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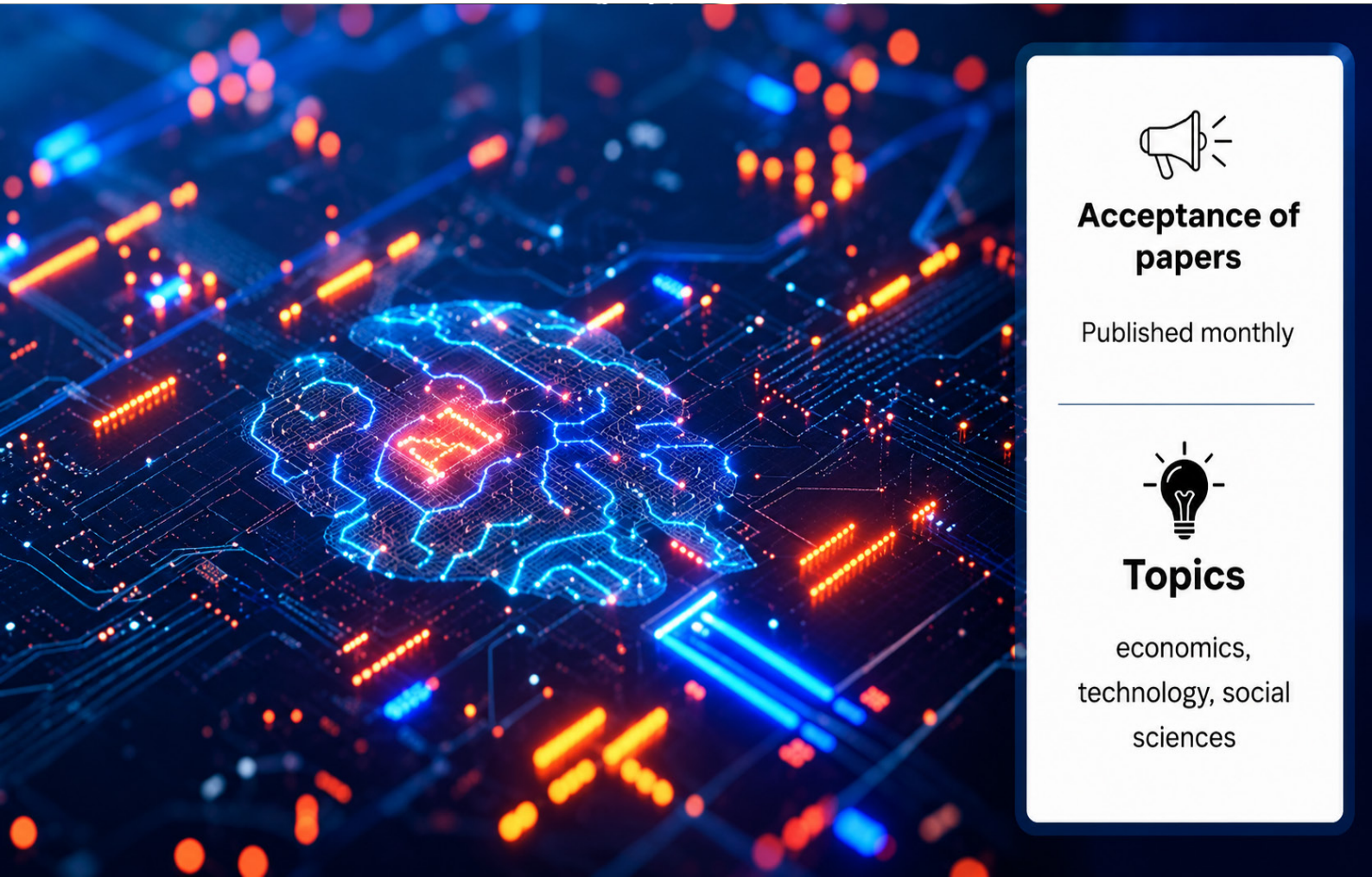

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FUNCTIONAL FEATURES OF SEMANTIC PHENOMENA IN ENGLISH AND UZBEK METALLURGICAL TERMINOLOGY

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ABSTRACT: This article provides a comparative analysis of the functional and semantic features of synonymy, polysemy, and homonymy in English and Uzbek metallurgical terminology. The primary objective of the article is to identify the similarities and differences between the two languages based on the relationships among the form, concept, semantic connection, and contextual realization of metallurgical terms. The article employs descriptive, comparative-typological, semantic, componential, and terminographic approaches. In evaluating terminological units, the object–concept–definition–designation relationships established in the ISO 704:2022 standard were used as a theoretical basis. The analysis demonstrates that synonymy in metallurgical terminology is characterized by different naming variants of the same metallurgical concept; polysemy involves a single term expressing several semantically interconnected meanings; and homonymy is characterized by formal similarity in the absence of a conceptual and semantic relationship. In English, units such as *casting, charge, ore,* and *matte* clearly demonstrate the relationship between general-language meanings and specialized meanings within the metallurgical domain, whereas in Uzbek, some of these concepts are expressed through differential or borrowed units such as *quyish/quyma, shixta, ruda,* and *shteyn*. On this basis, the article substantiates that semantic asymmetry in English and Uzbek metallurgical terminology is particularly associated with borrowing, calquing, derivation, and contextual specialization of terminological units.

KEYWORDS: metallurgical terminology, term, synonymy, polysemy, homonymy, semantic asymmetry, terminological equivalence, context, concept, English language, Uzbek language.

ANNOTATSIYA: Maqolada ingliz va o‘zbek metallurgiya terminologiyasida sinonimiya, polisemiya va omonimiyaning funksional-semantik xususiyatlari qiyosiy tahlil qilingan. Maqolaning asosiy maqsadi metallurgik terminlarning shakli, tushunchasi, semantik aloqasi va kontekstual namoyon bo‘lishi o‘rtasidagi munosabatlar asosida ikki til o‘rtasidagi o‘xshashlik va farqlarni aniqlashdan iborat. Maqolada tavsifiy, qiyosiy-tipologik, semantik, komponent va terminografik yondashuvlardan foydalanilgan. Terminologik birliklarni baholashda ISO 704:2022 standartida belgilangan obyekt–tushuncha–ta’rif–belgi munosabatlari nazariy asos sifatida qo‘llanilgan. Tahlil shuni ko‘rsatadiki, metallurgiya terminologiyasida sinonimiya bir xil metallurgik tushunchaning turli nomlash variantlari bilan tavsiflanadi; polisemiya bitta terminning o‘zaro semantik jihatdan bog‘langan bir nechta ma’noni ifodalashini anglatadi; omonimiya esa tushunchaviy va semantik aloqa mavjud bo‘lmagan holda shakliy o‘xshashlik bilan tavsiflanadi. Ingliz tilida *casting, charge, ore* va *matte* kabi birliklar umumtil ma’nolari bilan metallurgiya sohasidagi maxsus ma’nolar o‘rtasidagi bog‘liqlikni yaqqol namoyon etsa, o‘zbek tilida ushbu tushunchalarning ayrimlari *quyish/quyma, shixta, ruda* va *shteyn* kabi differensial yoki o‘zlashma birliklar orqali ifodalanadi. Shu asosda maqolada ingliz va o‘zbek metallurgiya terminologiyasidagi semantik assimetriya, ayniqsa, terminologik birliklarning o‘zlashishi, kalkalash, derivatsiya va kontekstual ixtisoslashuvi bilan bog‘liq ekanligi asoslab berilgan.

KALIT SO‘ZLAR: metallurgiya terminologiyasi, termin, sinonimiya, polisemiya, omonimiya, semantik assimetriya, terminologik ekvivalentlik, kontekst, tushuncha, ingliz tili, o‘zbek tili.

АННОТАЦИЯ: В статье представлен сравнительный анализ функционально-семантических особенностей синонимии, полисемии и омонимии в английской и узбекской металлургической терминологии. Основной целью статьи является выявление сходств и различий между двумя языками на основе взаимосвязей между формой, понятием, семантической связью и контекстуальной реализацией металлургических терминов. В статье использованы описательный, сравнительно-типологический, семантический, компонентный и терминографический подходы. При оценке терминологических единиц в качестве теоретической основы использованы отношения «объект – понятие – определение – обозначение», установленные стандартом ISO 704:2022. Анализ показывает, что синонимия в металлургической терминологии характеризуется различными вариантами наименования одного и того же металлургического понятия; полисемия предполагает выражение одним термином нескольких семантически взаимосвязанных значений; омонимия характеризуется формальным сходством при отсутствии понятийной и семантической связи. В английском языке такие единицы, как *casting, charge, ore* и *matte*, наглядно демонстрируют взаимосвязь между общеязыковыми и специализированными значениями в металлургической сфере, тогда как в узбекском языке некоторые из этих понятий выражаются посредством дифференцированных или заимствованных единиц, таких как *quyish/quyma, shixta, ruda* и *shteyn*. На этой основе в статье обосновано, что семантическая асимметрия в английской и узбекской металлургической терминологии в значительной степени

связана с заимствованием, калькированием, деривацией и контекстуальной специализацией терминологических единиц.

КЛЮЧЕВЫЕ СЛОВА: металлургическая терминология, термин, синонимия, полисемия, омонимия, семантическая асимметрия, терминологическая эквивалентность, контекст, понятие, английский язык, узбекский язык.

INTRODUCTION

Metallurgy is one of the oldest and most strategically important branches of production, playing a significant role in the development of human civilization. Knowledge and practical experience related to metalworking, extraction, smelting, refining, alloy production, and the application of metals in various technological processes have developed over long historical periods. Today, metallurgy is not only an important sector of industrial production but also constitutes a technological foundation for many other fields, including mechanical engineering, energy, construction, transportation, defense, electronics, and numerous other industries. Alongside the development of the field, a specialized terminological system serving to express metallurgical concepts accurately, concisely, and systematically has also emerged and continues to develop. Therefore, the linguistic analysis of metallurgical terminology represents one of the relevant areas of contemporary terminology, lexicology, semasiology, and comparative linguistics.

A terminological system reflects the conceptual structure of any scientific or industrial field. Metallurgical terms express concepts related to the physical and chemical properties of metals, production technologies, types of raw materials, the composition of metals and alloys, smelting and processing operations, technological equipment, production processes, and the characteristics of finished products. The formation and development of such terminology are closely associated not only with the general lexical patterns of a language but also with scientific and technological progress, international scientific cooperation, economic relations, and industrial experience. Consequently, various semantic phenomena emerge within metallurgical terminology, including semantic transfer, expansion and narrowing of meaning, terminologization, determinologization, synonymy, polysemy, and homonymy.

In particular, a comparative analysis of metallurgical terminology in English and Uzbek is of considerable scientific significance. Today, English, as one of the principal languages of international scientific and technical communication, plays a major role in expressing new scientific concepts, technologies, and innovative processes in the field of metallurgy. In Uzbek, by contrast, the terminological system related to metallurgy is developing on the basis of the internal resources of the national language, its historical and linguistic development, as well as units borrowed from other languages. From this perspective, comparing semantic processes in the terminologies of the two languages makes it possible to identify their common and distinctive features and to determine the semantic structure and functional characteristics of metallurgical terms.

When analyzing the semantic characteristics of metallurgical terms, particular attention should first be paid to the relationship between terminology and general vocabulary. Certain words may express a general meaning in the common language while acquiring a precise and restricted meaning as specialized terms within the field of metallurgy. For example, the English units *casting, refining, rolling, forging,* and *smelting* have developed as specialized terms denoting specific types of metallurgical processes. In Uzbek, they are correspondingly expressed by such units as *quyish, tozalash, prokatlash, bolg'alash,* and *eritish*. The semantic structure of these units, unlike their general lexical meanings, has been enriched with specific professional and technological content. Therefore, the field in which a term is used is an important factor in its semantic formation.

The phenomenon of **terminologization** is particularly significant in metallurgical terminology. Certain units of general vocabulary enter the terminological system to denote specialized scientific or technical concepts and acquire new, specialized meanings. In this process, the original meaning of a word may either be retained or become partially differentiated from its original semantic content. For example, the English word *grain* generally denotes a "grain," whereas in metallurgy it may refer to a "crystallite" or "grain" within the crystal structure of a metal. Similarly, *matrix*, which in general scientific vocabulary refers to the concept of a "matrix," denotes in materials science and metallurgy the primary metallic or alloy phase that contains other phases. In Uzbek, the specialization of certain general-language units as metallurgical terms can also be observed. Such processes demonstrate the semantic dynamics of the terminological system.

Furthermore, **semantic expansion and narrowing** constitute important semantic phenomena in metallurgical terminology. As a result of scientific and technological progress, an existing term may be used not only in its original sense but also to denote a new technological process or object. In other cases, the meaning of a term may become narrower within a particular professional context, referring exclusively to a specific technological process, material, or phenomenon. Identifying such semantic changes provides an important methodological basis for understanding the historical and contemporary development of English and Uzbek metallurgical

terminology.

In comparative analysis, particular attention should also be given to the phenomena of **polysemy and synonymy**. In an ideal terminological system, each term is expected to express a single concept precisely. However, actual scientific communication demonstrates that a single term may be used to express several semantically related meanings or that a single concept may be represented by several different terms. In English metallurgical terminology, terminological variants that have emerged under the influence of international scientific and technical communication are relatively common, whereas in Uzbek, some of these concepts are expressed through borrowed forms and others through the word-formation resources of the national language. This situation further complicates the determination of the semantic and functional equivalence of terms.

Borrowed terms also occupy a significant place in the metallurgical terminology of both languages. Since metallurgy has historically developed through the scientific and practical experience of different peoples and civilizations, its terminology contains units originating from Greek, Latin, French, German, Russian, and other languages. In the contemporary period, English, as one of the principal sources of technological innovation and scientific information, has a particularly strong influence on terminological renewal. The semantic adaptation, phonetic and morphological modification, and competition with national terms of metallurgical terminology entering Uzbek directly from English or through other languages require separate and systematic analysis.

LITERATURE REVIEW

The study of semantic phenomena observed in English and Uzbek metallurgical terminology requires an integrated investigation of contemporary terminology, lexicology, cognitive linguistics, and specialized communication. Metallurgical terminology differs considerably from other lexical layers of the general language in terms of its formation, development, and functional use. Terms used in this field represent a wide range of technological processes, including the extraction of metal ores, ore beneficiation, metal production, smelting, casting, alloying, heat treatment, determination of mechanical properties, and quality control of finished products. Therefore, the semantic structure of metallurgical terms is closely connected not only with the lexical meaning of linguistic units but also with particular production processes, technological operations, and scientific concepts.

Studies in terminology emphasize that the primary function of a term is to express a specialized concept as precisely, concisely, and unambiguously as possible. However, linguistic evidence demonstrates that terms do not always possess absolute monosemy. Particularly in rapidly developing technical fields such as metallurgy, terms may expand their semantic scope as new technologies, materials, and production methods emerge. Consequently, a single term may express several interrelated concepts, shift from a general technical meaning to a narrower specialized meaning, or acquire new semantic content as a result of borrowing from other terminological systems.

One of the important semantic phenomena in metallurgical terminology is **polysemy**. Within polysemy, a single terminological form expresses several meanings that are semantically interconnected. For example, the English term *slag* denotes the non-metallic material formed during the smelting process in metallurgy; however, depending on its composition and function at different stages of a technological process, certain semantic distinctions may arise. Similar processes of semantic specification can also be observed in Uzbek units such as *shlak* (slag), *eritma* (solution/molten material), *qotishma* (alloy), *pech* (furnace), and *quyma* (casting/ingot), whose precise meanings may vary according to context. Thus, the specific meaning of a term often depends on the technological process within which it is used.

Metaphorical transfer also plays an important role in the semantic development of metallurgical terms. Some technical terms have developed as a result of using words that originally belonged to the general vocabulary in specialized meanings. In this process, a new terminological meaning emerges on the basis of similarities in the shape, function, condition, or movement of an object. In English, the use of units such as *head, neck, skin, grain, seed, flow,* and *casting* in specialized metallurgical contexts can serve as examples. Similarly, in Uzbek, the use of units such as *bosh* (head), *bo'yin* (neck), *don* (grain), *oqim* (flow), and *qobiq* (shell/skin) as technical terms demonstrates the semantic relationship between their general-language meanings and specialized meanings. Such units help explain metallurgical processes through images and concepts that are closely related to human experience.

Metonymic transfer is another active semantic mechanism in the formation of metallurgical terminology. In this process, semantic change occurs on the basis of a close relationship between an object, a process, its result, a material, equipment, or a technological operation. For example, the name of a particular material may refer to a product made from that material, while the name of a technological process may denote the result of that process. Such semantic relationships between process and result, substance and product, and equipment and technological operation frequently occur in English metallurgical terminology. The same phenomenon is

also clearly manifested in the functional use of terms within Uzbek metallurgical terminology.

In the comparative study of the terminologies of the two languages, the issue of **synonymy** also deserves particular attention. Although terminological theory generally assumes that one precise term should correspond to one concept, synonymous or variant terms may exist in actual scientific and industrial discourse. This situation is particularly associated with the introduction of international terms into Uzbek, their parallel use alongside units formed from the resources of the national language, and the influence of different scientific schools. In English, abbreviated forms, full terminological expressions, and technological or general scientific variants may also be used in parallel to denote certain metallurgical concepts. In Uzbek, it is likewise possible to observe a period during which a borrowed term and its explanatory or translated equivalent are used alongside each other.

Antonymy is an important means of expressing opposing characteristics of processes and materials in metallurgical terminology. For example, contrasting concepts such as *heating–cooling, melting–solidification,* and *softening–hardening* serve to clearly distinguish different stages of technological processes. In Uzbek, the corresponding units *qizdirish–sovitish* (heating–cooling), *eritish–qotirish* (melting–solidification), and *yumshatish–qattiqlashtirish* (softening–hardening) express the same semantic relationships. Such antonymic pairs are particularly important for explaining the sequence of metallurgical processes and the technological oppositions between different operations.

RESEARCH METHODOLOGY

The methodological basis of this article consists of the principles of systematic, comparative, and functional analysis of semantic phenomena observed in the metallurgical terminology of English and Uzbek. In the article, metallurgy is regarded as a terminological system, and the formation, semantic development, semantic relationships, and functional characteristics of its terms in professional communication are comparatively analyzed in the two languages. In this approach, not only the lexical meanings of terms but also their functions in denoting specific technological processes, stages of production, types of metals or alloys, physical and chemical properties, equipment, materials, technological operations, and production outcomes are identified as key objects of analysis.

The article employs a comparative-typological approach to identify similarities and differences between English and Uzbek metallurgical terms. The analysis focuses on the structural and semantic correspondence of terminological units, their degree of conceptual equivalence, and the ways in which specialized meanings are realized in professional contexts. Particular attention is given to cases in which a single lexical form develops several related meanings, as well as cases in which different lexical forms denote the same or closely related metallurgical concepts. This makes it possible to distinguish polysemy from synonymy and to establish the functional boundaries of individual terminological units.

The semantic analysis is complemented by componential analysis, through which the semantic structure of metallurgical terms is examined by identifying their basic conceptual components. For instance, terms denoting metallurgical processes are analyzed according to features such as the type of material involved, the technological operation performed, the physical state of the material, the purpose of the process, and its expected result. This approach makes it possible to identify both common semantic components and language-specific features in English and Uzbek terminology.

A contextual approach is also applied because the meaning of a metallurgical term cannot always be determined independently of its professional environment. The same lexical unit may acquire a more specific meaning depending on the technological stage, type of furnace, material composition, production method, or scientific context in which it occurs. Therefore, terminological units are examined within authentic or professionally relevant contexts in order to determine their actual functional and semantic characteristics.

The comparative analysis additionally considers the processes of borrowing, calquing, derivation, semantic specialization, terminologization, and determinologization. Borrowed terms are analyzed in terms of their semantic adaptation to the Uzbek terminological system, while translated and derived equivalents are examined according to their conceptual correspondence with English terms. This approach makes it possible to identify cases of complete, partial, and context-dependent terminological equivalence.

The methodology is aimed at revealing the functional-semantic organization of English and Uzbek metallurgical terminology and determining the mechanisms through which semantic relationships develop within the two systems. The combination of descriptive, comparative-typological, semantic, componential, contextual, and terminographic approaches provides a comprehensive basis for identifying the specific characteristics of synonymy, polysemy, antonymy, metaphorical and metonymic transfer, as well as semantic asymmetry in English and Uzbek metallurgical terminology.

First and foremost, the **comparative-typological method** was employed in the article. This method made

it possible to identify the common and distinctive features of metallurgical terms in English and Uzbek. The comparison took into account the structural organization, semantic composition, nominative characteristics, semantic scope, and range of use of the terms. English metallurgical terms were compared with their Uzbek equivalents, with particular attention given to determining whether they represented full equivalents, partial equivalents, or cases of non-equivalence. Special consideration was given to cases in which a term expresses the same technological concept in both languages but differs in semantic scope or limits of application.

An important method applied in the article was the **semantic analysis method**, which was used to examine the semantic structure and semantic changes of metallurgical terms. On the basis of this method, the participation of terms in such semantic phenomena as monosemy, polysemy, synonymy, antonymy, homonymy, and metaphorical and metonymic meaning transfer was analyzed. For example, certain metallurgical terms were initially used with meanings belonging to the general vocabulary and subsequently acquired specialized terminological meanings in the course of professional activity. The transition of such terms from general lexical meanings to specialized scientific and technical meanings was examined from the perspective of semantic derivation.

ANALYSIS AND RESULTS

The findings of the article demonstrate that semantic phenomena in English and Uzbek metallurgical terminology have considerable functional significance in the formation, development, and practical use of terms. Since metallurgy is closely interconnected with disciplines such as engineering, chemistry, physics, geology, mechanical engineering, and energy, its terminological system is continuously enriched with new concepts. In this process, the development of terminology occurs not only through the creation of new lexical units but also through the expansion, narrowing, transfer, and specialization of the meanings of existing lexical units and through other semantic transformations.

The comparative analysis shows that although English and Uzbek metallurgical terminology share common semantic phenomena, the ways in which these phenomena are manifested differ according to the structural characteristics, historical development, and language-contact patterns of the two languages. In English, a considerable part of metallurgical terminology has developed in connection with international scientific and technical vocabulary, Latin and Greek linguistic sources, and the advancement of modern technological terminology. In Uzbek, the development of the terminological system is based on the internal resources of the Uzbek language, while the influence of Russian and international scientific terminology has also played a significant role.

One of the important phenomena identified during the analysis is the acquisition of specialized terminological meanings by certain units belonging to the general vocabulary. This process can be regarded as **semantic specialization**. For example, English units such as *ore, slag, charge, melt, casting, scale,* and *flux*, in addition to their general or domain-specific meanings, express specialized technological concepts in metallurgy.

For instance, the word *charge* is used in general English with meanings such as “electrical charge,” “fee,” or “loading,” whereas in metallurgy it refers to the set of raw materials or materials introduced into a furnace for processing. Similarly, *melt* generally means “to melt” or “to become liquid,” while in a metallurgical context it is actively used as a specialized unit referring to molten metal or the melting process.

Similar semantic specialization can also be observed in Uzbek. Units such as **“eritma,” “eritish,” “quyish,” “shlak,” “shixta,” “ruda,” “qotishma,” “pech,”** and **“o‘zak”** perform the function of precisely expressing specific technological concepts in metallurgical texts. In this process, the meaning of a term becomes narrower than its meaning in general communication and is standardized within a particular professional context.

In English and Uzbek metallurgical terminology, **polysemy**, that is, the ability of a single term or lexical unit to express several semantically related meanings, can also be observed. Polysemy is particularly evident in units denoting processes, products, technological operations, and physical states.

For example, the English unit *casting* may refer to the “casting process,” the “technology of producing cast products,” and, in certain contexts, a “cast product.” Similarly, *rolling* denotes the process of rolling metal and may also be used to express concepts associated with a technological operation or rolled products. Thus, the precise meaning of a term largely depends on its syntactic and terminological context.

The Uzbek equivalents of these terms demonstrate similar contextual differentiation. For example, **“quyish”** primarily denotes the technological process of pouring molten metal into a mold, whereas **“quyma”** may refer to the product obtained through casting. This distinction demonstrates that even closely related lexical units may acquire different functional roles within the metallurgical terminological system.

The analysis indicates that polysemy in metallurgical terminology should not necessarily be viewed as a deficiency in terminological precision. Rather, semantically related meanings may reflect different stages, aspects, or results of the same technological concept. Context, therefore, performs a crucial disambiguating

function, allowing specialists to identify the intended meaning of a polysemous term.

From a comparative perspective, English tends to preserve certain multifunctional lexical forms across different metallurgical contexts, whereas Uzbek may differentiate their meanings through separate lexical units, affixation, or contextual specification. This difference contributes to semantic asymmetry between the two terminological systems and demonstrates the importance of considering both linguistic form and conceptual structure when establishing terminological equivalents.

The article findings demonstrate that **metaphorical meaning transfer** is also one of the effective means of term formation in metallurgical terminology. In particular, terms have been formed through comparisons between the shape, structure, movement, or technological processes of metals and human activities, natural phenomena, or other objects.

Table 1. Comparative Characteristics of the Main Semantic Phenomena in English and Uzbek Metallurgical Terminology

№	Semantic phenomenon	Metallurgical terms in English	Uzbek language alternatives	Semantic feature	Functional feature
1	Synonymy	steel - alloy steel	steel – alloy steel	The presence of synonymous or close-meaning units	Provides clarification and variation of concepts in the terminological system
2	Synonymy	iron - ferrum	iron – ferrum	The expression of the same concept through different names	Provides a connection between scientific and international terminology
3	Antonymy	hardening - softening	hardening – softening	Represents opposite technological processes	Identifies opposing stages of metalworking processes
4	Antonymy	heating – cooling	heating – cooling	Opposite processes related to temperature	Serves to express the sequence of production processes
5	Polysemy	casting	casting	A term can express different, but related meanings	Allows the expression of the technological process and its result
6	Polysemy	charge	charge / load	Has different technical meanings depending on the context	Represents the raw material or charge fed into the metallurgical furnace
7	Metaphor	steel grain	steel grain	The concept of «grain» in common language was copied for the structure of metal	Helps to express the microstructure figuratively, but scientifically accurately

In English, the use of units such as *skin, neck, head, tail, finger,* and *arm* in certain metallurgical compounds with specialized technological or structural meanings can serve as an example of this phenomenon. For instance, *skin* generally denotes “the outer covering of the body,” whereas in a metallurgical context it may refer to the outer layer or surface portion of a metal. Such semantic transfer is based on external resemblance or functional similarity between objects.

A similar phenomenon can also be observed in Uzbek, where units such as **“oyoq” (leg/foot), “bosh” (head), “bo‘yin” (neck), “qatlam” (layer), “o‘zak” (core), and “qobiq” (shell/skin)** acquire specialized meanings within technical terms. For example, in combinations such as *metall qobig‘i* (metal shell), *detal o‘zagi* (core of a component), and *quvur bo‘yni* (pipe neck), general-language units serve to express specific technical concepts.

The primary function of metaphorical terms is to **name complex technological or physical processes in an illustrative, comprehensible, and concise manner**. At the same time, metaphorical terms in terminology do not primarily serve to increase the expressiveness of the terminological system; rather, they facilitate the concise and convenient expression of specialized concepts. In this respect, metaphor in scientific terminology differs functionally from metaphor in literary discourse.

Metonymic semantic transfer is also an active semantic phenomenon in metallurgical terminology. In this process, one designation begins to express another concept on the basis of semantic proximity between an object, process, material, equipment, and its result.

For example, in metallurgy, the name of a particular technological process may also be used to denote the product obtained as a result of that process. Similarly, the name of equipment may sometimes be used in a

meaning associated with the process performed using that equipment or with the product manufactured by it.

In Uzbek, semantic relationships between a process, product, and material can also be observed in units such as *quyma* (cast product/casting), *eritma* (melt/solution, depending on context), *qotishma* (alloy), and *prokat* (rolled product/rolling stock). Such a phenomenon ensures **economy and conciseness** within the terminological system. In other words, by preserving the direct relationship between several interconnected concepts, it reduces the need to create completely new lexical units for each individual concept.

The comparative analysis also revealed the presence of **synonymous and variant units** in English and Uzbek metallurgical terminology. Although the ideal condition for a terminological system is a one-to-one correspondence between a concept and a term, the parallel use of terminological variants is natural in actual scientific and technical discourse.

In English, local and international terms, abbreviations, and different structural variants may be used simultaneously to denote certain technological concepts. In Uzbek metallurgical terminology, borrowed terms may likewise be used in parallel with their explanatory or translated equivalents. For example, terminological variation may arise between phonologically and morphologically adapted forms of international terms and forms created through calquing or descriptive translation.

On the one hand, such variation contributes to the enrichment of terminology; on the other hand, it creates a **problem of terminological standardization**. Therefore, in scientific and technical literature, it is important to select the most appropriate, concise, precise, and widely accepted term for a particular concept among specialists in the field.

The comparative analysis of English and Uzbek metallurgical terminology demonstrated the particular importance of **borrowed terms**. Since metallurgy is an international scientific and technical field, its terminological system contains a large number of lexical units borrowed from different languages.

In Uzbek, terms such as *metall, material, prokat, domna, konverter, elektrod, alyuminiy, nikel, xrom, marten,* and *shlak* are actively used as international or foreign-origin terminological units. During their incorporation into Uzbek, these terms undergo phonetic, morphological, and semantic adaptation.

For example, borrowed terms adapt to the grammatical system of Uzbek and can take case, possessive, and plural suffixes: *metallar* (metals), *qotishmalar* (alloys), *elektrodlar* (electrodes), *prokatlash* (rolling), and *metallurgik* (metallurgical), among others. At the same time, certain borrowed units serve as bases for the formation of new derived terms. Thus, the functional potential of borrowed terminology is not limited to the adoption of ready-made terms; it is also manifested in the creation of new terminological units.

CONCLUSION AND SUGGESTIONS

Overall, the findings of the article demonstrate that the semantic system of English and Uzbek metallurgical terminology is dynamic and continuously developing. Phenomena such as **polysemy, semantic specialization, metaphor, metonymy, synonymy, borrowing, semantic expansion, and semantic narrowing** actively participate in this system. These phenomena perform various functions in the formation, development, and improvement of terminological systems.

The most important finding is that the differences between the terminological systems of the two languages are determined not only by the external forms of terms but also by their **semantic structures, contexts of use, functional load, and degree of terminological standardization**. While international scientific and technical terminology and terminological compression are strongly manifested in English, Uzbek places particular emphasis on adapting borrowed units to the national language system, as well as on creating terms through calquing and descriptive translation.

From this perspective, the comparative analysis of English and Uzbek metallurgical terms provides an important scientific and practical basis for **identifying terminological equivalents, improving the quality of technical translation, standardizing newly emerging terms, and ensuring the effectiveness of professional communication**. A comprehensive analysis of semantic phenomena makes it possible to convey metallurgical knowledge between the two languages accurately and appropriately in terms of meaning and content.

Consequently, the comparative-semantic analysis of metallurgical terminology contributes not only to linguistics but also directly to the development of **technical translation studies, terminology, professional education, and international scientific and technical communication**.

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