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YULIIA POLYCHEVA
PhD in Education, Associate Professor,
Department of Theory, Practice and Translation of the English Language,
National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute"

VOLODYMYR VETOKHIN
Doctor in Technical Sciences, Full Professor,
Department of Mechanical and Electrical Engineering,
Poltava State Agrarian University

MULTIMODAL APPROACH TO THE STUDY OF SPECIALIZED TEXTS IN TECHNICAL DISCOURSE

У статті висвітлено можливості мультимодального підходу до аналізу спеціалізованих текстів технічного дискурсу. Дослідження ґрунтується на дедуктивному наративному підході та комплексі взаємодоповнюючих *методів*: аналіз та узагальнення наукових джерел з досліджуваної проблеми; концептуальний аналіз термінів «мультимодальний підхід»; аналіз мультимодальних елементів технічного тексту; дистрибутивний аналіз – задля виявлення й опису середовища, в якому функціонують різні мультимодальні компоненти в технічному тексті; монографічний метод – задля логічної інтерпретації отриманих результатів.

Теоретичне значення цієї наукової розвідки полягає: по-перше, у розширенні існуючого розуміння мультимодальності в лінгвістичних дослідженнях загалом і в сучасному технічному дискурсі зокрема; по-друге, у застосуванні мультимодального аналізу до вивчення технічних текстів, який суттєво відрізняється від аналогічного аналізу інших типів дискурсу завдяки своїй потужній семіотичній складовій. Її практична значущість визначається виявленням додаткових можливостей для лінгвістів щодо аналізу технічних текстів на основі мультимодального підходу.

Зазначено, що зростання інтересу до мультимодальності у сучасній лінгвістичній науці можна пояснити двома основними причинами. По-перше, у лінгвістиці відбувся загальний поворот до функціонального прагматизму, зокрема до вивчення мовної продуктивності, включаючи взаємодію соціокультурних і когнітивних факторів мовленнєвої діяльності. По-друге, значні зміни відбулися й у сфері мовленнєвої практики: на перший план вийшла опосередкована, багатоканальна за своєю суттю комунікація, заснована на конвергенції семіотичних ресурсів.

Розглянуто принципи мультимодального підходу та модель здійснення мультимодального аналізу тексту. Наголошено, що мультимодальний підхід може бути застосований до аналізу всіх типів і форм комунікації, включно з аналізом текстів, у тому числі технічних, у яких два або більше семіотичних ресурсів інтегровані та взаємодіють задля реалізації комунікативних функцій.

Мультимодальний технічний текст розглянуто як особливий мовно-візуальний феномен, де мовні та екстралінгвістичні засоби утворюють спільне семантичне поле, комплексно впливаючи на адресата. Сучасні технічні тексти демонструють різноманітність і складність підходів до вираження змісту та досягнення комунікативної мети повідомлення, де поряд із вербальними елементами невід'ємними є й невербальні, зокрема ілюстрації, діаграми, графіки та схеми. Це забезпечує адекватне сприйняття і розуміння цих текстів. Екстралінгвістичні параметри технічного тексту включають також фон навколишнього тексту – розмір шрифту та його колір. Графічні елементи допомагають наочно представити різні технічні деталі, агрегати або процеси, посилюючи інтерес до матеріалу, допомагаючи уявити віддалені процеси і явища, які зазвичай важко описати словами. Крім того, графіки, діаграми та схеми забезпечують не тільки наочне представлення статичних даних, характеристик об'єктів / явищ, а і пояснюють їх.

Ключові слова: мультимодальність, мультимодальний підхід, мультимодальні елементи, невербальні елементи, технічний дискурс, технічний текст.

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Introduction

Nowadays, the phenomenon of multimodality provides researchers with promising linguistic ideas, which in the near future can become dominant directions that will contribute to the fruitful and innovative development of linguistic studies. The era of new technologies forces linguists to rethink the traditional vision of the elements of the interaction process in a new way and to involve innovative methods and techniques that allow substantiating their semantics and pragmatic-stylistic potential from various perspectives. "Notably, multimodality can be viewed as a characteristic of the modern world" [Fedorenko, Voloshchuk, Sharanova, Glinka, Zhurba, 2021, p. 179].

New technologies have led to changes in the communications landscape. Modern convergent technologies make it easier to combine different modes of communication such as images, sound, written language and animation. This is the reason why some scholars [e.g., Álvarez, 2016; Kress, 2010; Machin, 2007; O'Halloran & Smith, 2011] recognize that all communication is multimodal. During the digitalization of all spheres of human life, each and every person is faced with innovative technologies.

Moreover, knowledge of the modern world occurs in close, inextricable connection with technical discourse. Since, interaction with technology is an integral part of everyone's life, and visualization becomes a characteristic component of the information flow, regardless of the environment of its existence. The rapid development of information with visual components in communication processes in the technical field forces linguists to more often deal with issues of non-verbal language means, which are an immanent part or addition to the design of technical texts.

Additionally, the relevance of the research is determined by the fact that modern professional activity in various fields is characterized by high rates of growing specialization and an increase in the volume and speed of information exchange. In this regard, specialized languages require a deeper study, and therefore increasingly become objects of linguistic research [Fedorenko, Sheremeta, 2021]. And specialized text in the technical field is not an exception.

Researchers [Blake, Bly, 1993; Copeck et al., 1997; Rus, 2014] note that technical text is an informative source, the key communicative function of which is the description of objects, phenomena, new technologies as well. In all types of technical text, cognitive information predominates, reconstructing the real or imaginary physical environment around the recipient.

It should be stated that the findings of numerous linguists [Adami, Jewitt, 2016; Bateman, 2014; Gibbons, 2012; Hogde, Kress, 1988; Kiklewicz, Sładkiewicz, 2021; Kress, 2003; 2010; O'Halloran, 2011; Peterlicean, Modrea, 2010; Serafini, Clausen, 2012; van Leeuwen, 2011] have shed light on the essence of multimodality, its role in communication, means that function in the textual space, primarily fiction and Internet publications, websites. At the same time, the issue of the specifics of the implementation of multimodal means in the technical text requires a separate focus. As previous studies (Dimopoulos, Koulaidis, Sklaveniti, [2003]; Unsworth [2007]; Wanselin, Danielsson, Wikman, [2022]) have almost exclusively focused on the multimodality of technical texts in terms of education. Previous research by J.L. Lemke [1998] on visual and verbal semiotics in scientific text, and the essays on multimodal discourse analysis in worlplaces "Discourse and technology : multimodal discourse analysis" edited by P. Levine and R. Scollon [2004] can only be considered first steps towards a more profound investigation of the particulars of the multimodal analysis of the technical text, which differs from the multimodal analysis of other types of discourse by its significant semiotic component.

Given the aforementioned, we will consider the features of technical discourse based on multimodality, which help specialists in the technical field of activity to work effectively, as well as ordinary people to successfully interact with technology. The study of multimodality is associated with the material side, the organization of physical forms, including technologically determined forms, through which meanings arise. Because these meanings make it possible to create grammatical and semantic organizations of texts (e. g., semiotic systems and structures) at a higher level.

The theoretical significance of the article lies: firstly, in expanding the existing understanding of multimodality in linguistic studies at large and in modern technical discourse in particular; secondly, in applying multimodal analysis to the study of technical texts, which differs significantly

from similar analyses of other types of discourse due to its powerful semiotic component. Its practical significance is determined by the identification of additional opportunities for linguists to analyze technical texts in terms of a multimodal approach.

Aim and Objectives

The article aims to highlight the possibilities of a multimodal approach to the study of specialized texts in technical discourse. The specific objectives are as follows: 1) consider the main principles of the multimodal approach in linguistic science; 2) characterize extralinguistic features of technical discourse; 3) analyze multimodal components of the technical text.

Methodology

The research design for this study was analytical and descriptive, focusing on a deductive narrative approach and a complex of complementary theoretical methods: analyzing, summarizing and interpreting scholarly sources on the issue under scrutiny; conceptual analysis of the term "multimodal approach"; analyzing multimodal elements of a technical text; distributional analysis – to find out the environment, which contains various multimodal components; monographic method – to interpret the results obtained in a coherent logical way.

Multimodality in linguistic studies

This section reviews the literature related to the issue of multimodality in linguistic studies. Nowadays, numerous scholarly publications [Adami, Jewitt, 2016; Bateman, 2014; Gibbons, 2012; Kress, 2003; 2010; O'Halloran, 2011; Peterlicean, Modrea, 2010; van Leeuwen, 2011] in linguistics can serve as evidence of the increasing popularity of multimodal studies. This growing interest in multimodality can be attributed to two main reasons. Firstly, in linguistics, there has been a general turn to functional pragmatism, in particular, to the study of linguistic performance, including the interaction of sociocultural and cognitive factors of speech activity. Secondly, significant changes have also occurred in the field of speech practice: mediated, multi-channel communication in nature, based on the convergence of the semiotic resources available, has come to the fore. As the need to promote multimodality is determined by information technologies, generating innovative ways and forms of written and oral interaction, which, in turn, contribute to introducing completely new semiotic resources into the communicative environment and promoting the involvement of modern approaches (e.g., multimodal approach) to the analysis of existing elements both verbal and non-verbal in nature, coexisting in technical written discourse.

Researchers [Álvarez, 2016; Bateman, 2014; Gibbons, 2012; Kress, 2003; 2010; O'Halloran, 2011; Serafini, Clausen, 2012; van Leeuwen, 2011] of the problem under study share the opinion that communication itself is multimodal. For instance, oral speech cannot be interpreted without taking into account the non-verbal component. Modern written forms are also difficult to understand without considering images, text placement, typographic features, and color. A. Gibbons notes that multimodality is the coexistence of more than one semiotic mode in one context; in a broad sense, it is the daily reality that we know thanks to sight, sound, and movement. Even the simplest conversation combines speech, intonation, gestures [Gibbons, 2012, p. 8].

T. van Leeuwen claims that linguists have expanded its definition, defining multimodality as an integrated concept that encompasses such communicative resources as language, images, sound and music. According to the scholar, multimodality has developed as a linguistic field of research based on both common and distinctive properties of different modes that are integrated into multimodal texts as communicative situations [van Leeuwen, 2011]. In general, multimodality is a reply to the challenges facing linguistics due to the changes in the way modern texts are designed, produced, and distributed. Multimodality is viewed as "the approaches that understand communication and representation to be more than about language, and which attend to the full range of communicational forms people use – image, gesture, gaze, posture and so on – and the relationships between them" [Jewitt, 2009, p. 14].

It should be observed that in linguistic studies, the phenomenon of multimodality is polyvector. It expands the boundaries of language, increasing its possibilities thanks to other

resources: images, symbols, gestures, music, etc. [O'Halloran, 2008; 2015]. Multimodality is related not only to language and verbal means of expression, but to other forms: image, gaze, posture (physique), etc., and their relationship [Jewitt, 2014; Jewitt, Bezemer, O'Halloran, 2016]. Therefore, multimodality is understood as the coexistence of resources of different nature, belonging to at least two systems used during the communicative act.

Analyzing the text within the framework of multimodality, J. Bateman [2014] argues that the scope of its research should include various modes of expression and their combinations. While G. Kress [2003; 2010] focuses on written design, image and color. The multifaceted phenomenon of multimodality is studied on the basis of written materials, videos, websites, three-dimensional images, everyday situations, paying attention to combinations of resources, modes and modalities. Both printed texts and video recordings with elements of written and oral speech are multimodal [O'Halloran, Smith, 2011]. As F. Serafini and J. Clausen [2012], professors at Arizona State University, note printed texts are multimodal because they contain images, various graphic design elements, and means of written communication.

Multimodal approach to analyzing texts

In the late 20th and early 21st centuries, the multimodal approach became widespread, according to which the language code is considered as an element of a broader semiotic framework, which also presents alternative forms of information transmission. Its wide dissemination was facilitated by the achievements of the systemic functional grammar of M. Halliday [1973]. The researcher argues that texts should be viewed as contextually situated signs According to M. Halliday [1978], language has three main functions in communication, which are as follows; it helps people express and represent their experiences in the world (ideational metafunction), creates relationships between producers and recipients of messages (interpersonal metafunction), and allows organizing any texts into a coherent whole (textual metafunction).

Following M. Halliday's idea, R. Hogde and G. Kress [1988], G. Kress and T. van Leeuwen [2001], C. Jewitt [2009] and D. Machin [2007] have developed a multimodal social semiotic view of communication. One of the central concepts of this multimodal approach is semiotic resources. The latter ones are defined by T. van Leeuwen as actions, materials and artefacts that people employ for communicative purposes, whether they are produced physiologically (e.g., by our vocal apparatus, the muscles used to express faces and gestures) or technologically (e.g., by exploiting a pen or a computer, etc.) – along with ways to organize these resources [van Leeuwen, 2005, p. 285].

In this regard, such issues as the configuration of semiotic modes, the multisensory nature of information processing, and the sociocultural attribution of intersemiotic discourses have come to the fore. The main category of the multimodal approach is a mode, which is understood as a socioculturally formed resource, used to create meaning (e.g., layout, color, image, soundtrack, etc.) [Adami, Jewitt, 2016; Kress, 2011, p. 54; Kress, van Leeuwen, 2001, p. 22]. Therefore, a semiotic approach in combination with a linguistic one should be applied to analyzing a multimodal text.

According to G. Kress [2016], the multimodal approach does not correspond to any specific theory related to a particular discipline. From an applied point of view, the concept of multimodality is universal and can be exploited in all areas of knowledge related to semiotically mediated social interactions. In philosophy and linguistics as well, modality means semantic interpretation, which is characterized by different categories (objective, subjective, epistemic, axiological, etc.) [Kiklewicz, Sładkiewicz, 2021].

It should be noted that the multimodal approach can be applied to analyzing all types and forms of communication, including the analysis of texts in which two or more semiotic resources – modes of communication – are integrated and interact to realize the communicative functions of the text. Each semiotic resource provides certain opportunities and at the same time imposes certain restrictions (both in isolation and in combination with others), and also entails the emergence of analytical problems associated with the nature of the discourse, the characteristics of the analysis, including its elements and scope, as well as the complexities arising from the integration of semiotic resources in this environment.

In modern linguistics, the following main principles of the multimodal approach are identified [Fei, 2007; Kiklewicz, Sładkiewicz, 2021; Kress, 2010]:

1. Verbal signs are one of the semiotic resources used to convey information. Oral or written text is not necessarily the main carrier of semantic and pragmatic information.

2. A multimodal approach aims to explore the full repertoire of semiotic resources, as well as the ways how they are arranged.

3. Semiotic resources are formed considering the social structure, i.e., taking into account needs of the sociocultural community, primarily the communicative ones, as well as the conditions of its life.

4. The interaction of the modes of a particular text corresponds to the emergent principle, i.e., the principle of effective meaning, which presupposes studying a text as a complex of semiotic resources, and not as the sum of separate contents.

5. The architectonics of semiotic resources is built on the "center–periphery" principle: the main information load is usually carried by one of the involved modes, while the others complement it. The configuration of modes is associated with the category of affordance, i.e., the objective type of a given sign to convey relevant information. Thus, natural language is the optimal tool for transmitting semantic, especially abstract-conceptual, information, while in the field of implementing the persuasive function (for example, stimulating the mental and emotional states of communicative partners), other modes, primarily visual, are more effective.

6. Multimodal text analysis involves combined analysis at different levels. The study of multimodality itself is associated with the material side, the organization of physical forms (including technologically determined forms), through which meanings arise, since they make it possible to create grammatical and semantic organizations of texts at a higher level.

In turn, J. Alvarez [2016] proposes a model for performing multimodal analysis of a text, including the following:

1) studying the conditions of the text creation and its use;

2) defining the basic units (headings, paragraphs, font, color, graphics, white space/space, etc.);

3) defining the modes corresponding to the basic units, and their functions that assist navigation on the page (navigation and access structure, aesthetic / visual unity, content presentation, readability and organization of the text, highlighting in the text, etc.);

4) establishing intersemiotic relations (linguistic metafunctions provide the opportunity for "deep penetration" to determine how conceptual, interpersonal and textual meanings of multimodal texts are formed).

Thus, a multimodal approach provides tools for analyzing different texts, breaking them down into their basic components and understanding how they work together to create meaning. And all the mentioned above – principles of the multimodal approach and a model for multimodal analysis, are applicable to the analysis of technical texts too.

Specialized texts of technical discourse in terms of multimodality

Technical discourse "with subject matter in science and engineering" is characteristic of the engineering field of activity, which covers the metallurgical, chemical, fuel, energy, engineering, and construction industries [Peterlicean, Modrea, 2010, p. 66]. The goals of technical discourse can be various, among which are the following: creating a product, discussing a new technology or developing a new part, transmitting information, identifying the causes of defects, clarifying information on the technological process or manufacturing a product, issuing technical specifications, etc. [Coney, 1984]. Its main purpose is to demonstrate, convey or prove certain information or knowledge. In technical discourse, the message itself, its subject, results, play a significant role, independently of the author's opinions and feelings.

The values of technical discourse are mainly concentrated in its basic concepts (research, development) and come down to the analysis of knowledge and information, the need to create new benefits for people in the form of technological products, the manufacture of necessary products or the provision of appropriate services in the technical field, and making life easier through the introduction of innovations.

In addition to the linguistic characteristics of technical discourse (such as informativeness, coherence throughout the discourse, strict consistency of presentation, accuracy, validity; tech-

nological terminology; abbreviation), it is characterized by extralinguistic parameters. The latter ones include factors that accompany the discourse – knowledge about the world, sociocultural context, status characteristics of the participants, the relationship between the participants, their goals and intentions, the conditions for communication (setting), etc. It is multimodality as a combination of several modes in one phenomenon that presupposes that the text is characterized by certain extralinguistic features.

It is a well-known fact that discourse can be presented in either written or oral form. In our article, we will turn to the first of the two mentioned. Multimodal written (printed) texts are texts created by involving several different modes or semiotic resources, the totality of which forms the overall appearance of the text and produces its meaning [Makaruk, 2016, p. 100]. Examples of technical written texts can be presented with various technical documentation: instruction manual, product passport, instructions (technological instructions, safety instructions), specifications, explanatory notes, technical conditions, technical reports, training manuals.

Ukrainian scholar L. Makaruk [2016], taking into account semiotic resources based on common features, define the groups of multimodal manifestations of a technical text, which are as follows:

1. Text segmentation and other graphic effects (non-verbal text elements: placement of text on the page, line spacing, page orientation, text width, underlining, highlighting).

2. Font and color (font and color variations (non-verbal elements of the text: italics, capitalization, accentuation, unusual writing of words, simultaneous use of several typefaces and sizes)

3. Non-pictographic and non-photographic elements (non-verbal text elements: diacritical marks, numbers, mathematical symbols, abbreviations).

4. Iconic elements (non-verbal text elements: illustrations, drawings, icons, logos, emblems, maps, photographs).

5. Other non-verbal means (non-verbal elements of the text: tables, diagrams, graphs, schemes) [Макарук, 2016, p. 101].

We will analyze and substantiate the specifics of each of the mentioned groups concerning technical texts in more detail.

Let us consider a fragment of the article “How to prepare a technical drawing for CNC machining” [Horowitz, 2023]. Figure 1 shows a schematic representation of the part in two-dimensional space, and also in the upper right part there is a three-dimensional representation of it.

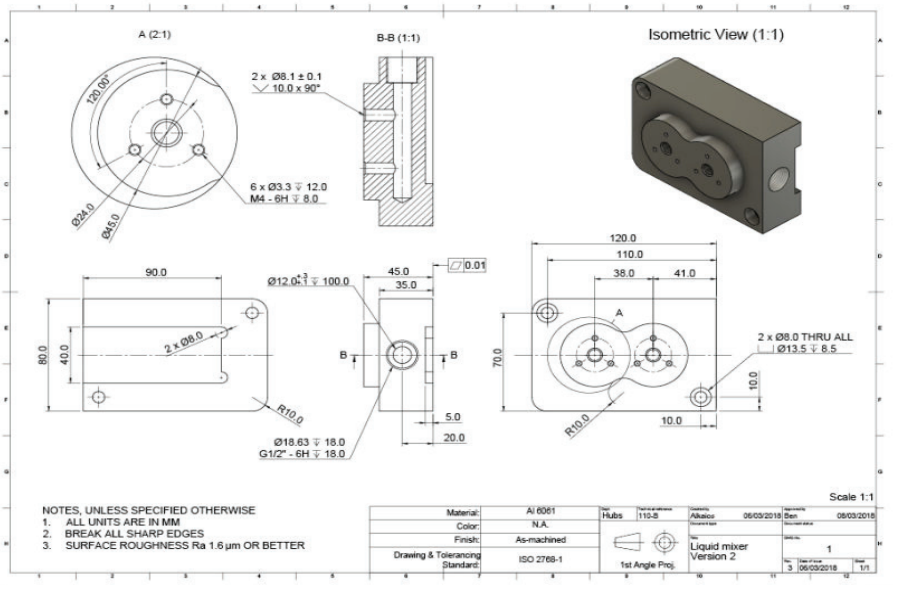

Fig. 1. Schematic representation of the part [Horowitz, 2023]

In the figure above we can see the main two-dimensional views of the drawing. The main ones are the front view (main view; frontal projection), left (profile projection) and top (horizontal projection), which helps to make the product absolutely accurate. In the upper right part, there is an isometric projection of the product, which makes it possible to see the future part clearly and facilitates understanding of the drawing.

The key inscription of the drawing in Fig. 1 is presented in the lower right part. It contains basic information about the part: material, color, scale, part name, etc., which helps in its manufacture. It is stated that the material of the part is aluminium alloy, easily deformable, high strength, and has good corrosion resistance.

To read such drawings, a specialist must have a wide range of knowledge: firstly, know materials science (designation of metals, alloys, their properties, etc.), engineering graphics (understanding symbols on drawings), mechanical engineering (various types of metal processing, tools, machine tools, etc.), mechanical engineering technology (understand what equipment to process a part on, in what sequence to remove layers of metal from a workpiece, etc.) and much more. In everyday life, an ordinary person whose work has nothing to do with engineering also comes across drawings from the technical field. Examples can include: operating instructions for household appliances (kettle, refrigerator, computer, blender, washing machine, etc.), instructions for assembling furniture (a bed, a wardrobe, etc.).

As far as the font is concerned, it is not only a technical tool and an integral typographic element. The font is a paraverbal component that has a wide palette that enables various manipulations. The choice of fonts, like other elements, is not random, but determined and explained by several factors: compliance with the technical design; a certain specialized field; unity of style in a technical text and graphic composition [Akinci, 2019].

Taking into account the fact that written speech, unlike oral one, lacks certain additional features, the font is responsible for the construction of such a meaning that would satisfy the producer as much as possible and would be as convenient as possible for the recipients of the technical text to read and understand. The importance of information in the technical text also depends on the font, which plays an integral role. For the most part, the larger its size, the more important the information, the smaller, the less important the message. At the same time, it is worth noting that the fonts used on the iconic and infographic elements of the technical text are usually smaller than the fonts of the main text.

Furthermore, fonts are designed to make the process of perception as accessible as possible to the reader of a technical text. In the typographical graphics of technical texts, serif-fonts (Palatino, Sabon, Minion, Caslon, Cambria and Garamond or fonts which are related to those) and sansserif fonts (Helvetica and Calibri) are mostly used, and decorative ones are avoided, which can complicate the process of reading information. Fonts combinations are possible, and very often two fonts in the same document may be applied – fonts for headlines can be different from body fonts for better optical separation in modern technical texts [Akinci, 2019; Zimmer, 2013].

According to U. Akinci [2019], today, the use of bold, emphasis and italics in a technical text is rather rare, as it can distract recipients' focus from a certain subject matter. However, it can be found in some technical texts, especially for educational purposes (e.g., Fig. 2). Regarding text segmentation and graphic effects, it is obvious that the vast majority of material in technical texts is presented linearly evenly with equal spacing.

In Fig. 2 the multimodal XAS-XRD endstation at Balder [Just, 2023] is shown. It allows simultaneous measurements of XAS and XRD for in-situ research. This endstation adds a 2D EIGER 1M detector, which is mounted on a robot arm for flexible positioning, to the experimental setup.

Undoubtedly, the font in the figure above serves as an important parameter for presenting technical information. Font variations (capitalization, bold selection), simultaneous use of several typefaces and font sizes – although not a mandatory condition for the production of multimodal technical texts, but due to its essence, it is steadfast, since the font is easy to manipulate and create at the same time, the original products are extraordinary. In most cases, it is impossible and hardly necessary to avoid the use of typefaces, because the verbalizers filling multimodal texts are the leading (most in demand and used) semiotic resources, which are familiar and desirable for recipients, although sometimes not the most powerful, unlike semiotic image resources [Макарук, 2016].

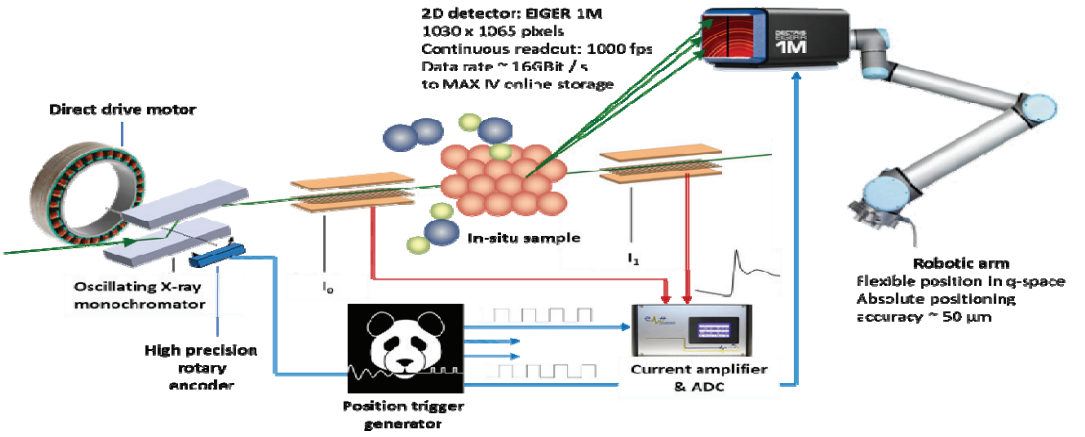

Fig.2. Schematic representation of the combined XAS-XRD setup at Balder [Just, 2023]

In English-language technical discourse, along with verbal means, the digital mode is intensively used. Its functional purpose is different, depending on each specific case. Often, next to the numbers we observe other conventional signs or abbreviations, which can be placed both at the beginning and at the end (Fig. 2). At the same time, in the modern English-speaking world of technical communication, numbers are designed to replace lexemes and add the desired color to a text fragment, compressing its content. Cases when numbers are used in a verbal environment of a technical text are common.

It is necessary to note the specificity of the use of color mode in both figures. As we can see, the colors are close to the colors of real parts of the equipment, which triggers the process of recognizing units at the cognitive level, and also brings a complex multimodal technical text closer to the familiar realities of a particular technical field (i.e., the "denotation-significate-referent" connection is emphasized at the visual level).

Figure 2 highlights images of the stator, panda, atoms and molecules. The image of a stator, evoking associations with a motor and accompanied by the caption "Direct drive motor," denotes a "direct drive mechanism" as a direct way to influence the device ("Monochromator"). The image of a panda with the caption "Position trigger generator" indicates a specific type of starting generator – a Panda generator as an energy conversion device. The panda image also points to the manufacturer "Chongqing Panda Machinery Co", a Chinese company, specializing in manufacturing energy products that protect the environment [Chen, 2023]. Its logo on the development of a Swedish scientific laboratory can indicate both partnership relations and common values on environmental protection. The image of atoms and molecules in the center of the figure indicates the composition of the substance of the sample that is subjected to X-ray absorption spectroscopy (XAS) and X-ray diffraction analysis (XRD). The images in Figure 2, functioning as components of a multimodal technical text, in this case, perform a semiotic function, acting as signs that contain information about the type of device (stator, panda generator); object of measurement analysis (atomic-molecular composition of the sample); manufacturer and the values promoted by the Swedish laboratory MAX IV (panda). The laboratory provides high-quality X-rays for materials and life sciences research and advocates for environmentally friendly technologies [Hilner, 2023]. It is noteworthy that the image of a panda can encrypt not only the name of the manufacturer, but also act as a symbol of environmental protection (Panda is the official symbol/logo of the World Wide Fund for Nature), which correlates with the vision of the Chinese company "Chongqing Panda Machinery Co". Thus, the semiotic components of a multimodal text provide information not only about the operating principles of the device (Multimodal XAS-XRD endstation at Balder [Just, 2023]), but also about the manufacturer, its partners and their position in science and production, causing the recipient to associate with objects close and understandable to him (stator, atoms/molecules, panda).

Among the identified graphic tools that function in the modern technical communication space, a separate group is made up of infographics, which include various diagrams, schemes,

and tables. These graphic objects have different shapes, sizes, and therefore structure. They are modelled and generated automatically by computer programs that are specially designed for such purposes. Certain non-special programs also have certain options that graphically convey information using specified elements. At the same time, short verbal comments are important here, as they briefly and succinctly explain the content. The importance of verbal and non-verbal modes is undeniable. The first means are necessary, and their absence leads to an incorrect minimal understanding of the technical text.

Having analyzed the infographic of the technical text, we single out certain of its differentiating features:

- verbal text is an important and necessary element of constructing infographic multimodal texts; its absence leads to difficulties in reading, and therefore its perception (there is a high degree of correlation of verbal and non-verbal; interdependence of verbal and non-verbal parts from each other);
- the verbal text is placed next to diagrams, schemes or tables; therefore, it acts as their structural component; references in the verbal part to the infographic resource occur frequently;
- infographics are heterogeneous; the number of resources used within one multimodal text is unlimited, among them we highlight various diagrams, graphs, schemes, tables, illustrations;
- the color range of infographic multimodal texts is limited to a few colors; they are almost always clearly followed and do not deviate from the chosen strategy;
- verbal components are short and concise, mostly they are single lexemes-sentences, phrases, or several sentences (impersonal) that are meaningfully connected to each other;
- sometimes the verbal components of infographics have separate headings, even if the text itself is divided into several separate blocks with subheadings;
- the verbal component performs an explanatory function and makes it possible to quickly understand the text as a set of verbal and non-verbal resources;
- almost all infographics have a common title, and all blocks of which it consists have subheadings; such a step-by-step representation contributes to the integrity and coherence of multimodal infographic texts, and an additional verbal explanation of individual parts emphasizes the content, explaining the essence.

Thus, a significant percentage of English-language multimodal technical text is occupied by infographics, the purpose of which is to visualize and structure information. Such infographic elements make up a significant part of the entire English-language technical communication space. Furthermore, it is obvious that the language of the technical text is a special mental representational system that encodes specific knowledge in the sign form. Words, tables, diagrams and illustrations, being semiotic signs, due to the sequence of presentation, activate those concepts and concepts for which they are symbolic substitutes.

Conclusions

To conclude, multimodal technical texts as a special linguistic and visual phenomenon, where linguistic and extralinguistic means form a common semantic field, have a complex impact on the addressee of these texts. These texts demonstrate the diversity and complexity of approaches to expressing the content and achieving the communicative goal of the message, where, along with verbal elements, non-verbal ones are integral, in particular, illustrations, diagrams, graphs and schemes. This ensures an adequate perception and understanding of these texts. Graphic elements help to visually present different technical details, units or processes, increasing interest in the material, helping to imagine distant processes and phenomena that are usually difficult to describe in words. In addition, graphs, diagrams and schemes provide not only a visual presentation of static data, characteristics of objects / phenomena, but also serve to explain them.

On the whole, visual content plays an extremely important role in written technical communication. The image is the most important part of multimodal technical texts and carries a significant functional load, providing a more complete, comprehensive perception. Also, among the main and most important elements of multimodal texts, color and signature stand out. Given that, a distinctive feature of multimodal technical discourse is the presence of accompanying drawings or / and explanatory drawings, which demonstrate all the geometric parameters and other information concerning the manufacturing processes of the product.

From an extralinguistic point of view, it is not the language that is considered, but a drawing, a table, a diagram as a whole, creating an image and representing encrypted data, the correct analysis of which reveals a large layer of technical information. Extralinguistic parameters of a technical text also include the surrounding text background – font size and color. Knowledge of these parameters and the ability to correctly decode and use them helps not only a technical specialist to successfully perform his duties, but also an ordinary person to successfully interact with machines and mechanisms, to understand innovation in the information technology age.

Therefore, the analysis of non-verbal means in technical texts makes it possible to single out their main functions. Each non-verbal tool has its own function, but often these functions are intertwined due to the combination of elements. At the same time, not only the number of non-verbal means increases, but also the attractiveness of the text, because the general function of non-verbal means is to explain the verbal series. In the interaction of verbal and non-verbal means in the analyzed technical texts, the following general patterns have been revealed: parallel use of verbal and non-verbal elements to explain the text and create a coherent image; extensive use of graphs, diagrams, illustrations and other graphic elements (use of colors, fonts and formatting) to visualize information and facilitate its effective perception.

As a scope for further research into this issue, we can determine the analysis of the status of the participants, their relationship, the goals and conditions of the flow of technical discourse, as well as its intertextuality in dialogues in the engineering field.

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MULTIMODAL APPROACH TO THE STUDY OF SPECIALIZED TEXTS IN TECHNICAL DISCOURSE

Yuliia V. Polycheva, National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" (Ukraine)
email: julia-sha@ukr.net
Volodymyr I. Vetokhin, Poltava State Agrarian University (Ukraine)
email: veto.vladim@gmail.com
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Key words: *multimodality, multimodal approach, multimodal elements, non-verbal elements, technical discourse, technical text.*

The article *aims* to highlight the possibilities of a multimodal approach to the study of specialized texts in technical discourse. The research design for this study is analytical and descriptive, which focuses on a deductive narrative approach and a complex of complementary theoretical *methods*: analyzing, summarizing and interpreting scholarly sources on the issue under scrutiny; conceptual analysis of the term "multimodal approach"; analyzing multimodal elements of a technical text; distributional analysis – to find out the environment, which contains various multimodal components; monographic method – to interpret the results obtained in a coherent logical way.

The theoretical significance of the article lies: firstly, in expanding the existing understanding of multimodality in linguistic studies at large and in modern technical discourse in particular; secondly, in applying multimodal analysis to the study of technical texts, which differs significantly from similar analyses of other types of discourse due to its powerful semiotic component. Its practical significance is determined by the identification of additional opportunities for linguists to analyze technical texts in terms of a multimodal approach.

It is stated that a growing interest in multimodality from the linguistic point of view can be attributed to two main reasons. Firstly, in linguistics, there has been a general turn to functional pragmatism, in particular, to the study of linguistic performance, including the interaction of sociocultural and cognitive factors of speech activity. Secondly, significant changes have also occurred in the field of speech practice: mediated, multi-channel communication in nature, based on the convergence of the semiotic resources available, has come to the fore.

The principles of the multimodal approach and a model for conducting a multimodal analysis of a text are considered. As mentioned in the article, the multimodal approach can be applied to analyzing all types and forms of communication, including the analysis of texts, including technical ones, in which two or more semiotic resources are integrated and interact to realize the communicative functions of the text.

A multimodal technical text is viewed as a special linguistic and visual phenomenon, where linguistic and extralinguistic means form a common semantic field, have a complex impact on the addressee of these texts. These texts demonstrate the diversity and complexity of approaches to expressing the content and achieving the communicative goal of the message, where, along with verbal elements, non-verbal ones are integral, in particular, illustrations, diagrams, graphs and schemes.

On the whole, visual content plays an extremely important role in written technical communication. The image is the most important part of multimodal technical texts and carries a significant functional load, providing a more complete, comprehensive perception. Also, among the main and most important elements of multimodal texts, color and signature stand out. Given that, a distinctive feature of multimodal technical discourse is the presence of accompanying drawings or / and explanatory drawings, which demonstrate all the geometric parameters and other information concerning the manufacturing processes of the product.

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Therefore, the analysis of non-verbal means in technical texts makes it possible to single out their main functions. Each non-verbal tool has its own function, but often these functions are intertwined due to the combination of elements. At the same time, not only the number of non-verbal means increases, but also the attractiveness of the text, because the general function of non-verbal means is to explain the verbal series. In the interaction of verbal and non-verbal means in the analyzed technical texts, the following general patterns have been revealed: parallel use of verbal and non-verbal elements to explain the text and create a coherent image; extensive use of graphs, diagrams, illustrations and other graphic elements (use of colors, fonts and formatting) to visualize information and facilitate its effective perception.

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