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Investigating the Strategies of Translating Neologisms in Science Magazines from English into Arabic (A Translational Perspective)

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ABSTRACT

This study investigates the strategies used for translating neologisms from English into Arabic in the context of science magazines. It aims to analyze the frequency of each translation strategy to identify the most commonly applied methods in translating neologisms within this specific genre. The study draws on a model of translation strategies based on Vinay and Darbelnet (1995), Molina and Albir (2002), and Gottlieb (2005). The study uses descriptive and comparative methods and conducts a quantitative analysis of data collected from 10 issues of two science magazines: *Scientific American* and *Nature*, along with their Arabic versions. The findings reveal that in *Nature*, the most frequent strategy is calque, while borrowing appears the least frequent. In *Scientific American*, calque is also the most common strategy, while amplification is the least frequent one. These results highlight the predominance of calque in translating technical terms, while also indicating the increasing use of borrowing and description when exact equivalents are unavailable. This research may contribute to translation theory and practice, offering insights into how neologisms are handled across languages. Future studies could look into how digital media platforms affect the translation of scientific terms. The role of artificial intelligence in translating neologisms and its impact on translation strategies also warrants investigation. Tracking the evolution of scientific terminology would shed light on how new terms are adopted and integrated into the target language over time. Finaly, the findings in this study could be used by translators, publishers of science magazines, language and translation programs and translator trainers.

Keywords: translation strategies, neologisms, science magazines, English-Arabic translation.

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Introduction

The translation of neologisms, particularly from English to Arabic, poses significant challenges for translators, especially in specialized domains like science. Neologisms are defined as "newly coined lexical units or existing lexical units that acquire a new sense" (Newmark, 2003, p. 140), or as expressions that have not always existed in the language but are of recent usage (Rey, 1995). As scientific fields evolve rapidly, new terms and concepts continuously emerge, particularly in English-language science magazines. These neologisms, often laden with cultural, conceptual, and linguistic nuances, do not always have direct equivalents in Arabic, which can complicate the translation process. This paper explores how these challenges are handled and analyzes the strategies employed to render such terms accurately into Arabic, with a focus on science magazines.

The significance of this study lies in the growing need for effective translation in the scientific community, where accurate communication is crucial for the dissemination of knowledge. While many studies have examined translation in general, few have focused specifically on the translation of neologisms into Arabic. This study addresses this gap, offering insights into how translators handle the complexities of new scientific terminology in Arabic.

The study aims to investigate the various strategies used for translating neologisms from English into Arabic within the context of science magazines. Additionally, this study aims to analyze the frequency of each translation strategy to understand which methods are most commonly applied in translating neologisms in this specific genre. The study seeks to answer the following questions:

1. What are the translation strategies used for translating English neologisms into Arabic in science magazines?
2. What is the frequency of each translation strategy used for translating English neologisms into Arabic in science magazines?
3. Which translation strategy is most frequently applied for translating English neologisms into Arabic in science magazines?

This research contributes to both the theoretical and practical understanding of translation in specialized fields, providing recommendations that may improve the translation of scientific neologisms. By focusing on the Arabic context, it offers valuable insights for translators, researchers, and students interested in the challenges of translating specialized terms and advancing cross-cultural communication in scientific discourse.

Literature Review

Related Studies on Translation of Neologisms

The translation of neologisms has been a focal point of several studies, which explore the strategies used by translators to render newly coined terms from English into various languages, including Arabic. These studies offer valuable insights into the strategies employed in different contexts and fields, highlighting trends such as the preference for borrowing, calque, and other translation techniques.

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Fumani and Abdollahpour (2017) conducted a study to identify the translation strategies used for neologisms in the specialized field of fishery-engineering, based on Kurki's (2012) model. The findings revealed that the most frequently employed strategy was borrowing, followed by calque, generalization, synonymy, and amplification. Transposition was the least frequently used strategy in this context, indicating that in technical translation, the preservation of the original term's form and meaning is prioritized over structural changes.

Similarly, Alharbi (2017) explored the translation strategies used to deal with neologisms in the *Harry Potter* series. The study found that transliteration, or borrowing, was the most common strategy. Additionally, Alharbi observed a combination of domestication and foreignization in the translators' approach, reflecting the tension between maintaining the foreign character of the neologism and adapting it to the target culture.

Hanaqtah (2019) investigated the translation of political neologisms, focusing on the challenges and strategies translators employed. The study identified several frequently used strategies, including functional equivalents, word-for-word translation, modulation, paraphrasing, and compensation. The study also highlighted less common strategies such as couplets, componential analysis, omissions, additions, reduction, and transference, providing a broad overview of the various ways political terms are handled in translation.

Houshyar and Karimnia (2013) examined the strategies applied by Iranian translators in rendering neologisms created by the Persian Academy. The study found that literal translation was the predominant strategy, while borrowing was the least used. This trend suggests a preference for retaining the structure and meaning of the original term rather than introducing foreign elements into the Persian language.

In a similar vein, Adili et al. (2023) focused on the translation of neologisms in the field of physics from English into Persian. The results of their study indicated that literal translation was more frequently used than transference, emphasizing the importance of accurately translating scientific terms while maintaining their original meanings.

Awang and Salman (2017) examined the strategies employed by the Arabic Language Academy of Cairo in translating English scientific and technical terms into Arabic. Their findings revealed that borrowing combined with literal translation was the most frequent strategy, followed by literal translation alone. The study also identified loan translation as a significant strategy in the translation of scientific terms, indicating a preference for terms that closely mirror the original text.

Finally, Bataina (2021) explored the translation of English business terms into Arabic by the Jordan Academy of Arabic. The study showed that calque was the preferred strategy over lexical borrowing, suggesting that the Jordan Academy of Arabic favors the creation of new Arabic terms that maintain the original meaning rather than borrowing foreign terms.

These studies collectively demonstrate the varied strategies employed in the translation of neologisms across different fields and contexts. Borrowing and calque consistently emerge as the most frequently used strategies, reflecting the challenges

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translators face in balancing linguistic accuracy with cultural adaptation. The preference for literal translation in many studies underscores the importance of retaining the original meaning and structure of neologisms, especially in technical and scientific domains. However, the variation in strategies across different fields, such as literature, politics, and business, highlights the complexity of translating neologisms and the need for translators to make strategic decisions based on the specific context.

Categorization of Neologisms

Neologisms can be categorized in multiple ways, with common threads in the literature surrounding their formation, meaning and function. Rey (1995) distinguishes between formal, semantic, and pragmatic neologisms. Formal neologisms involve structural changes to words, such as through prefixes, compounding, or acronyms. Semantic neologisms concern shifts in meaning, ranging from complete changes (e.g., borrowings) to partial shifts (e.g., affixation). Pragmatic neologisms focus on how new words are adopted and used in communication, emphasizing their social acceptance and functional role in language.

Other scholars, such as Cabre (1999), categorize neologisms by formation method. This includes words created through derivation, compounding, or borrowing from other languages. Functional neologisms arise from changes in grammatical structure, while semantic neologisms involve shifts in meaning. Additionally, Delabastita (2004) expands on this, highlighting specific processes like borrowing, calques, shifting meanings, combining words, and coining entirely new terms.

The literature also identifies several methods of neologism formation. These methods can be broadly grouped into changes in form and meaning. Pavel and Nolet (2001) distinguish between morphological and semantic neologisms. Morphological neologisms are created by altering word forms through derivation or compounding. Semantic neologisms, on the other hand, are marked by changes in meaning without altering the word's form, often involving shifts, expansions, or conversions of grammatical categories.

Coining and Borrowing are two prominent strategies for creating neologisms. While Sager (1997) emphasizes the importance of interlingual borrowing, especially from Greek and Latin in scientific terminology, Delabastita (2004) notes that borrowing can be direct or adapted, and sometimes takes the form of loan translations, where foreign terms are translated element by element. New words can also be coined entirely, often reflecting innovation in linguistic creativity.

Blending and shortening also play significant roles in neologism formation. Blending involves combining parts of two words, while shortening includes methods like abbreviations and acronyms, which are increasingly prevalent in contemporary language (Newmark, 2003). Newmark (2003) also presents a detailed classification of 12 categories of neologisms, ranging from new coinages and derived words to abbreviations, collocations, and internationalisms. This framework underscores the variety of neologism types and highlights the need for specific strategies for translating neologisms.

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Beyond structural and semantic processes, the pragmatic dimension of neologisms is crucial for understanding their role in communication. Rey (1995) asserts that the effectiveness of a new word is determined by how well it is accepted and integrated into social and communicative practices. This acceptance is not merely a matter of linguistic form but involves cultural and contextual factors that influence the use and meaning of neologisms in society.

Neologism Translation Strategies

Translation strategies encompass a wide range of techniques used to adapt content between languages, with key contributions from various scholars such as Vinay and Darbelnet (1995), Molina and Albir (2002), and Gottlieb (2005). Vinay and Darbelnet's (1995) translation procedures include various strategies for translating between languages. These include borrowing, where a word is directly taken from the source language, and calque, which translates foreign expressions literally. Amplification is the translation strategy of adding extra information to clarify or expand on the meaning that may not be explicitly stated in the source text. Other strategies include literal translation, transposition, modulation, equivalence, adaptation, compensation, dissolution, concentration, economy, explicitation, implicitation, generalization, particularization, articularization, juxtaposition, grammaticalization, lexicalization, and inversion. Additionally, Molina and Albir (2002) introduced strategies such as description, which involves substituting a term with a description of its form and function. Other strategies include discursive creation, substitution, and variation. These strategies further expand the range of translation techniques available. One important strategy by Gottlieb (2005) is partial borrowing, which involves translating part of a term while borrowing the other part directly from the source language.

Regarding the translation of neologisms, there are several models of translation strategies proposed by various scholars. These strategies aim to bridge the gap between the source and target languages, considering factors such as meaning preservation, cultural adaptation, and linguistic norms. A common thread in the literature is borrowing—the direct transfer of neologisms from the source language into the target language, often with some adjustments to fit phonological or grammatical norms. Scholars like Kurki (2012), Niska (1998), and Avagyan (2015) all highlight borrowing as a central strategy. In addition to direct borrowing, methods like loan translation and calque are also widely discussed, where terms are translated literally or mimicked in structure while maintaining the original meaning.

Several scholars propose strategies focused on adapting the foreign term to the target language. For example, Delabastita (2004) presents phonological/graphological adaptation, where the foreign term is adjusted to the target language's sound or writing system, while Arabicization (adjusting terms to fit Arabic norms) and derivation (forming new terms through morphological processes) are emphasized by scholars like Al-Khury (1988) and Elmgrab (2011) in the context of Arabic.

Another strategy is creating new terms, which involves coining entirely new words or phrases to represent a neologism. This can be done through blending (combining two

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words to form a new term) or descriptive translation (using explanatory phrases). This is advocated by scholars like Avagyan (2015) and Newmark (2003), who stress the importance of ensuring that the translation maintains the neologism's meaning and function.

Additionally, compensation is a technique highlighted by Delabastita (2004), where the neologism's essence or style is conveyed through different linguistic devices in the translation, possibly in a different context or position. In some cases, omission or generalization of the original neologism might occur, simplifying or excluding the term when a direct equivalent is unavailable.

Overall, the translation of neologisms involves a mix of direct and adaptation-based strategies, including borrowing, loan translation, coining new terms, and various methods of cultural and linguistic adaptation. The choice of strategy often depends on the nature of the neologism, the target language's norms, and the degree to which meaning must be preserved or adjusted in the translation process.

Methodology

Building on these insights, the present study investigates the specific strategies used to translate neologisms in the context of scientific magazines. To explore this, the research followed a descriptive and comparative approach, employing both qualitative and quantitative methods to identify and analyze the translation strategies used in Arabic versions of *Nature* and *Scientific American magazines*.

Theoretical Framework

Several scholars have proposed various models for translating neologisms (e.g., Avagyan, 2015; Delabastita, 2004; Gottlieb, 2005; Kurki, 2012; Molina & Albir, 2002; Newmark, 2003; Niska, 1998; Vinay & Darbelnet, 1995). While these strategies offer diverse tools for handling neologisms across languages, this study does not adhere to a single model, as each approach has its strengths and limitations. For example, strategies like borrowing or calque can retain the original flavor of a term, but they may lack clarity or disrupt the target language's norms. In contrast, descriptive translation ensures clear meaning but may result in lengthy expressions that are less recognizable than the original term.

Thus, this study adopts a model combining strategies from Vinay and Darbelnet (1995), Molina and Albir (2002), and Gottlieb (2005). By integrating techniques like borrowing, calque, amplification (Vinay & Darbelnet, 1995), partial borrowing (Gottlieb, 2005) and description (Molina & Albir, 2002), our model seeks to preserve the neologism's intended meaning and connotations while adapting it to the target language. This approach provides translators with a systematic framework for selecting the most appropriate strategy based on the specific characteristics of each term and the target language's needs.

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Corpus of the Study

In order to investigate the strategies used in translating neologisms, the study selected a corpus which consists of texts drawn from two renowned science magazines, *Nature* and *Scientific American*, along with their Arabic versions. Five issues of each magazine were selected for analysis (see Table 1 and 2 for the selected issues of the two magazines).

Table 1
Selected Issues of *Nature* and Their Arabic Translations

STs and TTs	Publication Date	Volume	Issue
Source Text 1	March 2013	495	7441
Target Text 1	May 2013		8
Source Text 2	November 2013	503	7477
Target Text 2	January 2014		16
Source Text 3	December 2013	504	7480
Target Text 3	February 2014		17
Source Text 4	February 2014	506	7488
Target Text 4	April 2014		19
Source Text 5	June 2013	498	7453
Target Text 5	August 2013		11

Table 2
Selected Issues of *Scientific American* and Their Arabic Translations

STs and TTs	Publication Date	Volume	Issue
Source Text 1	November 2006	295	5
Target Text 1	January 2007	23	1
Source Text 2	January 2007	296	1
Target Text 2	February 2007	23	2
Source Text 3	May 2011	304	5
Target Text 3	July 2011	27	7
Source Text 4	February 2006	294	2
Target Text 4	February 2006	22	1
Source Text 5	January 2006	294	1
Target Text 5	October 2006	22	10

These two magazines were selected for their broad coverage of scientific topics which provide a diverse set of neologisms related to different scientific fields. This diversity ensured that the corpus was representative of the types of neologisms encountered in contemporary science magazines. Selection criteria include genre, publication date, and availability of both original English texts and their Arabic translations. The study ensures that the Arabic translations are officially published versions to maintain accuracy and reliability.

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Procedure

Once the corpus was selected, the next step involved identifying the neologisms in the English source texts and their Arabic equivalents. A total of 500 neologisms were extracted from the two magazines, with 250 terms selected from each. The number of neologisms per magazine was chosen to allow for a comprehensive analysis of translation strategies. After identifying the neologisms, the study classified the translation strategies used to render them into Arabic. This classification followed the models proposed by Vinay and Darbelnet (1995), Molina and Albir (2002), and Gottlieb (2005). Each neologism was compared to its Arabic equivalent to identify the most suitable translation strategy, considering both context and meaning. Then, the analysis interpreted why particular strategies were chosen for each neologism, considering the scientific context and communicative goals of the translated texts.

Furthermore, the frequency of each translation strategy was calculated and presented using tables and charts. A table displayed the number of occurrences of each strategy, and bar charts visually represented the percentages of these strategies across the corpus. This provided a clear understanding of which strategies were used most frequently in the translation of neologisms. The use of charts and figures was essential for providing an accessible visual summary of the study's findings, and enhancing the clarity of the conclusions drawn from the analysis.

Analysis

This analysis explores the translation strategies employed in the translation of neologisms found in two scientific magazines: *Nature* and *Scientific American*. The strategies identified in the translations include calque, partial borrowing, description, amplification, and borrowing. These strategies reflect various approaches to conveying the meaning of newly coined terms while preserving both linguistic accuracy and the intended scientific meaning. The following analysis examines these strategies in relation to specific examples drawn from the two magazines.

Calque

Calque is a translation strategy that involves the literal translation of a term's components, often resulting in a term that closely mirrors the structure of the original language while adapting the term to the target language's syntactic rules (Vinay & Darbelnet, 1995). In the case of *Nature*, the term *cosmic curl* is translated as *التجعد الكوني*, which reflects a direct translation of the two components: *curl* becomes *التجعد* [twist or curl], and *cosmic* is translated as *الكوني* [cosmic or related to the cosmos]. This calque preserves the metaphorical and technical meaning of the original term, making it understandable in Arabic while maintaining its scientific accuracy, see Table 3 for more examples of calque in *Nature*.

A similar approach is used in *Scientific American* for the term *refrigerator mother*, which is translated as *الأم الثلاجة*. This strategy mirrors the English term structure, retaining both the components *refrigerator* (*الثلاجة*) and *mother* (*الأم*). Although the term itself may carry a specific cultural connotation in English, the calque translation ensures that the reader is presented with the literal term, which may require further

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explanation in the Arabic-speaking context, see Table 4 for more examples of calque in *Scientific American*.

Borrowing

Borrowing is the direct transfer of a term from one language to another without significant alteration (Vinay & Darbelnet, 1995). This strategy is often used when the term is either widely recognized or when no suitable equivalent exists in the target language. From Table 3, we can observe that, in *Nature*, the term *difluorotoluene* is borrowed directly as *داي فلوروتولوين*, with only minor phonetic adaptations to suit Arabic phonology. This borrowing strategy is common in scientific fields, where precise terms are retained in their original form to maintain accuracy. Following a similar pattern, the term *Bluetooth* in *Scientific American* is borrowed directly as *بلوتوث*. The global recognition of *Bluetooth* ensures that the borrowed term is widely understood across different languages and cultures, see Table 4 for more examples of borrowing.

Table 3

Some Examples of Neologisms and their equivalents identified in *Nature*

Source Terms	Target Terms	Strategy
Cosmic curl	التجعد الكوني	Calque
Flexible current collector	لاقط التيار المرن	Calque
Light sheet microscopy	مجهر الصفحة الضوئيّة	Calque
Southern Right Whale	الحوت الصائب الجنوبي	Calque
Cellulosome	سليلوسوم	Borrowing
Kinesin	كينيزين	Borrowing
Burkholderia dolosa	بيركولديريا دولوزا	Borrowing
Ibuprofen	أيبوبروفين	Borrowing
Hydraulic fracking	التكسير الهيدروليكي	Partial Borrowing
Nanoscale	مقياس النانو	Partial Borrowing
Silica cycling	تدوير السيليكا	Partial Borrowing
Ankyrin repeat	تكرارية الأنكيرين	Partial Borrowing
Knockout mice	فئران معدَّلة جينيًّا بتعطيل أجزاء من الحمض النووي	Description
Aneurysm	مرض تمدّد الأوعية الدموية	Description
Bin	أقسام متساوية من الكروموسوم	Description
Indels	طفرات جينية قصيرة	Description
Connectome	كونّكتوم: خريطة أو قائمة بكافة الوصلات المشبكية	Amplification
Phagocytic	بلاعم: خلايا تبتلع الأجسام الغريبة، وتقضي عليها	Amplification
Micrographia	ميكرو جرافيا: التصوير المجهري للنباتات بخط اليد	Amplification
Marmoset	مارموسيت: قرد أمريكي	Amplification

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Partial Borrowing

Partial borrowing occurs when a portion of the original term is retained in the target language, usually the more technical or complex part, while other components are translated into the target language (Gottlieb, 2005). This strategy is often used when the term is highly specialized or lacks an equivalent in the target language. As can be seen from Table 3, in *Nature*, *hydraulic fracking* is translated as *التكسير الهيدروليكي*, where *hydraulic* is partially borrowed as *الهيدروليكي*, and *fracking* is translated as *التكسير* [cracking or breaking]. This approach allows for a balance between retaining the technical specificity of the term *hydraulic* and adapting *fracking* in a way that makes sense in Arabic. Similarly, *Scientific American* uses partial borrowing for *synchrotron radiation*, translating it as *الإشعاع السنكروتروني*, see Table 4. Here, *synchrotron* is borrowed directly as *السينكروتروني*, while *radiation* is translated as *الإشعاع* [radiation]. This method preserves the scientific specificity of *synchrotron* while ensuring that the concept of *radiation* is clearly understood in Arabic.

Table 4

Some Examples of Neologisms and their equivalents identified in *Scientific American*

Source Terms	Target Terms	Strategy
Refrigerator mother	الأم الثلاجة	Calque
Computer crime	الجريمة الحاسوبية	Calque
Trapped particles	جسيمات مأسورة	Calque
Wet chemistry	الكيمياء الرطبة	Calque
Bluetooth	بلوتوث	Borrowing
Diphtheria	الدفتيريا	Borrowing
Chacma	الشقمة	Borrowing
Eusthenopteron	يوستينوبتيرون	Borrowing
Synchrotron radiation	الإشعاع السنكروتروني	Partial Borrowing
Microprocessor	معالج ميكروي	Partial Borrowing
Topological properties	الخواص الطبولوجية	Partial Borrowing
Triglycerides	الجليسيريدات الثلاثية	Partial Borrowing
Adjuvants	المواد المساعدة في اللقاحات	Description
GPS	نظام تحديد الموقع بالأقمار الصناعية	Description
Panderichthys	سمكة ضخمة لها بوز مدبب وعينان اعلى رأسها	Description
Rotavirus	فيروس مسبب للإصابة بإسهال الأطفال	Description
AIDS	الإيدز: فيروس نقص المناعة البشرية المكتسب	Amplification
Insula	إنسولا: جزيرة رايل	Amplification
Tetanus	تيتانوس: مرض يسبب تقلصا في عضلة الفك والرقبة	Amplification
Empathy	التشاعر: تفهم مشاعر الأخرين	Amplification

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Description

In cases where no direct equivalent exists in the target language or when a term is complex, description is often employed to explain the term in more detail (Molina & Albir, 2002). This strategy helps ensure that the concept is conveyed accurately, even if the term itself is not directly translatable. Table 3 shows that, in *Nature*, the term *knockout mice* is translated as *فئران معدَّلة جينيًّا بتعطيل أجزاء من الحمض النووي* [genetically modified mice by disabling parts of the DNA], which explains the scientific procedure involved in creating these animals. The use of a description in this instance allows Arabic-speaking readers to understand the meaning of *knockout mice* even though there is no direct Arabic equivalent for the term. In the same vein, the term *adjuvants* in *Scientific American* is translated as *المواد المساعدة في اللقاحات* [substances that help in vaccines]. As evidenced by Table 4, the descriptive translation ensures that the functional role of *adjuvants* is clarified for the Arabic-speaking audience, making the term more accessible.

Amplification

Amplification involves expanding on the original term by providing additional information, typically in the form of a brief explanation or clarification (Molina & Albir, 2002). This strategy is used when the original term requires further elaboration for it to be fully understood by the target audience. In reference to Table 3, in *Nature*, the term *connectome* is translated as *كونّكتوم (خريطة أو قائمة بكافة الوصلات المشبكية)* [a map or list of all synaptic connections], where the term is amplified by providing a clear definition of what a *connectome* represents. This amplification strategy aids comprehension by providing the reader with a broader understanding of the term beyond the technical name itself.

Equally, Table 4 reveals that *Scientific American* employs amplification in the translation of *AIDS*, which is rendered as *الإيدز: فيروس نقص المناعة البشرية المكتسب* [AIDS: acquired human immunodeficiency virus]. This translation not only uses the term *الإيدز* [AIDS] but also clarifies that it refers to a specific virus, offering additional context that aids in the understanding of the term.

In conclusion, the translation of neologisms from English to Arabic in scientific texts involves the use of a variety of strategies, each carefully chosen to maintain the meaning of the original terms while adapting them to the linguistic norms of the target language. The strategies of calque, partial borrowing, description, amplification, and borrowing each play a crucial role in ensuring that new terms are accessible and comprehensible to Arabic-speaking readers. These strategies reflect the translator's efforts to balance linguistic innovation with conceptual clarity. As scientific fields continue to evolve, these strategies will likely continue to play a key role in bridging linguistic and cultural gaps, ensuring that new terms are accessible to a global audience.

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Results

The analysis of the neologisms in the Arabic translations of *Nature* and *Scientific American* magazines identified five distinct translation strategies, with a total of 500 instances across both texts. The findings show distinct patterns in how these strategies were applied in both magazines.

As Table 5 shows, in *Nature*, the most frequently used translation strategy was calque, accounting for 102 instances, or 41% of the total translations. This was followed by partial borrowing, which appeared in 50 instances, representing 20% of the translations. The strategy of description was used in 42 instances, making up 17% of the translations. Amplification, which involves combining two strategies, was used 38 times, accounting for 15% of the total. Finally, borrowing was the least common strategy in *Nature*, used in just 18 instances, or 7% of the total.

Table 5
Frequency of Translation Strategies in *Nature*

Translation Strategies	Frequency	Percentage
Calque	102	41%
Partial Borrowing	50	20%
Borrowing	18	7%
Description	42	17%
Amplification	38	15%
Total	250	100%

It is clear from Table 6 that *Scientific American* showed a similar trend. Calque was again the most frequently used strategy, though it accounted for slightly fewer instances than in *Nature*—100 instances, or 40%. Partial borrowing followed closely, with 52 instances, making up 21% of the total translations. Borrowing was the third most frequently used strategy, appearing in 50 instances (20%). Description was used in 40 instances, representing 16% of the total, while amplification was the least common strategy in *Scientific American*, with just 12 instances, or 3%.

Table 6
Frequency of Translation Strategies in *Scientific American*

Translation Strategies	Frequency	Percentage
Calque	100	40%
Partial Borrowing	52	21%
Borrowing	50	20%
Description	40	16%
Amplification	8	3%
Total	250	100%

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As shown in Figures 1 and 2 below, the comparative analysis between the two magazines reveals that calque was consistently the most frequently used strategy in both *Nature* and *Scientific American*, although its proportion was slightly higher in *Nature* (41%) compared to *Scientific American* (40%).

In summary, the analysis of the neologisms in the Arabic translations of the *Nature* and *Scientific American* Magazines highlights both shared and divergent strategies in their translation processes. While calque and partial borrowing dominated both texts, subtle differences emerged, particularly with respect to the use of borrowing and amplification. The higher frequency of partial borrowing in both magazines suggests a greater reliance on retaining the form of the original neologisms, while the more frequent use of amplification in *Nature* indicates a preference for combining strategies to preserve the meaning.

Figure 1
Percentage of Translation Strategies in *Nature*

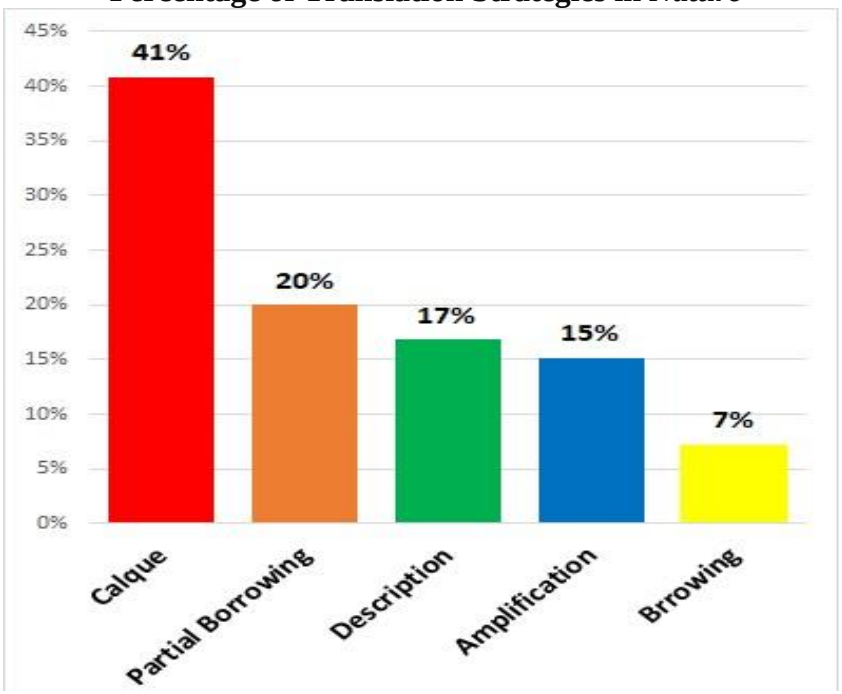

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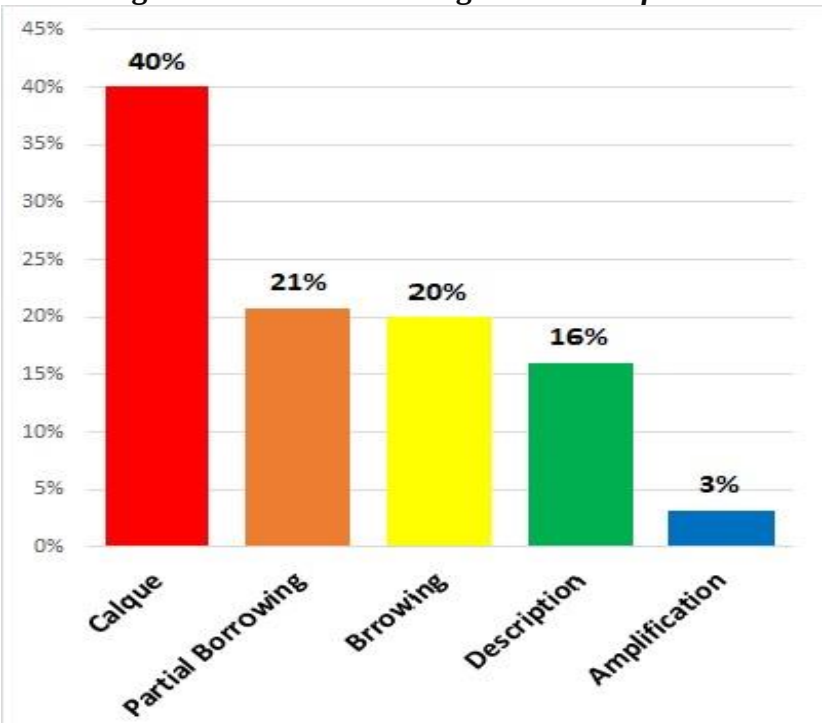
Figure 2
Percentage of Translation Strategies in *Scientific American*



Discussion

The results show that distinct patterns emerged in the translation strategies employed in the Arabic translations of *Nature* and *Scientific American* magazines, suggesting specific preferences in how these terms were translated for the Arabic reader. A closer examination of these strategies highlights both similarities and differences in their application, and these patterns can be interpreted in the context of existing research on the translation of neologisms.

As Tables 5 and 6 shows, the most frequent strategy identified in both *Nature* and *Scientific American* magazines was calque, a finding that aligns with previous studies on neologism translation. For example, Adili et al. (2023) and Houshyar and Karimnia (2013) found that calque is commonly used when translating technical terms, as it allows for the retention of the original meaning while adapting the form to the target language. In this study, calque accounted for 41% of the total translations in *Nature* and 40% in *Scientific American* (see Figures 1 and 2). This similarity to previous research indicates that calque is a preferred strategy for translating neologisms, particularly when the aim is to keep the meaning of the source term intact while conforming to the grammatical structure of Arabic.

A notable observation is the second most frequent strategy, partial borrowing, which appeared in 20% of the translations in *Nature* and 21% in *Scientific American*. This

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strategy mirrors findings from Alharbi (2017), who also reported a high frequency of transliteration in the translation of neologisms, particularly in the *Harry Potter* series. The prevalence of partial borrowing in this study suggests that when no precise equivalent exists in Arabic, translators may opt for borrowing parts of the term, creating a hybrid that maintains some degree of the original term's foreign flavor while making it accessible to the target audience.

The strategy of description, or paraphrasing, also played a significant role, appearing in 17% of the translations in *Nature* and 16% in *Scientific American*. This approach, identified by Hanaqtah (2019) as a frequent strategy for translating political neologisms, is used when there is no direct equivalent or when the concept is difficult to express in a single term. The consistent use of description across both texts indicates that translators often rely on explanatory translations to convey the meaning of a neologism, especially when dealing with complex or context-specific terms.

Another key finding was the use of amplification, which, in this study, was more frequent in *Nature* (15%) than in *Scientific American* (3%). This difference suggests that translators of *Nature* were more inclined to expand upon the original term to ensure clarity or to convey cultural nuances. Amplification, as noted by Vinay and Darbelnet (1995), is a translation strategy that combines multiple techniques and is used when the target language requires more words than the source language to express the same idea. The higher frequency of amplification in *Nature* may be reflective of a more complex or culturally rich context in which additional explanations were necessary.

Lastly, borrowing was the least frequent strategy in *Nature* (7%) but appeared more often in *Scientific American* (20%), see Figures 1 and 2. This suggests that *Scientific American* contained more neologisms that did not have adequate Arabic equivalents, prompting the translators to opt for full borrowing to maintain the meaning of the source terms. This contrasts with findings from Bataina (2021), where borrowing was used less frequently in the translation of business terms from English into Arabic, possibly due to the difference in the nature of the texts studied.

The comparative analysis between the two magazines highlights several key trends. While calque and partial borrowing dominated both texts, the application of these strategies varied in terms of proportion. Additionally, the distinct use of amplification in *Nature* and the higher frequency of borrowing in *Scientific American* demonstrate how the nature of the neologisms and the context of the source text influence the translation strategies employed.

Overall, the findings of this study may contribute to the broader understanding of how neologisms are translated into Arabic. They support the idea that calque remains the preferred strategy, as noted in previous studies (e.g., Adili et al., 2023; Bataina, 2021; Fumani & Abdollahpour, 2017), but they also highlight the differences in strategy usage depending on the text type and the specific challenges posed by the neologisms being translated.

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Conclusion

To summarize, this study examined the translation of neologisms from English into Arabic in two science magazine, *Nature* and *Scientific American*, identifying the strategies employed and their frequencies. The findings revealed that calque was the most frequently used strategy, accounting for nearly half of the translations in both texts. This reflects the importance of maintaining the original meaning of technical terms while adapting them to the grammatical structure of the target language. Partial borrowing and description were also prevalent, highlighting the challenges of translating neologisms when no direct equivalent exists or when a term is too complex to be conveyed in a single word.

The study also found notable differences between the two texts, particularly in the use of amplification in *Nature*, which suggests that context plays a significant role in translation decisions. Borrowing, though less frequent, was more common in *Scientific American*, indicating the varying nature of neologisms across different texts.

This research has several implications for translation theory and practice. It reaffirms the importance of calque in technical translations, while also demonstrating the growing role of borrowing and description when no exact equivalents exist. It also underscores the importance of considering context when selecting translation strategies, particularly in specialized fields like science.

Future studies could look into how digital media platforms affect the translation of scientific terms. The role of artificial intelligence in translating neologisms and its impact on translation strategies also warrants investigation. Finally, tracking the evolution of scientific terminology would shed light on how new terms are adopted and integrated into the target language over time.

The findings from this research could benefit various people and institutions. For example, translators can improve strategies for handling neologisms, enhancing accuracy and readability. Publishers of science magazines could develop more standardized approaches to translating scientific terms, leading to greater consistency and clarity across publications. The findings could inform the creation of policies or guidelines for translating scientific and technical terms, promoting consistency and quality in scientific texts. Language and translation programs can incorporate the findings into their curricula, offering students practical insights into translating specialized vocabulary. Translator trainers can develop training modules based on this study, preparing future translators to handle neologisms more effectively.

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