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ENHANCING USER EXPERIENCE WITH 5E MODELS FOR MULTIPLE AUDIENCES

Abstract

The user experience of a system can be directly tied to the user's understanding of the terminology used as they interact with a system's information. Design teams have a difficult time connecting the user, the information, and the user experience because a typical complex information system has multiple user groups, each with their own set of terminology, information needs, and ways of interacting with the system. An initial step in creating this web of relationships can be performed by creating a 5E model for each persona. This 5E model can then be used as a basis for making design decisions that work across multiple audiences.

INTRODUCTION

Early HCI embraced the dictum "Know the user!" and endorsed a user-centered approach to interface design, but its focus was still mainly on the individual human user, viewed as an information-processing mechanism (Bannon, 1991). This opening statement reveals the technology focus that pervades many of the ideas, concepts, and methods of information analysis. They focus on the technologies for communicating information rather than the ways people comprehend and understand information. A view which Bannon (2011) reiterated as changing, yet still technology-focused. The privileged status is given to technology rather than technology being viewed as a means to enable comprehension. I believe the privileged status should be given to methods of communicating information, with the technology only being a part of those methods. With complex systems, the focus on comprehension is necessary because there is no straightforward process, either with or without technology, that allows a person to fully comprehend the situation.

Defining the information needs in a complex system is about defining the communication required to communicate the information relationships, not individual information elements. It requires thinking about the complexity of the whole rather than the simplicity of the parts. It is about communicating the non-linear, dynamic relationships and not linear cause-effect relationships. It is about understanding how people interact with information. As such, it is about the cognitive and social psychology of people interacting with information and not about either the people or the texts in isolation (Albers 2012b).

The opening paragraph exposes an underlying assumption about information analysis, but it is an assumption that is rarely explicit: "What should be communicated?" With open-ended complex information systems, "Is the user gaining and comprehending the proper information" becomes itself a deep and complex question. A question that design teams must explicitly answer. The information analysis must define the information needs, the information relationships, and the audience terminology (Albers 2010). The importance of information needs and relationships are obvious, but the audience terminology is just as important since the correspondence of content terminology and audience knowledge (defined in audience terminology) directly affects comprehension.

CHARACTERISTICS OF COMPLEX INFORMATION

People come to a website or any information source looking for real answers to real questions. They are not concerned about what a design team or client wants them know; they want answers to their questions.

When performing usability testing or when defining the user terminology, it can be very easy to lose sight of this very obvious statement. Questions rarely have a short, simple answer. Morrison, Pirolli, and Card (2001) found only 25% of the people they studied searched for something specific: looking for a clearly defined X. Rather than needing single pieces of information, they found 71% searched for multiple pieces of information. Plus, more than just having multiple pieces of information, they must understand the relationships between those pieces of information. In a study where the task was to compare features of cars so they could make a purchase recommendation to their boss for new company cars, most people

gave up on using a car corporation web site and simply said they would go talk to a dealer. While the site provided abundant information on individual models, it gave no way to view comparable information across models or to easily answer some of the boss's specific questions (Albers: 2000). The problem found in the study was not difficulty in finding single pieces of information, but integrating them into a usable form.

There are three classes information problems people work with.

Simple	Can be fully defined. Has a correct answer that can be arrived at by following a single fixed path. A usability test can say yes/no the person found correct answer in the correct way.
Complicated	Can be fully defined, but has multiple paths to the correct answer. A usability test can say yes/no the person found correct answer, but can't say if they found it correctly since there isn't a single path.
Complex	Cannot be fully defined. The correctness and completeness of an answer depends on the person's information needs. A complex situation has six defining factors (Albers 2004).

- No single answer. Depending on a person's needs, there can be multiple acceptable answers.
- Open-ended answers. A person decides when they have enough information or when they need more. Thus, it is impossible to fully diagram a search or task path, or to define the complete set of information.
- Multi-dimensional approaches. A problem can be understood in multiple ways.
- Dynamic information. The information can change on short enough time scales that the change can affect the situation. For example, corporate sales information.
- History. The previous states of the situation or the person affect how people interpret and comprehend the information. If a person recently had good or bad experiences with a similar situation, they will expect the same good/bad experience with the current one.
- Non-linear interactions. Small differences in the initial characteristics can cause large changes in the end results.

The information and interaction needs of simple information make the terminology decisions simple. Unfortunately, simple information needs rarely exist in real-world situations. Non-trivial information interaction occurs within open-ended complex situations. One result is that it becomes irrelevant to ask "do we have all the information?" from both the viewpoint of content creation and usability testing.

> When an individual or an organization seeks to attain a goal within a completely closed system, it is possible in principle for a complete knowledge of the system and of its options and probabilities to be obtained, so that a completely rational pattern of response can be drawn up….In most real life situations, however, and particularly in the face of the most important problems to which decision-makers are required to address themselves, the issue is much less simple; for, in such cases, they usually deal with open systems in which they are unable to gain a complete knowledge of the implications of one action as set against those of another (Turner & Pigeon 1997: 134).

A design team must work to create a complex information system that provides content that communicates the needed information in an efficient manner that reduces readers' uncertainty,

maximizes comprehension, and minimizes cognitive load. These three factors are measured not in terms of the information applied to its current context, but to understanding the overall long-term situation development (Albers: 2012a).

An interesting factor about complex information, which plagues usability testing, is that decisions and actions cannot be assumed to be repeatable since they depend on past situation and user history. The assumption of a single input and output is a basic assumption of usability tests and works fine for simple systems, but fails for complex ones. Complex situations must deal both with multiple audiences, multiple inputs and outputs. In addition, complex information has many separate information elements that may contradict or conflict with other information elements. Sorting through the interaction and terminology issues inherent within this complex web presents a design team with a wicked problem that must be constantly reconsidered as they develop the system.

The situations discussed in the remainder of this article are assumed to be complex situations.

ADDRESS COMPLEXITY WITH A 5E MODEL

Quesenbery (2002) developed a 5E model (figure 1) as a visual method for emphasizing the relative user priorities within a system and how information should be presented.

A 5E model has five dimensions: effective, efficient, engaging, error tolerant, and easy to learn. Short definitions for each dimension are:

Effective	The completeness and accuracy with which users achieve their goals.
Efficient	The speed (with accuracy) with which users can obtain and comprehend information.
Engaging	The degree to which the tone and style makes the information satisfying to use.
Error tolerant	How well the design prevents errors, or helps with error recovery.
Easy to learn	How well the system supports both initial orientation and deepening understanding of its capabilities.

The model always contains all five dimensions since, in reality, they are an integrated whole. However, splitting them up gives a strong visual since the relative sizes of the circles directly correlate with their relative importance. As a result, the design team can use the five dimensions to visually display the information balance required to meet a user's information needs. "This model provides a way of understanding the relationship between the content, and its presentation and use, that can guide the creation of the visual presentation, information design, and navigation structure as a unified product that meets user needs" (Quesenbery, 2002, p.100).

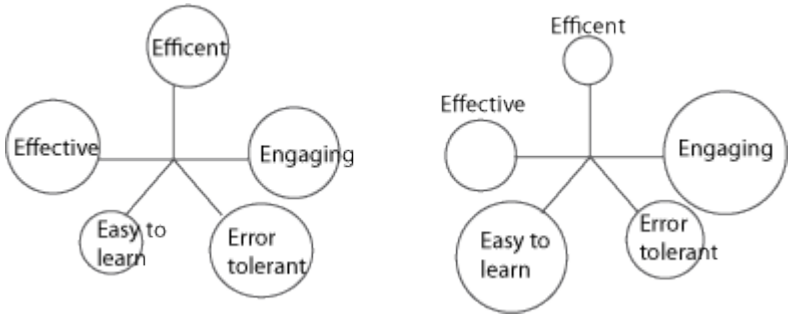

Figure 1. 5E model. The model divides the information analysis into five areas and then sets the relative size of those five areas. The two 5E models shown could be displaying the differences between two projects or two different personas within a single project.

Quesenbery originally saw the 5E model as differing for each project. In reality, she did not take the idea far enough. It is not each project, but each persona within a project which needs a different 5E model.

Persona generation involves collecting information about various users, creating a wide collection of different ones and then combining similar ones into the final set of personas. The 5E model can be a determining factor for the combination process. Initially constructed personas with similar 5E models can be combined. Or, perhaps just as important, personas that seem similar in many aspects, but which have different 5E models should not be combined.

Written technical communication can be considered as part of a conversation (Redish 2013) – actually multiple conversations with multiple audiences for any specific document. Defining each circle within a 5E model can capture the conversational differences required for each persona: What does the reader expect, what information elements do they privilege, what relationships do they expect, and what terminology do they expect within the conversation. The information analysis for any single circle needs to look at each persona and define what information achieves the circle's purpose and then must go beyond that to define what the terminology fits the persona: what they say and what they think.

The user terminology differences are an important aspect of defining those differences. A simplistic approach could find that two personas expect the same information and stop at that point. But the terminology that the people expect the content to contain can be very different – for example, the differences between sales and manufacturing. A design team must take the information analysis down to the terminology level in order to ensure the final design maximizes reader comprehension.

INFORMATION ANALYSIS AND 5E MODELS

One mantra of technical communication is to "make the information as simple as possible." Although this is good advice, many times "as simple as possible" is interpreted as "write so anyone can understand it." However, that interpretation is flawed if "anyone" is not one of the personas. A government form must be understood by a random person, but a business report should not be written for a novice in marketing or finance. The 5E model provides a design team a clear visual to show that the terminology needed for "anyone" is not the terminology needed for the finance person. Or, in general terms, the terminology must be appropriate for the personas; it only needs to be appropriate for the general public if they are one of the personas.

Any information analysis methodology works to capture the needed information. However, when 5E models become an integral part of the methodology, they help to make the priority differences between personas visually explicit. The various stakeholders within an information development project inevitably have different concerns. Reconciling these concerns is not a simple task. The strong visual representation obtained from 5E models of the differing needs of the various personas can help keep those persona information needs up-front in the design decision-making process and keep all of the stakeholders focused on all user groups.

The 5E models built during the information analysis help ensure that both the development cycle and the user's information interaction move as smoothly as possible. People interacting with information can only extract information and build relationships when that information gets presented using their terminology. This statement is nothing new. For many years the technical communication literature has pushed writing content in user terms and not system or corporate terms. However, it fails to follow through with ways to actually learn and incorporate those user terms into the final content. Developing terminology requirements as part of constructing a 5E model can help provide that path.

5E MODELS IN THE DESIGN DECISION PROCESS

Content creation involves providing the proper information to fit the reader's information needs. This, in turn, raises the question of what is meant by information. Drucker (2011) argued that "Information is data imbued with relevance and purpose" (Drucker 2011: 5), a definition closely related to common data, information, and knowledge hierarchies (Albers 2004). Dissecting the final two terms of Drucker's statement, relevance means more than just being relevant to the situation, but also being relevant to the reader's current knowledge state. If a piece of information is already known, then it is not relevant. Likewise for purpose; data that fails to help the reader build an appropriate view fails to fit the purpose (Albers 2012a). In the end, any communication is a conversation; the conversation must consider the purpose or it fails. Especially since the amount of available information far exceeds what people can process or what they need to know. "Relevant information, or perhaps what Wilensky calls "high-quality intelligence" itself becomes a scare resource in such circumstances so that the cost of obtaining one piece

of information has to be balanced against the lost opportunity of locating another piece of information" (Turner & Pigeon 1997: 41).

Within the information analysis process (Figure 2), the 5E model is an outcome of the analysis. After the information needs and requirements are collected, a 5E model can be developed for each persona (Figure 3). These models then feed into the content and interface design.

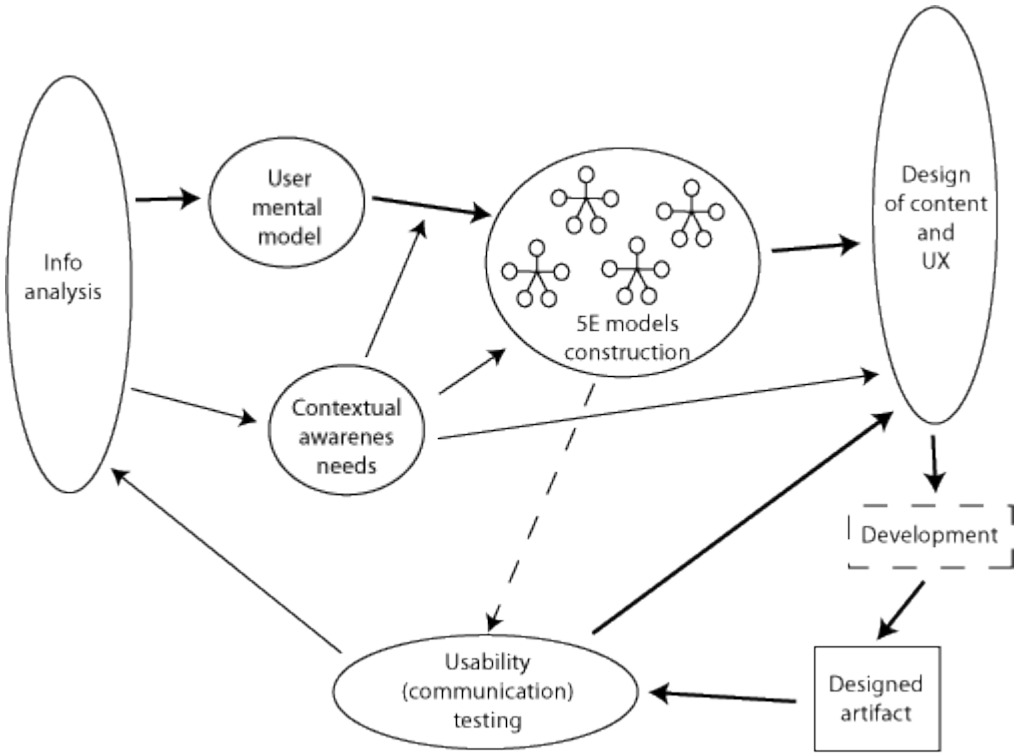

Figure 2. A cyclic information analysis and development process. The 5E model development assists in transforming the information analysis findings into a form that can be used by development and testing.

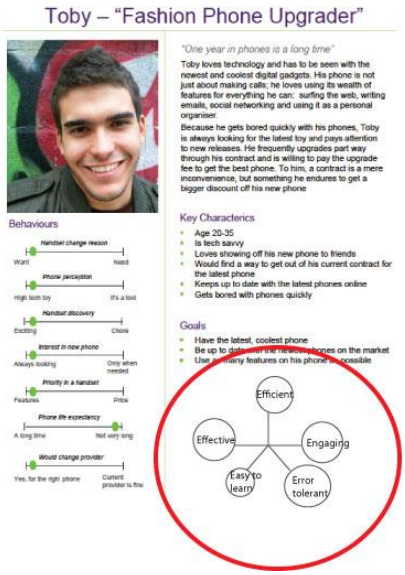

Figure 3. 5E model as part of a persona. The 5E model developed for the individual personas should appear on the persona sheet. It helps to summarize the persona's information needs and allows the design team to discuss those needs with respect to the circle size.

Design teams need to make decisions about what content goes into a system and what affordances and terminology within that information cue the information relationships. A design team can easily succumb to time or other pressures and create a design optimized for one persona or attempt a generic one-size-fits-all. The 5E models give a design team a visual representation that lets them compare the different circle sizes and take them into account on design decisions. The visual aspects of the 5E model make it more difficult to rationalize poor design decisions, helps prevent tunnel vision, and keeps the design team focused on the information needs of all personas. The 5E model helps focus design choices because it focuses the design discussions on each of the five circles and whether that specific design choice makes sense for this specific 5E model. For example, design changes that would increase the efficiency aspects of an interface may be deemed unnecessary (too time costly for the return on investment) if the efficiency circle was small.

Any content decision amounts to drawing lines around information to limit it to a manageable amount. However, the limits both design teams and readers define do not necessarily conform to the amount needed to fully comprehend the situation. Drawing tight boundaries makes a situation seem easier to analyze, but might miss essential factors to understanding it. They also make it harder to see the future ripple effects of any decision.

Drawing the lines in a complex system amounts to attempting to transform it into a closed system. Unfortunately, the people reading the information do not realize they are seeing only a subset, but believe they are seeing the full world and make decisions accordingly. From an information analysis perspective, this leads to problems in determining the appropriate levels of abstraction to use when analyzing and describing complex informational systems or socio-technical systems (Avgerou 2001). Of course, if different groups are using different terms and drawing boundaries differently, then any analysis and subsequent decisions are doubly difficult. Failing to fully study each of the personas can lead to an analysis that assumes one set of boundaries applies to all personas.

THE CASE FOR TERMINOLOGY AND 5E MODELS

A 5E model can be easily created by designers sitting around a table and asking themselves about the relative size of each circle. Unfortunately, there is no assurance the answers bear any resemblance to reality. Creating answers based in reality requires a careful information analysis and one which dives deeply into user terminology.

Understanding the relative size of the circles requires understanding the user's mental models and what are considered the salient clues for activating the different mental models. Only then can a design team understand what users expect or need for comprehending a change in the overall situation and for making predictions about its future development. And, quite simply, providing a path to mentally evaluating and developing those predictions is the primary purpose of complex information content.

5E models help to define the terminology needed by the users. Without the 5E models being used as part of the development process, the design team may miss some of the necessary terminology or related presentation to enhance comprehension. Of course, each design factor tied to the 5E model gets multiplied by the number of personas since the proper design answer for each persona is different even if the base information remains the same. The critical salient cues exist within mental models in rather precise terms. The different mental models held by different groups can contain different terms for the same critical cue. If the interface presents it using the wrong terminology, then a person will most likely discount or ignore the cue because it is not presented in the terms they expect.

In addition to helping define terminology, a 5E model can help prevent information analysis from falling into an assumption that having information available is sufficient. Besides being over-simplistic at many levels, an available/not-available binary fails to consider the human-information interaction issues that surround people comprehending information. Even when the information is placed in the proper location within the text, there are many terminology and design factors that can prevent a person from comprehending it. Poor design may hide its significance or give it poor salience, the readers may be skimming or they may not know they need that information, or the information might conflict with prior knowledge. The 5E model assists the usability team in developing tests which help bridge the information the system must provide with the users' information needs and priorities.

Hailey (2010) questions how well even usability people can evaluate the contextual level of the information since they lack a deep understanding of the real-world context. Testing complex information requires looking at the overall information interaction. It is not a matter of counting clicks, mapping search paths, or knowing if a person can find individual information elements. Instead, the test design must allow for the issue that, as people evaluate complex information, they do not follow a clean linear path. Rather than looking up single elements, with complex information people need to integrate multiple information elements (Morrison, Pirolli, & Card 2001). The usability test needs to determine if people are building the web of relationships that leads to understanding the overall situation (Albers 2010).

If the system as implemented fails to have a 5E diagram that looks relatively close to an ideal one for the user's situational context, then the system risks having multiple serious usability and information comprehension problems. The user experience people can focus redesign efforts on making changes that will bring the system closer to the 5E model. Operationalizing the five dimensions within a 5E model, especially for complex information as viewed in the light of Mirel's (2003), Speier's (2006), and Dicks's (2010) research, leads to many questions. What level of task? How about task sequences? How about sequences with highly branching tasks? Answering these questions in a way that leads to developing a good 5E model and understanding user needs requires knowing the terminology the user requires to develop that understanding.

CONCLUSION

One source of the problem of under-utilized systems arises because information analysis is a complex operation within the socio-technical issues that revolve around effectively communicating information. One reason systems are under-utilized is because they introduce ways of working that conflict with other aspects of a person's job. Once source of this conflict is the system's terminology fails to be meaningful to the user. Or it may have it may use term for a concept where that term already has a different explicit meaning to the user.

Given hindsight or the position of an omniscient observer, one can specify exactly the terminology needed for the optimal solution. However, this point of view misses the cognitive task of focusing on the relevant subset of information critical to understanding a complex situation (Woods, Patterson, & Roth 2002). Post-accident reports have the value of hindsight and often reveal the people involved had the information available but did not act on it (Dekker 2011). When interacting with information within a situation, people are striving to make good possible decisions and use the available information. The real problem in the cases that both Woods, Patterson and Roth as well as Dekker discuss is not the availability of the information, but that it is so buried within irrelevant information or that it uses terminology foreign to the users. In other words, people could not effectively use the relevant information to increase their understanding of the situation.

Developing a 5E model as part of the information analysis helps avoid these issues because it puts the factors relevant to a project's personas visually before the development team. Creating high quality 5E models requires taking the user's terminology and the user's perspective on the terminology into account. This, in turn, gives the design teams a basis for making design decisions focused on addressing the user's needs. It also helps usability testing for the user experience because it requires defining what and how the people need the information and how to interpret test results. For example, if the "efficient" circle was different between personas, the importance of the time required to comprehend the information would differ. Likewise, different sized "easy to learn" circles would mean different interpretations of interaction difficulties that arise from learning issues.

To paraphrase Norman, "if the user can't find the information or comprehend it, then it's not in the system." Justification of problems with variations of "The information is right here" or "The information is correct" followed by "we can't help it if the user can't understand it" are unacceptable for high quality information systems. In the end, the design team is responsible for creating and displaying content to support a person's needs; any failure must fall back onto the design team. Of course, design teams can never fully answer how much is enough until after the fact – typically after a major failure which leads to a postmortem study – but they have to make a good attempt at it. A 5E model provides a major element in that good attempt.

Creating high quality 5E models as part of the information analysis will result in higher quality design, development, and testing. The user terminology will have been captured and the relative use and

importance of that terminology will have been apportioned within the model. Creating individual models for each persona allows for comparison and ensuring all information elements are designed to communication with all relevant personas.

REFERENCES

ALBERS, M. (2000). Information design for web sites which support complex decision making. *Proceedings of the STC 2000 Annual Conference*. Orlando FL. May 21–24, 2000.

ALBERS, M. (2004). C*ommunication of Complex Information: User Goals and Information Needs for Dynamic Web Information*. Mahwah, NJ: Erlbaum.

ALBERS, M. (2010). Usability and information relationships: Considering content relationships when testing complex information. In Albers, M. & B. Still (eds.) *Usability of Complex Information Systems: Evaluation of User Interaction* (109–132). Boca Ratan, Fl: CRC Press.

ALBERS, M. (2012a). Communication as reducing uncertainty. *30th Annual International Conference on Design of Communication*. Seattle, WA. October 4–5, 2012.

ALBERS, M.(2012b). Information analysis: A complex socio-technical problem. Presented at *Symposium on Communicating Complex Information*. Greenville, NC. February 24-25, 2012.

AVGEROU, C. (2001). The significance of context in information systems and organizational change. *Information Systems Journal*, 11, 43–63.

BANNON, L. (1991) From human factors to human actors: The role of psychology and human-computer interaction studies in systems design. In: Greenbaum, J. & M. Kyng (eds.) *Design at Work: Cooperative Design of Computer Systems*. Hillsdale, NJ: Lawrence Erlbaum Associates, 25–44.

BANNON, L. (2011). Reimaging HCI: Toward a more human-centered perspective. In: *Interactions* 13.4, 50–57.

DEKKER, S. (2011). *Drift into Failure: From Hunting Broken Components to Understanding Complex Systems*. Burlington, VT: Ashgate.

DICKS, S. (2010) Designing usable and useful solutions for complex systems: A case study for genomics research. In: Albers, M. & B. Still (eds.) *Usability of Complex Information Systems: Evaluation of User Interaction*. Boca Raton, FL: CRC Press, 207–222.

DRUCKER, P. (1998). The coming of the new organization. H*arvard Business Review on Knowledge Management*. Boston: Harvard Business School Publishing, 1–19.

HAILEY, D. (2010) Combining rhetorical theory with usability theory to evaluate quality of writing in web-based texts. In: Albers, M. & B. Still. (eds.) *Usability of Complex Information Systems: Evaluation of User Interaction.* Boca Ratan, Fl: CRC Press, 17–46.

MIREL, B. (2003). *Interaction design for complex problem solving: Developing useful and usable software*. San Francisco: Morgan Kaufmann.

MORRISON, J., Pirolli, P. & Card, S. (2001). A taxonomic analysis of what world wide web activities significantly impact people's decisions and actions. Presented at the *Association for Computing Machinery's Conference on Human Factors in Computing Systems,* Seattle. March 31 - April 5, 2001.

QUESENBERY, W. (2002). Dimensions of usability. In: Albers, M. & B. Mazur (eds.) *Content and Complexity: Information Design in Technical Communication* (pp. 81–102). Mahwah, NJ: Erlbaum.

REDISH, J. (2013). Purposes, personas, conversations. Presented at the *STC Technical Communication Summit*. Atlanta GA. May 6–8, 2013.

SPEIER, C. (2006). The influence of information presentation formats on complex task decision-making performance. In: *International Journal of Human-Computer Studies*, 64.11, 1115–1131.

TURNER, B. & Pigeon, N. (1997). *Man Made Disasters*. Oxford, UK: Butterworth-Heinemann.

WOODS, D., Patterson, E., Roth, E. (2002). Can we ever escape from data overload? A cognitive systems diagnosis. In: *Cognition, Technology, & Work* 4, 22–36.

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TERM AND TERMINOLOGY: BASIC APPROACHES, DEFINITIONS, AND INVESTIGATION METHODS

(Eastern-European perspective)

Abstract

In this article, different views on term and terminology are analyzed and generalized. Various approaches to the concept "term" and its definitions are discussed. An attempt is made to formulate the relevant comprehensive definition generalizing the existing ones. It is shown that there exist grounds to treat terminology not only as a set of professional terms or a linguistic field or a teaching but also as a science operating with statistical and analytical methods in combination. Peculiarity of the proposed investigation methods is due to their generalized synthetic character manifesting in effective unsophisticated synthesis of common and subject field methods, including purely linguistic ones. The relevance of terminological methods to those of natural science and traditional linguistics is elucidated. It is stated that the application of statistical and analytical methods takes into account natural features of the objects of study, including terminology and linguistics in general. Prospects of future studies are formulated.

I. INTRODUCTION

Development of theoretical propositions about the organization of lingual units is an essential part of modern linguistic research because "the linguistic theory is necessary not only and not so much to describe facts [...] but how to identify these"[1] (Kibrik 1992, 41). The concepts of *term* and *terminology* attract much interest, especially due to recent advances in computational and textual terminology and to fast development of its applications (Lejchik and Shelov 1989-1990; Condamines 1995; Otman 1996; Budin 2001; Bourigault, Jacquemin, and L'Homme 2001; Tabanakova 2001; Perebyjnis 2002; Condamines 2002; Felber 2002; Ivina 2003; Verbenjec 2004; Kristiansen 2004; Kristiansen 2006; Fidelia, Condamines, & Castellví 2007; Kochan 2009). The present investigation aims to consider these and formulate the relevant concepts consistent with today's challenges. In Section II, various approaches to the concept of *term* and its definitions are discussed. An attempt is made to formulate a relevant comprehensive definition by synthesizing and generalizing the existing ones. In Section III, different approaches to the concept of *terminology* are analyzed. The conclusion is made that there are sufficient grounds to treat terminology not just as a vocabulary or part of lexicology or a teaching (doctrine) but also as a separate independent science about term formation and operation. In Section IV, investigation methods of terminology as a science are proposed and discussed concerning the general scientific methods and those of natural sciences and traditional linguistics. Section V summarizes the results obtained and outlines prospects of future investigation.

II. DEFINITIONS AND CONCEPTS OF A TERM

The process of establishing the concept of a term is long and diverse. On the one hand, this is due to the fact that the concept is quite complicated. On the other, the concept of concept itself is one of the hardest to define. Among various approaches to this notion, we will emphasize the one from the international standard ISO 1087-1:2000, 3.2.4, which considers it as a unit of knowledge created by a unique combination of characteristics, and the one suggested by the "Dictionary of Ukrainian language": "One of the forms of thinking, a result of the generalization of essential attributes of the object of reality"[2] (Bilodid et al. (VII) 1970-1980: 168). Showing closer correspondence to terminological issues,

[1] „лингвистичнеская теория необходима не только и не столько для описания фактов, <…> сколько для обнаруженя самих фактов" [transl. by Maksym Vakulenko].

[2] „Одна із форм мислення, результат узагальнення суттєвих ознак об'єкта дійсності." [transl. by Maksym Vakulenko].

the latter appears to be more appropriate for our study. In particular, from the time of appearance of the term concept (it is assumed 1876, although in the 18th century, the Ukrainian thinker Gheorghij Konysjkyj had used this word, Ukr. "termin") and until now, it has no single definition (Rusanivsjkyj et al. 2004: 683; Selivanova 2010). In general, the essence of a term was formulated by the Russian linguist V. V. Vinogradov, who noted that a word becomes a scientific term only if it is a tool of logical definition (Vinogradov 1947: 12-13).

Obviously, it is impossible to formulate a comprehensive overview of all existing definitions of a term. Therefore, it is appropriate to limit with the most important ones. In its historical evolution, the concept of "term" was interpreted as:

- "a word that is a name of a strictly defined concept"[1] (Volin and Ushakov 1940);
- "a word that shows strictly defined philosophical, scientific, technical, etc. concept"[2] (Vvedenskij 1955);
- "a word or a collocation that expresses a concept of some special science, technology, art, social life, etc."[3] (Bazhan (14) 1959-1965);
- "a word or a collocation of special (scientific, technical, etc.) language that is created (received or borrowed) for accurate expression of specific concepts and notations of specific objects" [4] (Akhmanova 1966: 95-96);
- "a specially cultivated word being artificially invented or taken from natural language" [5] (Superanskaja 1976: 74);
- "a word or a collocation being the exact name of a special concept for any field of science, technology, production, social political life, culture, etc."[6] (Zhovtobrjukh 1984: 70).

The above definitions cannot be considered as successful. Firstly, one should be aware that the Latin word *terminus* is not the etymon of a term, as far as the latter is derived from the Greek *τέρμα* 'end, boundary'. Secondly, the qualification "special" is not quite correct, because the terms are normally classified as belonging to the groups of the common ones (*distance, light, section, speed, star, water*), general (*analysis, analogy, category, synthesis*), cross-disciplinary (*electricity, osmosis, proton, weight*), field terms (*bosons, gluons, quarks*), etc.

Adherents of the substantive approach believe that a term is a special word or a word combination (collocation) that differs from other nominative units by unambiguity, exactness, systematic character and independence of the context (Lotte 1961; Danilenko 1977; Kandelaki 1977; Golovin and Kobrin 1987; Kyjak 1989). Even so, most of the terms possess these features. Many of the linguists consider this approach opposing terms against words, as "rejected by modern science"[7] (Lejchik 2009, 28; Zhytin 2009, 10).

The question to what extent terms remain "special" is still open. For example, since physics is a natural science considering everything in the world as its subject, it does not require a separate artificial language (although there are certain reserving remarks for terms denoting objects that do not play a significant role in the daily occurrence: *atom*, *quasar*, *quark*, *molecule*, etc.). The most natural way to develop this specialized language is a continuation of a literary language – of course, with necessary special features. Physics has been widely enjoying words of general use, including polysemantic ones which, after having narrowed their semantics, acquired a specific meaning: *degeneration* (*levels*), *field* (*electromagnetic*), *body* (*physical*), *noble* (*gas*), *hole* (*black*), *current*, *image*, *level*, *power*, *run*, *space*,

[1] „слово, являющееся названием строго определённого понятия" [transl. by Maksym Vakulenko].
[2] „слово, обозначающее строго определённое философское, научное, техническое и т. п. понятие" [transl. by Maksym Vakulenko].
[3] „слово або словосполучення, що виражає спеціальне поняття якоїсь галузі науки, техніки, мистецтва, суспільного життя тощо" [transl. by Maksym Vakulenko].
[4] „слово или словосочетание специального (научного, технического и т. п.) языка, создаваемое (принимаемое, заимствуемое и т. п.) для точного выражения специальных понятий и обозначения специальных предметов" [transl. by Maksym Vakulenko].
[5] „специально культивированное слово, искусственно изобретённое или взятое из естественного языка" [transl. by Maksym Vakulenko].
[6] „слово або словосполучення, що служить точним найменуванням спеціального поняття з якоїсь галузі науки, техніки, виробництва, суспільно-політичного життя, культури, мистецтва тощо" [transl. by Maksym Vakulenko].
[7] „отброшены современной наукой" [transl. by Maksym Vakulenko].

star, *time*, *water*, *weight*. However, in their non-terminological meaning, such lexemes are often emotionally biased or qualified as conversational ones.

According to the functional (descriptive) approach, terms are not special words but the words in a "special function" (Vinokur 1939; Kapanadze 1965; Lejchik 1986; Grinjov 1993; Tabanakova 2001). Within this approach, the opposition "term – word" proved to be very productive in the term theory creation (Tabanakova 2001: 28-29). However, most of these "special" functions are inherent to ordinary words (Kochan 2009: 31). In addition, "there is no clear boundary line between terms and common vocabulary. [...] The process of interchange between trivial language and terminology in the form of terminologization and determinologization, never stops"[1] (Ovcharenko 2010: 173). These processes have many interesting practical aspects that will be discussed in detail elsewhere.

Given that "every word, however trivial,"[2] can become a term (Vinokur 1939: 5), stylistically neutral terms are not necessarily the most suitable ones. Metaphors and comparisons, being highly distinctive features of fiction, are also common in scientific language: the metaphorically reinterpreted words are widely used in scientific, technical, and field terminology (Danilenko 1973: 84). A significant portion of terminological vocabulary in the European languages has been produced by metaphors, thus evidencing an emotional component in these units (Palamarchuk 1965: 155). This corresponds to the language tendency of expressivity manifested in the desire to use the most picturesque words (Serebrennikov 1970: 251). For example, such terms as *hotline*, *hold a post* (business); *bare particle*, *strangeness*, *flavour*, *charm*, etc. (elementary particle physics); *runaway electrons*, *excitation* (plasma physics); *dead zone* (radio physics); *magnetic storm* (astro- and geophysics); *hot luminescence*, *soft / hard radiation* (optics); *metal fatigue*, *hard / soft water* (technology); *bare wire* (electrical engineering) are conventional and recognized. An emotionally charged component does not prevent successful implementation of necessary language features here. This is natural and logical, because language reveals two opposing trends, expressive and intellectual ones: "the expressive tendency enriches language with specific elements <...> it creates new words and expressions; the intellectual, analytical tendency eliminates emotional elements, creating formal affiliation from their parts,"[3] – as Charles Bailly remarked (cit. by Vinogradov 1947: 19). Evidently, to describe newly discovered complicated objects of science and technology, one may need to take advantage of "emotional" terms because in many cases such lexemes possessing extra semantic depth and "ultra sense," define best the essence of these complex phenomena. Therefore, in the term vocabulary (term lexicon), unlike nomenclature, searching or choosing solely stylistically neutral words is often inappropriate and unjustified.

In the second half of the twentieth century, there appeared many author definitions of a term, although it was claimed in 1959 that special works providing term definition and its particularities, "are almost absent in the linguistic literature"[4] (Moskalenko 1959: 9). In particular, such definitions include those describing terms as:

- a word or a word complex that correlates with the concept of an organized field of cognition (science and technology) and enters a system relationship with other words and word complexes, in every individual case and in certain time forming with them a closed system that is highly informative, unambiguous, accurate and expressively neutral[5] (Kvitko 1976: 21);

[1] „чіткої межі між термінами й загальновживаною лексикою не існує. <…> між загальнонародною мовою та термінологією не зупиняється процес взаємообміну у формі термінологізації й детермінологізації" [transl. by Maksym Vakulenko].

[2] „каждое слово, каким бы оно ни было тривиальным" [transl. by Maksym Vakulenko].

[3] „экспрессивная тенденция обогащает язык специфичными элементами <…> она создаёт новые слова и выражения; тенденция интеллектуальная, аналитическая устраняет эмоциональные элементы, создаёт из их части формальные принадлежности" [transl. by Maksym Vakulenko].

[4] „в лінгвістичній літературі майже немає" [transl. by Maksym Vakulenko].

[5] „слово чи словесний комплекс, який співвідноситься з поняттям певної організованої галузі пізнання (науки, техніки) і вступає в системні відношення з іншими словами та словесними комплексами, утворюючи разом з ними в кожному окремому випадку й у певний час замкнену систему, що характеризується високою інформативністю, однозначністю, точністю й експресивною нейтральністю" [transl. by Maksym Vakulenko].

- a basic unit of terminological systems, the structure of which is determined by the fact that it is, on the one hand, a member of the terminological system, and on the other, it inherits the "traits that are characteristic for the actual vocabulary of the native language"[1] (Nikitina 1978: 3);
- "a word or a collocation with historically justified or conventionally assigned meaning that reflects one concept in a specialized field of knowledge or production"[2] (Mostovyj 1993: 191);
- "a lingual sign expressing special scientific concept and reflecting its position in an appropriate scientific notions system, in the system of lore. Scientific terminology is a system of terms that always corresponds to a system of concepts being implemented in their definitions. It is system and concept character that distinguishes a term from a non-term and grants special vocabulary the status of scientific terminology"[3] (Tabanakova 2001: 37);
- "a unit of a historically formed terminological system that expresses a concept and its place among other concepts, is denoted by a word or a collocation, serves for communication between people interconnected by unity of specialization, belongs to the language vocabulary and pertains to all its laws. The term is used for precise definition in a particular field of knowledge"[4] (Ponomariv 2001: 72);
- "a basic unit of science, special area of expertise and area of human activity denominating processes and objects and, at the same time, acting as an agent of environmental world cognition"[5] (Ivina 2003: 4);
- "a linguistic unit (word or collocation) of a special area of use that is a verbal denotation of a scientific concept, has a meaning fixed by a definition that is the semantic basis of corresponding concept, and is implemented within a certain terminological field"[6] (Serghjejeva 2002: 4);
- "a word or a collocation denoting a concept of science, technology and art, the main features of which are consistency, conformity with the concept defined, presence of definitions, a tendency to monosemy within its terminological field, i.e. terminology of a specific area of knowledge, conciseness, stylistic neutrality, exactness, high information content"[7] (Symonenko 2007: 21);
- "a word or a collocation being created, borrowed or copied from the popular language, that expresses a concept of science, special fields of knowledge and human activities, is designed to nominate objects and processes and simultaneously serves as a tool of cognition of the world, has clear semantic boundaries and is incorporated into a terminological system"[8] (Ovcharenko 2010: 173);

[1] „притаманні риси, що є характерними для сучасної лексики загальнонаціональної мови" [transl. by Maksym Vakulenko].

[2] „слово або словосполучення з історично умотивованим чи умовно закріпленим значенням, що відбиває одне поняття у спеціалізованій галузі знання чи виробництва" [transl. by Maksym Vakulenko].

[3] „языковой знак, выражающий специальное научное понятие и отражающий место этого понятия в соответствующей системе научных понятий, системе знаний. Научная терминология представляет собой систему терминов, за которой всегда стоит система понятий, которая реализуется в его дефиниции. Именно системность и понятийность отличают термин от нетермина и придают специальной лексике статус научной терминологии." [transl. by Maksym Vakulenko].

[4] „одиницю історично сформованої термінологічної системи, що виражає поняття та його місце серед інших понять, позначається словом або словосполученням, служить для спілкування людей, пов'язаних між собою єдністю спеціалізації, належить до словникового складу мови і підпорядковується всім її законам. Термін уживається для точного визначення поняття у певній галузі знань" [transl. by Maksym Vakulenko].

[5] „основную единицу науки, специальных областей знаний и сфер деятельности человека, которая называет процессы и объекты и одновременно служит средством познания окружающего мира" [transl. by Maksym Vakulenko].

[6] „мовну одиницю (слово або словосполучення) спеціальної сфери вживання, яка є словесним позначенням наукового поняття, має закріплене дефініцією термінологічне значення, що є семантичною основою відповідного поняття і реалізується в межах певного термінологічного поля" [transl. by Maksym Vakulenko].

[7] „слово або словосполучення, що позначає поняття певної галузі науки, техніки, мистецтва, основними ознаками якого є системність, відповідність позначуваному поняттю, наявність дефініції, тенденція до однозначності в межах свого термінологічного поля, тобто термінології певної галузі знань, стислість, стилістична нейтральність, точність, висока інформативність" [transl. by Maksym Vakulenko].

[8] „створене, запозичене або взяте із загальнонародної мови слово чи словосполучення, яке виражає поняття науки, спеціальних галузей знань і діяльності людини, покликане номінувати об'єкти і процеси й одночасно слугувати засобом пізнання навколишнього світу, має чіткі семантичні межі і входить у термінологічну систему" [transl. by Maksym Vakulenko].

- "a word or a collocation that is coordinated with a clearly defined concept of a science, technology, art, social and political life and enters a systemic relationship with other similar units of language, forming with them a particular system, or terminology"[1] (Voznjuk et al. 2010: 8).

Let us make a few remarks to the definitions cited: 1) not all the terms form a system, i.e. possess generic-specific relations and clear and sufficient derivational potential; 2) most of the above attributes and characteristics are inherent to the "apposite," or "well formed" terms; 3) as shown above, the criterion of stylistic neutrality/expressiveness is not always appropriate (see also Vakulenko 1996b: 25-26); 4) the parity "one concept – one term" is an ideal rather than a description of the real state of affairs; 5) it is possible to define any word, not only a term; 6) a term is not so much a tool of cognition as, according to the philosophical and epistemological approach, fixes the results of cognitive activity.

According to Theodore Savory, "terms are symbols designed to transfer a certain amount of encoded information that is understood only by those who know the appropriate key or code" (Savory 1967: 21). It turns out then that a term does not denote the concept but, on the contrary, rather isolates it from those "not initiated enough." Russian terminologists Vladimir Lejchik and Sergej Shelov define a term as a lexical unit of a language for special purposes that indicates the general, specific or abstract concept of a theory of a particular domain of knowledge or activity (Lejchik and Shelov 1989-1990: 12). However, there are so many terminological lexemes representing concepts of practical human activity, namely technical, pharmaceutical, cosmetic, and agricultural and other terms.

Unfortunately, too simplistic interpretation of the term offers the Ukrainian State standard DSTU 3325-96 "Terminology. Definition of basic concepts" that qualifies a term as "a designation of a concept in professional language through linguistic expression."

Let us pay attention to those definitions that can be considered sufficiently successful. These include the following:

- "a term is a word or a collocation that corresponds (unambiguously, in the ideal) to some concept in social and political life, science, technology and art. A term differs from the usual word by accuracy of semasiological boundaries"[2] (*Boljshaja sovetskaja ehnciklopedija*, 1946 – cit. by Moskalenko 1959: 9);
- "a term is a variant of a usual word or a specially created unit that has not only the properties of a primordial, but also new specific quality"[3] (Florenskij 1989: 123);
- "a word or a collocation that is used to accurately express concepts specific to any field of knowledge, production, or culture, and that serves communicative needs in this field of human activity, is called a term"[4] (Arnoljd 1991: 81);
- "a concise to the limit concept definition that is presented according to the rules of the native language and concerns a certain element of the external or inner world of a human, is referred as a term. One may say even profounder: a verbal name of the nodal concept of the abstract logic design of a person's conscious perception of the external or inner world, is called a term. One can tell the most profoundly: a term is the node element of human realization of interaction processes with one's external and internal world"[5] (Talanchuk, Ghondjul, and Shherbyna 1995: 33).

[1] „слово або словосполучення, яке зіставляється з чітко окресленим поняттям певної галузі науки, техніки, мистецтва, суспільно-політичного життя і вступає у системні відношення з іншими подібними одиницями мови, утворюючи разом з ними особливу систему – термінологію" [transl. by Maksym Vakulenko].

[2] „термін – слово чи словосполучення, якому (в ідеалі – однозначно) відповідає певне поняття в галузі суспільно-політичного життя, науки, техніки, мистецтва. Від звичайного слова термін відрізняється точністю семасіологічних границь" [transl. by Maksym Vakulenko].

[3] „термин – это вариант обычного слова или специально созданная единица, обладающая как свойствами первоосновы, так и новыми, специфичными качествами" [transl. by Maksym Vakulenko].

[4] „термином принято называть слово или словосочетание, служащие для точного выражения понятия, специфичного для какой-нибудь отрасли знания, производства или культуры, и обслуживающее коммуникативные потребности в этой сфере человеческой деятельности" [transl. by Maksym Vakulenko]

[5] „терміном називають подане відповідно до законів національної мови максимально стисле означення поняття, яке стосується певного елемента зовнішнього чи внутрішнього світу людини. Скажемо ще глибше – терміном

Representatives of the French terminological school Didier Bourigault and Anne Condamines emphasize the logical and linguistic essence of a term and its ability to express the concept, where the term appears as a terminological element that is a linguistic expression of concepts in a specific field of knowledge (Bourigault and Condamines 1993, 15). One of the most famous representatives of the Austrian-German terminological school, author of the textbook on terminology Helmut Felber defines a term in the context of logical lingual approach: "a term is a conventional symbol (word, group of words) that expresses a certain concept in a particular field of knowledge" (Felber 2002, 54). The leading representative of the Polish terminological school Luba Biesiekirska also proceeds from logical-linguistic correlation of a special concept with a linguistic unit, treating a term as a word or a combination of words represented in a notional plan by a scientific, technical or other specific concept (Biesiekirska 1996, 34). These definitions can be considered among the most successful in terminology.

There are many generic concepts through which a term is defined: verbal complex; special object, specific concept, language sign, word, special word, verbal complex motivated sign, lexicalized combination, reduction, function, terminological element, integrity of sign and concept, lexical unit (Tabanakova 2001: 28). Despite this, none of the current definitions can fully satisfy the scientists that tend to invent their own ones (Kochan 2009: 30). Moreover, such a high number of grasps and definitions of the concept of a term confirms an impossibility to create its universal definition (Tabanakova 2001: 28). However, this does not mean that a striving towards the most successful definition of a term is without interest.

So, summarizing and amending the above definitions, the following can be presented:

> a term (from the Greek *τέρμα* 'end, boundary') is a word or a collocation that refers to a certain concept in a particular field of human endeavour: science, technology, culture, sports, art, etc. (Vakulenko 1994: 3; Vakulenko 1996b: 5).

This understanding is fixed in the traditional linguistics that considers a term as "a word or a collocation that refers to a concept of science, technology, etc."[1] (Rusanivsjkyj et al. 2004). This definition is widely accepted, but as a result of further development of the author's terminology conception, there have appeared the improved version of the relevant definition:

> a term (from the Greek *τέρμα* 'end, boundary') is a unit of the lexical level (a word or a collocation) that denominates some concept of respective domain of human endeavour and forms functional thematic class of the field vocabulary and is a natural (systemic or off-systemic) element of the terminology fund.

Gabriel Otman, considering the conceptual specificity of terms, divides them into scientific ones that denote the theoretical concepts of sciences, and technical ones representing tools, artifacts, observations, experiences, and measures (Otman 1996, 15).

Scientific terms can also be classified by their origin into aboriginal and borrowed ones; by motivation degree into "correct" and "erroneous" ones; by definition degree into prototerms, terminoids and preterms (Grinjov 1993: 48-52); by functional style limitation into normative and non-normative ones (Komarova 1991: 21), or into terms and professionalisms (Shelov 1984) because the professionalisms, unlike the terms, do not have common circulation (Kodukhov 1987: 319-320). The universal basis for distinguishing terms from nomens is not formulated yet, although a good number of terminologists is inclined to that the first ones denote concepts, and the second refer to solitary articles (Meljnikov 1991: 14; Tabanakova 2001: 33-34; Selivanova 2010: 737).

By terms, the cognition results are fixed in the material form (Zvegincev 1996, 45). In cognitive terminology, a term is understood as a component of the dynamic language model that dialectically combines stable sign system with its continuous reinterpretation (Alekseeva and Mishlanova 2002: 15).

називають словесну назву вузлового поняття абстрактно-логічної схеми свідомого сприйняття людиною її зовнішнього чи внутрішнього світу. Можна сказати найглибше – терміном називають вузловий елемент усвідомлення людиною процесів її взаємодії зі зовнішнім і внутрішнім світом" [transl. by Maksym Vakulenko].

[1] „слово або словосполучення, що позначає поняття певної галузі науки, техніки тощо" [transl. by Maksym Vakulenko].

III. APPROACHES TO TERMINOLOGY

The lexical layer of language is continuously updated with new terms that form their specific subsystem. Furthermore, the relevant units need to be processed and systematized. All these facts clearly demonstrate a necessity for a separate discipline, the object of study of which would be terms themselves. It can be noted that there is an urgent need to treat terminology as a full-fledged science.

Understanding terminology as an independent science is a modern achievement, but for a long time, this was not the case. In particular, terminology was considered as:

- "a set of terms of any domain"[1] (Volin and Ushakov (IV) 1940: 689);
- "a set of terms used in a particular field of science, technology, politics and art"[2] (Vvedenskij 1955);
- "1) a vocabulary part encompassing terms of different fields of science, technology, art, social life, and 2) a set of terms of any field of science, technology, art, etc., or all terms of the given language"[3] (Bazhan (14) 1959-1965: 359);
- "a set of terms of any field of science, technology, art and all terms of the given language"[4] (Bilodid (X) 1970-1980: 88);
- "a set of terms expressing a historically established concept of a certain field of human knowledge or activity"[5] (Kyjak 1989: 7);
- "a set of linguistic (lexical) units denoting the concept of a certain specialized field of knowledge or activity that is spontaneously shaped during the birth and development of this field"[6] (Lejchik 1994: 149).

We see that the Ukrainian encyclopedia (Bazhan (14) 1959-1965: 359) is trying to look at terminology from a different angle (treating it not only as a set of terms), but it is just more detailed classification of linguistic units, not a separate science. It should be noted that computational terminology (see Bourigault, Jacquemin, and L'Homme 2001) can also be regarded as a lexicology domain. In turn, Taras Kyjak rightly distinguishes a terminology as an arbitrary set of terminological units from a terminological system as a methodically ordered combination of terms (Kyjak 1989). An important reason for this distinction is that a considerable number of terms arise spontaneously and are not included in the terminological hierarchy as its organic component. Other definitions that can be also regarded as acceptable do not have significant differences.

The authors of "The linguistic fundamentals of teaching about terms" (Superanskaja 1989) and "General terminology" (Golovin and Kobrin 1987) are quite close to understanding terminology as an independent science: in both works, terminology is considered as a teaching (doctrine) about terms, as indicated, in particular, in the definition of this concept (Superanskaja 1989: 14). It can be argued that a teaching as a doctrine is a system of scientific or scholarly notions, and it is not a science yet but can be developed into an autonomous science.

As follows from the cited studies, until recently terminology has been interpreted primarily as: 1) a set (corpus) of terms of science, engineering, culture, art, etc., 2) part of lexicology and 3) a teaching (doctrine) about terms. It is worth mentioning that in Ukrainian and in Russian, terminology teaching has been denoted by the terms "terminoznavstvo" and "terminovedenie", respectively (see Kyjak 1989;

[1] „совокупность терминов какой-нибудь отрасли" [transl. by Maksym Vakulenko].
[2] „совокупность терминов, употребляемая в той или иной отрасли науки, в технике, в политике, в искусстве" [transl. by Maksym Vakulenko].
[3] „1) розділ лексики, що охоплює терміни різних галузей науки, техніки, мистецтва, суспільного життя; 2) сукупність термінів якоїсь галузі науки, техніки, мистецтва тощо або всіх термінів даної мови" [transl. by Maksym Vakulenko].
[4] „сукупність термінів якоїсь галузі науки, техніки, мистецтва або всіх термінів даної мови" [transl. by Maksym Vakulenko].
[5] „сукупність термінів, що виражають історично сформовані поняття певної сфери людських знань або діяльності" [transl. by Maksym Vakulenko].
[6] „совокупность языковых (лексических) единиц, обозначающих понятия определённой специальной области знаний или деятельности, которая стихийно складывается в процессе зарождения и развития этой области" [transl. by Maksym Vakulenko].

Meljnikov 1991; Grinjov 1993; Lejchik 1994; Biesiekirska 1996; Lejchik 2009). Such discrimination of terms denoting teaching and science has its tradition. In 1789, the founder of modern chemistry Antoine Laurent de Lavoisier had changed the form *Chymie* (Eng. *chymistry*) into *Chimie*, in order to distinguish between the newly appeared science and old doctrine based on the phlogiston theory (Σαραντόπουλος 1997, 325)[1].

So, if until recently, terminology has been usually supposed as a set of terms or a trend or a part of lexicology, the main objective of which is to establish the contents of terms of specific areas, their regulation and standardization and creation of terms for new subject fields (Ghujvanjuk, Kardashhuk, and Kuljbabsjka 2005: 45; Meljnikov 1991: 3) and term and knowledge extraction (Condamines 1995), now most Ukrainian and Russian experts consider terminology as an independent science about terms (Vasenko, Dubichynsjkyj, and Krymecj 2008; D'jakov, Kyjak, and Kudeljko 2004: 12; Lejchik 2009; Ovcharenko 2010: 174). This point of view agrees well with the classification of terminology as a knowledge theory in the international standard ISO 1087-1:2000, definition 3.5.2, and its treatment therein as a science studying the structure, formation, development, usage and management of terminologies in various subject fields. The French terminologist Anne Condamines also treats modern terminology as a separate discipline that is closely related to linguistics but differs from it (Condamines 2002: 142, 144; Condamines 2010: 34, 44).

The set-out of terminology as a science was due to the Austrian scientist Eugen Wüster and Russian terminologist Dmitrij Lotte who independently published in 1931 their first terminological works: *Internationale Sprachnormung in der Technik, besonders in der Elektrotechnik (Die nationale Sprachnormung und ihre Verallgemeinerung) [International standardization of language in technology, particularly in electrical engineering (National language standardization and its generalization)]* and *Ocherednye zadachi tekhnicheskoj terminologii [Current problems of technical terminology]*, respectively. Existence of a separate science about terms is widely acknowledged now, even more – independent trends and schools develop therein. "However, recognition of terminology as an autonomous scientific discipline has not resulted in creation of generalizing theoretical work [...] with a clear formulation and solution of problems related to the components of a scientific discipline"[2] (Danilenko 1986: 7). The indicated wherefores for this are evident interdisciplinary nature of this field of knowledge (cf. Budin 2001: 20), and the fact that the rate of development of applied fields of terminology is far ahead of its own. The apparent difficulty in fixing scientific status of terminology is that "in the process of research and developments there appeared so many specific features and characteristics inherent to terminology, its techniques and methods are so separated from the purely linguistic ones and the object of terminology, terms, is so multifaceted and comprehensive that the majority of terminologists were impelled to a conclusion about complex character of the science about terms"[3] (Averbukh 2005: 8f).

IV. METHODS OF TERMINOLOGY

Let us remind ourselves of what characteristics give reasons to define a domain as a science. This is the presence of sociological and epistemological criteria, where the first group includes the existence of: 1) research groups with a common paradigm, 2) specialized associations, 3) common communication channels, 4) regular events where researchers meet – and the second one implies the presence of: 1) the separate subject of investigation, 2) the principles and methods of research, and 3) the procedures for description and analysis of the material, 4) the theoretical field propositions and their practical implementation (i. e, availability of appropriate university courses, as well as specialized technical, educational and reference materials, etc.), and 5) common conceptual apparatus (Kuhn 1970a; Vakulenko 1994; Vakulenko 1996b: 5; Kristiansen 2004; Kristiansen 2006: 17; Vakulenko 2013: 17).

[1] It can be argued also that to distinguish between the concepts of 'set of terms' (terminology-vocabulary) and 'science about terms' (terminology-science), thus denoting different concepts by different terms (cf. Serebrennikov 1970, 240-241), it would be appropriate to use the collocation "term vocabulary" (or "term lexicon") for the first.

[2] „Однако признание терминоведения самостоятельной научной дисциплиной пока не завершилось созданием обобщающего теоретического труда <...> с чёткой постановкой и решением проблем, связанных с необходимыми атрибутами научной дисциплины" [transl. by Maksym Vakulenko].

[3] „в процессе исследований и разработок выявилось столько специфических черт и особенностей, присущих только терминоведению; приёмы и методы настолько обособились от чисто лингвистических, а объект терминоведения - термин (терминология) столь многогранен и всеобъемлющ, что это привело подавляющее число терминоведов к выводу о комплексном характере науки о терминах" [transl. by Maksym Vakulenko].

With the sociological criteria being fully satisfied, terminology has a clearly defined research subject (terms), and more or less successful implementation of its theoretical positions within educational courses (in the Ljviv Ivan Franko National University, National University "Kyjevo-Moghyljansjka Akademija," Kyjiv National Linguistic University, Kyjiv National University after Taras Shevchenko). At the same time, relevant research methods of terminology (together with the principles and specialties of their application) needed also for its theory and conceptual apparatus, were not elaborated until recently – that did not allow one to consider terminology as a complete science. The idea of the statistical and analytical methods of terminology as a science was stated originally in the preface to the "Russian-Ukrainian dictionary of physical terminology" (Vakulenko, 1996b, 5) and in (Vakulenko 1994; Vakulenko 1996a; Vakulenko and Vakulenko 1996; Vakulenko 1997; Vakulenko 1998a, Vakulenko 1998b).

Every well-developed science has two basic methods that complement each other. For example, physics operates with the experimental and theoretical methods: experimental results are always compared with the theoretical predictions, and the theory is derived based on the empirical facts. The linguistic methods may also be divided into experimental and theoretical ones.

Similarly, there are two methods in terminology. Terminology as a science studies the rules and laws of the formation, development and operation of terms in a particular field of human undertaking, and enjoys the statistical and analytical research methods. The comprehensive use of the well-defined investigation methods in terminology manifesting the shift from terminologyteaching to terminology science is equivalent to the transition from critical discourse to the puzzle solving inherent to science (cf. Kuhn 1970b: 6-7).

Given the fact that at the dawn of the 21st century, "Linguistic science of the former Soviet Union found itself in a methodological crisis"[1] (Selivanova 2008: 10), and the methodology is known to outline guidelines, principles, methods, tools and procedures for the analysis of objects of scientific knowledge, there emerged an urgent need to revise habitual lingual canons. Furthermore, in view of active promotion of interdisciplinary studies, syncretism and synthetic character of scientific macro paradigm (i.e. coexistence of several diverse paradigms, and presence of intersectoral and interdisciplinary interaction), ideas on methodological interaction of different scientific fields are relevant and productive because the contemporary linguistics "is overgrowing its traditional limits"[2] now (Serebrennikov 1970: 365).

Elementary interpretation of the first (weaker) Gödel incompleteness theorem (Gödelsche erste Unvollständigkeitssatz), 1931 says that for any consistent system of axioms (assumptions), there can be effectively constructed a true, but non-deducible statement (Uspenskij 1974: 3). In other words, true statements that cannot be deduced by purely linguistic means, may be present in the language. Additionally, the second (stronger) Gödel incompleteness theorem asserts that the logical completeness (or incompleteness) of any system of axioms cannot be proven within this system, and such verification (or negation) needs additional axioms (system strengthening). So it implies, in particular, the possibility and feasibility of synthesis of the linguistic and non-linguistic methods. In this context, it is worth mentioning that the naturalistic trend in linguistic comparativism (the 1850s and 1860s, August Schleicher) spread the principles and methods of the natural sciences into study of language (Popova and Sternin 2007: 13). Even the level model of language was created under influence of physics (Popova and Sternin 2007: 202). If we account for those achievements that both the fields have attained over time, current interchange at the ideological level and at the level of technique can yield tangible results. In addition, appreciating the existence of the so-called "sublanguages",[3] namely law sublanguage (Verbenjec 2004: 1), biochemistry sublanguage, radio electronics sublanguage (Maslov 2007: 22), etc., the idea of interaction between linguistics and related natural and engineering sciences seems promising and fruitful since it gives rise to interdisciplinary fields of the kind of jurislinguistics (term introduced by the German scholar Adalbert Podlech in 1976) that emerged at the intersection of law and linguistics and that synthesizes the achievements of both subject fields (Verbenjec 2004: 1; Pradid 2011: 31). Furthermore, for systemic scientific generalizations, including linguistic ones, it is necessary to regularize purely linguistic and contiguous methods that are often dispersed within different linguistic areas and schools. Peculiarity of the proposed investigation methods is due to their generalized synthetic character

[1] „мовознавча наука пострадянського простору опинилася у стані методологічної кризи" [transl. by Maksym Vakulenko].
[2] „перерастает свои традиционные границы" [transl. by Maksym Vakulenko].
[3] The term "sublanguage" manifests the fact that a general subject field is split into several "subfields" with their specific terminologies.

manifested in effective natural combination of nonspecific and subject field methods, including especially linguistic ones.

The **statistical method** (SM) that determines "what is customary," is to establish the presence of a linguistic fact regardless of its accuracy and correctness, and assumes accumulation of such facts. The principal components of this method are descriptive and observation method and statement stage in a number of linguistic methods (e. g., in the method of grammatical analogies and comparative method). Several socio-, psycho- and ethno linguistic methods such as listening to recordings, questionnaires, surveys, testing, associative experiment and collecting field material (as a lingual geographic method component), should be also included here. The statistical method that fixes practice of use (language usage) of certain language or speech unit, is traditionally applied to oral speech and written texts. The SM does not provide a faultfinding assessment of existing results and transfer of acquired information to a qualitatively new knowledge, and requires therefore an additional interpretational tool.

The **analytical method** (AM) that determines "what is right," provides critical methodical analysis and allows one to discover scientific validity and feasibility of a given linguistic unit (including lexemes and, in particular, terms) or operation mode of specific rules. The AM components are: induction and deduction, idealization and formalization, method of hypotheses, falsification method, taxonomization, transformation stage of the analysis and synthesis method, comparative historical method (reconstruction technique, relative chronology, glottochronology, historical and etymological analysis), structural method (opposition, distribution, transformation, component and string analysis, method of immediate constituents), functional method (lingual, pragmatic, conversation, contextual interpretive, discourse analyses, methods of functional semantic fields modeling), typological, comparative, lingual statistical method, method of acoustic invariants and others (Vakulenko 2013: 18). In the practical work, the required AM elements are to be chosen according to the given problem.

In terms of philosophical concepts of dialectics of the nature, of analysis and synthesis, and of quantity and quality, the essence of interaction of SM and AM is as follows. The AM is a tool of study, where the SM, determining the really existing and available language facts, supplies investigation material. As a result, new facts are synthesized that carry modern knowledge. In turn, these fresh facts are subject to further investigation, and so on.

In terms of the linguistic norm elements (Klymenko 2009), the SM refers to the language system (in part), usage and literary norm, while the AM relates to the language system (partially), objective and axiological norms. Use of necessary, depending on the purpose and object of study, components of statistical and analytical methods as equal components of a holistic approach within linguistic research, helps one to eliminate the typical shortcomings of the application of certain lingual methods, including imperfections of initial theoretical statements and generalizations of one part of the whole (Serebrennikov 1973: 288-297), and thus provides an opportunity to get the most balanced scientific generalizations about quantitative and qualitative characteristics of linguistic phenomena.

The interrelation between a norm and use in terminology is interesting on its own. However, it requires special investigation including lexical semantic relations study, and will be presented elsewhere.

Application of statistical and analytical methods takes into account natural features of the objects of study including terminology and linguistics in general, namely the spontaneous emerge of terms (< SM) and their following elaboration (< AM).

Such a dichotomy of the scholarly approach in the linguistic studies has been pointed out by a number of specialists. For example, Jurij Sheveljov distinguished scientific and regulatory approaches to lingual phenomena (Sherekh 1951: 10). This vision of scholarly methods in terminology corresponds to an approach to language as a whole dialectical unity of "persistent and mobile, stable and variable, static and dynamic"[1] (Serebrennikov 1970: 199). In the study of general concepts, Mikhail Nikitin accentuated inductive empirical and structural logical aspects that also assemble dichotomy, and noted that "a concept exist in constant correlation, confrontation and coordination of these two aspects"[2] (Nikitin 1988:

[1] „устойчивого и подвижного, стабильного и переменного, статики и динамики" [transl. by Maksym Vakulenko].
[2] „понятие существует в постоянном соотнесении, противоборстве и согласовании этих двух аспектов" [transl. by Maksym Vakulenko].

51-53). By similar logic, at the beginning of the last century, grammar was divided into passive (traditional) one in which linguistic facts are viewed from grammatical forms towards content, and active (functional) one where description proceeds from sense to possible means of its expression (Shherba 1974).

Alla Baghmut also speaks on similar components of scientific research: "In the approach to the analysis of linguistic practices one can identify two lines: statistical and qualificative"[1] (Baghmut 2001: 144).

Given the fact that in the modern linguistic paradigm, "descriptive linguistics yielded to comparativism" because "the analysis of lingual phenomena has been unprecedentedly enriched" by expanding into the area and historical aspects (Zelenjko 2010: 385), one can talk about the increase in the proportion of the AM (comparativism) with respect to the SM (descriptive linguistics).

Note that the SM should be distinguished from the statistical analysis method widely used in corpus linguistics (see Perebyjnis 1970; Perebyjnis 2002; Condamines 2002) that includes elements of the AM and is therefore a combination of both methods. For example, by using statistical analysis one can find out quantitatively how often a certain term is employed under given conditions, as compared with other terms denoting the same concept.

Thus, the SM determines the familiar (used) linguistic phenomena or forms that are not necessarily correct. Instead, the AM helps to establish the right but not always commonplace phenomena or forms, and also identify the emergence or presence of certain tendencies or laws.

For example, for the English term *sensor*, the SM gives the frequently used Ukrainian counterpart *datchyk*, whereas the AM offers the form *datnyk* (Vakulenko 1996b; Vakulenko 2008).

It is obvious that merely passive accumulation of textual material – without due analysis – does not allow one to carry out necessary generalizations or to formulate comprehensive conclusions or recommendations about any linguistic phenomenon. On the other hand, an excess of theorizing – without relying on real facts – conceals a danger of drift from important language laws and regularities that may result in the appearance of new whimsical "modish" crooked words or wet language constructs that openly or covertly corrupt language, e. c. Ukr. *poslid*, *tjamka* instead of *rezuljtat* (result), *ponjattja* (concept), respectively.

The SM allows one to define the actual functioning of the studied language units and phenomena, while the AM is an integral part of scientific work, development process, improvement, refining and normalizing language. Some studies on real use of Ukrainian terms in the context of objective and axiological norms were presented, particularly, in (Vakulenko 1996a; Vakulenko 1996b; Vakulenko 1997; Vakulenko 1998a; Vakulenko 1998b; Vakulenko 2010).

V. CONCLUSIONS

In this article, various approaches to the concepts "term" and "terminology" and corresponding definitions have been discussed. A relevant comprehensive definition of the concept "term" generalizing the existing ones has been proposed. Furthermore, different approaches to the concept of "terminology" were analyzed. The conclusion was made that there exist sufficient grounds to treat terminology not only as a vocabulary, part of lexicology or a teaching (doctrine) but also as a separate independent science about term formation and operation that uses statistical and analytical methods. Investigation methods of terminology as a science were proposed and discussed concerning the general scientific and traditional linguistic methods. In combination, the systemic application of both statistical and analytical methods, taking into account the natural features of the objects of study, recognizes terminology as a full science. Such an approach allows one to formulate the objective hallmarks of an "apposite" ("well-formed") term, carry out a comprehensive and reasonable classification and ordering of synonyms inherent to every advanced term vocabulary, develop practically beneficial recommendations for spelling and use of linguistic units, investigate acoustic features of speech sounds and distinguish their invariant characteristics that make it possible, in particular, to unify the principles of graphic rendering of foreign

[1] „У підході до аналізу мовної практики можна визначити два напрямки: статистичний і кваліфікативний" [transl. by Maksym Vakulenko].

loanwords. Thus, the methodology and approaches of exact sciences and humanities contribute jointly in the terminology as a science that allows one to investigate language material much deeper and more objectively.

REFERENCES

AKHMANOVA, O. S. (1966). *Slovarj lingvisticheskikh terminov [Dictionary of linguistic terms].* Moskva: Sovetskaja ehnciklopedija.

ALEKSEEVA, L. M. & S. L. MISHLANOVA. (2002). *Medicinskij diskurs: teoreticheskie osnovy i principy analiza [Medical discourse: theoretical grounds and principles of analysis].* Permj: Izd-vo Perm. un-ta.

ARNOLJD, I. V. (1991). *Osnovy nauchnykh issledovanij v lingvistike [Fundamentals of scholarly studies in linguistics].* Moskva: Vysshaja shkola.

AVERBUKH, K. Ja. (2005). *Obshhaja teorija termina: kompleksno-variologicheskij podkhod [General theory of a term: complex variological approach]. PhD thesis: spec. 10.02.19 "Theory of language".* Ivanovo.

BAGHMUT, A. J. (2001). Suchasna movlennjeva dijsnistj: orfoepichni normy i movlennjeva dijaljnistj [Modern speech reality: orthoepical norms and speech activity]. In: SKALOZUB, L. Gh. (ed.) *Zaghaljna ta eksperymentaljna fonetyka [General and experimental phonetics]*. Kyjiv: VD "Soborna Ukrajina", 143–144.

BAZHAN, M. P. (chief ed.). (1959–1965). *Ukrajinsjka radjansjka encyklopedija [Ukrainian soviet encyclopedia]. Vol. 1–17.* Kyjiv: Ghol. red. URE.

BIESIEKIRSKA, L. (1996). K voprosu ob opredelenii termina [To the question of term definition]. In: *Terminovedenie* 1–3: 34–37.

BILODID, I. K. et al. (eds). (1970–1980). *Slovnyk ukrajinsjkoji movy: v 11 tt. [Dictionary of Ukrainian language: in 11 vols.].* Kyjiv: Naukova dumka.

BOURIGAULT, D. & A. CONDAMINES. (1993). *Terminology & Artificial Intelligence*. Toulouse: Université de Toulouse.

BOURIGAULT, D. Chr. JACQUEMIN, & M.-C. L'HOMME (eds). (2001). *Recent advances in computational terminology.* Amsterdam/Philadelphia: John Benjamins Publishing Co.

BUDIN, G. (2001). A Critical Evaluation of the State-of-the-art of Terminology Theory. In: *Terminology Science & Research* 12(1–2): 7–23.

CONDAMINES, A. (1995). Terminology: New needs, new perspectives. In: *Terminology* 2(2), 219–238.

CONDAMINES, A. (2002). Corpus analysis and conceptual relation patterns. In: *Terminology* 8(1), 141–162.

CONDAMINES, A. (2010). Variations in terminology. In: *Terminology* 16(1), 30–50.

DANILENKO, V. P. (1973). O terminologicheskom slovoobrazovanii [On the terminological word creation]. In: *Voprosy jazykoznanija [Questions of linguistics]* 4, 76–85.

DANILENKO, V. P. (1986). Aktualjnye napravlenija lingvisticheskogo issledovanija russkoj terminologii [Current trends of linguistic investigation of Russian terminology]. In: Danilenko, V. P. (ed.) *Sovremennye problemy russkoj terminologii [Modern problems of Russian terminology]*. Moskva: Nauka, 5–36.

DANILENKO, V. P. (1977). *Russkaja terminologija: Opyt lingvisticheskogo opisanija [Russian terminology: Experience of theoretical description].* Moskva: Nauka.

D'JAKOV, A. S., T. R. KYJAK & Z. B. KUDELJKO. (2004). *Osnovy terminotvorennja: semantychnyj ta sociolinghvistychnyj aspekty [Fundamentals of term creation: semantic and sociolinguistic aspects].* Kyjiv: VD "Academia".

FELBER, H. (2002). *Terminology Manual.* Paris: UNESCO; Infoterm.

FIDELIA I.-S., A. CONDAMINES & M. T. Cabré CASTELLVÍ (eds). (2007). Application-driven terminology engineering. In: *Benjamins Current Topics* 2/VII.

FLORENSKIJ, P. A. (1989). Termin [Term]. In: *Voprosy jazykoznanija [Questions of linguistics]* № 1, 120–127; № 3, 104–117.

GHUJVANJUK, N. V., O. V. KARDASHHUK & O. V. KULJBABSJKA. (2005). *Ukrajinsjka mova: skhemy, tablyci, testy [Ukrainian language: schemes, tables, tests].* Ljviv: Svit.

GOLOVIN, B. N. & R. Ju. KOBRIN. (1987). *Lingvisticheskie osnovy uchenija o terminakh [Linguistic grounds of the teaching about terms].* Moskva: Vysshaja shkola.

GRINJOV, S. V. (1993). *Vvedenie v terminovedenie [Introduction to terminology-teaching].* Moskva: Moskovskij licej.

IVINA, L. V. (2003). *Lingvo-kognitivnye osnovy analiza otraslevykh terminosistem [Lingual and cognitive grounds of subject field terminological systems analysis].* Moskva: Akademicheskij proekt.

KANDELAKI, T. L. (1977). *Semantika i motivirovannostj terminov [Semantics and term motivatedness].* Moskva: Nauka.

KAPANADZE, L. A. (1965). Vzaimodejstvie terminologicheskoj i obshheupotrebiteljnoj leksiki [Interaction of terminological and commonly used vocabulary]. In: *Razvitie leksiki sovremennogo russkogo jazyka [Development of modern Russian vocabulary]*. Moskva: Nauka, 86–103.

KIBRIK, A. E. (1992). *Ocherki po obshhim i prikladnym voprosam jazykoznanija [Sketches on general and applied questions of linguistics].* Moskva: Izd-vo Mosk. un-ta.

KLYMENKO, O. S. (2009). Preskryptyvna linghvistyka. Francuzjkyj dosvid movnogho vnormuvannja vprodovzh XX stolittja [Prescriptive linguistics. French experience of language normalizing during 20th century]. Lughansjk: Vyd-vo SNU im. V. Dalja.

KOCHAN, I. (2009). Ukrajinsjki terminy v paradyghmi suchasnykh naukovykh uchenj [Ukrainian terms in the paradigm of modern scholarly teachings]. In: Symonenko, L. O. (ed). *Ukrajinsjka terminologhija i suchasnistj [Ukrainian terminology and modernity]*, Issue VIII. Kyjiv: KNEU, 30–34.

KODUKHOV, V. I. (1987). *Vvedenie v jazykoznanie [Introduction to linguistics].* Moskva: Prosveshhenie.

KOMAROVA, Z. I. (1991). *Semanticheskaja struktura specialjnykh slov i ejo leksikograficheskoe opisanie [Semantic structure of special words and its lexicographic description].* Sverdlovsk: Uraljskij un-t.

KRISTIANSEN, M. (2004). *The Multi-Disciplinary Nature of the Social Sciences. Investigating Disciplinary Autonomy in Organisational Behaviour by means of Terminological Analysis.* Bergen: UiB/NHH, Dr. art. thesis.

KRISTIANSEN, M. (2006). A terminological approach to multi-disciplinary domains and disciplinary autonomy. In: *Terminology Science & Research* 17, 15–28.

Kuhn, T. S. (1970a). *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.

Kuhn, T. S. (1970b). Logic of Discovery or Psychology of Research? In: Lakatos, I. & A. Musgrave (eds.) *Criticism and the Growth of Knowledge*. London: Cambridge University Press, 1–23.

KVITKO, I. S. (1976). *Termin u naukovomu dokumenti [Term in a scientific document].* Ljviv: Vyshha shkola.

KYJAK, T. R. (1989). Linghvistychni aspekty terminoznavstva [Linguistic aspects of terminology]. Kyjiv: UMK VO.

LEJCHIK, V. M. (1986). O jazykovom substrate termina [On the lingual substrate of a term]. In: *Voprosy jazykoznanija* 5, 87–97.

LEJCHIK, V. M. & S. D. SHELOV. (1989–1990). *Lingvisticheskie problemy terminologii i nauchno-tekhnicheskij perevod [Linguistic problems of terminology and science technical translation],* part. 1–2. Moskva: Vysshaja shkola.

LEJCHIK, V. M. (1994). Iskhodnye ponjatija, osnovnye polozhenija, opredelenija sovremennogo terminovedenija i terminografii [Primary concepts, basic provisions, and definitions of contemporary terminology-teaching and terminography]. In: *Vestnik Kharjkovskogo politekhnicheskogo un-ta* 1, 147–180.

LEJCHIK, V. M. (2009). *Terminovedenie: predmet, metody, struktura [Terminology-teaching: subject, methods, structure].* Moskva: KD "Librokom".

LOTTE, D. S. (1961). *Osnovy postroenija nauchno-tekhnicheskoj terminologii [Fundamentals of building the science and technical terminology].* Moskva: Izd-vo AN SSSR.

MASLOV, J. S. (2007). *Vvedenie v jazykoznanie [Introduction to linguistics].* Moskva: Academia; Saint Petersburg: Filol. fak. SPbGU.

MELJNIKOV, G. P. (1991). *Osnovy terminovedenija [Fundamentals of terminology-teaching].* Moskva: Izd-vo un-ta druzhby narodov.

MOSKALENKO, N. A. (1959). *Narys istoriji ukrajinsjkoji ghramatychnoji terminologhiji [Sketch of history of Ukrainian grammatical terminology].* Kyjiv: Rad. shkola.

MOSTOVYJ, M. I. (1993). *Leksykologhija anghlijsjkoji movy [Lexicology of the English language].* Kharkiv: Osnova.

NIKITIN, M. V. (1988). *Osnovy lingvisticheskoj teorii znachenija [Fundamentals of the linguistic theory of signification].* Moskva: Vysshaja shkola.

NIKITINA, F. O. (1978). *Semantychni ta slovotvorchi problemy suchasnoji terminologhiji [Semantic and word formation problems of contemporary terminology].* Kyjiv: Vyshha shkola.

OTMAN, Gabriel. (1996). *Les Representations Semantiques en Terminologie [Semantic representations in terminology].* Paris: Masson.

OVCHARENKO, N. (2010). Teoretychni peredumovy doslidzhennja terminosystem (na materiali suchasnoji ukrajinsjkoji terminologhiji) [Theoretical premises of terminological systems investigation (on the material of contemporary Ukrainian terminography)]. In: *Linghvistychni studiji [Linguistic studies]* 20, 172–175.

PALAMARCHUK, L. S. (chief ed.). (1965). *Doslidzhennja z leksykologhiji ta leksykoghrafiji [Studies on lexicology and lexicography].* Kyjiv: Naukova dumka.

PEREBYJNIS, V. S. (1970). *Kiljkisni ta jakisni kharakterystyky systemy fonem ukrajinsjkoji literaturnoji movy [Quantitative and qualitative characteristics of phonemic system of the Ukrainian language].* Kyjiv: Naukova dumka.

PEREBYJNIS, V. I. (2002). *Statystychni metody dlja linghvistiv [Statistical methods for the linguists].* Vinnycja: Nova knygha.

PONOMARIV, O. (2001). *Kuljtura slova: Movnostylistychni porady [Word culture: lingual and stylistic recommendations].* Kyjiv: Lybidj.

POPOVA, Z. D. & I. A. Sternin. (2007). *Obshhee jazykoznanie [General linguistics].* Moskva: AST; Vostok-Zapad.

PRADID, Ju. F. (2011). Jurydychna linghvistyka v Ukrajini: zdobutky i perspektyvy [Juristic linguistics inUkraine: achievements and prospects]. In: *Movoznavstvo* № 2, 31–37.

RUSANIVSJKYJ, V. M. & O. O. Taranenko et al. (eds). (2004). *Encyklopedija "Ukrajinsjka mova" [Encyclopedia "Ukrainian language"].* Kyjiv: Vyd-vo "Ukr. encykl." im. M. P. Bazhana. 824 p.: il.

ΣΑΡΑΝΤΌΠΟΥΛΟΣ, Π. (1997). *Παιχνίδια, ιστορικές πληροφορίες και αναλογίες στη διδακτική τησ χημείας, με έμφαση στισ αναλογίες με εντόνο κοινωνικό περιεχόμενο: επίπτωσεις στη διδακτική πράξη, στη στάση των μαθητών και στη μάθηση [Using chemical games, historical information and analogies with a strong social content in chemistry teaching: effects on learning and on the attitude of students].* PhD thesis. University of Ioannina, Greece.

SAVORY, T. H. (1967). *The Language of Science.* London: Andre Deutsch.

SELIVANOVA, O. O. (2010). *Linghvistychna encyklopedija [Linguistic encyclopedia].* Poltava: Dovkillja-K.

SEREBRENNIKOV, B. A. (ed). (1970). *Obshhee jazykoznanie: formy sushhestvovanija, funkcii, istorija jazyka [General linguistics: forms of existence, functions, history of language].* Moskva: Nauka.

SEREBRENNIKOV, B. A. (ed). (1973). *Obshhee jazykoznanie: metody lingvisticheskikh issledovanij [General linguistics: methods of linguistic studies].* Moskva: Nauka.

SERGHJEJEVA, Gh. A. (2002). *Anghlomovni zapozychennja v ukrajinsjkij pravnychij terminologhiji [English-language borrowings in the Ukrainian law terminology].* PhD (candidate) thesis autoref., spec. 10.02.01. Kharkiv.

SHELOV, S. D. (1984). Terminologija, professionaljnaja leksika i professionalizmy [Terminology, professional vocabulary, and professionalisms]. In: *Voprosy jazykoznanija [Questions of linguistics]* № 5, 76–87.

SHEREKH, Ju. (1951). *Narys suchasnoji ukrajinsjkoji literaturnoji movy [Sketch of contemporary Ukrainian literary language].* Muenchen: Molode zhyttja.

SHHERBA, L. V. (1974). *Jazykovaja sistema i rechevaja dejateljnostj [Language system and speaking activity].* Leningrad: Nauka.

SUPERANSKAJA, A. V., N. V. PODOLJSKAJA, & N. V. VASILJEVA. (1989). *Obshhaja terminologija: Voprosy teorii [General terminology: Questions of theory].* Moskva: Nauka.

SUPERANSKAJA, A. V. (1976). Terminologija i nomenklatura [Terminology and nomenclature]. In: *Problematika opredelenij terminov v slovarjakh raznykh tipov [Problematics of terms definitions in the different types of dictionaries]*. Leningrad: Nauka, 73–83.

SYMONENKO, L. (2007). Linghvistychni problemy unormuvannja naukovoji terminologhiji [Linguistic problems of scientific terminology normalizatioon]. In: Symonenko, L. O. (ed.) *Ukrajinsjka terminologhija i suchasnistj [Ukrainian terminology and modernity]*, VII. Kyjiv: KNEU, 21–25.

TABANAKOVA, V. D. (2001). *Ideograficheskoe opisanie nauchnoj terminologii v specialjnykh slovarjakh [Ideographic description of scientific terminology in special dictionaries]: PhD thesis, spec. 10.02.21.* Tjumenj: Tjumenskij gos. un-t.

TALANCHUK, P., V. GHONDJUL & Ju. SHHERBYNA. (1995). Priorytetni zavdannja osvitjan u rozvytku ukrajinsjkoji naukovo-tekhnichnoji terminologhiji [Priority problems of educators in development of science and technical terminology]. In: *Naukovo-tekhnichne slovo* № 1, 31–35.

USPENSKIJ, V. A. (1974). Teorema Gjodelja o nepolnote v ehlementarnom izlozhenii [Goedel theorem on incompleteness in elementary exposition]. In: *Uspekhi matem. nauk* № 1(175): 3–46.

VAKULENKO, M. & O. VAKULENKO. (1994). Pidvalyny dlja nauky terminologhiji je! [The foundations for the terminology as a science do exist!]. In: *Kyjivsjkyj universytet* № 3 (1987), 3–4.

VAKULENKO, M. O. (1996a). Terminologhichna pravopysna konvencija-1993 z tochky zoru nauky terminologhiji [Terminological spelling convention-1993 from the point of view of terminology as a science]. In: *Ukrajinsjkyj Fizychnyj Zhurnal* № 1, 122–123.

VAKULENKO, M. (1996b). *Rosijsjko-ukrajinsjkyj slovnyk fizychnoji terminologhiji [Russian-Ukrainian dictionary of physical terminology]*, ed. by Prof. O. V. Vakulenko. Kyjiv: Polighraf. centr Kyjivsjkogho un-tu im. Tarasa Shevchenka.

VAKULENKO, M. & O. VAKULENKO. (1996). Nauka terminologhija ta jiji metody [Terminology as a science and its methods]. In: *Tezy 4-ji Mizhnar. nauk. konf. [Problemy ukrajinsjkoji naukovo-tekhnichnoji terminologhiji], (17 20 ghrudnja 1996 r.) [Theses of 4th Intern. sci. conf. Problems of Ukrainian science and technical terminology]*. Ljviv: Vyd-vo Derzh. un-tu "Ljvivsjka politekhnika", 11–12.

VAKULENKO, M. O. (1997). *Pro "skladni" problemy ukrajinsjkogho pravopysu (ukrajinsjka latynycja, zapozycheni slova ta in.) [On the difficult problems of Ukrainian orthography (Ukrainian latinics, loaned words, etc.)].* Kyjiv: Kurs.

VAKULENKO, M. O. (1998a). Vostochnoslavjanskaja latynyca v mezhdunarodnom kontekste [Eastern-Slavonic latinics in the international context]. In: *Slavia* R 67, 333–339.

VAKULENKO, M. O. (1998b). Pravopysni aspekty nauky terminologhiji [Spelling aspects of the terminology as a science]. In: *Visnyk Knyzhkovoji palaty* № 11, 15–17.

VAKULENKO, M. O, & O. V. VAKULENKO. (2008). *Tlumachnyj slovnyk iz fizyky [Explanatory dictionary on Physics].* Kyjiv: VPC "Kyjivsjkyj universytet".

VAKULENKO, Maksym O. (2009). *Suchasni problemy terminologhiji ta ukrajinsjkoji naukovoji terminoghrafiji [Modern problems of terminology and Ukrainian scientific terminography].* Kyjiv: VPC "Kyjivsjkyj universytet".

VAKULENKO, Maksym O. (2010). Rozvytok terminosystem i terminotvorennja [Development of terminological systems and term creation]. In: *Ukrajinsjka mova* 1, 88–93.

VAKULENKO, M. O. (2013). Metodologhichni zasady vyvchennja naukovoji terminologhiji [Methodological principles of the scientific terminology study]. In: *Terminologhichnyj visnyk* № 2(2), 16–21.

VASENKO, L. A., V. V. DUBICHYNSJKYJ & O. M. KRYMECJ. (2008). *Fakhova ukrajinsjka mova [Specialized Ukrainian language].* Kyjiv: Centr uchb. literatury.

VERBENJEC, M. B. (2004). *Jurydychna terminologhija ukrajinsjkoji movy: istorija stanovlennja i funkcionuvannja [Juristic terminology of Ukrainian language: history of becoming and functioning]. PhD (Candidate) autoref., spec. 10.02.01 "Ukrainian language".* Kyjiv: In-t filologhiji KNU im. T. Shevchenka..

VINOGRADOV, V. V. (1947). *Russkij jazyk [Russian language].* M. Leningrad: Uchpedgiz.

VINOKUR, G. O. (1939). O nekotorykh javlenijakh slovoobrazovanija russkoj tekhnicheskoj terminologii [On some word formation phenomena of the Russian technical terminology]. In: *Trudy MIIFL* 5, 3–54.

VOLIN, B. M., & D. N. USHAKOV (eds). (1940). *Tolkovyj slovarj russkogo jazyka [Explanatory dictionary of Russian language]. Vol. IV.* Moskva: Gos. izd-vo inostrannykh i nacionaljnykh slovarej.

VOZNJUK, Gh. L., S. Z. BULYK-VERKHOLA & M. V. GHNATJUK et al. (2010). *Terminologhichna leksyka v systemi profesijnogho movlennja: metodychni vkazivky ta zavdannja dlja samostijnoji roboty studentiv [Terminological vocabulary in the system of professional speech: methodical instruction for independent work of students].* Ljviv: Vyd-vo Nac. un-tu "Ljvivsjka politekhnika".

VVEDENSKIJ, B. A. (ed). (1955). *Ehnciklopedicheskij slovarj [Encyclopedic dictionary],* Vol. 3. Moskva: Boljshaja sovetskaja ehnciklopedija.

ZELENJKO, A. S. (2010). Rolj i misce komparatyvnoji paradyghmy u stanovlenni koghnityvnoji linghvistyky [Role and place of comparative paradigm in of cognitive linguistics]. In: *Studia Linguistica* 4. Kyjiv: VPC "Kyjivsjkyj universytet", 385–388.

ZHOVTOBRJUKH, M. A. (1984). *Ukrajinsjka literaturna mova [Ukrainian literary language].* Kyjiv: Naukova dumka.

ZHYTIN, Ja. (2009). Poghljad na termin krizj pryzmu strukturno-semantychnogho ta funkcionaljnogho pidkhodiv [View at the term through the prizm of structural semantic and functional approaches]. In: *Visnyk Nac. un-tu "Ljvivsjka politekhnika". Series "Problemy ukrajinsjkoji terminologhiji [Problems of Ukrainian terminology]"* 648, 9–15.

ZVEGINCEV, V. A. (1996). *Mysli o lingvistike [Thoughts about linguistics].* Moskva: Izd-vo MGU.

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TERM PROPERTIES AND MODERN TERMINOLOGICAL SYSTEMS DEVELOPMENT

Abstract

In this article, we study some important term characteristics and aspects of its rise and operation. It is shown that a significant number of terms have a dual role as they operate in a specific domain where they are customary and widely used, and in the common area where they have a highly specialized nature. It is conjectured that to carry out demarcation of the terms from the non-terms, it is expedient to take into account the fact that all terms are generally divided into two major groups: proper terms and terminological words. Morphological and semantic differences between terms and ordinary words are discussed. The national and international tendencies in terminology are reviewed. It is argued that a terminological neologism can and should be based mainly on the native lexical reserve. Also, the generalized attributes of an apt term are presented.

INTRODUCTION

Terminology is a significant and unique element of the literary language (Matvijas 1987: 3). Investigation of formation, development and operation processes of special vocabulary becomes more and more important for understanding regularities of language development, as currently the growth of the number of terms exceeds the increase in the number of common words since almost every new discovery, phenomenon, fact, and method require new concepts and terms (Stashko 1999: 34; Vasenko, Dubichynsjkyj, and Krymecj 2008: 4). As a result, over 90% of new words in modern dictionaries are a special lexicon (Sytdykov 2009: 348). The aim of this paper is to study some important term characteristics and aspects of its rise and operation, following the generalized term definition: a term (from the Greek *τέρμα* 'end, boundary') is a unit of the lexical level (word or collocation) that denominates some concept of respective domain of human endeavour and forms functional thematic class of the field vocabulary and is a natural (systemic or off-systemic) element of the terminology fund (Vakulenko 2011: 141). This will include investigation of similarities and distinctions between terms and ordinary words, brief survey of main tendencies in the term vocabulary development, and analysis of the apposite term signs.

TERMS AND ORDINARY WORDS: SIMILARITIES AND DISTINCTIONS

A term is a three-aspect unit. Investigating a specific term, a scholar determines certain aspect of its existence: emergence and development (diachrony), presence and functioning within modern vocabulary (synchrony), distinctions of variation depending on the native language system (area). "Terminological property of a word comes out on the background of the lexical system of the language"[1] (Kryzhanovskaja and Simonenko 1987: 14). As a linguistic unit, a term, on the one hand, is a component of the lexical level of language and forms the thematic class of words (thus causing concept nomination in any scientific or technical field). On the other hand, a term goes beyond the lexical layer by functional reasons and due to specifics of denoted concepts it belongs to conceptual apparatus of different sciences, that provides two-fold quality of the term lexicon (Moskalenko 1959: 17; Reformatskij 1964: 33). In this context, the somewhat forgotten method of "words and things" (German "Wörter und Sachen"; 1910s-1920s, G. Schuchardt and R. Meringer) is worth recalling that required to ascertain not only the history of words from a purely linguistic point of view, but also thoroughly explore the history of things, and therefore concepts that these words are showed by (Bulakhovsjkyj 1975: 102ff; Kocherghan 2006: 70ff). Although these remarks concern mainly etymology, they are no less relevant, measured and reasonable for study of the term systems.

[1] "Терминологичность слова обнаруживается на фоне лексической системы языка" [transl. by Maksym Vakulenko].

A term lexicon is inseparably connected with the vocabulary in general use, even with the everyday one (Moskalenko 1959: 19-20). "Any ordinary non-auxiliary word can become a term by including it in special dictionary grounding on the principle of strict compliance with the certain socially organized thing"[1] (Reformatskij 1986: 165). Furthermore, a term, nominating elements of extra linguistic reality, is the most comprehensive, semantically complicated lexeme as it is affected by a number of diverse factors reflecting characteristics of organization and development of: a) the actual field systems, b) conceptual systems of various areas, c) language system and d) lexical subsystem. It is worth mentioning that each of the four of these systems has its own time-space grid, i.e. structural differentiation and stratification in synchrony and diachrony. Purely from the semantic point of view, a significant number of terms have dual role (this applies mainly to those units originated from the common words) as they operate in a specific domain (of the corresponding field) where they are customary and widely used, and in the common area (as they are included in the general vocabulary) where they have a highly specialized nature.

"Perfect terminology is a completely ordered system that meets the following requirement: knowing the term, one knows its place in the system, knowing the place in, one knows the term"[2] (Reformatskij 1964: 32). In this connection, a term "should be strictly systematic lexically and morphologically, capable to create derivatives, and be most paradigmatic in terms of normal and typical paradigm"[3] (Reformatskij 1961: 54). However, a term is asymmetric as any linguistic sign that allows, in particular, its development, and operates according to the natural language laws (Kryzhanovskaja and Simonenko 1987: 17). Therefore, a term lexicon has intrinsic feature of dichotomy of inner processes and a number of discrepancies including contradiction between historicity of its formation and systemic nature (Reformatskij 1964: 33).

The difficulty of distinguishing between terms and non-terms has various causes. Above all, it is absence of formal hallmarks on which discrimination would be carried out because the existing "definitions of the concept of 'a term' are based on the semantic criterion"[4] that defies formalization (Reformatskij 1964: 24).

Given that a term "retains its specialized certainty namely in the context"[5] (Kryzhanovskaja and Simonenko 1987: 32), the thesaurus methodology was proposed once. It was oriented to the study of particularity of words functioning in specific scientific texts of synchronous section. On this basis, given that "the word belongs with the sublanguage of certain service area and to description of activities in this domain"[6] (Kryzhanovskaja and Simonenko 1987: 16), and taking into account its systematic relationship with other words-terms, separation of terms and non-terms takes place. When applying the thesaurus techniques, "one should focus primarily on specific contexts and speech practice"[7] (Kryzhanovskaja and Simonenko 1987: 20-22), i.e. they determine currency of the given term unit in several texts of the area. For this reason, the term is qualified as normative. "From this perspective, a normative (in the orthographic sense – M. V., K. M.) term should be understood as a special name in scientific, technical, and practical activities, that operates in an area of professional communication and is a component of modern science, of special classification system"[8] (Kryzhanovskaja and Simonenko 1987: 21). However,

[1] "Всякое обыденное неслужебное слово может стать термином путём включения в специальный словарь по признаку точного соответствия с определённой социально организованной вещью" [transl. by Maksym Vakulenko].

[2] "Идеальная терминология – это полностью упорядоченная система, удовлетворяющая следующему требованию: зная термин – знаешь место в системе, зная место в системе– знаешь термин" [transl. by Maksym Vakulenko]

[3] "должен быть как лексически, так и морфологически строго систематическим, способным к созданию производных и максимально парадигматичным в плане нормальной и типовой парадигмы " [transl. by Maksym Vakulenko]

[4] "определения понятия 'термин' базируются на семантическом критерии" [transl. by Maksym Vakulenko]

[5] "именно в контексте сохраняет свою организованную определённость" [transl. by Maksym Vakulenko]

[6] "фактор принадлежности слова к языку определённой сферы обслуживания и описанию деятельности в этой сфере" [transl. by Maksym Vakulenko]

[7] "следует ориентироваться в первую очередь на специальные контексты и речевую практику" [transl. by Maksym Vakulenko]

[8] "С этих позиций нормативный термин следует понимать как специальное наименование из сферы научно-технической и практической деятельности, которое функционирует в сфере профессионального общения и

the thesaurus method ignores essential details. Due to the fact that many terms have aroused sporadically and without due control, the term existence alone does not guarantee its accuracy and compliance with native language (this is especially true for recently borrowed and alien terms) and therefore not every current term may be considered as normative. Besides, the term belonging with "the special classification system" cannot be its defining aspect because not all terms are systemic in nature due to their etymology or practice that often result in inconsistencies between the formal appearance and sense. In particular, the *argument* in the sense of 'independent variable' shows up without relevant paradigmatic relations, and so do the *thermal conductivity coefficient* within the meaning of 'thermal conductivity', boson, fermion, and Ukrainian *pryskorennja* 'acceleration', *tjaghunecj* 'magnet', *charunka* 'cell' that are the non-systemic ones.

In the context of demarcation of the terms from the non-terms, it is expedient to take into account the fact that all terms are generally divided into two major groups: 1) those that were initially formed in the process of denomination of a new reality phenomenon consistent with the concept of a *particular discipline*, or taken from another term system, 2) those aroused in the process of transformation of *common word* semantics. Thus the units from the first group are **proper terms**, and those from the second are **terminological words**. The proposed delineation is effective for studying interaction between the field vocabulary and the generally used one as takes into account presence or absence of term element connection with a common lexicon. In particular, the first group units that have only the terminological bearing, are somewhat isolated lexically (they do not have branchy paradigmatic and syntagmatic links), and are therefore much more resistant to general lingual transformation processes (such as formal semantic changes), usually operate only within the relevant area and do not acquire fundamentally new sense or connotations when changing their functional context. Instead, the second group units having usually appeared due to terminologization process, retain stable relationship (hidden or overt) with their primary non-terminological (common) lexical value, and can act as the non-terms if the functionally marked context changes.

In general, within each scientific or technical field, they distinguish: 1) purely professional terms, 2) applied terms (those that first had been components of other terminological systems but acquired specific application in a certain area), 3) common words that have gained specific meaning in a specific domain, 4) adjacent terms belonging with other terminological systems that are interdisciplinary, or widely used in a particular field, 5) contiguous common words that obtain distinctly terminological meaning and sense in conjunction with other terms of a certain domain, 6) common words (no terms) commonly used in a particular domain, 7) terminologized collocations (stable word combinations that are specific to a particular field) (Doroshenko 1930: 5).

The main distinctive property of a term is its "ability to express […] a scientific, technical or professional concept"[1] (Ovcharenko 2010: 173). A term differs from the ordinary word in that it has a definite signification and logically identifies attributes necessary and sufficient for expression of the features of the given notion on which the concept classification is built (Danilenko 1986: 12). This is why absolute synonyms happen much more frequently among terms.

Borrowed or synthesized terms have fairly significant formal differences from common words, such as foreign language basics, symbol components, eponym components, etc. Terms often acquire semantic and grammatical distinctions not usually appropriate to the common words. For example, from the common literary standard point of view, the concept compatibility in the composed terms such as *heavy water*, *high latitude*, *magnetic storm*, *yellow dwarf*, *solar wind*, *speed of light* and so on, is atypical and out of norm.

Since a term – unlike an ordinary word – reflects objective reality of the world, antonymic oppositions of measure, quantity, and quality inherent to a human as a cognition subject, disappear in it. The concepts of 'long' – 'short', 'high' – 'low', 'good' – 'bad', 'large' – 'small', 'speedy' – 'slow', 'wide' – 'narrow', 'frequent' – 'rare', etc. are subjective and relative, so only those have terminologized which have had the "positive" semantics showing "substantial" measure or number and "good" quality: *longitude* (not **shortitude*), *height* (not **lowth*), *goodness* (not **badness*), Ukr. *velychyna* 'quantity' (not **malyná*),

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является компонентом современной научной, специальной классификационной системы" [transl. by Maksym Vakulenko]

[1] "здатність бути виразником […] наукового, технічного чи професійного поняття" [transl. by Maksym Vakulenko]

shvydkistj 'speed' (not **povíljnistj*), *shyrotá* 'latitude' (not **vuzjkotá*), *chastota* 'frequency' (not **ridkotá*). In this regard, there exist terminological collocations such as *small height*, *small width*, *poor quality factor*, Ukr. *mala velychyna* 'small quantity', *mala shvydkistj* 'small speed', *nyzjka chastota* 'low frequency', etc. that are self-contradictory in the everyday sense.

Because of differences between common and terminological bearings of the Ukrainian noun "moment" where the duration is finite in the first case and infinitesimal in the second, it is possible to form verbal nouns with terminological value of duration from the so-called "instant" verbs: Ukr. *strybannja* 'jumping' (< *strybaty* 'jump'), *spalakhuvannja* 'flashing' (< *spalakhuvaty* 'flash'), *udarjannja* 'hitting' (< *udarjaty* 'hit'), *zavmyrannja* 'fading' (< *zavmyraty* 'fade').

Terms often include specific derivational affixes (a-, anti-, sub-, supra-, ultra-, hyper-; -age, -ia, -ism, -ation) and proper terminological affixoids that correlate with the basics of living significant words (Danilenko 1973: 82f): *-meter* (avometer), Ukr. *-lam* (*krygholam* 'icebreaker'), *-vid* (*khvylevid* 'waveguide'), *-mir* (*shumomir* 'noise meter'). The Ukrainian terms with the final *–istj* (in many cases, it corresponds to the English suffix *-ness*) often acquire not abstract but quantitative value: *tochnistj* ('exactness', 'accuracy', 'correctness', 'exactitude', 'nicety', 'sensibility', 'truthfulness', 'validity', 'veracity'), *shhiljnistj* ('compactness').

The process of term creation is complex. G. O. Vinokur specified that "terms do not 'appear' but they are 'invented', 'fashioned' to the extent of realization of their need to"[1] (cit. by Danilenko 1973: 76) because term coinage is a deliberate, controlled and regulated process (Danilenko 1973: 77). V. M. Lejchik and S. D. Shelov clarify that terms appear as they in the special lexicon (vocabulary for specific purposes), but not in the lexicon of any natural language as a whole (Lejchik and Shelov 1989). So it is the term application domain that is special but not necessarily the term itself.

Processes of rise of proper terms and terminological words differ. They first appear in the nomination process approximately within the same pattern as that of common words; the difference is only that perception of the reality object is carried out not through the senses but because of its logical comprehension as a part of a structured set of particular field concepts. In particular, first the most general impression of the object as the sum of its characteristics obtained on the basis of logical interpretation is formed out. After initial analysis of the object within the overall impression, its dominant characteristic is parted that is the inner form of the word. Then the object enters the system of allied concepts. Finally, conscious perception of the object proceeds, based on experience and knowledge and assignment of this perception in the semantic structure of the word, so the concept is formalized and a term for its designation comes into being.

The terminological word is the result of secondary nomination as it arises owing to qualitative changes in semantic structure of the generally used lexeme. It stems from transfer of lexical meaning by similarity (metaphor) or by contiguity (metonymy) of corresponding objects attributes. Therefore, a word takes on new significance and operates dually: as a common word and as a term. Soon the relationship between common and terminological bearings of the word is being weakened because, first of all, the denominated objects are different. Changes of semantic kind, in particular establishment of new paradigmatic and syntagmatic relations in different functional contexts may cause restructuring, too, since changes in semantics are usually displayed in the morphemic structure of words (presence / absence of certain affixes), its compatibility, derivational properties, etc. Thus, the specific English form *elder* is used for the family members in place of the common one *older*; in the Ukrainian physical terminological collocation *kolirna temperatura* 'colour temperature', the attribute *kolirnyj* differs morphemically from its common counterpart *koljorovyj*; the Ukrainian linguistic term *zapozychennja* 'borrowing' and Russian technical term *zapodlico* 'flush(-mounted)' have acquired the unusual extra prefix "za-"; the Ukrainian mathematical term *spodivannja* 'expectation' differs from the relevant common word by government; the plural form of the Russian technical term *zub* 'tooth' is *zubjja* whereas that of the relevant common word is *zuby*.

[1] "термины не 'появляются', а 'придумываются', 'творятся' по мере осознания их необходимости" [transl. by Maksym Vakulenko]

NATIONAL TENDENCIES IN THE DEVELOPMENT OF TERMINOLOGICAL SYSTEMS

Term forging on the basis of native language should be the key instrument in building the field terminological systems, because the term lexicon "is formed primarily on the basis of linguistic resources of each native language and only partly through foreign words"[1] (Moskalenko 1959: 19). However, today one of the most common – although not always justified and effective – ways to replenish term lexicons, is borrowing. This causes a sharp increase in the number of foreign words that retain specificity of their own language and are usually poorly adapted to peculiarities of the recipient language. Due to their pronounced foreign qualities, such units shatter formal semantic language balance because the process of collection of inappropriate to native language words is long, and many of such words cause qualitative (but unwanted) changes at the lexical semantic, structural, and morphological levels.

However, tendency to borrow is fairly traditional in the Eastern-Slavonic term lexicons, because according to famous Russian linguist A. A. Reformatskij, consequence of term mintage steps is as follows: 1) borrowing of an international term (if any), 2) translation of an established foreign professional term, 3) terminological specification of common words, 4) borrowing a term from other fields, 5) modern word coinage (Reformatskij 1986: 173).

Many researchers, including specialists of the Institute of Ukrainian scientific language, as well as D. Lotte, A. Terpigorev, N. Moskalenko, A. D'jakov, T. Kyjak, Z. Kudeljko and others, favour the use of internal resources of the native language in new terms creation (VIUNM 1928: 66; Terpigorev 1952: 52; Lotte 1961: 31; D'jakov, Kyjak and Kudeljko 2004: 106). Only "ignorance of the richness and creative possibilities of the native language and misunderstanding of problems and ways of international standardization of term lexicons can explain refusal of building terminology based on the native language"[2] (Moskalenko 1959: 24).

Given that a terminological neologism can and should be based mainly on the native lexical tools, namely: 1) by semantic transformations (narrowing or expanding the semantics of common words or terms), 2) by affixation, 3) by formation of terminologized collocations, in particular, by the method of syntax combination (Moskalenko, 1959: 22), it is inappropriate to ignore such language capabilities and introduce into the scholarly use new, often unjustified, foreign words.

The term set as an integral part of the most dynamic language level – the lexical one – is actively developing, being continuously enriched with new units. Therefore, quantitative expansion of term systems occurs, particularly, at the expense of linguistic potential, the use of which involves creation or finding a native term, or by borrowing it from other languages. In this regard, two major trends to replenish terminological funds have been identified: national and international. However, this distinction is rather arbitrary, since it is based not that much on lingual but as much on extra linguistic criteria. The national trend is to provide advantage of native words over the foreign ones, while the international trend manifests itself in wide use of the borrowed lexemes, i.e. it is not about internationalisms.

Since "purism has been one of the factors of language stability"[3] and "refines language taste and linguistic consciousness of ordinary citizens"[4] (Selighej 2008: 59f), the basis of each naturally formed term system should be the native words (Symonenko 2007: 15). So those countries that care about their language defend and implement native term lexicons. A. A. Reformatskij had noted that the developed countries "along with use of the old terminological funds, updated term lexicons with their native words"[5] (Reformatskij 1986: 171).

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[1] "формується в першу чергу на основі мовних ресурсів кожної національної мови і тільки частково – за рахунок іншомовних слів" [transl. by Maksym Vakulenko]

[2] "незнанням багатств і творчих можливостей рідної мови та неправильним розумінням завдань і шляхів міжнародної стандартизації термінології можна пояснити відмову від побудови термінології на базі рідної мови" [transl. by Maksym Vakulenko]

[3] "пуризм виступає одним із чинників мовної стійкості" [transl. by Maksym Vakulenko]

[4] "розвиває мовний смак і мовну свідомість пересічних громадян" [transl. by Maksym Vakulenko]

[5] "наряду с использованием старых терминологических фондов обновляли терминологию своими национальными словами" [transl. by Maksym Vakulenko]

Some European peoples have cleared their languages from excessive borrowings (and the Germans created their own long words instead of well-sounding and short French ones) and continue to contribute to the emergence and spread of native terms and lexemes. One may recite the German *Bahnsteig* 'platform' (cf. French *perron*), *Fahrkarte* 'ticket' (cf. French *billet*), Gesundheitspflege 'hygiene', Zahlungseinstellund 'competition' (cf. French *concours*), *herunterladen* instead of English *download*; Polish *całka* 'integral', *jednostka* 'individual', *lotnisko* 'airport', *odmiana* 'option', *odruch* 'reflex', *podmiot* 'subject', *sterownik* 'driver', *współrzędna* 'coordinate', *wzór* 'formula', *zjawisko* 'phenomenon'; Czech *divadlo* 'theater', *doprava* 'transport', *kyslík* 'oxygen', *letiště* 'airport', *padák* 'parachute', *počitač* 'computer', *přístav* 'port', *stroj* 'machine', *tajemník* 'secretary', *tisk* 'print', Croatian *glazba* 'music', *kazalište* 'theater', *prijevoz* 'transport', *putovnica* 'passport', *sveučilište* 'University', *vozilo* 'vehicle, car', *zrakoplov* 'plane', *zračna luka* 'airport' (Shtepa 1977: 32; Selighej 2008: 55ff). In addition, the tradition entrenched in Germany to name new technical inventions by own neologisms. In particular, the aim of the "Allgemeiner Deutscher Sprachverein" ["General Association for the German Language"] (created in 1885 and re-founded in 1947 as the "Gesellschaft für deutsche Sprache" ["Society for German language"]) is to cultivate the German language and counteract excessive borrowings. Hungary in the 18th century and Turkey in the mid of 20th century substantially depurated their vocabularies from foreign borrowings by new words created on a native basis (Serebrennikov 1970: 448; Selighej 2008: 50: 57-59). The Europeanisms in the Greek language are also replaced by the native names (Klymenko 2002).

Iceland and Canada continue to act in this course, where the English terms are translated accordingly to Icelandic and French (see D'jakov, Kyjak and Kudeljko 2004: 155; Superanskaja 1989: 4; Selighej 2008: 54), as well as Croatia: *dizalo* 'lift', *računalo* 'computer', *upravitelj* 'manager', *ronjenje* 'diving', *daskanje (na valovima)* 'surfing', *jedrenje na dasci* 'windsurfing', *odbojka* 'volleyball', *košarka* 'basketball', *rukomet* 'handball', *nogomet* 'football' (a synonym *fudbol*), *tvrtka* 'movie' (synonymous with *film*), *štampač* 'printer' (a synonym for *printer*), *elektronska pošta* or *e-pošta* (synonymous with *e-mail*). France actively resists globalization influences, including massive borrowing of Anglicisms, and translates those lexemes by spelling, creating neologisms, expanding semantics of own words, among others. As a result, there have arisen native French terms like: *logiciel* (instead of English *software*), *matériel* 'hardware', *télécharger* 'download', *télécopie* 'fax', *courriel* 'e-mail', *imprimante* 'printer', *technologies de point* 'high technologies', *savoir faire* 'know how', *sondage aux sorties des urnes* 'exit poll', *ingénierie* 'engineering', *stylisme* 'design', *palmarés* 'hit parade', *planche à roulettes* 'skate board', *planche à voile* 'surfing', *mondialisation* 'globalization', etc. (Cherednychenko 2007: 22, 75, 82). Recently, certain success in refining and developing the Ukrainian physical term lexicon on the basis of native terms has been achieved, too (Vakulenko 2010).

In the Russian language, the desire to use specific words is also felt. The father of Russian terminology Mikhail Lomonosov spoke against dominance of foreign words, and on the verge of 18th-19th centuries the writer and statesman A. Shishkov was a strong advocate of Russian purism (Selighej 2008: 60). At the dawn of aviation, instead of foreign term *aviator* 'airman', the Russians began to use the neologism *ljotchik* 'pilot' that successfully operates now, as well as the Velimir Khlebnikov's neologism *samoljot* 'airplane' (Serebrennikov 1970: 444f; Ponomarenko 2012: 28).

The founder of the Soviet terminology D. S. Lotte and the authors of the dictionaries of synonyms V. M. Kljueva and Z. E. Aleksandrova give preference to own Russian words against the borrowed ones, including: *bessmyslica* 'nonsense' against *abrakadabra*, *velikan* 'giant' against *gigant*, *dokazateljstvo* 'proof' against *argument*, *izrechenie* 'aphorism' against *aforism*, *oprjatnyj* 'tidy' against *akkuratnyj*, *ochertanie* 'cut, outline' against *abris*, *pereryv* 'break' against *antrakt*, *predpolozhenie* 'assumption' against *hypothesis*, *prinadlezhnostj* 'accessory' against *atribut*, etc. (Lotte 1961: 57; Kljueva 1961; Aleksandrova 1965). F. Filin was also proponent of native Russian term lexicon (Selighej 2008: 61). This is despite the declared tendency to "internationalization" that is still noticeable in the Russian scientific terminology.

Today the main ways to create native scientific and technical terms are: 1) providing new meanings to existing words, 2) modification (creation of derivative terms using derivative affixes), 3) compilation of term stems, 4) formation of collocations, 5) construction of abbreviations (D'jakov, Kyjak and Kudeljko 2004: 107). The value transfer may occur by classification subordination of concepts, by concept similarity, by technical analogy, by external analogy, by contiguity of concepts (Lotte 1961: 40-56).

APT TERM TOKENS

The term feasibility is defined not by personal affection of a user but by the combination of objective criteria provided by scientific validity determined by the analytical method, and currency given by the statistical method (Vakulenko 1996: 5; Vakulenko M. & O. 1996; Vakulenko 2011: 144).

For a term to settle easily down and exist in a full value, it must be appropriate, particularly, "comfortable and morphologically suitable for easy formation of derived and combined terms"[1] (Sheludjko and Sadovsjkyj 1928: 11). Tadej Sekunda proposes the following attributes of an "apt" term: 1) easiness to be understood, 2) exactness, 3) unambiguity, 4) derivativity (ability to easily create derivatives of the word), 5) good sounding (Sekunda 1930: 12). D. S. Lotte scores to the signs of an apposite term brevity, monosemy, reasonable motivation, simplicity, coordination with other units present in the vocabulary (systemic feature), preferring native term against the foreign ones (Lotte 1961: 7, 57). Though many scientists believe that only an unambiguous term is apt, rise of ambiguity has natural causes: "even in cases where (at least for lexicographic genres) the idea of 'harmfulness' of phenomena such as polysemy and homonymy is almost universal, this opinion may not have a practical value for terminology, as natural development of these phenomena in the terminology is stronger than artificial strokes to release the lexicon from them. [...] Harmfulness of polysemy (that still covers certain categories of words-terms) is somewhat exaggerated, because the term (although it can be understandable regardless of the context) is usually used not separately. The context is always warranting it from ambiguous interpretation"[2] (Danilenko 1971: 27f). A. Moiseev (1970) and L. Kutina (1970) also recognize multiple bearings of terms.

A. Reformatskij distinguished several important features, too. First, it is specificity, or coverage of essential concept features: function (e.g. conduction band), purpose (e.g. current meter), specific value against generic definition (e.g. varizone semiconductor, nitric acid), sometimes composition (e.g. high-carbon steel), material (e.g. copper contact) and position in several similar terms (e.g. mercury lamp). Instead, specification by origin (e.g. Dutch way of stitching, Steiger lamp, etc.) that does not contribute to understanding of the concept is undesirable. However, the more accurate title can be proposed for this feature, namely ***essentiality***. Secondly, A. Reformatskij goes on, connexity in the system is important for a term: for example, the denomination of some machine should reflect its belonging with the class of machines (e.g. refrigerator machine < machine). However, it is appropriate to use here the term "systemic feature", or "systemness", or "systemity." The third hallmark is substantiality, or limited use of descriptive prepositional constructions in the composite terms (Reformatskij 1986: 186-187).

Instead, the following features of a term as nominativity (naming the concept) and definitivity (definition availability) that are considered additional (Tabanakova 2001: 29), are necessary attributes of each term, not just apposite. For a well-turned term, the ***nominativity*** will denote naming concepts without utilization of narrative structures.

In addition, an apposite term is to be a structural element of the language appropriate to its spelling norms and trends. Therefore, another important attribute is worth specifying, namely ***organic nature***, or ***organicity***, within which claim of native terms dominance is realized as well. A great deal of the English borrowings in Ukrainian (especially those in the *-ing* form that are difficult to pronounce by the Ukrainians: *backbending*, *consulting*, *scaling*, *tuning*, etc.) and mechanically spelled Russian lexemes with extrinsic to the Ukrainian language morphological structure or semantics (*bizhuchyj* 'running', *nesuchyj* 'bearing', *fosforescijujuchyj* 'phosphorescent'; *datchyk* 'sensor', *kachaty* 'pump', *nakachka* 'pumping', etc.) are unsuccessful terms. It should be added that essential requirement is not only derivative capacity

[1] "зручний і морфологічно придатний до легкого створення від нього похідної та зложеної термінології" [transl. by Maksym Vakulenko]

[2] "даже в тех случаях, когда почти общепризнанной (по крайней мере для лексикографических жанров) становится мысль о 'вредности' таких явлений, как полисемия и омонимия, для терминологии эта мысль не может иметь практического воплощения, поскольку естественное развитие этих явлений в терминологической лексике сильнее искусственных приёмов освобождения терминологии от них. […] Вредность полисемии (которая охватывает всё-таки определённые категории слов-терминов) несколько преувеличена, потому что термин (хотя он и может быть понятным, независимо от контекста) изолированно, как правило, не употребляется. А контекст всегда бронирует его от неоднозначного толкования" [transl. by Maksym Vakulenko]

but also ***compatibility*** of the term, i.e. ability to combine with other parts of speech in a variety of grammatical structures.

Having outlined the signs of an apt term by the importance criterion, one obtains the following sequence: 1) ***exactness***, 2) ***essentiality*** (coverage of important aspects of the concept and absence of false associations), 3) ***plainness***, 4) ***derivative quality***, or ***derivativity*** (ability to easily create derivatives of the word), 5) ***good sounding***, 6) ***systemic feature***, or ***systemness***, or ***systemity*** (reflection in the designation belonging with a particular class of concepts), 7) ***organic nature***, or ***organicity*** (compliance with spelling and tendencies of language), 8) ***compatibility*** (ability to combine terminological collocations), 9) ***unambiguity***, 10) ***nominativity*** (as opposed to descriptive attribute), 11) ***brevity***. Only a small number of terms have all the above features, while most of them miss some tokens entirely or partly.

So, codifying a current term or suggesting in return a new one that does not comply with the results obtained using the statistical method, one must take into account the above characteristics, i.e. take advantage of the analytical method. As Iryna Kochan rightly noted, "a clear definition of the term is a necessary condition to become a component of a terminological system" [1] (Kochan 2009: 32). Discrimination or choice of words is a very delicate thing, because in terminology that is an integral part of the lexical layer of language and an organic element of the language system, it is necessary to consider simultaneously all the totality of factors, trends, patterns. That is a complex procedure, not just sequential rejecting of terminological units according to some hierarchy of certain requirements. Although effectuation of all above conditions does not guarantee that a term will necessarily come into use, scientific approach requires observing them strictly.

CONCLUSION

Thus, a term is a semantically complicated unit of a lexical level that is affected by multisystemic factors. A significant number of terms have dual role as they operate in specific domain where they are customary and widely used, and in the common area where they have a highly specialized nature. Development of terminology is tightly associated with the objects of extra linguistic reality, including the specifics of systemic organization and functioning, and the peculiarities of language, in particular, the structure of the lexical level. Then there is active interaction of generally used and field vocabularies that is embodied mainly in terminologization and determinologization processes, whereas interaction of various term lexicons enables transterminologization and reterminologization.

REFERENCES

ALEKSANDROVA, Z. E. (1975). *Slovarj sinonimov russkogo jazyka [Dictionary of synonyms of the Russian language].* Moskva: Russkij jazyk.

BULAKHOVSJKYJ, L. A. (1975). *Vybrani praci. Tom. 1: Zaghaljne movoznavstvo [Selected works. Vol. 1: General linguistics].* Kyjiv: Naukova dumka.

CHEREDNYCHENKO, O. I. (2007). *Pro movu i pereklad [About the language and translation].* Kyjiv: Lybidj.

DANILENKO, V. P. (1971). Leksiko-semanticheskie i grammaticheskie osobennosti slov-terminov [Lexical semantic and grammatic pecularities of the words-terms]. In: Danylenko, V. P. (ed.) *Issledovanija po russkoj terminologii [Studies in Russian terminology],* 7–67. Moskva: Nauka.

DANILENKO, V. P. (1973). O terminologicheskom slovoobrazovanii [On terminological word creation]. In: *Voprosy jazykoznanija [Questions of linguistics]* № 4: 76–85.

[1] "чітка дефініція терміна – необхідна умова того, щоб термін став компонентом певної термінологічної системи" [transl. by Maksym Vakulenko]

DANILENKO, V. P. (1986). Aktualjnye napravlenija lingvisticheskogo issledovanija russkoj terminologii [Current trends of linguistic investigation of Russian terminology]. In: Danilenko, V. P. (ed.) *Sovremennye problemy russkoj terminologii [Modern problems of Russian terminology]*. Moskva: Nauka, 5–3.

DOROSHENKO, M. (1930). *Slovnyk dilovoji movy: terminologhija ta frazeologhija (projekt) [Dictionary of the business language: terminology and phraseology (project)].* Kharkiv; Kyjiv: Derzhavne vyd-vo Ukrajiny.

D'JAKOV, A. S., T. R. KYJAK & Z. B. KUDELJKO. (2004). *Osnovy terminotvorennja: semantychnyj ta sociolinghvistychnyj aspekty [Fundamentals of term creation: semantic and sociolinguistic aspects].* Kyjiv: VD "Academia".

KLJUEVA, V. N. (1961). *Kratkij slovarj sinonimov russkogo jazyka [Concise dictionary of synonyms of the Russian language].* Moskva: Uchpedgiz.

KLYMENKO, N. F. (2002). Neologhizmy u riznykh styljakh suchasnoji ukrajinsjkoji ta novoghrecjkoji mov [Neologisms in different styles of modern Ukrainian and modern Greek languages]. In: Korbozerova, N. M. (ed.) *Problemy semantyky slova, rechennja ta tekstu,* 8. Kyjiv: Vyd. centr KNLU, 388–394.

KOCHAN, I. (2009). Ukrajinsjki terminy v paradyghmi suchasnykh naukovykh uchenj [Ukrainian terms in the paradigm of contemporary scientific teachings] In: L. O. Symonenko (ed.) *Ukrajinsjka terminologhija i suchasnistj [Ukrainian terminology and modernity]*, Issue VIII. Kyjiv: KNEU, 30–34.

KOCHERGHAN, M. P. (2006). *Zaghaljne movoznavstvo [General linguistics].* Kyjiv: VC "Akademija".

KRYZHANOVSKAJA, A. V. & L. A. SIMONENKO. (1987). *Aktualjnye problemy uporjadochenija nauchnoj terminologii [Current problems of ordering scientific terminology].* Kyjiv: Naukova dumka.

KUTINA, L. L. (1970). Jazykovye processy, voznikajushhie pri stanovlenii nauchnykh terminologicheskikh sistem [Lingual processes, emerging during scientific terminological systems becoming]. In: *Lingvisticheskie problemy nauchno-tekhnicheskoj terminologii.* Moskva: Nauka, 92–94.

LEJCHIK, V. M., & S. D. SHELOV. (1989–1990). *Lingvisticheskie problemy terminologii i nauchno-tekhnicheskij perevod [Linguistic problems of terminology and science technical translation],* part. 1–2. Moskva: Vysshaja shkola.

LOTTE, DMITRIJ S. (1961). *Osnovy postroenija nauchno-tekhnicheskoj terminologii [Fundamentals of building the science and technical terminology].* Moskva: Izd-vo AN SSSR.

MATVIJAS, I. GH. (1987). Dejaki pytannja terminologhiji v ukrajinsjkij dialektologhiji [Some terminological questions in Ukrainian dialectology]. In: Matvijas, I. Gh., P. Ju. Ghrycenko & N. P Prylypko (eds.) Ukrajinsjka dialektna leksyka [Ukrainian dialectic lexicon]. Kyjiv: Naukova dumka, 3–9.

MOISEEV, A. I. (1970). O jazykovoj prirode termina [On a linguistic nature of a term]. In: *Lingvisticheskie problemy nauchno-tekhnicheskoj terminologii [Linguistic problems of the science and technical terminology]*. Moskva: Nauka, 127–138.

MOSKALENKO, N. A. (1959). *Narys istoriji ukrajinsjkoji ghramatychnoji terminologhiji [Sketch of history of Ukrainian grammatical terminology].* Kyjiv: Rad. shkola.

OVCHARENKO, N. 2010. Teoretychni peredumovy doslidzhennja terminosystem (na materiali suchasnoji ukrajinsjkoji terminologhiji) [Theoretical premises of investigation of the term systems (on the material of modern Ukrainian terminology)]. In: *Linghvistychni studiji* 20, 172–175.

PONOMARENKO, V. P. (2012). Ce bulo i bude neshhodavno… [It was and it will be recently…]. In: Desheriev, Ju. D. (ed.) *Movoznavstvo* 2, 27–30.

REFORMATSKIJ, A. A. (1961). Chto takoe termin i terminologija [What is term and terminology]. In: Voprosy terminologii [Questions of termiinology]. Mockva: Izd-vo AN SSSR, 46–54

REFORMATSKIJ, A. A. (ed). (1964). *Lingvisticheskaja terminologija i prikladnaja toponomastika [Linguistic science and applied toponomastics]*. Moskva: Nauka.

REFORMATSKIJ, A. A. (1986). Mysli o terminologii [Thoughts about terminology]. In: *Sovremennye problemy russkoj terminologii [Contemporary problems of the Russian terminology*. Moskva: Nauka, 163–197.

SEKUNDA, T. (1930). Pryncypy skladannja ukrajinsjkoji terminologhiji [Principles of compilation of the Ukrainian terminology]. In: *Visnyk In-tu ukrajinsjkoji movy VUAN* 2, 11–21.

SELIGHEJ, P. O. (2008). Puryzm u terminologhiji: ukrajinsjkyj dosvid na jevropejsjkomu tli [Purism in terminology: Ukrainian experience on the European background]. In: *Movoznavstvo* 1, 49–66.

SEREBRENNIKOV, B. A. (ed). (1970). *Obshhee jazykoznanie: formy sushhestvovanija, funkcii, istorija jazyka [General linguistics: forms of existence, functions, history of language].* Moskva: Nauka.

SHELUDJKO, I., & T. SADOVSJKYJ. (1928). *Slovnyk tekhnichnoji terminologhiji (zaghaljnyj): (Projekt) [Dictionary of technical terminology (general): (Project)].* Kyjiv: Derzh. vyd-vo Ukrajiny.

SHTEPA P. (1977). *Slovnyk chuzhosliv. Znadibky [Dictionary of alien words. Materials].* Montreal.

STASHKO, MARIJA V. (1999). *Formuvannja ta rozvytok ukrajinsjkoji bibliotechno-biblioghrafichnoji terminologhiji [Formation and development of Ukrainian library bibliographic terminology].* PhD (Candidate), spec. 10.02.01. Kyjiv: In-t ukrajinsjkoji movy NAN Ukrajiny.

SUPERANSKAJA, A. V., N. V. PODOLJSKAJA & N. V. VASILJJEVA. (1989). *Obshhaja terminologija: Voprosy teorii [General terminology: Questions of theory].* Moskva: Nauka.

SYMONENKO, L. (2007). Linghvistychni problemy unormuvannja naukovoji terminologhiji [Linguistic problems of scientific terminology normalizatioon]. In: Symonenko, L. O. *(ed.) Ukrajinsjka terminologhija i suchasnistj [Ukrainian terminology and modernity]*, Issue VII. Kyjiv: KNEU, 21–25.

SYTDYKOV, P. GH. (2009). Zv'jazok synkhronnykh ta diakhronnykh doslidzhenj u terminologhiji (na prykladi kytajsjkoji movy) [Connection between synchronic and diachronic studies in the terminology]. In: Korbozerova, N. M. (ed.) *Problemy semantyky slova, rechennja ta tekstu [Problems of semantics of a word, sentence, and text],* 23. Kyjiv: Vyd. centr KNLU, 347–353.

TABANAKOVA, V. D. (2001). *Ideograficheskoe opisanie nauchnoj terminologii v specialjnykh slovarjakh [Ideographic description of scientific terminology in special dictionaries]: PhD thesis, spec. 10.02.21.* Tjumenj: Tjumenskij gos. un-t.

TERPIGOREV, A. M. (1952). *Rukovodstvo po razrabotke i uporjadocheniju nauchno-tekhnicheskoj terminologi [Manual on development and ordering of science and technical terminology].* Moskva: AN SSSR. 54: [2] p.

VAKULENKO, M. & O. VAKULENKO. (1996). Nauka terminologhija ta jiji metody [Terminology as a science and its methods]. In: *Tezy 4-ji Mizhnar. nauk. konf. ["Problemy ukrajinsjkoji naukovo-tekhnichnoji terminologhiji"], (17 20 ghrudnja 1996 r.) [Theses of 4th Intern. sci. conf. "Problems of Ukrainian science and technical terminology"]*. Ljviv: Vyd-vo Derzh. un-tu "Ljvivsjka politekhnika", 11–12.

VAKULENKO, M.. (1996). *Rosijsjko-ukrajinsjkyj slovnyk fizychnoji terminologhiji [Russian-Ukrainian dictionary of physical terminology]*, ed. by Prof. O. V. Vakulenko. Kyjiv: Polighraf. centr Kyjivsjkogho un-tu im. Tarasa Shevchenka.

VAKULENKO, M. O. (2010). Rozvytok terminosystem i terminotvorennja [Development of terminological systems and term creation]. In: *Ukrajinsjka mova* 1, 88–93.

VAKULENKO, M. O. (2011). Termin i terminologhija: suchasni ujavlennja ta koncepciji [Term and terminology: modern ideas and conceptions]. In: *Wort und Woerterbuch. Vocabium et vocabularium. Band 12: Aktuelle Probleme der Lexikographie, Herausgegeben von Volodymyr Dubichynskyi und Tilmann Reuther.* Charkiv: Verlag "Lehrbuch NTU "ChPI"", 140–145.

VASENKO, L. A., V. V. Dubichynsjkyj, & O. M. Krymecj. (2008). *Fakhova ukrajinsjka mova [Specialized Ukrainian language].* Kyjiv: Centr uchb. literatury.

VIUNM (1928). *Visnyk instytutu ukrajinsjkoji naukovoji movy*, 1. Kyjiv: Okrlit.