

## Approaches to Translating Neologisms in Physics<sup>1</sup>

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### *Abstract*

This paper aims to examine the strategies used by translators to translate neologisms from English into Persian in the field of physics. The study utilized two reference books in physics and their Persian translations as the corpus. The time gap of approximately two decades between the first and subsequent translated versions was examined to investigate any changes in translation strategies over time. A total of 120 neologisms were identified and categorized based on Newmark's (1988) classification, and their Persian equivalents in both translated versions were compared. The study identified the translation strategies applied by the translators according to Newmark's (1988) proposed framework, and the frequency of each strategy was calculated. The results showed that combination (couplets, triplets) was the most commonly used strategy in both periods of the study. Transference was the least commonly used strategy in the translated versions published in the 1360s (the first period of the study), while TL-derived word was the least commonly used strategy in the later translated versions. Finally, the study found no significant changes in the applied translation strategies between the two periods examined.

**Keywords:** Neologisms, Physics, Translation, Translation strategies

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## 1. Introduction

The problematic aspects in the translation have always been controversial and challenging among researchers and theoreticians. One of these challenges concerns the translation of new words and structures that are coined with the advancement of science and technology and the development of languages, which are called "neologisms". Neologisms are vital in the advancement of a language since they are instrumental for producing new lexemes that lead to terminological evolution. Therefore, authors may utilize several techniques to convey the message of texts, i.e., employing a combination of existing words or creating new words and concepts. Similarly, translating neologisms makes a considerable contribution to the development of the vocabulary of the target language, and for this reason translation of neologisms is particularly important (Petrova, 2014). However, "neologisms are the non-literary and the professional translator's biggest problem" (Newmark, 1988, p. 140). Due to cultural and linguistic differences, the meaning of such words may not be found in ordinary dictionaries or even the newest specialized dictionaries; therefore, in facing neologisms, translators who do not possess sufficient knowledge of these differences and gaps find themselves at a loss. Generally speaking, neologisms and the strategies used to render them are interesting realms of research in translation, not least representing one of the serious challenges that researchers face in the process of transfer from one language into another in different disciplines including chemistry, math, physics, psychology, linguistics, just to mention a few. Therefore, according to what has been mentioned above as well as considering the role of physics in the advancement of science and technology, the translation in this field is of special importance. Yet, there is a dearth of research devoted to the translated texts in physics, especially on the texts translated into Persian. Thus, in order to fill this gap, this study examines the strategies used by Persian translators in transferring different types of neologisms in the aforementioned field.

## 2. Literature Review

### 2.1. What Is Neologism?

Newmark (1988, p. 140) defines neologism as “newly coined lexical units or existing lexical units that acquire a new sense”. The creation of neologisms is “a response to changed circumstances in the external world, which achieves some currency within a speech community” (Crystal, 1992, p. 264). According to Herberg (1988), neologism is a lexical unit that arises at a certain stage of language development due to communicative needs in a language community; it spreads, collectively, accepts as a linguistic norm, and is perceived as new by the majority of language users over a while at the stage of development. Thus, neologisms are coined to satisfy the linguistic demands of a speech community; however, as mentioned by Newmark (1988) at the beginning, a neologism has just one meaning but acquires other ones as time goes on. In our dynamic world, creating new terms is crucial, that is why “Neology as a way of creating new designations is necessary for special subject fields in which the emergence of new concepts entail constant neological activity” (Cabre, 1999, p. 204). While the process of neology is complex and difficult to explain, it is also a comprehensible and unquestionable concept (Rey, 1988a, cited in Cabre, 1999).

### 2.2. Types of Neologisms

Researchers and scholars of applied linguistics have classified neologisms into different types based on their findings and perception. Some of these categories are listed below.

Vihonen (1988) classifies neologisms into two groups: primary and translated. She asserts that primary neologisms are new words developed for new concepts in a certain language while translated neologisms are new expressions in another language for an already existing concept. Silvia (2001) offers another classification. She separates neologisms into morphological neologisms and

semantic neologisms. She defines the former as the recently created terms through derivation, composition, compounding, blending, acronym, and borrowing, and the latter as the recently created terms through expansion, metaphor, conversion of grammatical category, and adoption from another field. Lefevere (1992) believes that writers create new words to increase the illocutionary power of their texts, and "it is done either through variations on existing words or a combination of parts of existing words" (p.41). On the other hand, Cabre (1999) maintains that neologisms could not be categorized based on a single criterion; thus, she identifies different types of neologisms according to what they are based on. From the viewpoint of their belonging to the general language, she suggests that there is a difference between two large groupings of lexical neologisms that perform differently: those present in the general language (known as true neologisms) and those present in a special language (also known as neonyms). From the viewpoint of their function, she classifies neologisms into expressive and referential, and elaborates that "referential neologisms develop because they are required, i.e., there is a gap in a specific special field that must be filled. Expressive neologisms develop simply to introduce new forms of expression into the discourse" (Cabre, 1999, p. 206). Finally, she classifies neologisms into the following categories based on their formation: neologisms in form (including derivations, compounds, phrases and shortenings), functional neologisms (including cases of lexicalization of an inflected form) and semantic neologisms (including broadening or narrowing or change of the meaning of the base form). Ultimately, Cabre (1999) asserts that neologisms are different from each other in their creations, primary functions, their relationship with co-occurring synonyms, the strategy applied for creating them, their continuance in the language, the way they co-exist in the system and the way they relate to other systems. Newmark (1988) proposes another classification. He categorizes neologisms into two main groups: existing lexical items with new senses and new forms. The former includes words and collocations and the former new coinages,

derived words, abbreviations, collocations, eponyms, phrasal words, transferred words, acronyms, pseudo-neologisms, and internationalisms (see section 4.2).

### 2.3. Approaches in Translating Neologisms

In today's world where intercultural communication among different nationalities is increasing the accurate and applicable translation of neologisms seems necessary. Consequently, "applying adaptive strategies to neologism translation is crucial for succeeding in cross-cultural communication" (Yun & Shuang, 2020, p. 6). In this regard, the translator's task is to create equivalences for new words or expressions during the translation process. As mentioned by Lefevere (1992, p. 41) "translators have to decide how important a given neologism is and whether they can build analogous neologisms in their language or achieve analogous illocutionary outcome some other way". According to Choi (2006), translators should look for topics related to neologism and adapt themselves continuously to language changes and transfer the meaning of neologisms to the target language by understanding the core meaning of these terms. In this respect, Dasgupta (2004) asserts that translators need a fundamental as well as a general understanding of newness to deal with neologisms. He considers this crucial because translations must be simultaneously new to the target language and be linked with its old trends. Hawamdeh (2004) who has studied the neological process of reviving unused terms in translation to find the equivalent of borrowed terms, insists that this process can be achieved "by reusing them in translation and adopting them in special dictionaries" (p. 92). In this respect, Delabastita (1996, cited in Ma'azallahi & Saeedi, 2013, p. 12) emphasized that

The semantic range of a neologism may be difficult to pin down with precision and the more elusive or nonsensical it is, the more freedom the translator seems to enjoy in recreating other dimensions of the source text neologisms. To do this, the translator may attempt to imitate the original neologism's linguistic mechanism or fall back on the target language's techniques for forming neologisms.

Newmark (1988) also believes that translators have to recreate any kind of neologism in the target text and insists that it is the translator's "duty to re-create any neologism he meets on the basis of the SL neologism" (p. 149).

### 3. Research Questions

1. What strategies are used in translating neologisms in the corpus of the study?
2. What are the most and the least frequent strategies adopted by the Persian translators in translating neologisms in the corpus of the study?
3. What changes have occurred in the translation strategies of neologisms in the corpus of the study about two decades after the publication of the first translated edition?

### 4. Methodology and Data Analysis

This descriptive corpus-based study examines the translation of neologisms. The research utilizes two works in physics, authored by Stephen William Hawking (1988) and Arthur Beiser (1963), along with their two Persian translated versions, published twenty years apart. The study aims to observe possible changes in translation strategies used by the translators over time, as one of its primary objectives is to analyze the transfer of neologisms.

#### 4.1. Corpus

##### Original Texts in English:

Hawking, S. W., (1988). *A brief history of time: from big bang to black holes* (1st ed.). New York: Random House.

Beiser, A., (1963). *Concepts of Modern Physics* (1st ed.). New York: McGraw-Hill.

##### Translated Versions in Persian:

Hawking, S. W. (1369/1990). *Tarikhche-ye Zaman: Az Enfejar-e Bozorg ta Siah Chale-ha* [A brief history of time: from big bang to black holes]. (M.R.

Mahjoob, Trans.). Tehran: Sherkat-e Sahami-e Enteshtar (Original work published in 1988)

Hawking, S. W., (1390/2011). *Tarikhche-ye Zaman: Az Enfejar-e Bozorg ta Siah Chale-ha* [A brief history of time: from big bang to black holes]. (D. Nematolahi, Trans.). Tehran: Meyare-e Andishe (Original work published in 1988)

Beiser, A., (1367/1988). *Mafahim-e Fizik-e Novin* [Concepts of Modern Physics]. (A.A. Takaaloo, Trans.). Mashhad: Astan-e Ghods-e Razavi (Original work published 1963)

Beiser, A., (1386/2007). *Mafahim-e fizik-e Jadid (1)* [Concepts of Modern Physics]. (H. Eshghi, Trans.). Shahrood: Daneshgah-e Sanati-e Shahrood (Original work published 1963)

#### 4.2. Theoretical Framework

This study builds on Newmark's (1988) theoretical framework as it was more comprehensive than others proposed by other theoreticians (see Delabastita (1996), Molina & HurtadoAlbir (2002)). Newmark (1988) classifies neologisms into two main groups: existing lexical items A) with new senses, and B) with new forms.

##### ***A) Existing lexical items with new senses***

This group includes words and collocations. *Words* include old words with new senses. These neologisms which are non-cultural and non-technical are usually translated "either by a word that already exists in the TL, or a brief functional or descriptive term" (Newmark, 1988, p. 141). *Collocations* are existing collocations with new senses. For translating them if the referent exists in the TL, normally the translation or through translation procedures are used. Furthermore, an economical descriptive equivalent has to be given if the concept does not exist or the TL speakers are not yet aware of it.

**B) Existing lexical items with new forms**

This group includes the following: new coinages, derived words (including blends), abbreviations, collocations, eponyms, phrasal words, transferred words (new and old referents), acronyms (new and old referents), pseudo-neologisms and internationalism.

*New coinages* are often brand or trade names. Unless the product is marketed in the target culture under another name, brand or trade names are mostly transferred. If the term is a proper name, "it may be replaced by a functional or generic term if the trade name has no cultural or identifying significance" (Newmark, 1988, p. 143). *Derived words (including blends)* are new words mainly derived from Latin and ancient Greek morphemes usually with various suffixes naturalized in the appropriate language. These words are translated by through-translation in which the use of TL morphemes is preferred. In the case of *blends*, before deciding whether to recreate them in the TL or to translate their completed components, the translator has to consider their functions. *Abbreviations* which are a common type of pseudo-neologism are written out in the TL unless they coincide. *Collocations* are common in the social sciences and in computer language. In order to transfer the computer terms, they are given their recognized translations; if they do not exist, the translators have to transfer them and then add a functional or descriptive term. The translators have not the authority to devise their own neologisms. An *eponym* is "any word that is identical with or derived from a proper name which gives it a related sense" (Newmark, 1988, p. 198). An Eponym directly refers to a person so it can be transferred unless it refers to the referent's ideas or qualities in which case the translator may have to add something else. *Phrasal words* "are restricted to English's facility in converting verbs to nouns [...] and are translated by their semantic equivalents" (Newmark, 1988, p. 147). *Newly transferred words (new and old referents)* which are taken directly from another language are "usually transferred together with a generic term and the requisite



specific detail depending on readership and setting" (Newmark, 1988, p. 148). *Acronyms* are the initial letters of other words and pronounced as a word. To translate these terms, a standard equivalent term is used and if it does not exist a descriptive term is chosen. These terms are transferred in case they are utilized for the institutions and names of companies. A *pseudo-neologism* is a generic word which stands for a specific word. An *internationalism* is a loanword that occurs in several languages.

Newmark (1988) proposes translation strategies for neologisms as follows: *transference* (transferring SL word to a TL text), *TL neologism* (recreating neologism in the TL based on SL neologism), *TL derived word* (creating new words in the TL), *naturalization* (transferring and adapting the SL word first to the normal pronunciation then to the normal morphology), *recognized TL translation* (using the official or the generally accepted translation of any institutional term), *functional term* (using a cultural-free word sometimes with a new specific term to neutralize or generalize the SL word), *descriptive term* (explaining the essential elements of the SL neologism), *literal translation* (word-for-word interpretation of the original word in which the syntactic structures of the TL are considered), *translation procedure combinations* (couplets, triplets, quadruplets: combining two, three or four of the above-mentioned procedures), *through translation* (literal translation of common collocations, names of organizations, the components of compounds and phrases known as calque or loan translation) and *internationalism* (keeping the same meaning and form of a term which is used in several languages).

### 4.3. Data Analysis

After extracting neologisms from the original English texts, they were classified based on Newmark's (1988) above taxonomy. Then, the date of each neologism as well as its brief definition were presented. The next step was extracting their Persian translated equivalents (both from the first published versions and the versions published about two decades after the first edition). Then, the strategies

applied by the Persian translators to render each neologism were determined. Finally, the frequency and percentage of each strategy were calculated and the results were presented.

#### 4.4. Examples of the Data

**Example 1.** They suggested that in addition to the photon, there were three other spin-1 particles, known collectively as massive vector bosons that carried the weak force.

**محبوب (۱۳۶۹):** بگفته آنها علاوه بر فوتون، سه ذره دیگر وجود دارند که اسپین شان ۱ می باشد و همگی بوزون های برداری بزرگ نامیده می شوند و حامل نیروی ضعیف اند.

**نعمت اللهی (۱۳۹۰):** آنها پیشنهاد کردند که علاوه بر فوتون، سه ذره دیگر با اسپین ۱ وجود دارد که در مجموع بوزون های برداری بزرگ نام دارند که حامل نیروی ضعیف می باشند.

#### Discussion:

According to Merriam-Webster dictionary (n.d.), "the first known use of boson was in 1947"; defined as "a particle (such as a photon or meson) whose spin quantum number is zero or an integral number".

'Boson' is a new coinage word whose creator, Paul Dirac, an English theoretical physicist, named it to commemorate an Indian physicist, Satyendra Nath Bose, who developed the theory characterizing such particles (eponym). Moreover, this term is created by adding the subatomic particle suffix 'on' to 'Bose' and making a new meaning (derived word) which has the same form and meaning in all languages (internationalism). As it can be observed, this neologism is coined through a mixture of 'new coinage', 'eponym', 'derived words' and 'internationalism'. Both translators have used 'couplet' (naturalization and internationalism) to render this term. That is, they transferred 'Boson' to TL and attuned it to Persian pronunciation.

**Example 2.** Radiation produced under these circumstances is given the German name bremstrahlung ("braking radiation").

تکالو (۱۳۶۷): تابشی را که تحت این شرایط به وجود می آید، تابش ترمزی می نامند که به نام آلمانی برمش ترالانگ مشهور است.

عشقی (۱۳۸۶): تابشی که تحت این شرایط ایجاد می شود به زبان آلمانی به برماشترالونگ ("تابش ترمزی") موسوم است.

#### Discussion:

According to Merriam-Webster dictionary (n.d.), "the first known use of bremstrahlung was in 1935"; defined as "the electromagnetic radiation produced by the sudden deceleration of a charged particle in an intense electric field (as of an atomic nucleus); also: the process that produces such radiation".

'Bremstrahlung' is a newly transferred word borrowed from the German 'Bremstrahlung' (braking or deceleration radiation) that keeps only one sense of its nationality. Hence, this neologism is coined through a mixture of 'transferred words' and 'internationalism'. Both translators have transferred the word to TL following the Persian phonetic form. Each translator has naturalized it in a different form, but both have applied 'couplet' (naturalization and internationalism).

**Example 3. Maser:** microwave amplification by stimulated emission of radiation.

تکالو (۱۳۶۷): میزر: تقویت که موج با گسیل القایی تابش.

عشقی (۱۳۸۶): میزر: تقویت امواج میکروویو از طریق گسیل برانگیخته تابش.

#### Discussion:

According to Merriam-Webster dictionary (n.d.), "the first known use of maser was in 1955"; defined as "a device or object that emits coherent microwave radiation produced by the natural oscillations of atoms or molecules between energy levels".

The newly coined word, 'maser', is an acronym for "microwave amplification by stimulated emission of radiation" (Merriam-Webster, n.d.). In physics, this term is commonly used in most languages (internationalism). So, the type of this neologism is a mixture of 'new coinage', 'acronym', and 'internationalism'. To translate this

term, both translators have transferred the term 'maser' to TL without any changes in its phonetic form. This explanation shows that Takaaloo and Eshghi have translated this term through 'couplet' (transference and internationalism).

**Example 4.** Do the same conclusions apply to ordinary clocks that use machinery—spring-controlled escapements, tuning forks, vibrating quartz crystals, or whatever—to produce ticks at constant time intervals?

**تکالو (۱۳۶۷):** آیا همین نتایج در مورد ساعت‌های معمولی که از ابزارهایی نظیر فنر بازدارنده، چنگال کوک، بلورهای کوارتز مرتعش یا سایر چیزها برای تولید تیک‌ها در فواصل زمانی ثابت استفاده می‌کنند نیز صدق می‌کند؟

**عشقی (۱۳۸۶):** آیا با کاربرد ساعت‌های معمولی که در آن از دستگاهی نیر ابزار فنری قابل کنترل، دیپازون‌ها، بلورهای کوارتز مرتعش یا چیز دیگر که برای ایجاد تیک‌های با فواصل زمانی ثابت استفاده می‌شود، همین نتایج به دست می‌آید؟

#### Discussion:

According to Merriam-Webster dictionary (n.d.), "the first known use of tuning fork was in 1799"; defined as "a 2-pronged metal implement that gives a fixed tone when struck and is useful for tuning musical instruments and ascertaining standard pitch".

For 'tuning forks', the author used the combination of two nouns, which is a common type of collocation. As a result, the type of this neologism is 'collocation'. To translate this term, Takaaloo used 'چنگال کوک', which is a 'literal translation'. But Eshghi has used 'دیپازون' as an equivalent term for transferring this neologism. 'دیپازون' which is originally a French term (diapason) is widely used in Persian as an equivalent term for the English term 'tuning forks'. In fact, in Persian, a loan word from a language other than English has been used to translate this English term. However, this strategy has not been suggested by Newmark (1988).

## 5. Findings

As mentioned, 120 neologisms were extracted from the corpus of the study. The frequency and percentage of each applied strategy for translating them in the first edition of each translated text are presented in Table 1.

Table 1. Frequency and Percentage of the Applied Strategies in the Translated Versions Published in the 1360s

Strategy	Frequency	Percentage
Transference	2	1.65%
TL neologism	0	0
TL derived word	0	0
Naturalization	4	3.3%
Recognized TL translation	0	0
Functional term	0	0
Descriptive term	0	0
Literal translation	33	27.27%
Combination (couplets, triplets)	69	57.02%
Through-translation	9	7.43%
Internationalism	0	0

Table 1 clearly demonstrates the scope of the application of the strategies in translating neologisms in the translated versions published in the 1360s. Observable as it is in the table, 'combination' (with the percentage of 57.02%) is the most frequently applied strategy to translate neologisms from English into Persian. After 'combination', 'literal translation' (with the percentage of 27.27%) and 'through-

translation' (with the percentage of 7.43%) are the most commonly used translation strategies respectively. Finally, the least frequently applied strategy is 'transference' (with the percentage of 1.65%).

Table 2 shows the frequency and percentage of the strategies adopted by the Persian translators who translated the English original texts about two decades after the publication of the first translated editions.

Table 2. The Frequency and Percentage of the Applied Strategies about Two Decades After the Publication of the First Translated Editions

Strategy	Frequency	Percentage
Transference	0	0
TL neologism	0	0
TL derived word	2	1.65%
Naturalization	3	2.47%
Recognized TL translation	0	0
Functional term	0	0
Descriptive term	0	0
Literal translation	30	24.79%
Combination (couplets, triplets)	70	57.85%
Through-translation	12	9.91%
Internationalism	0	0

According to the data observable in table 2, 'combination' (with the percentage of 57.85%) is the most frequently applied strategy to translate neologisms from English into Persian. After 'combination', 'literal translation' (with the percentage of 24.79%) and 'through-translation' (with the percentage of 9.91%) are the most commonly used translation strategies respectively. Finally, the least commonly used strategy is 'TL derived words' (with the percentage of 1.65%).

Based on the findings of the research, it can be inferred that the translators have applied 6 out of the 11 strategies proposed by Newmark (1988) including 'transference', 'TL derived word', 'naturalization', 'literal translation', 'combination (couplets, triplets)', and 'through-translation'. The translators did not use other strategies mentioned earlier in the framework of the study. Furthermore, the most frequently applied strategy used in the translated texts in both periods is 'combination (couplets, triplets)'. Thus, no significant changes can be seen in the most frequently used strategy. However, a change in the least frequently applied strategy is notable. 'Transference' is the least commonly used strategy employed in the translated versions published in the 1360s and 'TL derived word' is the least frequently used strategy about two decades later.

## 6. Conclusions

The emergence of new words makes the role of translation and translators more prominent. "Grasping neologisms is not easy even for native speakers" (Yun & Shuang, 2020, p. 6); thus, appropriate translation of these terms that encompass complex linguistic information contributes to a better understanding of them in the target language. Therefore, the translators, the translation trainees as well as the institutions practicing translation in various fields must be aware of the different strategies which can be used in transferring neologisms.

In the present research, the translators mainly used the 'combination' strategy. One possible reason is that combining the strategies can clearly demonstrate the meaning components encapsulated in the neologisms. As suggested by Panahi, Shomoossi and Rasekh (2009), this strategy can improve the clarity of sense in the text. This is significant, as it is crucial that the translation of these words is understandable and acceptable to the readers of the TL. According to Nasser (2018), for important and basic terms 'couplet' is used and the translators apply this strategy both to improve the quality of their translations in transferring problematic notions such as neologisms and to give such terms a local color. In addition, "it is

used generally to avoid extremity in presenting full standardization or full localization" (Newmark, 1988, cited in Nasser, 2018, p. 16) because "in translation, there are additional considerations: the authority of the text, the knowledge and motivation of the putative readership, and the different culture. The fail-safe procedure, which is also the most educative, is to translate using a couplet" (Newmark, 1998, cited in Nasser, 2018, p. 16). It is worth mentioning that in the present research, 'combination' was mostly consisted of 'literal translation' and 'naturalization' used simultaneously by the translators. The reason may be that the translators have tried to transfer both the form and meaning in an acceptable way.

As argued in the previous section, in the first period of the study 'transference' and in the second period 'TL derived word' were the least frequently applied strategies used by the translators. Hence, it can be suggested that after two decades, the translators attempted to find proper Persian equivalents for newly coined terms used in the source texts. In other words, the translators have tried to indigenize the new terms in Persian.

Finally, there were some additional strategies adopted by the Persian translators to render neologisms that were not proposed by Newmark (1988) including 'expansion', 'shift or transposition', 'omission', and 'reduction' with the frequency of 4, 3, 3, 1 respectively. Another notable strategy was using a loan term from another language – in the present research a French term instead of the original English term (see example 4 above) – which can be considered as a rare case.

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