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SEMANTIC TRANSFORMATION AND MULTIMODAL REPRESENTATION OF INFORMATION TECHNOLOGY TERMS

Annotation

The rapid development of digital technologies has significantly influenced the formation and dissemination of information technology (IT) terminology. In contemporary digital communication, technological concepts are represented through the interaction of linguistic and visual resources, which makes the study of semantic transformation and multimodal representation particularly relevant. This study investigates the semantic transformation and multimodal representation of IT terms in English and Uzbek. The research is based on a corpus of frequently used IT terms collected from digital platforms, online dictionaries, and technological interfaces. Comparative, semantic, contextual, and multimodal discourse analysis methods were employed to identify the major patterns of semantic adaptation and representation. The study contributes to the fields of terminology, digital linguistics, and multimodal discourse studies by providing insights into the linguistic and cognitive mechanisms underlying the adaptation of technological vocabulary.

Keywords: information technology terminology, semantic transformation, multimodal discourse, multimodal representation, digital communication, terminology adaptation, English and Uzbek, IT terms.

AXBOROT TEXNOLOGIYALARI TERMINLARINING SEMANTIK TRANSFORMATSIYASI VA MULTIMODAL REPREZENTATSIYASI

Annotatsiya

Raqamli texnologiyalarning jadal rivojlanishi axborot texnologiyalari terminologiyasining shakllanishi va tarqalishiga sezilarli ta'sir ko'rsatmoqda. Zamonaviy raqamli kommunikatsiyada texnologik tushunchalar lingvistik va vizual vositalarning o'zaro aloqasi orqali ifodalanadi. Bu esa IT terminlarining semantik transformatsiyasi va multimodal reprezentatsiyasini o'rganishni dolzarb masalaga aylantiradi. Mazkur maqolada ingliz va o'zbek tillaridagi axborot texnologiyalari terminlarining semantik o'zgarishi hamda multimodal ifodalanish xususiyatlari tadqiq etiladi. Tadqiqot materiali raqamli platformalar, onlayn lug'atlar va texnologik interfeyslardan olingan keng qo'llanadigan IT terminlari korpusiga asoslanadi. Ishda qiyosiy, semantik, kontekstual va multimodal diskurs tahlili metodlaridan foydalanildi. Maqola terminologiya, raqamli lingvistika va multimodal diskurs tadqiqotlari uchun texnologik leksikaning moslashuvi bilan bog'liq lingvistik va kognitiv mexanizmlarni yoritishi bilan ahamiyatlidir.

Kalit so'zlar: axborot texnologiyalari terminologiyasi, semantik transformatsiya, multimodal diskurs, multimodal reprezentatsiya, raqamli kommunikatsiya, terminologik moslashuv, ingliz va o'zbek tillari, IT terminlari.

СЕМАНТИЧЕСКАЯ ТРАНСФОРМАЦИЯ И МУЛЬТИМОДАЛЬНАЯ РЕПРЕЗЕНТАЦИЯ ТЕРМИНОВ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ

Аннотация

Стремительное развитие цифровых технологий оказывает значительное влияние на формирование и распространение терминологии информационных технологий. В современной цифровой коммуникации технологические понятия репрезентируются посредством взаимодействия лингвистических и визуальных средств, что делает изучение семантической трансформации и мультимодальной репрезентации особенно актуальным. В данной статье исследуются особенности семантической трансформации и мультимодального представления терминов информационных технологий в английском и узбекском языках. Материалом исследования послужил корпус часто употребляемых IT-терминов, собранных из цифровых платформ, онлайн-словарей и технологических интерфейсов. В работе использованы сравнительный, семантический, контекстуальный методы, а также метод мультимодального дискурса-анализа. Статья представляет значимость для терминоведения, цифровой лингвистики и исследований мультимодального дискурса, поскольку раскрывает лингвистические и когнитивные механизмы адаптации технологической лексики.

Ключевые слова: терминология информационных технологий, семантическая трансформация, мультимодальный дискурс, мультимодальная репрезентация, цифровая коммуникация, терминологическая адаптация, английский и узбекский языки, IT-термины.

Introduction. The rapid development of information and communication technologies has significantly transformed contemporary communication practices, giving rise to new forms of digital discourse. In modern digital environments, information is conveyed not only through verbal language but also through various visual, graphical, and interactive elements. This integration of multiple semiotic resources has led to the

emergence of multimodal discourse, in which meaning is constructed through the interaction of linguistic and non-linguistic modes. One of the most dynamic components of digital communication is information technology (IT) terminology. The continuous advancement of technological innovations generates a large number of new concepts that require linguistic representation. As a result, IT terminology is

constantly expanding and undergoing semantic transformation. Many technological terms originate from everyday vocabulary and acquire specialized meanings within digital contexts. Terms such as cloud, firewall, dashboard, bug, and cookie illustrate how lexical units develop new semantic functions in response to technological progress. The study of semantic transformation has become an important area of contemporary linguistics because it reveals the mechanisms through which lexical meaning changes under the influence of social, cultural, and technological factors. In the field of information technology, semantic transformation is often accompanied by multimodal representation. Technological concepts are frequently presented through combinations of words, icons, symbols, diagrams, screenshots, and interface elements, which together contribute to the interpretation of meaning. Therefore, the analysis of IT terminology requires an integrated approach that considers both linguistic and visual dimensions of communication. Previous studies have examined multimodality, terminology, and semantic change from various theoretical perspectives. Scholars such as Kress and Van Leeuwen emphasized the role of multimodal resources in meaning construction, while Lyons investigated the dynamic nature of lexical semantics. Cognitive linguistic studies have further demonstrated that metaphor and conceptualization play a significant role in the formation of specialized terminology. However, the interaction between semantic transformation and multimodal representation of IT terms, particularly in a comparative English-Uzbek context, remains insufficiently explored. The aim of this study is to investigate the semantic transformation and multimodal representation of information technology terms in English and Uzbek.

Methods. This study investigates the semantic transformation and multimodal representation of information technology (IT) terms in English and Uzbek. The research material consists of 25 frequently used IT terms selected from English-language technology websites, online IT dictionaries, software interfaces, and their Uzbek equivalents used in digital communication and educational resources. The selected terms include cloud, firewall, dashboard, browser, chatbot, artificial intelligence, machine learning, database, platform, algorithm, interface, cookie, phishing, malware, server, network, hyperlink, icon, menu, cybersecurity, big data, cache, bug, prompt, and blockchain.

The selection of the corpus was based on three criteria: (1) the frequency of occurrence in contemporary digital communication, (2) the presence of semantic shifts during adaptation into Uzbek, and (3) the active use of verbal and visual elements in their representation within multimodal environments. The study focuses on terms that demonstrate semantic adaptation and are frequently accompanied by visual signs such as icons, diagrams, interface symbols, and graphical elements. Several complementary research methods were employed. The comparative method was used to identify similarities and differences in the semantic interpretation of IT terms in English and Uzbek. Semantic analysis was applied to determine changes in meaning, including semantic extension, narrowing, metaphorization, and terminologization. Contextual analysis was used to examine the functioning of terms in authentic digital texts and software environments. In addition, multimodal discourse analysis was employed to investigate the interaction between verbal and visual modes in the representation of IT concepts.

The collected data were classified according to the type of semantic transformation observed during cross-linguistic adaptation. The transformations were grouped into four categories: transliteration, calque translation, semantic extension, and functional equivalence. Furthermore,

multimodal representations were analyzed with reference to the theoretical principles of multimodality proposed by Kress and Van Leeuwen, focusing on the relationship between linguistic signs and visual components in digital communication. The obtained results were systematized through qualitative and quantitative analysis, enabling the identification of the most common patterns of semantic transformation and multimodal representation in contemporary IT discourse.

Results. The analysis of 25 information technology terms revealed that semantic transformation is a common phenomenon in the process of adapting English IT terminology into Uzbek. The findings show that transliteration remains the most productive strategy in the adaptation of IT terminology. Terms such as platform, server, chatbot, blockchain, and cache have entered Uzbek with minimal structural modification while preserving their original meanings. This tendency reflects the rapid development of information technologies and the international character of technical vocabulary. Another frequently observed phenomenon is semantic extension. For example, the term cloud originally denotes a natural atmospheric object, but in digital discourse it has acquired the meaning of a virtual data storage environment. Similarly, dashboard has undergone semantic expansion from a physical panel to a digital interface used for monitoring and managing information. In Uzbek, these terms are often interpreted through explanatory descriptions that broaden their semantic scope. Several terms exhibited metaphorical transformation. The term firewall is based on the metaphor of a protective wall that prevents the spread of fire, while in information technology it refers to a security system protecting computer networks. Likewise, bug originally denotes an insect but has become a widely accepted technical term referring to a software error. Such examples demonstrate the important role of conceptual metaphor in the formation of IT terminology.

Quantitative analysis indicates that transliteration accounts for approximately 40% of the examined terms, while calque translation represents 28%, semantic extension 20%, and functional equivalence 12%. These results suggest that direct borrowing remains the dominant strategy in Uzbek IT discourse, although semantic adaptation is increasingly observed in newly emerging technological concepts. The study also revealed the significant role of multimodal representation in conveying IT terminology. Most analyzed terms appeared together with visual elements such as icons, diagrams, interface symbols, screenshots, and graphical indicators. For example, the concept of cloud computing is commonly represented by a cloud icon, while dashboard is accompanied by visual panels, charts, and control widgets. Such visual representations facilitate comprehension and contribute to the cognitive interpretation of technological concepts. Furthermore, multimodal representation was found to reduce semantic ambiguity. Users were able to identify the intended technical meaning more effectively when verbal terminology was supported by visual cues. This tendency was particularly evident in terms with metaphorical origins, such as firewall, bug, and cookie, where visual elements helped distinguish technical meanings from their original lexical senses.

Discussion. The findings demonstrate that the semantic transformation of information technology terms is closely related to the processes of technological development, globalization, and digital communication. The predominance of transliteration among the analyzed terms indicates that English continues to function as the principal source of IT terminology. Terms such as browser, platform, chatbot, and blockchain are transferred into Uzbek with minimal modification, preserving both their form and technical meaning. This tendency reflects the rapid dissemination of technological innovations and the

need for terminological uniformity in the global digital environment. The study also revealed that semantic extension plays a significant role in the formation of contemporary IT terminology. Terms such as cloud and dashboard have acquired new meanings that differ considerably from their original lexical interpretations. Such transformations support the view that terminology develops not only through borrowing but also through the reinterpretation of existing lexical units. In this regard, the findings correspond to the semantic theories of Lyons, who emphasizes the dynamic nature of lexical meaning and its dependence on communicative context. Another important finding concerns the role of conceptual metaphor in IT terminology.

The multimodal analysis further indicates that the meaning of IT terms is constructed through the interaction of verbal and visual resources. In digital environments, linguistic signs are rarely presented in isolation; instead, they are accompanied by icons, interface symbols, diagrams, screenshots, and other visual elements. According to Kress and Van Leeuwen, meaning in multimodal discourse emerges from the integration of different semiotic modes. The present findings confirm this assumption, showing that visual representations significantly facilitate the interpretation of technological concepts and reduce semantic ambiguity. The comparative analysis also reveals certain differences between English and Uzbek in the representation of IT concepts. While English often relies on concise technical terminology, Uzbek tends to employ explanatory or descriptive equivalents,

particularly for newly introduced concepts. This difference reflects the ongoing process of terminological standardization in Uzbek digital discourse and highlights the need for the development of consistent IT terminology adapted to the linguistic and cultural norms of the Uzbek language. The adaptation of IT terms involves not only linguistic changes but also cognitive and communicative mechanisms that enable users to understand and apply technological concepts effectively in multilingual digital environments. Consequently, multimodal discourse serves as an important medium through which new technological meanings are created, transmitted, and interpreted across languages and cultures.

Conclusion. The study demonstrated that semantic transformation is a fundamental process in the adaptation and development of information technology terminology in both English and Uzbek. The analysis revealed that transliteration, calque translation, semantic extension, and functional equivalence are the main mechanisms through which IT terms are integrated into Uzbek digital discourse, with transliteration emerging as the most productive strategy. Overall, the study indicates that semantic transformation and multimodal representation are closely interconnected processes that contribute to the effective transmission of technological knowledge across languages. The findings may serve as a theoretical basis for further research in terminology studies, digital linguistics, multimodal discourse analysis, and the development of English-Uzbek IT terminology.

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