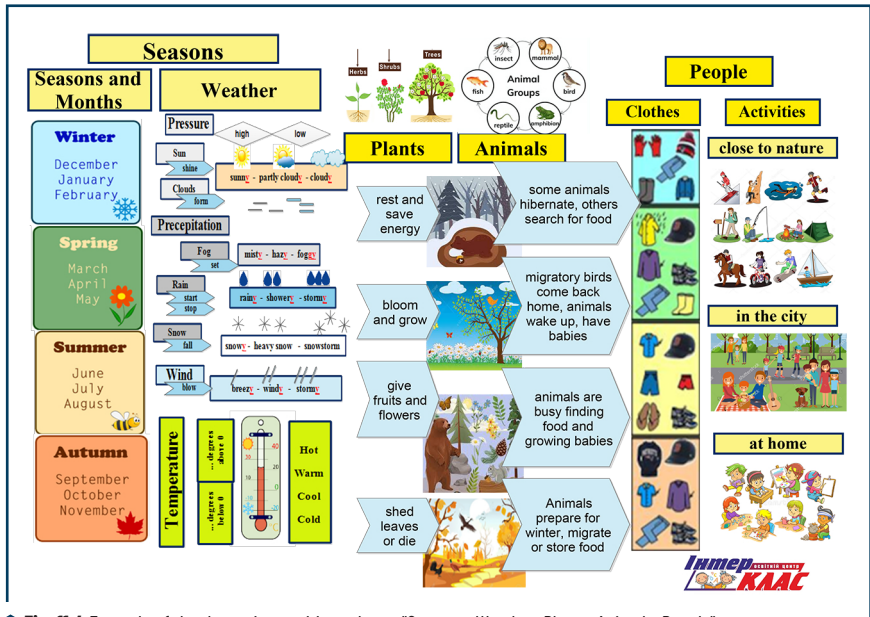


Fig. 11.4 Example of the thematic cognitive scheme "Seasons, Weather, Plants, Animals, People"

A complex of such metacognitive schemes (or thematic maps), developed with the involvement of projective-recursive technology, is used for a long time on the basis of the private enterprise "Educational Center "Interklas"" (Kryvyi Rih, Ukraine), certified as an institution of extracurricular education of the humanitarian direction [2, 4].

In our understanding, metacognitive schemes appear as functionally appropriate polycode texts in teaching a foreign language, combining the resources of the natural language code with the codes of the visual semiotic system (images of the subject field, schematized vectors of connections between concepts (text design), etc.). Accordingly, the metacognitive scheme is interpreted as a multimodal invariant-variant text formation that expresses the macro- and micro-level structure of the text, taking into account the fractal perspective of the cognitive-discursive segment of a foreign language in the conditions of a bilingual speech culture. The basis of the schematic representation of the metacognitive space of the functioning of a certain construct is the multi-scale recursive structural self-similarity of a text formation – the fractal – according to the ILDA model (**Table 11.1**).

● **Table 11.1** Levels of the recursive cycle in working with metacognitive schemes (**Fig. 11.4**) (in the ILDA model architectonics)

Level	Metacognitive tasks	Metacognitive mechanisms	Activity examples
1	2	3	4
Conceptualization and systematization of the subject field of meanings ( <i>vocabulary &amp; concept mapping</i> ) LOTS: Remember – Understand	Perception of basic lexemes, understanding the connection between word and image; operating with logical categories	Perception (recognition of features), cognitive organization of information (grouping of features), awareness of connections	<i>Match</i> → <i>Categorise</i> → <i>Label</i> "Which things belong to winter? Why?"
Thematic map structured by: – seasons and months; – weather (pressure, precipitation, wind, temperature); – plants (seasonal changes); – animals (behaviour patterns); – people (clothes, activities)			
Cognitive level ( <i>comparison and explanation</i> ) LOTS → HOTS: Apply – Analyse	Development of thinking operations (from recognition to analysis and synthesis)	Monitoring, control of cognitive competencies for structuring experience	Answers to questions with explanations of reasons: "Why do trees shed leaves in autumn?" "What happens to animals when it's cold?"
Working with the map, students: – observe, compare seasons ( <i>noticing</i> ); – analyze, explain cause-and-effect relationships ( <i>reasoning</i> ); – analyze the behavior of animals, people (model short descriptions); – compare clothing, weather and people's activities (demonstrate understanding of the relationships between the predicates of the phenomenon)			

◆ Continuation of Table 11.1

1	2	3	4
Linguistic (generalization and description, narrative) HOTS: Analyse – Evaluate – Create	Development of logical thinking and academic literacy, formation of argumentation skills ( <i>because... but...</i> )	Analysis of language structures, modeling of coherent utterances, text, reflection on language experience	A2 speaking: "What's your favourite season? Why?" A2 writing: "Write 35–45 words about what people do in your city in summer"
<p>The map allows you to create extended statements that meet the requirements of KET A2:</p> <ul style="list-style-type: none"> <li>– description of the weather;</li> <li>– description of the seasons;</li> <li>– description of activities, occupations of people with an explanation of cause-and-effect relationships and interpretation of consequences (<i>interpreting</i>);</li> <li>– short factual texts with a variable development of the story (<i>creating</i>)</li> </ul>			

Thus, the use of the heuristic potential of the educational and developmental complex of metacognitive schemes, built in the dimensions of a generalized idea of a certain language field, ensures the stability of speech patterns and updates the vocabulary, improves the skills of categorization and classification of lexemes, optimizes the skills of structuring the thinking of education seekers, contributes to the formation of reading, speaking, and listening skills, thereby expressing the basic levels of the recursive cycle and formatting strategies of metacognitive self-expression.

The logical sequence and complementarity of basic mental schemes allows for the variably use of different combinations of this toolkit in teaching a foreign language.

For example, the sequential "unpacking" of individual semantic fractals of the ILDA model works effectively, such as: actualization of the resource of the "Free Time Activities & Clothes" scheme (**Fig. 11.5**) as a "packed information", embedded in the broader content of the mental scheme "Seasons".

Working out the cognitive-discursive scenarios of the "Seasons, Weather, Plants, Animals, People" scheme, students simultaneously actualize previously studied categories expressed by the blocks "Clothes", "Activities", "People in different contexts (close to nature/in the city/at home)" of the mental scheme "Free Time Activities & Clothes". Thus, in the fractal perspective of the cognitive-discursive segment of a foreign language, the mental scheme "Seasons, Weather, Plants, Animals, People" appears as the upper level of generalization of the "Free Time Activities & Clothes" content. The architecture of the logical-semantic scheme of mastering a foreign language in the continuum of this subject field is built in the following semantic design:

- upper level – categorical resource of the mental scheme "Seasons" (contextual paradigm markers are generalized, characterizing indicators of the environment and conditions of a natural phenomenon);
- middle level – fractal segment "People", which is expressed through the definitive blocks "Clothes" / "Activities" and structures the categories of the world order;
- lower level – conceptual maps "Free Time Activities" and "Clothes", which denote lexical fields, word formation models for invariants of grammatical structures [2–4].

As a result of the recursive cycle of mastering the semiotic continuum of the specified subject field, a logical invariant system (Robust Construction) of language competencies appears, which integrates the

dimensions of perception, thinking, and speech in a holistic pattern and forms the basis for further (varia-  
 tive) development of text creation skills (Table 11.2).

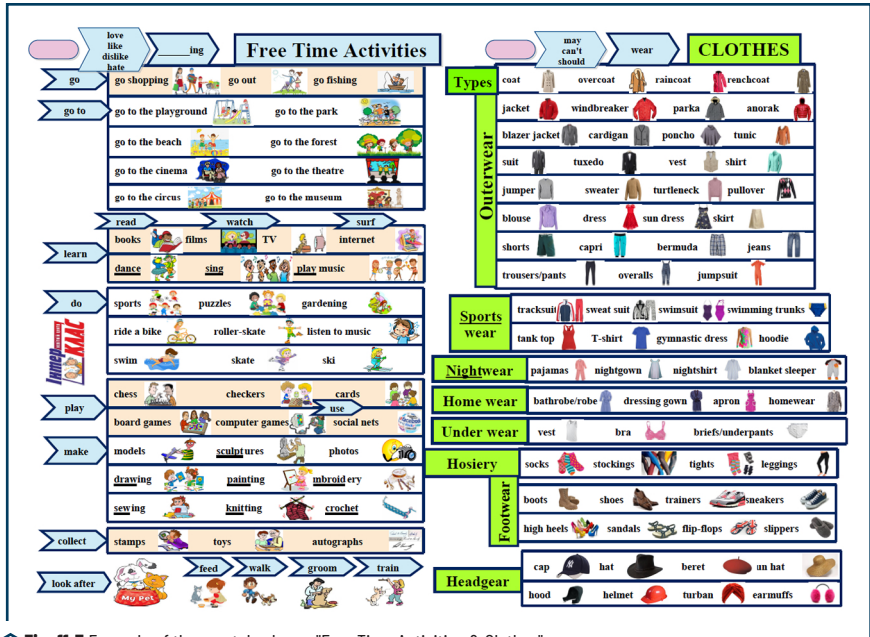


Fig. 11.5 Example of the mental scheme "Free Time Activities & Clothes"

Therefore, each metacognitive scheme functionally provides ordering and categorization of semantic markers of a certain subject field, coordinates grammatical and syntagmatic connections between segments of foreign language discourse at the levels of LOTS/HOTS constructs. Thus, metacognitive schemes contribute to effective and conscious structuring of information, understanding of logical dependencies and coordination of elements of mental denotative graphs of different orders in systems of expansion (linguistic recursion) of the concept sphere of the studied language patterns.

Multimodal constructs of metacognitive schemes (conceptual-grammatical, algorithmic, polyvector mind maps [2]) contribute to the actualization of the necessary information that is lacking for students to build a logical-semantic formula of a text construct (new, forgotten or insufficiently mastered), enable the formation of a cognitive style and define heuristic strategies of metacognitive activity of the individual. Complex layouts of metacognitive mind maps allow to generalize language fields and combine them into integral syntagmatic modules, which allows students to more consciously use pragmatic invariants of linguistic discourse and gain experience in the variable use of a foreign language in the polyvector continuum of syntagmatic formations of bilingual (or multilingual) culture. Therefore, teaching English using the ILDA model and a complex of metacognitive schemes determines the formatting of the open space of mental activity,

provides an understanding of the amplification tendencies (deepening and enrichment) of the individual's metacognitive development in the plane of continuous mental formation of activity subjects on the path of internalization of the information model of the pragmalinguistic formula of foreign language discourse.

● **Table 11.2** Example of developing text creation skills (resource: "Seasons, Weather, Activities, Celebrations" Speaking Part 1 Level 6)

Question	Simple answer	Expanded answer
1. What season do you like?	Transformation + Present Simple: <i>My favourite season is _____</i>	Reason (weather/ clothes/ activities): <i>because _____</i>
2. What is the typical weather for the season?	Mostly: <i>Mostly the weather is _____</i>	Sometimes + lower probability: <i>But sometimes there may be _____</i>
3. What activities do you enjoy in this season?	Gerund (Ving): <i>In my opinion this weather is good for _____</i>	Reason + Modal (may/can't) + Infinitive: <i>So you _____</i>
4. How does nature change in this season?	Present Simple: <i>Plants _____</i>	Add: <i>Also, animals _____</i>
5. How do you feel in this season?	Frequency adverbs: <i>always, often, sometimes, rarely, never:</i> <i>I often _____, however, I never _____</i>	
6. What is your favourite celebration in this season?	Transformation + Present Simple: <i>I really enjoy _____, which is _____ (holiday)</i>	Ways of celebration: <i>which is celebrated _____</i>

At the same time, fractality (as a principle of modeling the multi-scale and multi-level structural self-similarity of a subject field of a certain modality) allows, in an ecological manner, in the order of non-discriminatory education, to form in students the skills of tolerant (invariant-variative) modeling and representation of such a macro-sign unit as a text in their own speech, at the main stages of its content construction – from mastering the vocabulary base to the final semiotic product – a holistic text formation (Academic Literacy & Genre). Thus, the visualization in a holistic metacognitive scheme of the sequence of formal-logical modeling and grapheme structuring of logical-semantic constructs of a foreign language order expands the resource potential of this toolkit and allows students to develop metacognitive activity, practice coherent speech skills (Speaking Part Level 1-2 & Writing Part level 7-8) at different levels of the fractal discourse model, produce image descriptions and reasonably express their own thoughts in the form of structured texts.

#### 11.4 DISCUSSION OF THE RESULTS OF SECTION 11

The generalization of the systemic dimensions of the organization of teaching English as a foreign language allows us to state the need to change the principles of didactics in the modern globalized and

information-saturated socio-cultural environment. This is primarily due to the trends in the intellectual development of students in the 21<sup>st</sup> century, expressed in clip thinking and rational ergonomics of metacognitive activity in conditions of prolonged uncertainty. The Internet generation of the postmodern era is focused primarily on the perception and comprehension of clearly structured information content, supported by visual visions of pragmatic discourse without complex formalized constructions of logical proof. This leads to the depreciation of text-creation registers by modern youth, the partialization of language segments and the impoverishment of variant scenarios of language discourse. At the same time, the new generation of the high-tech era is able to successfully solve complexly structured, multi-level tasks, including when learning English as a foreign language. Therefore, multimodal formants of the metacognitive and bilingual personality development in the modern dynamic information society should be recognized as ambivalent system-forming constructs of educational innovations. Instead of memorizing texts-samples of the language product, learning a foreign language should become a dimension of the metacognitive personality development, focused on modeling foreign language discourse, taking into account the communicative goal and situational coordinates of interaction in the bilingual space.

Mastering a foreign language in the modern information society should be considered in the architectonics of understanding, adequate interpretation of meanings and production of texts of various genres in order to achieve the communicative intention of the linguistic personality in the dimensions of a specific interaction situation and extralinguistic contexts of life-creation.

One of the scenarios for effective teaching of English as a foreign language is the integrative system-functional approach to the educational process (ILDA) with the involvement of projective-recursive technology and metacognitive educational schemes of invariant-variative linguistic discourse created on its basis. Multimodal metacognitive schemes allow us to visualize the sequence of composing and paraphrasing sentences in a foreign language, contribute to the ordering of syntagmatic constructions, form the skills of establishing and varying logical-semantic connections between concepts, and mastering algorithms for building linguistic maxims. Cognitive-discursive polycode practices of foreign language acquisition are based on the ability of a linguistic personality to invariantly format information in coherent speech in accordance with the logical-semantic and grammatical constructs of a particular language, and also determine the ability to produce variable (author's) text formations in order to express one's own thoughts using the acquired linguistic signs and the rules of their combination. Predictors of the linguistic picture of the world and the content characteristics of metacognitive activity, perceived by the subject of learning, determine the vectors of self-expression and self-realization of a person in the multimodal space of bilingual text creation.

Presenting to the scientific community theoretical and methodological developments on the architectonics of metacognitive modeling of text formations in foreign language learning, the authors are fully aware that this study does not reveal all aspects of the problem of using metacognitive schemes in the continuum of projective-recursive technology of English language teaching, but it opens up prospects for further study of trends in the multilingual personality development in the changing information world.

## REFERENCES

1. Tokareva, N. (2018). Genesis of the Logico-Semantic Organization of Adolescents Speech in the Post-Nonclassical Perspective of the Contemporaneity. *Psycholinguistics*, 24 (1), 343–359. <https://doi.org/10.31470/2309-1797-2018-24-1-343-359>
2. Tokareva, N., Tsehelska, M. (2020). Metacognitive Schemes as a Tool for Teaching English to Young Learners: Psychological Discourse. *Revista Romaneasca Pentru Educatie Multidimensionala*, 12 (4), 53–71. <https://doi.org/10.18662/rrem/12.4/333>
3. Tokareva, N., Tsehelska, M., Iliencko, O., Ikhsangaliyeva, G., Prylutska, L.; Morhunova, N., Levchenko, I., Kholodov, A. (Eds.) (2025). Projective-recursive technology as a predictor of efficiency in English language teaching. Implementation of modern technologies in language learning as a basis for the formation of communicative competences. Kharkiv: TECHNOLOGY CENTER PC, 154–170. <https://doi.org/10.15587/978-617-8360-15-3.ch10>
4. Tsehelska, M. V. (2016). Cognitive strategies to enhance English language teaching in Ukraine. *Philological Studies: Scientific Bulletin of Kryvyi Rih State Pedagogical University*, 14, 318–326. <https://doi.org/10.31812/filstd.v14i0.235>
5. Brinker, K., Pappert, St., Cölfen, H. (2024). *Linguistische Textanalyse. Eine Einführung in Grundbegriffe und Methoden*. Auflage. *Grundlagen der Germanistik*, 29. Berlin: Erich Schmidt Verlag, 200.
6. Fairclough, N. (1995). *Critical Discourse Analysis*. London: Longman. 154. Available at: <https://www.felsemiotica.com/descargas/Fairclough-Norman-Critical-Discourse-Analysis-The-Critical-Study-of-Language.pdf>
7. Halliday, M. A. K. (1978). *Language as a Social Semiotic: The Social Interpretation of Language and Meaning*. London: Arnold, 256.
8. Kress, G., van Leeuwen, T. (2001). *Multimodal Discourse: The Modes and Media of Contemporary Communication*. London: Arnold, 142.
9. Van Leeuwen, T. (2008). *Discourse and Practice: New Tools for Critical Discourse Analysis*. New York: Oxford University Press, 172. Available at: [https://www.academia.edu/84133798/Theo\\_van\\_Leeuwen\\_Discourse\\_and\\_practice\\_New\\_tools\\_for\\_critical\\_discourse\\_analysis\\_New\\_York\\_Oxford\\_University\\_Press\\_2008\\_Pp\\_ix\\_172\\_Pb\\_29\\_95](https://www.academia.edu/84133798/Theo_van_Leeuwen_Discourse_and_practice_New_tools_for_critical_discourse_analysis_New_York_Oxford_University_Press_2008_Pp_ix_172_Pb_29_95)
10. Warnke, Ingo (Ed.) (2007). *Diskurslinguistik nach Foucault. Theorie und Gegenstände (Linguistik – Impulse und Tendenzen)*. Berlin, New York: Walter de Gruyter, 187–210.
11. Heinemann, M., Heinemann, W. (2002). *Grundlagen der Textlinguistik: Interaktion – Text – Diskurs*. Tübingen: Niemeyer, 281.
12. Heinemann, W. (2011). *Diskursanalyse in der Kontroverse. Tekst i dyskurs*, 4, 31–67. Available at: [https://bazhum.muzhp.pl/media/texts/tekst-i-dyskurs-text-und-diskurs/2011-tom-4/tekst\\_i\\_dyskurs\\_text\\_und\\_diskurs-r2011-t4-s31-67.pdf](https://bazhum.muzhp.pl/media/texts/tekst-i-dyskurs-text-und-diskurs/2011-tom-4/tekst_i_dyskurs_text_und_diskurs-r2011-t4-s31-67.pdf)
13. Serazhym, K.; Rizun, V. (Ed.) (2002). *Dyskurs yak sotsiolinhvalne yavvyshche: metodolohiia, arkhitektonika, varyatyvnist*. Kyiv: Kyiv. Nats. un-t im. Tarasa Shevchenka, 392. Available at: <https://moodle.znu.edu.ua/mod/resource/view.php?id=341609&forceview=1>

14. Kijko, J. (2004). *Grundlagen der Textlinguistik*. Czernowitz: Ruta, 68.
15. Kiiko, Yu. Ye. (2015). Language system from the fractal point of view. *Naukovyi visnyk Mizhnarodnoho humanitarnoho universytetu. Seriya: Filolohiia*, 16, 117–120. Available at: [http://nbuv.gov.ua/UJRN/Nvmgu\\_filol\\_2015\\_16\\_34](http://nbuv.gov.ua/UJRN/Nvmgu_filol_2015_16_34)
16. Makaruk, L. L. (2021). Multimodal linguistics and its metalanguage. *Philological science and education: transformation and development vectors*. Latvia: Izdevnieciba "Baltija Publishing", 304–339. <https://doi.org/10.30525/978-9934-26-083-4-16>
17. Makaruk, L. L. (2018). Multimodality and polycodeness in modern linguistic studies: schools, figures and approaches. *Current Issues of Foreign Philology*, 9, 133–142. Available at: <https://journals.vnu.volyn.ua/index.php/philology/article/view/2602>
18. Holubenko, N. (2022). Cognitive-discursive features of functioning of the lexical means of modality in intersemiotic translation. *Humanities Science Current Issues*, 51, 250–254. <https://doi.org/10.24919/2308-4863/51-38>
19. Tarricone, P. (2011). *The Taxonomy of Metacognition*. London: Psychology Press, 288. <https://doi.org/10.4324/9780203830529>
20. Coyle, D., Hood, Ph., Marsh, D. (2010). *CLIL: Content and Language Integrated Learning*. Cambridge: Cambridge University Press. Available at: [https://assets.cambridge.org/97805211/30219/excerpt/9780521130219\\_excerpt.pdf](https://assets.cambridge.org/97805211/30219/excerpt/9780521130219_excerpt.pdf)
21. Forceville, C.; Kristiansen, G. et al. (Eds.) (2006). Non-verbal and multimodal metaphor in a cognitivist framework: Agendas for research. *Cognitive Linguistics: Current Applications and Future Perspectives*. Berlin; New York: Mouton de Gruyter, 379–402. <https://doi.org/10.1515/9783110197761.5.379>
22. O'Halloran, K. L., Smith, B. A. (2011). *Multimodal Studies: Exploring. Issues and Domains*. London: Routledge 270. Available at: [https://www.academia.edu/1962406/Multimodal\\_Studies](https://www.academia.edu/1962406/Multimodal_Studies)