The OSCAR PUBLISHING Services
American Journal of Philological Sciences

VOLUME Vol.05 Issue04 2025
PAGE NO. 333-337
DOI 10.37547/ajps/Volume05Issue04-82

Terminological Precision and Linguistic Challenges in Technical Translation

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Received: 28 February 2025; **Accepted:** 29 March 2025; **Published:** 30 April 2025

Abstract: This article explores the distinct features of technical translation in contrast to literary translation, emphasizing the critical role of precision, clarity, and consistency in scientific and technical texts. It highlights the challenges posed by neologisms, polysemy, synonymy, and term creation, and examines the differences in lexical and terminological meanings. The article also analyzes how language-specific sentence structures and the systematic organization of terminology affect translation accuracy. Through examples, it demonstrates the importance of a well-developed terminology system for effective communication and knowledge transfer in science and technology. Mastery of terminology is presented as essential for professional technical translation.

Keywords: Technical translation, terminology, neologisms, polysemy, synonymy, lexical meaning, terminological meaning, precision, scientific texts, term creation, language structure, clarity, consistency, semantic analysis, communication.

Introduction: The translation of technical literature differs from the translation of literary literature in several distinctive ways. These distinctive features are primarily related to the specific nature of the language used in technical literature. The main requirements for the language of scientific and technical literature are style, manner of expression, brevity, and the clarity of the ideas being conveyed. At the same time, scientific and technical literature is characterized by the use of specialized terms (and abbreviations), the tradition of word usage, and the preference for certain syntactic constructions over others.

METHODS

The presence of a large number of specialized terms in the text, especially those that have recently emerged (neologisms) and have not yet been recorded in dictionaries, creates significant challenges in the translation process. The richness of scientific and technical literature with new terms is explained by the fact that the terminology of the language is inherently a dynamic layer of the vocabulary. Typically, the primary goal of scientific and technical literature is to reflect the latest achievements in science and technology, and neologisms form a relatively large percentage of the overall lexicon.

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In general, terminology, particularly technical terminology, forms a part of the national language. In it, the elliptical nature of expression is especially evident, and this primarily occurs from the perspective of the requirements for scientific precision and abbreviation. Another key stylistic feature of technical literature is the conciseness of the presentation of material and the fluency of expressions.

One of the distinctive characteristics of the English scientific-technical language, and of English in general, is that in it, semantic saturation weakens towards the end of a sentence. In Russian, however, the opposite occurs, meaning that the semantic growth develops from the beginning to the end of the sentence. As for the Uzbek language, neither of the two aforementioned observations can be fully applied; in our opinion, this is influenced in some sense by the emphasis placed on the predicate in Uzbek sentences. Thus, in English, the point that requires attention often comes first, while in Russian, it is typically placed at the end. The Uzbek language, on the other hand, consists of sentences that require an even distribution of emphasis.

In addition to characteristics such as abbreviation and precision, which are typical of scientific-technical literature, technical texts also stand out for their richness in technical figurative phraseological expressions. For example, "the wire is alive" – провод под током – "a wire under electrical voltage," "dead engine landing" – посадка с выключенным двигателем – "landing with the engine turned off" are some of the examples. In such cases, a full (adequate) translation is achieved not only by accurately conveying the meaning but also by delivering all the elements of the figurativeness from the original text to the reader. [2, 5]

One of the distinctive features of scientific-technical literature is that, despite the large number of specialized terms, it also includes a significant percentage of words and phrases used in general language. A large portion of general-use words consists of polysemous words. In some cases, knowing the grammatical features of polysemous words is not enough to determine their meaning; it is also necessary to understand their lexical relationships. A typical example of such polysemous words in English technical terminology are lexical units such as to suggest, to stem, to claim, and to understand.

Another important aspect of translating technical texts is that, in many cases, the translator has to create equivalents in the target language for new concepts. This is because it is precisely the terms that create difficulty when translating technical material.

When translating literary works, understanding the text in a foreign language generally does not present significant difficulties, and the main issue arises in recreating the aesthetic and ideological world of the original text in the target language. In contrast, understanding scientific or technical texts in English is usually associated with a series of challenges, each varying in significance. At the initial stages, the specific features of the foreign language's grammar usually present difficulties. As the translator's skill improves, grammatical challenges tend to subside; however, determining the meanings of unknown terms remains a constant necessity. It is not always possible to find the meaning of an unfamiliar term. Often, the translator is compelled to conduct a contextual and specialized (morpho)-semantic analysis of the term.

The phrases encountered in technical literature belong to two categories: one consists of general vocabulary, while the other includes specialized (scientific or coined) terms. So, what exactly is a term, and how does it differ from other words?

Let’s compare words and phrases from both categories as an example:

qog‘oz – base, substrate; chiroyli – hidden.

It should be emphasized that the first type of word is widely used and is understandable to any literate person. However, this definition cannot be applied to the words in the second part of the examples. This is because these words express highly specialized scientific and industrial concepts and are only used in specific fields of science and technology. Thus, the primary difference between scientific and industrial terms and other general vocabulary words is that they represent specific scientific and technical concepts. Terms also differ from ordinary words in their higher degree of semantic precision. This can be seen when comparing the general-use verb to go with the technical term to mill (meaning to crush or grind).

The high precision of terms is ensured by their separate recording and definition in specialized dictionaries.

The precision of terms is primarily based on their original meaning. The original meaning (or semantic structure) of a term usually corresponds partially to its real-world meaning. For example, the original meaning of the term атомоход refers to an object moving from one place to another using atomic energy. Its actual, practical meaning, however, is "a ship with an atomic engine." The original meaning of a term, its semantic structure, must reflect one of the most important characteristics of the object (thing or phenomenon) it represents. In terminology, the semantic structure (or

matrix) is directly related to the precise scientific understanding, clear description, and classification of the given concept.

A concept or phenomenon that lacks a precise scientific description and classification cannot have a clear name that reflects its specific characteristics.

For example, in the terms zarba kuchi, kuchli zarba, and tirik kuch, the word kuch only represents real, literal force in the second term. In the first and third terms, it is used in the meanings of impuls and quvvat (energy). As we can see, when these terms were created, the concepts of kuch, impuls, and quvvat were not sufficiently differentiated, which led to the situation described above. [9]

The concept of samolyot itself is defined as follows: "an aircraft that is heavier than air, with a stationary external supporting structure and a power (current) device that ensures its flight." From the examples provided, it is clear that terms in different languages often differ in their original meanings, even when they refer to the same object. However, in any case, the original meaning of a term always reflects a particular characteristic or feature of the object it represents. We have become so accustomed to the words in our native language that we generally do not pay attention to their core meaning. In contrast, when translating an unfamiliar word from a foreign language, we tend to focus on its original or root meaning.

Therefore, it is essential that a term includes the necessary features or characteristics. However, this alone is not sufficient. The necessary feature or characteristic does not provide a complete and precise description of the object being termed. This is why, in the construction of meaning, adequate features and characteristics must also be reflected. However, if only the sufficient features and characteristics, rather than the necessary ones, are taken as a basis, then, with the future changes in the object being termed, the semantic structure of the term may no longer align with its actual meaning. This, for example, occurred with the English term sweeper, which now refers not only to a brush-type sweeping machine but also to a pneumatic (air-compressed) broom [7]. In the process of term creation, both necessary and sufficient features and characteristics must be considered. [1] Only the combination of necessary and sufficient features fully describes the object and distinguishes it from similar concepts.

Specific characteristics in language are expressed through lexical markers. A specific characteristic is, in general, a concept related to the field that the term represents. A lexical marker, on the other hand, is a linguistic concept. However, by lexical marker, we mean the lexical material through which the "specific characteristics" are expressed in the construction of the term's meaning. In this way, the motivation (justification) of a term depends on two factors: first, the characteristic of the object being termed in its entirety; and second, the selection of the material used to express this descriptive characteristic.

The descriptive, specific characteristic expressed through a lexical marker ensures and brings about the lexical meaning of the term. By the lexical meaning of a term, we understand the meaning of the word or word combination derived from the semantic structure (i.e., the meaning of the lexical elements that constitute the term) used as a term and its practical use in general language. However, in translation, the lexical and specific (i.e., terminological) meanings of a term (whether simple, coined, complex words, or stable word combinations) must differ. [6, 5]

As a unit of a particular technical terminology system, the meaning of a term refers to the lexical meaning that is clarified and defined by the term's defining element within that system.

For example, the lexical meaning of the word wing (in Uzbek qanot) is "flight organ," while the meaning of the aviation term wing is "one of the main parts designed to create lift during the forward motion of an aircraft, having a shape that is tilted and flattened in the flow direction." The phrase qanot burunchasi (wing tip) means simply "the front part of the wing," but the term qanot burunchasi has the meaning of "the front part of the wing up to the first longitudinal spar or the first rib." At first glance, even when the lexical and terminological meanings appear to match, there is always some distinction between them. The lexical meaning pertains to all objects that are characterized by specific features that directly reflect the object in the term's meaning structure, providing a full description of the object and differentiating it from similar objects. Terminological meaning, however, includes the aspects that are not explicitly expressed but are always implied, serving as limiting factors.

For example, the lexical meaning of the term attaching parts might apply to any parts that connect objects, such as wires or even ropes, and closely aligns with the phrase birlashuvchi detallar in Uzbek. At the same time, according to the definition of this term, it specifically refers to parts like bolts, nuts, washers, pins, and similar components, aligning with the term mahkamlovchi qismlar in Uzbek. [8] As we can see, the conceptual content of the lexical and terminological meanings generally matches. However, due to additional restrictions, the scope of the terminological concept is smaller than that of the corresponding word

or word combination used as a term.

Therefore, the literal translation of a foreign term, even if it accurately reflects the essence of the scientific concept in practice, can introduce additional nuances of meaning that were not present in the original.

RESULTS AND DISCUSSION

The precision of terms in terminology means the absence of homonymy and polysemy. If a term is understood in multiple ways, it cannot be considered precise. In fact, context should not affect the meaning of a term; unfortunately, in many terminology systems, we often encounter polysemous terms. To express a new concept, a term is often borrowed from one that has previously referred to a different concept, object, or phenomenon (for example, the term qayiq (boat) was used to describe the fuselage of a hydroplane). Initially, the meaning of a univocal term "loosens" during its usage, and as a result, it frequently acquires multiple meanings.

The presence of synonymous terms also has a negative impact on the terminology system. Polysemy and synonymy are of positive importance in literary works, as the richness, beauty, and vividness of the narrative are achieved precisely because of them. However, in terminology, polysemous and synonymous terms often lead to misunderstandings, which is why there is always an effort to avoid them. Therefore, at first glance, such a paradoxical phenomenon is considered surprising in language; the number of synonyms in a terminology system (especially in fields that have emerged recently or have developed relatively more) is greater than the number of synonyms present in the general literary lexicon.

The fact that scientific and technical terminology is saturated with synonyms can be explained by the relatively recent creation of many terms. Usually, the emergence of new concepts leads to the simultaneous creation of several terms by different specialists. When we add that the new concepts themselves are not yet clearly and precisely defined, it becomes clear why the terminology of new fields in science and technology is so rich in synonymous terms.

For example, there are several synonyms for the term "twin-spool turbojet engine" in English: turbo-fan engine, ducted-fan engine, by-pass engine, augmented jet engine. Over time, the scope, size, and meaning of new concepts are clarified. The process of identifying the necessary and sufficient attributes of the concept being terminologized (i.e., the concept that is acquiring the status of a term), and either creating a new term or selecting from existing ones that meet the required criteria, becomes possible. The remaining "less active" terms gradually become less used and give way to the selected terms. [4]

Thus, the richness of terminology in relation to synonyms, although not eagerly welcomed, is an inevitable consequence of the unstoppable development of science and technology.

Among synonyms (as in the literary lexical layer), it is necessary to distinguish between absolute synonyms, which have exactly the same meaning, and relative synonyms, whose meanings only partially overlap.

Absolute synonyms are considered an unnecessary burden for terminology, as synonymic duplicates do not perform any additional function relative to the main member of a synonymic group. Therefore, during the development of a terminology system, absolute synonyms either fall out of usage in speech or writing, or their meanings diverge. For example, when the term "aircraft missiles" was first used, this new type of weapon had names such as flying bomb, winged bomb, jet-propelled projectile, glider bomb, doodle bomb, doodle bug, and buzz bomb. Over time, only the term "flying bomb" remained; the others have fallen out of use.

For example, in recent years, the English synonym terms de-icer and anti-icer have shown a tendency to differentiate in meaning. The "English-Russian Aviation Dictionary" provides a single translation for these terms, antiobledenitel – a substance or agent against freezing (icing). However, in reality, the meanings of these terms do not completely overlap. This can also be seen in the following micro-context example: "In a typical four-turboprop transport installation, the wing, stabilizer, fin, and propeller blades are de-iced." With the development of aviation technology, many types of anti-icing systems emerged, and the term de-icer began to refer not to any system of anti-icing devices, but specifically to systems that periodically act to melt the ice that has formed.

The term anti-icer began to refer to systems of devices that provide continuous action, meaning those that completely prevent the formation of ice.

Other important characteristics of terminology are its consistency and regularity.

The terminology of a specific science is not only a set of terms that express the concepts of this particular science, but also a system of terms that reflects the interrelation of the concepts emerging in the process of the development of that science.

This can be demonstrated using a group of terms related to the wave motion of liquids: gravitational (based on laws of attraction) waves, capillary (extremely thin, delicate) waves, capillary-gravitational waves, forced waves, surface waves, internal waves,

space waves, plane waves, and so on. All of the terms listed here are interconnected and dependent on each other. The meaning of each term relates to the meanings of the other terms in the group.

In addition to the specific characteristics of terminology discussed above, another important aspect is its future potential for creating terms, meaning the creation of derived (secondary) terms and their use in terminological word combinations. As a result, this characteristic also shows how correctly the word formation model has been chosen.

CONCLUSION

In conclusion, the translation of scientific and technical literature demands a deep understanding of terminology, precision, and linguistic nuance. Unlike literary translation, where artistic expression prevails, technical translation prioritizes clarity, accuracy, and consistency. Challenges such as neologisms, polysemy, and synonymy require translators to conduct thorough semantic and contextual analyses. Effective term creation, distinction between lexical and terminological meanings, and awareness of language-specific structures are essential. A well-structured terminology system not only ensures efficient communication within scientific fields but also facilitates future term development, reflecting the evolving nature of science and technology. Thus, mastering terminology is key to successful technical translation.

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