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COGNITIVE AND LEXICAL FEATURES OF ROBOTICS TERMS

Abstract. This study explores the cognitive and lexical characteristics of robotics terminology through a combination of qualitative and quantitative methods. Findings reveal that robotics terms often use conceptual metaphors and cognitive frames to enhance comprehension. The morphological complexity, semantic relationships, and syntactic roles of these terms underscore their importance in technical communication. Educational exercises targeting these features can improve terminological competence, while professionals can benefit from a deeper understanding of these dimensions for better communication and documentation practices.

Keywords: Robotics terminology, cognitive linguistics, lexical analysis, morphological analysis, semantic analysis, syntactic analysis, technical vocabulary, terminological competence.

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КОГНИТИВНЫЕ И ЛЕКСИЧЕСКИЕ ОСОБЕННОСТИ ТЕРМИНОВ РОБОТОТЕХНИКИ

Аннотация. В данном исследовании изучаются когнитивные и лексические характеристики терминологии робототехники с использованием качественных и количественных методов. Результаты показывают, что термины робототехники часто используют концептуальные метафоры и когнитивные рамки для улучшения понимания. Морфологическая сложность, семантические отношения и синтаксические роли этих терминов подчеркивают их важность в технической коммуникации. Образовательные упражнения, направленные на изучение этих особенностей, могут повысить терминологическую компетентность, а профессионалы могут извлечь пользу из более глубокого понимания этих аспектов для улучшения коммуникации и практики документации.

Ключевые слова: терминология робототехники, когнитивная лингвистика, лексический анализ, морфологический анализ, семантический анализ, синтаксический анализ, техническая лексика, терминологическая компетентность.

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ROBOTOTEXNIKA TERMINLARINING KOGNITIV VA LEKSIK XUSUSIYATLARI

Annotatsiya. Ushbu tadqiqotda robototexnika terminologiyasining kognitiv va leksik xususiyatlari sifatli va miqdoriy usullar yordamida o‘rganiladi. Natijalar shuni ko‘rsatadiki, robototexnika terminlari ko‘pincha tushunishni yaxshilash uchun kontseptual metaforalar va kognitiv ramkalar qo‘llaniladi. Ushbu terminlarning morfologik murakkabligi, semantik munosabatlari va sintaktik rollari ularning texnik kommunikatsiyadagi muhimligini ta'kidlaydi. Ushbu xususiyatlarga qaratilgan ta'lim mashqlari terminologik kompetentlikni oshirishi mumkin, shu bilan birga, professional mutaxassislar bu jihatlarni chuqurroq tushunish orqali kommunikatsiya va hujjatlash amaliyotlarini yaxshilashlari mumkin.

Kalit so‘zlar: robototexnika terminologiyasi, kognitiv lingvistika, leksik tahlil, morfologik tahlil, semantik tahlil, sintaktik tahlil, texnik leksika, terminologik kompetentlik.

Introduction

The field of robotics is evolving at an unprecedented pace, transforming the way we interact with technology in both academic and practical settings. This rapid advancement necessitates the development of a specialized vocabulary that can accurately convey the complex concepts and functionalities associated with robotics. Understanding the cognitive and lexical characteristics of robotics terminology is crucial for both learners and professionals in this field. Robotics terminology encompasses a wide range of specialized terms that reflect the technical and operational aspects of robotic systems. These terms are not merely words; they encapsulate the knowledge, concepts, and technologies that define the field. The cognitive characteristics of these terms involve how they represent and communicate intricate robotic functions and processes.

From a lexical perspective, robotics terminology includes a variety of neologisms, abbreviations, and compound terms that have been introduced to describe new technologies and innovations. These terms are often derived from existing words or are newly coined to fit the specific needs of the field. For instance, terms like

"actuator," "sensor," and "microcontroller" are fundamental in describing the parts and functions of robots. Understanding these lexical formations and their usage is essential for effective communication and knowledge dissemination in robotics. The classification and mastery of robotics terminology are vital for enhancing lexical competence among students and professionals. As highlighted in various studies, including those by Urunova Sh. R., the systematic approach to teaching and learning these terms can significantly improve one's professional and communicative competence[2]. Exercises that focus on the morphological, semantic, and syntactic properties of robotics terms help in building a robust vocabulary that is crucial for academic and professional success in the field of robotics.

Literature Review

The study of robotics terminology encompasses both the cognitive and lexical dimensions of language, which are critical for understanding and communicating complex robotic concepts. The literature on this topic explores the intricate relationship between language, cognition, and technology, focusing on how specialized terminologies are developed, understood, and utilized in the field of robotics.

Cognitive linguistics emphasizes the role of mental processes in the formation and comprehension of language. In the context of robotics, cognitive characteristics of terminology involve the mental representation and categorization of robotic concepts. Faber (2009) discusses the cognitive shift in terminology, highlighting how the conceptual framework of robotics influences the creation and use of terms[1]. This cognitive approach helps in organizing knowledge about robotic systems and facilitates clearer communication among professionals. The lexical characteristics of robotics terminology involve the study of word formation, including neologisms, abbreviations, and compound terms. Dubuc (1997) provides a practical approach to terminology, focusing on how new terms are created and standardized in technical

fields. In robotics, terms such as "actuator," "sensor," and "microcontroller" are derived from existing words or newly coined to describe specific components and functions[3].

Budileva (2002) classifies terms based on their morphological structure, identifying simple terms, derived terms, and compound terms. This classification is crucial for understanding how terms are formed and how they evolve to accommodate new technological advancements[4]. For example, terms like "automation" and "robotics" illustrate the morphological processes of prefixation and suffixation, which are common in technical vocabulary development. Urunova (2022) also discusses the role of exercises in mastering these terms, emphasizing the need for targeted educational strategies to enhance lexical competence. She highlights the effectiveness of exercises that focus on the morphological, semantic, and syntactic properties of robotics terms, which help students develop a deeper understanding and better retention of these terms[2]. Terminological competence is essential for professional communication and knowledge dissemination in the field of robotics. Leichik (2009) explores the methods and structure of terminology, stressing the importance of a systematic approach to terminological education. By developing terminological competence, professionals can more effectively communicate complex concepts and collaborate on technological innovations[5].

Research Methodology

To analyze the cognitive and lexical features of robotics terminology, various methods can be employed, each contributing to different aspects of the study. These methods can be broadly categorized into qualitative and quantitative approaches, as well as interdisciplinary techniques that draw from linguistics, cognitive science, and computational analysis. Cognitive Linguistic Analysis is used to explore the conceptual and cognitive structures underlying robotics terminology. Conceptual Metaphor Analysis is used to identify metaphors used in robotics terminology (e.g.,

"robot brain," "neural network") and analyze how these metaphors shape understanding. Frame Semantics analyzes how terms fit within larger cognitive frames or schemas related to robotics. Morphological Analysis studies the formation and structure of robotics terms, including prefixes, suffixes, and compound words. It analyze the processes of word formation (e.g., affixation, compounding) and identify common morphological patterns. Semantic Analysis examines the meanings and relationships of robotics terms within the lexical field.

By employing a combination of these methods, researchers can gain a comprehensive understanding of the cognitive and lexical features of robotics terminology. Each method offers unique insights and, when integrated, can provide a holistic view of how robotics terms are formed, used, and understood within the field. This multi-faceted approach is essential for developing effective educational strategies and tools for teaching and learning robotics terminology.

Results and Discussion

Robotics terms frequently employ conceptual metaphors that frame these technologies in familiar, human-like terms. For instance, terms such as "neural network" and "robot brain" utilize biological metaphors to describe artificial systems, aiding in the conceptual understanding by likening these systems to human cognitive processes. This metaphorical framing helps bridge the gap between complex robotic functions and everyday human experiences, making the technology more accessible and comprehensible. Additionally, the study identified that robotics terminology often fits into broader cognitive schemas related to machinery, intelligence, and automation. Terms like "automation" and "controller" are integral to cognitive frameworks that users employ to understand how robots function and interact with their environments. These terms serve as cognitive tools, helping individuals categorize and make sense of robotic technologies.

From a lexical perspective, terms are categorized into simple, derived, and compound structures. Simple terms like "robot" and "sensor" are foundational elements of the vocabulary. Derived terms, such as "automation" and "microcontroller," demonstrate common morphological processes including affixation. Compound terms like "machine learning" and "computer vision" illustrate how existing words are combined to create precise technical concepts. The study also reveals significant insights into the semantic relationships within robotics terminology. Synonyms such as "autonomous" and "self-operating," and antonyms like "manual" and "automated," reflect the nuanced meanings and distinctions within the field. Polysemous terms, those with multiple meanings like "drive" (as in motor drive and data drive), show the importance of context in disambiguating technical language.

Conclusion

The comprehensive analysis of the cognitive and lexical features of robotics terminology reveals the intricate ways in which language, cognition, and technology intersect in this rapidly evolving field. The study, informed by Urunova's research, highlights several key findings that have significant implications for both educational and professional practices in robotics. The use of conceptual metaphors and cognitive schemas plays a crucial role in making complex robotic technologies more comprehensible. Terms like "neural network" and "robot brain" leverage familiar biological concepts to help bridge the gap between human cognition and artificial systems. This cognitive framing is essential for both novices and experts to understand and relate to advanced robotic functions. This study underscores the importance of a nuanced understanding of robotics terminology. By exploring the cognitive and lexical features of these terms, we can foster clearer communication, more effective learning, and better professional practices in the field of robotics.

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