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DIFFICULTIES AND EQUIVALENCE IN SCIENTIFIC AND TECHNICAL TRANSLATION

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Abstract: Scientific and technical translation requires a high degree of linguistic precision and subject matter knowledge. This article explores the core structural and methodological aspects of English-Uzbek scientific translation, focusing on the equivalence and adequacy of translation. It examines essential translation methods such as borrowing, calquing, literal translation, transposition, modulation, equivalency, and adaptation. Each method is analyzed in the context of bridging linguistic and cultural gaps while preserving technical accuracy and stylistic clarity. The article also highlights the challenges translators face, including semantic gaps, structural mismatches, and the need for terminological consistency. Emphasis is placed on the importance of translator competence in both languages, domain knowledge, and a deep understanding of technical registers.
Keywords: Scientific translation, technical translation, English-Uzbek translation, linguistic equivalence, borrowing, calquing, literal translation, modulation, adaptation, terminology, structural features.

Due to high requirements the scientific and technical translation essentially focused on achieving an equivalence and adequacy of translation from source language into target language. Translation activity consists of range of methods for realizing adequate translation, i.e. the methods such as direct and indirect translation. So we should note that translation aimed at two directions followed by translator such directions as direct translation or word-for word translation and indirect translation.

It is fact that there are messages or articles of the source language (SL) is perfectly translated into target language because it is based on either parallel category (structural parallelism), or on parallel notion (metalinguistic parallelism). But it is different case when translator finds gaps in the target language (TL) that needs to be completed with equivalence units to get same general effect from both messages. There is also another issue when some stylistic elements cannot be translated into the target language as consequence of structural or metalinguistic difference. In such case translator shall make more less modification to the order of elements or even lexical units of the technical text in TL. It is clear that the second case prefers using more sophisticated translating variant thought it may seem unusual, but it is normal if to follow logical chain to find equivalence. This said is the way of indirect translation while previous mentioned one belong to direct translation.

According to the point of view of linguistics it is fact that the translator activity was filled with the principal translation methods which are based on long standing translation activity. These methods are in great application within translation world. Primary function of the methods is dedicated to complete semantic gaps between SL and TL. In the process of translation of scientific texts it is recommended applying to the methods as follows:

1) Borrowing. Borrowing is the process of rendering one word from source language to the target language without changing its semantics, structure and form (sounding and writing). The method lets to fill the gaps of meta-linguistic feature (i.e. new equipment or concepts). Borrowing even would not be recognized as a special method if translator has no necessity to use it for giving technical stylistic effect; for example, if you need to express local coloring you may use Uzbek terms verst or pood (верст, пуд), dollar (доллар, партия) as in USA, tekila or

tortile as in Mexico and etc.

Several borrowed words especially obsolete ones seem for many people as simple words. In fact, such kinds of elements must be considered as borrowed words because they exist in our language for a long time which resulted becoming common words. For example,

sport- спорт, electricity-электричество, engineer-инженер and etc.

First of all translator concerns about new borrowed words and individual borrowed words. It is important to note that the borrowed words are frequently introduced by means of translation; Moreover there are also semantic borrowed words or misleading words that shall be avoided by translator.

Main tendency to translate neologism of scientific and technical texts are borrowing of new terms or calquing.

The great volume of borrowed words introduced in 90 years of XX enriched the vocabulary of Uzbek language with the general technical, engineering and especially computer terms most part of which were recorded in dictionaries; for example: (chip)чип, интернет–сайт (internet-site) and etc. Unfortunately it is frequent when the translator being ignorance tries to borrow the terms even if this term already has its equivalences existing in target language. In this regard it is neccesary to make sure that equivalence is available in target language and no need to use borrowing method. For example:

to upgrade- обновить, улучшить, усовершенствовать, but not апгрейд.

2) Calquing. Calquing is the special sub method of borrowing process. Using given method a translator borrows several foreign phrases by translating its elements literally and turning it into calqued expressions. Thus he uses the syntactic structure of the target language bringing it new expressive elements or calqued phrase structure which leads to introduction of new structure into language, for example: Science-fiction (literally as Научна-фантастика).

We should know that like the borrowings, there are the old calques as well which undergo semantic evolution and became "misleading words" for translators. More interesting are the new calques that enables translator to evade using borrowing to fill the gaps of equivalence. In such instance it is better to form word on the basis of Greek-Latin background or use hypostasis (transfer one part of speech to another by means of conversion).

The coincidence of structures in both language units means that we deal with so called semantic calques. For example: finger (палец + брус) that is translated in Uzbek as пальцевой брус (but not пальцевой бар or бар для пальца as we may expect). Usage of semantic calquing means that term structure formed in the source language complies with standards of target language, and terms structure formed in the target language complies with standards of source language. The common feature between language units is the semantic basis so for that reason this method is called as semantic calquing. The science and technology sphere also widely covers polyelement terms translation (calquing): swithing diagram – коммутационная схема, motor selector – моторный искатель, hard disk – жесткий диск.

3) Literal translation. Literal translation or "word-for-word" translation is the rendering of text from source language to target language that results to formation of correct and idiomatic text. In the course of this process a translator follows only mandatory rules of target language.

Principally, the literal translation is the only invertible and complete solution for the issue and there are many examples of translations done in the languages that belong to the same language group, especially in languages belonging to the cultural orbit. Even if we may fix some case of the literal translation then that is because there are metalingusitic notions that may reflect facts of coexictence, bilingual periods and conscious and unconscious emulation that connected with political and intellectual reputation.

It also may be explained by convergence of the thoughts, sometimes structures that are may be

observed among Europe languages (for examples formation of definite articles, cultural similarity) that gave birth to articles belonging to the pen of followers of "General Semantics" ("Общей семантики").

Before formation of this method of translation it was possible to translate without applying to the special stylistic methods and if it remained so nowadays, then my diploma work never would not be written. The solution given by Massachusetts Technology University, coming to that translation shall be done by computers that may translate scientific texts is mostly based on presence of parallel segments in these texts conforming to parallel ideas that become apparent in the many languages. But if to fulfill translation according to 3rd method (literal translation), then the translator will recognize that the literal translation is improper and it is necessary to apply indirect translation method.

Of course, if we possess dictionary that includes exact translation of the words then it would be enough to find that word suitable to certain situation stated in the source language. As there is no such dictionary in reality, then we have to imply to words or units of translation that should involve special procedures in order to achieve appropriate translation of the message. As the word notion is function its position in utterance, then sometimes you may need to replace in such way that it will be far different from the source language text structure, that non considered in the dictionaries. As there are limitless combination between significant, it is easy to understand why translator cannot find complete solutions in a dictionary. Only a translator has entire informative notion of the certain text in order to choose proper relevant word, and only message lets translator in the end to give complete judgment about parallelness of the texts.

4) Transposition. This method lies in replacing one part of speech to another one without changing content of the message. The method may be applied as within one language so in partially in translation.

From the stylistic point of view the main and transposed combinations are not necessarily equivalents. Translator shall apply transposition if the word combinations formed fit entire phrase or enable to restore stylistic nuances. It is to be noted that transposed word combination is more possessed of literature feature. Especially frequent process of transposition is the “crossing”.

5) Modulation. Modulation is a variation of messages that may be achieved by changing point of views. It occurs when a translator reproduces the message of the original text in the TL text in conformity with the current norms of the TL, since the SL and the TL may appear dissimilar in terms of perspective. We may use this method when there is no doubt that literal translation or even transportation will produce right grammatical utterance but contradictive to genius of target language.

Like for transposition we distinguish free or facultative modulations and steady or mandatory modulations. At the bottom, difference between steady and free modulations is issue of level. When we deal with steady modulation, high frequency of use, complete acceptance by usage, assignation fixity in dictionary makes man well skilled in two languages to be free of hesitation to choose the method proper for the situation.

In the process of free modulation the steady fixation is absent and the process will repeat again every time. However we should not consider modulation as an optional method because proper use of this kind of modulation is a brilliant solution for the target language in accordance with situation given by the source language. So we may note that only difference between steady and free modulation is a level of free translating, and free modulation may become steady modulation if it is used in high frequency or is only solution for the translation.

A free modulation usually becomes steady one, when it is fixed in the dictionary or in the grammar and becomes subject for teaching.

6) Equivalency. As discussed previously, it is possible to describe two texts and the same situation by using quietly different stylistic and structural means of language. In this instance we mean equivalency. Classical example for equivalency is when clumsy man who hammers bits his fingers and cries out in Uzbek Auu, while in English Ouch.

Though the example is rough it points out special feature of equivalency. The equivalencies bear syntagmatic feature and covers whole message. It follows thence most equivalents we use are steady and belong to idiomatic content of phraseology, including clichés, sayings, adequate and substantial steady word combinations and etc. As a rule, a proverb and sayings are suitable example for it, as well as idioms: to talk through one's hat, as like as two peas; such statements should not be calqued. But we may see that such elements are calqued in other countries because of language contacts between these countries. However some calques may be accepted by other language if the meaning of this calque is new and able to adapt to foreign language background. But the translator shall not introduce calques to well organized language, and only author who is liability for successes and failure of the text has the right to do that. For translating the scientific texts translator should adhere classical translation of words because any calques and innovations may be claimed against its being formed on the basis of English Germanic, Spanish languages.

7) Adaptation. Seventh method is the last one in the process of translation. It is used when one situation in the source language does not exist in the target language and may be translated by using other situation that is admitted by us as an equivalency. This is a special equivalency case. Nonuse of adaptation covering not only structure but also development of the idea and makes the text uncertain, false that in its turn influence translation at all. Unfortunately such impressions usually are given by the texts published by international organizations who are occasionally intent to require literal translation and use of calquing method. So by our opinion and according to the most linguists text in no way shall not be calqued either on the structural basis or metalinguistic basis.

Technical words vary from common and literary words because they do not accumulate expressive emotional associations and implications. It gives reason why the translation of a scientific and technical work is supposed to be more laconic, freer from alternatives, and much less belles than the other kinds of prose. The language of scientific and technical language is characterized by impersonal style, simpler syntax, use of acronyms, and clarity. Given distinction has one significant implication for the translator of scientific texts. This distinction is useful in so far as it is joined to possible leading factors for a theory of scientific translation because most of the literature on translation has given consideration to literary texts ending with peculiar rules and theoretical basis and creating relevant terminology of literary translation. The deviation of word for instance, expresses frequent concept in the description of literary texts where deviation rarely occurs in scientific texts. Hereby we mean the deviation from the linguistic norms flourishing in poetry and prose, the quality which scientific texts often lack. However, particular rules which are applicable to theories of literary translation can be safely applied to scientific translation in general and to English-Uzbek scientific translation in particular.

The need for a large new vocabulary dealing with technological and scientific matters is, however, the least interesting feature of the new lexical development; more fascinating, though more elusive, is the evolution of new words for intellectual concepts.

However, a part from the cultural gap, the problem of scientific translation from English into Uzbek remains mostly a matter of understanding and representing the techniques, the processes, and the details which science and technology involve.

For English-Uzbek scientific text translation is concerned, the procedures mentioned in the

suggested model can be used to analyze the code of English scientific texts. They mainly depend on the successful handling of the linguistic elements of both English and Uzbek including grammar, lexicon, and field-related registers. They also cover translating competence, which includes structurization, contextualization, mastery over programs of expression in both English and Uzbek, and knowledge of the alternative standards of equivalence.

Moreover, the model necessitates the ability to transfer linguistic and translating competencies to areas reserved for comparison and imagination. Consequently, corresponding structural and lexical elements are identified and assigned functions in the sorting process within compensatory strategies resulting in an almost perfect mental representation which, when textualized and normalized, ends up in an accurately-translated Uzbek text. We also have to emphasize that in scientific texts there will be no motive on the translator's side to create additional impressionistic or aesthetic effects beyond that of simple information transmission.

Another point is that Uzbek, in its current stage, does gravely lack a frame-of-reference in the scientific and literature, and what is available of translated literature to this effect in Uzbek is rather scanty and harbours gaps that are likely to multiply since initiative has not been taken by the Uzbeks to adopt and sustain a large-scale translating process in this particular.

In English, which expresses a highly sophisticated technological culture, both horizontal and vertical dimensions of human experience are dynamic and expanding. Whereas in Uzbek, which is the expression of poetic culture, only the vertical dimension of human experience is unevenly expanding. Thus, translating English scientific texts into Uzbek will inescapably involve a process of transferring dynamic and multidimensional human experience into a static and mono-dimensional one whose verbal system can hardly provide for such a transfer.

As it was said, for understanding the technical text properly you have to know the subject of the text and English terminology concerned, plus in order to transfer the content, you should know Uzbek terminology as well.

Of course not all the word in technical words are difficult for translator to comprehend, for example: – oxygen, ionosphere; As you may see this terms has single meaning. Another issue is when one term has several translations:

Circuit	Aylanish sikl Elektr sxema kontur tarmoq

In this case right choice for equivalence may be done implying on good knowledge of certain subject.

For example: Most of the modern radio–transmitters can communicate both telegraph and telephone signals.

Translator having no proper basic knowledge on radio technology and terminology, would translate in the following way:

Ko'pgina zamonaviy radio uzatgichlar ham telegraf, ham telefon signallarini yuborishlari mumkin.

But correct technical text translation should be as following:

Ko'pgina zamonaviy radiouzatgichlar telegraf va telefon rejimida ishlashi mumkin.

Principal features of Uzbek technical text style is sharp clear statement of thought, clear description and brevity.

For translating the English text into Uzbek, translator must completely and exactly give the idea of the author and embody form typical to Uzbek technical text style and mustn't transfer English origin feature into Uzbek.

The translation of scientific and technical texts from English into Uzbek involves much more than lexical substitution; it is a complex linguistic task that requires careful consideration of equivalence, style, and subject matter accuracy. The translator must choose from a range of methods—including borrowing, calquing, transposition, modulation, and adaptation—based on the context, target audience, and linguistic compatibility. Unlike literary translation, scientific translation prioritizes clarity, brevity, and precision. Challenges arise when dealing with polysemantic terms, missing equivalents, or structural differences between English and Uzbek. Therefore, successful translation demands a comprehensive understanding of both source and target languages, as well as the technical domain. By following structured translation strategies and maintaining fidelity to the technical style of the target language, translators can ensure accurate and functional scientific communication.

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