Translating Scientific Terminology: Examples from the Arabic versions of Two International Magazines

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Abstract

The purpose of this study is to examine the strategies used in translating scientific terminology. It is an attempt to explore how scientific English terms are translated in the Arabic versions of two international magazines; namely, the famous Scientific American (Arabic Edition) and Nature (Arabic Edition). The evidence provided by these magazines is expected to explain to what extent semantic and communicative translation is crucial in rendering scientific terms into Arabic. It also classifies the different types of semantic translation.

Keywords: *Scientific Translation, Terminology, Transliteration, Calque, Gloss Translation, Semantic and Communicative Translation, Globalization*

1. Introduction

Scientific translation is an important channel of knowledge dissemination; i.e. it is a means of seeking knowledge to fulfill scientific research needs. Translation of English scientific texts into Arabic is extremely scarce and is not keeping pace with global knowledge explosion. Scientific translation is an important step to acquire new technologies. The system of terminology in scientific language is not closed and constant in the age of globalization. It is in constant development as the new scientific disciplines emerge and develop.

Terminology is one of the problems that translators face in translating scientific English texts into Arabic. A good scientific translator should guarantee an accurate rendering of terminology. Actually, Arabic suffers a serious shortage of scientific terminology. Language purists argue that translators should find original Arabic terminology which is better than loanwords. Selection of an equivalent scientific term in the target language also complies with the requirement of precise transmitting of thoughts and ideas. Therefore, terminology must be carefully chosen in order to be unequivocal.

Newmark (1988; 1991) suggests that the issue is a conflict of loyalty to the source language or the target language. His semantic translation method attempts to be close to the phonetic, morphological and lexical structure of the source. It is similar to Eugene Nida's formal equivalence. His communicative translation method, also, attempts to produce a similar effect on the target language. It resembles Nida's dynamic equivalence.

2. Significance and Scope of the Study

The study focuses on the translation strategies of scientific terminology in *Scientific American* (Arabic Edition) and *Nature* (Arabic Edition) and the factors which play a role in the choice of these strategies. It does not deal with the other linguistic features of scientific and technical texts, or the stylistic genres on which they are based. It focuses on finding out the frequency of using transliteration, calque, gloss translation and communicative translation. It also provides a rationale beyond the frequent use of the frequently used strategy in translating the two magazines.

3. Objectives of the Study

The research problem for this study is to identify the frequency of using translation strategies in rendering English scientific terms into Arabic. The contribution of this study lies in its attempt to answer the following research questions:

1. How often are transliteration, calque, gloss translation and communication translation used in the translation of scientific terms?
2. What are the factors which play role in the choice of these strategies?

The study aims at setting criteria for the translation of scientific terms.

4. Literature Review

There are many different translation strategies, most of which are based on equivalence. The concept of equivalence is a central and controversial issue in translation. It has been studied by various theorists (cf. Jakobson 1959, Catford 1965, House 1977, Nida and Taber 1982, Newmark 1988, Vinay and Darbelnet 1995 and Baker 1992). Since the introduction of semantic and communicative translation theories by Newmark (1988; 1991), there have been various studies on them. Some studies compare them; others analyze them in some specific literature texts or in the translation of news reports.

Scientific translation has been discussed by many scholars. Gerzymisch-Arbogast (1993) explains translation problems in technical and scientific translation. Gommlich (1993) utilizes text typology in scientific and technical translation. Franco Aixela (2004) surveys the history of technical and scientific translation. Few studies deal with how scientific terms are translated into Arabic. El-Shami (2010) discusses the translation of prefixes and suffixes in the scientific terms. El-Khoury (2010) examines the translation of medical terms into Arabic.

5. Data Collection and Methodology

Data in the study are scientific terms collected from the translated Arabic version of the famous *Scientific American* (Arabic Edition) and *Nature* (Arabic Edition). I depended on a descriptive analytic method: I have gone through the two magazines in the period from 1993 to 2016. Three hundred scientific terms have been chosen from each magazine. I selected scientific terms from miscellaneous fields, including astronomy, physics, computer studies, medicine … etc. The criteria of choice are based on the following aspects:

1. Term recentness
2. Clarity of the term

To achieve a level of accuracy, a rich variety of techniques have been used, from manual search to dictionary-based methods. I collected manually the scientific terms. To restrict choices and identify the exact meanings of the English scientific terms I used *Oxford Dictionary of Science* to find out meanings. Then, I classified the terms into four categories:

1. Semantic translation at the phonetic level (transliteration)
2. Semantic translation based on morphological processes such as suffixation, derivation and reduplication (calque)
3. Semantic translation based on lexical equivalence (gloss translation)
4. Communicative Translation

A sample of data is provided in the appendix of the study for further investigation.

6. Theoretical Framework

6.1 Nature of Scientific Texts

Scientific texts have some distinctive characteristics. The use of terms, objectivity, and accuracy are the most important ones. Scientific texts have common features such as:

- Simple structure and sentence ordering
- Explicitness
- Objectiveness
- Impersonality

Lee-Jahnke (1998:83-84) shows how to render scientific and technical texts. First, translators should have scientific knowledge. The challenges for the scientific translator are to be able to research subjects and to have scientific knowledge in a particular field. Moreover, translation of science poses a huge linguistic challenge. The key feature of scientific texts is terminology which is considered a key principle in scientific knowledge. Terminology and science have been interwoven for a long period of time. The relation between terminology and science is even more strongly understood by seeing an intrinsic dependency of the development of language and the development of science. Gerhard and Wright (2001) designated a handbook to meet the practical needs of terminologists, translators and lexicographers. They argue that "the terminologist is usually focused on the designation of terms and has to consider various determining mechanisms such as *affixation*, *prefixation*, *backformation*, *compounding*, *deprecation*, *borrowing* and *neologisation* within specialist terms" (2001: 813).

6.2 Semantic Translation of Scientific Texts

The paper draws on Peter Newmark's translation theory (1988, 1991). He distinguishes two kinds of translation; semantic translation and communicative translation. His semantic translation focuses on replicating the source text forms within the target language. It denotes formal correspondence between the source text (ST) and the target text (TT). It focuses on the phonetic, morphological and lexical structure of the text. Semantic translation is used in genres which are ST-biased. It is rendering of the contextual meaning of the ST according to the syntactic and semantic characteristics of the TT. It is similar to Nida's formal correspondence which focuses on form and content. It is author-centered, faithful, more literal and informative. Peter Newmark's semantic translation can be divided into three levels; phonetic level (transliteration), morphological level (calque) and lexical level (gloss translation).

6.2.1 Semantic Translation at the Phonetic Level (Transliteration):

Semantic translation at the phonetic level refers to transliteration which is a word taken from one language into another language alphabet. Transliteration is frequently used in scientific translation.. Familiar words are;

1. Alzheimer الزهايمر
2. Microwave ميكروويف
3. SARS سارس

Transliteration follows the phonetic rules of the target language. Transliterated words are often naturalized to assimilate the structure of the target language. Translators introduce some phonetic and morphological changes to the foreign term (Ghazzala 1995). Naturalization of loanwords refers to the addition of some affixes to the foreign words without changing their roots. The affixes are added to suit the nature of the Arabic language:

Technology → تكنولوجيا
Technological → تكنولوجى
Technologically → تكنولوجيا
Lasering → ليزرة

Ghazzala (1995) is in favor of using pure Arabic terms. For example, the word "تقنية" can be used to render the word "technology". According to Baker (1987) transcription and naturalization are rejected because they threaten the position of Arabic. In fact, these strategies do not explain the meaning of the words in Arabic. Notice, for example, how the following two words (*ballistic* and *cruise*) are transliterated:

Ballistic missile صواريخ باليستية
Cruise missile صواريخ كروز

The Arabic reader may not know the meaning of "باليستية" and "كروز". Another example is the translation " الأمن السيبرانى" for the English phrase "cyber security". Using transliteration does not enrich Arabic vocabulary. In fact, it implies that Arab translators are not able to create new pure Arabic terms and prefer the easiest way to translate scientific terms.

6.2.2 Semantic Translation at the Morphological Level (Calque):

Calque or loan translation is a kind of semantic translation. This strategy renders a phrase borrowed from another language, keeping the source language structure.

Anaerobic لاهوائى (*Scientific American* 2015, Vol.7-8, p.74)
Gasohol بنزحول (*Scientific American* 1994, Vol.12, p.58)

Some calque words are not natural. Consider the following words:

Spacetime زمكان (*Nature* 2016, Vol.43, p.12)
Electromagnetic كهرطيسية(*Scientific American* 2000, Vol.14, no.3, p.48)

6.2.3 Semantic Translation at the Lexical Level (Gloss Translation):

Semantic translation at the gloss level refers to lexicalizing equivalent words in the target language. Translation as per the lexicon is much more preferable in some author-oriented scientific texts. Gloss translation aims at rendering the terms and concepts into the Arabic language by translating the lexicon. It receives much acceptance in some scientific texts. For example:

Resolution → الميز (*Scientific American* 2000, Vol.16, no.11, p.40)

Resolution → الاستبانة (*Nature* 2013, Vol.9, p.22)
HDTV → التليفزيون عالى الوضوح (*Scientific American* 2002, Vol.18, no.5-6, p.63)

6.3 Communicative Translation of Scientific Texts

On the contrary, communicative translation aims at influencing the reader. It is reader-centered and effect-oriented. Newmark proposes the principle of "equivalent effect". According to Newmark (1988), it focuses on making the target language readers understand the source language author's thoughts. It is used in genres which are communicative in nature such as news report, textbooks, and public announcement. The differences between communicative and semantic translation is based on their different emphasis. In semantic translation, the focus is on the original's formal properties. However, communicative translation does not adhere to the source language text. Then, it attempts to eliminate any exoticism and to look natural; smooth translation. While communicative translation attempts to produce on its readers an effect close to that of the original, semantic translation aims to render the semantic and syntactic structures of the original (Newmark 1991: 11).

> *Semantic translation [is] usually more awkward, more detailed, more concentrated, but briefer…. Communicative translation [is] easy reading, more natural, smoother, simpler, clearer, more direct, [and] more conventional… (1991: 11).*

As pointed out by Newmark,

> *Communicative and semantic translation may well coincide…. There is no one communicative or one semantic method of translating a text—these are in fact widely overlapping bands of methods. A translation can be more, or less, semantic—more, or less, communicative—even a particular section or sentence can be treated more communicatively or less semantically (1991: 10)*

7. Analysis

This section deals with examples from the two English-Arabic translated scientific magazines. First, statistical data are offered to point out the frequency of the translation strategies used by the two magazines.

Table 1: Frequency and Percentage of Translation Strategy in *Scientific American* (Arabic Edition)

Translation strategy	Frequency	Percentage
Transliteration	150	50%
Calque	23	7.6%
Gloss Translation	222	74%
Communicative Translation	24	8%

Table 2: Frequency and Percentage of Translation Strategy in *Nature* (Arabic Edition)

Translation strategy	Frequency	Percentage
Transliteration	27	9%
Calque	2	0.6%
Gloss Translation	299	99.6%
Communicative Translation	6	2%

The first category of semantic translation, i.e. transliteration, has been frequently used in *Scientific American* (Arabic Edition). It has been used in almost 50 % out of 300 terms. Examples of transliterated words are:

Faxes (الفاكسات (المثالات (*Scientific American* 1996, Vol.12, no.7-8, p.40)
Profile (بروفايل (سيماء / لاحة (*Scientific American* 2011, Vol.27, no.9-10, p.50)

Some transliterated words are naturalized by using derivational processes.

Automata (أتوماتا (أتمتة / أتوماتيكية (*Scientific American* 2015, Vol.8, no.3-4, p.26)
Chemokine كيموكينة (*Scientific American* 1997, no.12, p.19)
Chlorinated مكلورة (*Scientific American* 1994, no.10-11, p.40)

Galvanization غلفنة (*Scientific American* 1997, no.1, p.52)
Gasification تغويز (*Scientific American* 1993, no.7-8, p.26)
Ultrafiltrating فلترة فائقة (*Scientific American* 1999, no.8-9, p.95)
Automated flight تحليق مؤتمت (*Scientific American* 2015, no.11-12, p.28)

It is noticed that while *Nature* (Arabic Edition) utilizes gloss translation, *Scientific American* (Arabic Edition) uses transliteration. The following two terms are transliterated in *Scientific American* (Arabic Edition);

DNA الدنا (*Scientific American* 1995, no.1, p.70)
RNA الرنا (*Scientific American* 2014, no.9-10, p.18)

However, it is lexically translated in *Nature* as;

DNA الحمض النووى (*Nature* 2013, Vol.2, p.13)
RNA الحمض النووى الريبى (الريبوزى) (*Nature* 2013, Vol.2, p.13)

Some terms are translated through a combination of two or three strategies, as the case in *Scientific American* (Arabic Edition). Translation of scientific terms in *American Scientific* (Arabic Edition) can be divided into three kinds—semantic translation, communicative translation and the combination of semantic and communicative translation. It has been noticed that the rate of using loan words in Arabic scientific texts is higher than the rate of coining new Arabic words in *Scientific American* (Arabic Edition). However, *Nature* (Arabic Edition) adopts the principle of gloss translation.

In other cases, *Scientific American* (Arabic Edition) combines transliteration and gloss translation;

Pixel (*Scientific American* 1995, no.7-8, p.65)
(1) بكسل
(2) بقعة ضوء
neuron (*Scientific American* 2015, no.7-8, p.23)
(1) النورون
(2) العصبون
quantum (*Scientific American* 2015, no.9-10, p.4)
(1) كوانتى
(2) كمومى

Again, in the previous examples, the second translation may be easy to the general reader.

The second category of semantic translation or calque is also frequent in *Scientific American* (Arabic Edition). 23 terms out of 300 terms have been translated by calque. Examples are;

Gasohol بنزحول (*Scientific American* 1994, no.12, p.58)
Knowbot (knowledge robots) نوبوت (*Scientific American* 1996, no.7-8, p.30)
Nanobot (إنسان + آلى) الإنسالية (*Scientific American* 2015, no.11-12, p.20)
iRobot إنسالات الأنا (*Scientific American* 2013, no.29, p.53)
Achromatic لالونى (*Scientific American* 2002, no.5-6, p.43)
Interneurons مابين العصبونات (*Scientific American* 2015, no.7-8, p.23)
Botnet (robot network) شبكة البوتنت (*Scientific American* 2012, no.3-4, p.90)
Anaerobic اللاهوائى (*Scientific American* 2015, no.7-8, p.74)

Calque is used as strategy but it should be on condition that it is intelligible. The following words are translated as calque but in an awkward way:

Electromagnetic الكهرطيسية (*Scientific American* 2015, no.5-6, p.26)
Spacetime زمكان (*Scientific American* 2015, no.9-10, p.34)
Chronobiological البيوزمنية (*Scientific American* 2015, no.7-8, p.45)
Superhuman فوبشرية (*Scientific American* 2015, no.5-6, p.63)
Ultraviolet مافوسجى (*Scientific American* 1996, no.11-12, p.13)
Hemangioma وعاؤوم (*Scientific American* 1998, no.1-2, p.97)
Submarine تحبحرى (*Scientific American* 1998, no.4, p.26)
Biome حيوم (*Scientific American* 1990, no.1, p.99)

They can be best translated as follows:

Electromagnetic الكهرومغناطيسية
Spacetime زمانى مكانى
Chronobiological علم البيولوجيا الزمنى
Superhuman فوق بشرية
Ultraviolet مافوق بنفسجى

Hemangioma ورم وعائى
Submarine تحت بحرى
Biome جينوم مجموعة كائنات حية

The third category of semantic translation; i.e. translation at the lexical level, is also frequent in the two magazines. 299 terms out of 300 terms have been translated lexically in *Nature*.

On-line معلومات مباشرة فورية (*Scientific American* 2009, no.5-6, p.25)
Placebo دواء غفل (أدوية وهمية) (*Scientific American* 2015, no.11-12, p.56)
Genome المادة الوراثية (الجينوم) (*Scientific American* 2015, no.11-12, p.34)
Nanomachine آلة جزيئية (*Nature* 2013, Vol.2, p.14)
Epigenetic marks علامات وراثية غير جينية (*Nature* 2014, Vol.6, p.20)
Generic medicines أدوية جنيسة (*Nature* 2014, Vol.6, p.19)
Gonotrophic dissociation التغذية التوالدية العرضية (*Nature* 2015, Vol.2, p.18)
Diffraction pattern أنماط حيود (*Nature* 2016, Vol.4, p.22)
Ideograms صور رمزية (*Nature* 2015, Vol.2, p.30)
Heartbleed ثغرة أمنية (خطأ برمجى) (*Scientific American* 2015, no.7-8, p.50)

It is also noticed that some scientific terms undergo a process of extraction. For example 'cloud system' is used instead of 'cloud computing system'. Good scientific translation lexicalizes the extracted term, for example;

Cloud system نظام السحابة الحاسوبية (*Nature* 2014, Vol.7, p.26)
Valence band نظام التكافؤ الكيميائى (*Nature* 2012, Vol.12, p.71)

Communicative translation, on the other hand, is a challenge for the scientific translator. It requires efforts to paraphrase and explain a term. Notice how the following word "spam" is translated:

Spam (*Scientific American* 2015, no.7-8, p.50)
(1) سبام ;
البريد الإلكترونى المزعج المرسل بكميات كبيرة إلى المتلقين دون رضاهم (2)

The two translations both have the same meaning. The first translation is semantic and the second translation is communicative. The study also finds out that communicative translation is more used in *Scientific American* (Arabic Edition) with a percentage of 8 % (24 terms). *Nature* (Arabic Edition) utilizes this strategy in only 6 terms. Examples are;

Esperanto (*Scientific American* 1996, no.7-8, p.25)
(1) الإسبرانتية
(2) لغة دولية مبسطة للتفاهم
Quarks (*Scientific American* 2015, no.5-6, p.27)
(1) الكواركات
(2) جسيمات تكون عالمنا
Glue (*Scientific American* 2015, no.7-8, p.42)
(1) الكليونات
(2) جسيمات صغيرة
Silcene (*Nature* 2013, Vol.4, p.23)
(1) السيليسين
(2) رقائق سيليكون تشبه الجرافين بسمك ذرة واحدة

Nevertheless, semantic translation and communicative translation are not in complementary distribution as there are some overlaps between them as well. The following are examples of communicative translation in *Scientific American* (Arabic Edition).

Table 3: Examples of Communicative Translation

Term	Communicative Translation
Spintronics (Scientific American 2014, no.5-6, p.77)	الإلكترونيات السبينية تقانة بازغة لحمل المعلومات تستغل بعض خواص الإلكترون من قبيل الشحنة والسبين والعزم المغنطيسي.spin(التدويم)
WiMAX (Scientific American 2007, no.11-12, p.42)	التشغيل البيني على النطاق الدولي للوصول عبر الموجات الميكروية، وهو تعبير عن «الشبكة الرقمية اللاسلكية الواسعة»، التي توفر نقل معلومات رقمية لاسلكيا مسافات طويلة بطرائق تختلف من وصلات النقطة إلى نقطة حتى الشبكات الخلوية اعتمادا على المواصفة القياسية
field-effect transistor (Scientific American 2010, no.3-4, p.40)	ترانزستور يمر معظم تياره عبر قناة يمكن التحكم في مقاومتها بواسطة حقل كهربائي مستعرض متغير.
quantum dot (Scientific American 2010, no.3-4, p.40)	النقطة الكمومية هي نصف ناقل أزواج إلكتروناته، وثقوبه المترابطة محتواة ضمن جميع الأبعاد المكانية الثلاثة.

Of course, communicative translation is not meant to be better than semantic translation. The choice of translation strategy depends on specific conditions: the communicative situation. One finding of the study is that choice of translation strategy depends on the communicative value of the text. It plays a role in determining the translation strategy used; i.e. text type, readership, the roles of translators, and functions of the texts. It imposes certain limits on the translator's freedom of choice. It subsumes the following:

1. Who is the intended audience?
2. What is the text type?
3. What is the function of the text?

With regard to readership, if priority is given to audience, communicative translation is used; if priority is given to author, semantic translation is used. The function of the text is also important. Scientific texts have informative function. The study stresses that the communicative value of the text is important to determine the translation strategy. As for text type, Newmark (1988:40) proposes three text types: namely, expressive texts, informative texts and vocative texts. According to Newmark, communicative translation is preferred in scientific texts because they are informative (cf. Newmark 1988, 1991). He views communicative translation as smother and simply clearer, while semantic translation is viewed as awkward, more detailed and more concentrated.

It has been noticed that many English scientific terms have become loan words in Arabic under the umbrella of borrowing. The present situation can be justified by two reasons:

1- The huge flux of information in the age of globalization helps transfer of terminology. Cronin (2003) explains that translators, like everybody else, are susceptible to the influence of globalization. Since globalization cancelled space, it seems to be synonymous with instantaneous communication. This impact is especially on non-literary texts or scientific texts. Globalization has imposed the rapid flow of scientific and technological terms. This situation has been encountered by a blurred vision in Arabic scientific translation: there is no unified strategy in translating scientific terms and excessive dependence on transliteration or lexical borrowing. In the global age the Arab world is not scientifically and technologically advanced. Therefore, the developed countries are scientifically dominant and their global language, English, is also dominant. Transliteration or lexical borrowing in the age of globalization is one-way process which takes place from the culturally-dominant language to the borrowing languages. Cronin also raises the issue of why nations need translation. He points to the danger of 'foreignizing' translation strategy advocated by those like Schleiermacher. The situation is beneficial for the global language which retains most of the scientific terms. He recommends facing the challenge of foreign terms in translation and inventing equivalent terms in national languages to expand its lexical base.

2- Transliteration is easier than gloss translation or communicative translation.

It is quite clear in the analysis that the strategies used in translating scientific terms have more than one option. The main finding of the study is that semantic translation is more used in the two magazines. While *Nature* (Arabic Edition) opts for gloss translation, *Scientific American* (Arabic Edition) favors a combination of semantic and communicative translation.

8. Conclusion

The study surveys the two kinds of translation proposed by Peter Newmark; i.e. semantic and communicative translation and their use in the translation of scientific texts. It concludes that *Scientific American* (Arabic Edition) uses semantic translation, communicative translation and a combination of the two methods. However, *Nature* (Arabic Edition) depends heavily on gloss translation. The study is in favor of using gloss translation to enrich Arabic repertoire and using communicative translation in case the scientific term needs clarification.

The study argues for the option of gloss translation that typifies semantic equivalence or formal equivalence, where form and content are reproduced as faithfully as possible to address the specialized reader. In fact, as prescribed by Newmark, communicative translation is suitable for scientific texts. The study is in favor of using both strategies to address both the general and specialized reader. This solution has been adopted by *Scientific American* (Arabic Edition).

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Appendices: Sample of Data

Appendix I: Scientific American (Arabic Edition)

English Term	Arabic Translation	Type of translation
Bytes	بيتات	Transliteration
Byte = 8 bits	بايت	Transliteration
Bit	بتة	Transliteration
Bits	بتات	Transliteration
serendipity	سرنديبية [اكتشاف أشياء مهمة مصادفة]	Transliteration & Communicative Translation
resolution	الميز	Gloss Translation
High resolution	عالية الميز	Gloss Translation
On-line	معلومات مباشرة فورية	Communicative Translation
prodigy	برودجى	Transliteration
Esperanto	الإسبرانتية (لغة دولية مبسطة للتفاهم)	Transliteration & Communicative Translation
Knowbot = knowledge robots	النوبوت	Transliteration
HDTV	التليفزيون العالى الوضوح	Gloss Translation
x-ray	أشعة سينية	Gloss Translation
Soliton	سوليتون (موجة وحيدة)	Transliteration & Communicative Translation
Video teleconferencing	التداول الفيديوى عن بعد	Gloss Translation
Encoding	تكويد (تورية)	Transliteration & Gloss Translation
Decoding	كسر التكويد	Transliteration & Gloss Translation
microwave	الموجات المكروية (الصغرية)	Gloss Translation
Faxes	الفاكسات (المثّالات)	Transliteration & Gloss Translation
Nucleus accumbens	نواة متكئة	Gloss Translation
acetylation	أسْتَلة	Transliteration
achromatic	لا لونى	Calque
Nanobots	الإنسالات النانوية- جمع إنسالة تحت من إنسان آلى	Calque & communicative Translation
DNA	الدنا	Transliteration
Nanoparticle	جسيم نانوى	Transliteration & Gloss Translation
Drugs in disguise	ادوية مموهة	Gloss Translation
Metastases	ورم حبيث- سرطان متقدم	Gloss Translation
Nanodrug	ادوية نانوية	Transliteration & Gloss Translation
Sheath material	مادة الغمد	Gloss Translation
Computer chips	شبيات حاسوبية	Transliteration & Gloss Translation

English Term	Arabic Translation	Type of translation
Automated flight	تحليق مؤتمت	Calque & Gloss Translation
Genome	الجينوم (المادة الوراثية)	Transliteration & Gloss Translation
Quarks	الكواركات (جسيمات تكون عالمنا)	Transliteration & Communicative Translation
Quantum	كمومى	Gloss Translation
Hard drive	سواقة	Gloss Translation
Entropy	الإنتروبية	Transliteration
Thermodynamic	ترموديناميك	Transliteration
Neuron	النورون (العصبون)	Transliteration & Gloss Translation
Neurobiology	عصبيولوجى	Transliteration & Gloss Translation
Plate tectonics	الواح تكتونية	Gloss Translation
Space-time	زمكان	Calque
Iphone 6	الهاتف الذكى	Gloss Translation
Memristor =memory + resistor	مقاوم الذاكرة	Gloss Translation
Cache memory	ذاكرة خبيئة	Gloss Translation
Flash memory	ذاكرة ومضية	Gloss Translation
Photonics	الفوتونيات	Transliteration
Housefly	فراشة منزلية	Gloss Translation
Video monitor	مظهار فيديوى	Transliteration & Gloss Translation
Routers	موزعات	Gloss Translation
Chromosome	الكروموسوم (الصبغى)	Transliteration & Gloss Translation
Monoclonal	وحيد النسيلة	Gloss Translation
Placebo	دواء غفل (أدوية وهمية)	Gloss Translation
Hard wiring	البنية الوراثية	Gloss Translation
interneurons	مابين العصبونات	Calque
Glue	الكليونات (جسيمات صغيرة وهى منحوتة عن أصلها الانجليزى)	Transliteration & Communicative Translation
Photon	الفوتون	Transliteration
Femtoscope	فيمتوسكوب	Transliteration
Metabolism	الإستقلاب (الأيض)	Gloss Translation
chronobiological	البيوزمنية	Calque
Botnet = robot network	شبكة البوتنت	Transliteration
Spam	رسائل مزعجة (سبام)	Transliteration & Gloss Translation
GPS satellites	منظومة (نظام) تحديد المواقع العالمية	Gloss Translation
Internet of things	اجهزة انترنت الأشياء	Gloss Translation
Heart bleed	ثغرة أمنية (خطأ برمجي) (حاسوب)	Gloss Translation
SSL	مآخذ التوصيل الآمنة	Gloss Translation
Open SSL	برمجيات التشفير	Gloss Translation
Vulnerabilities	ثغرات أمنية	Gloss Translation
RNA	الرنا	Transliteration
Nucleotides	نوكليوتيدات	Transliteration
Cable network	شبكة كبلية	Transliteration & Gloss Translation
Camcorder	جهاز آلة التصوير والتسجيل	Gloss Translation
Camless	عديم الكامة	Calque
Cathode	كاثود (مهبط)	Transliteration & Gloss Translation
CD-ROM	سى دى روم (قرص مدمج)	Transliteration & Gloss Translation
Cellular automata	اتوماتا (أتمتة / أتوماتيكية) خلوية	Transliteration & Gloss Translation
Chemokine	منشط كيميائى (كيموكينة)	Transliteration & Gloss Translation
Chlorinated	مكلورة	Transliteration
Clone	نسيلة	Gloss Translation
Cloning	استنساخ (استنسال) (كلونة)	Transliteration & Gloss Translation
Dialysis	ديلزة (تحال)	Transliteration & Gloss Translation
DVD	شاشة عرض فيديوية رقمية (دى فى دى)	Transliteration & Gloss Translation
Disk drive	سواقة (مسير) القرص	Gloss Translation
Biome	حيوم	Gloss Translation
Dialysis	ديْلزة (تحال)	Transliteration & Gloss Translation
Diode	ديود (صمام ثنائي)	Transliteration & Gloss Translation
facsimile (fax)o	فاكس (مثالة)	Transliteration & Gloss Translation
iROBOT	انسالات الأنا	Calque
Robotics	انسالية	Calque
connectomics	كونيكتوميكس	Transliteration
Human Connectome Project	مشروع الكونيكتوم البشري	Transliteration & Gloss Translation
Pixel	بقعة ضوء (بيكسل)	Transliteration & Gloss Translation
anyons	الأنيونات	Transliteration
Qubits	ككيوبتات	Transliteration
Profile	بروفيل تعريب ل : أو سيماء، أو لاحة	Transliteration & Gloss Translation
https	البروتوكول	Gloss Translation
spintronics	الإلكترونيات السبينية: السبين هو خاصة كمومية من خواص الجسيمات دون الذرية، وهو نوع من التدويم يختلف عن التدويم	Transliteration & Communicative Translation

English Term	Arabic Translation	Type of translation
	المألوف في عالم الأجسام الكبيرة. أما الإلكترونيات السبينية فهي تقانة بازغة تستغل السبين المتأصل في الإلكترونات وعزم الاندفاع المغنطيسي المرافق له، إضافة إلى شحنته الكهربائية. وسبين الإلكترون يمكن أن يكون في واحدة من حالتين، ولذا يصلح للتعبير عن البِتّة الرقمية.	
HDD	قرص صلب يخزن 16.8 جيگابايت في خمسة أطباق قطر كل منها 3.5 إنش	Communicative Translation
CD DVD	الأقراص المتراصة وأقراص الفيديو الرقمي	Gloss Translation
Wifi	الواي فاي : لا علاقة لغوية لهذا المصطلح بمضمونه. فالأحرف مأخوذة من اسم التي أطلقت هذا الاسم على الشبكات المحلية WiFi Allianceالشركة اللاسلكية التي تقوم على المواصفة القياسية	Transliteration & Communicative Translation
broadband service	خدمات عريضة النطاق	Gloss Translation
WiMAX	الواي ماكس Worldwide Interoperability for Microwave Access: مختصر العبارة ؛ أي التشغيل البيني على النطاق الدولي للوصول عبر الموجات الميكروية، وهو تعبير عن «الشبكة الرقمية اللاسلكية الواسعة» التي توفر نقل معلومات رقمية لاسلكيا مسافات طويلة بطرائق تختلف من وصلات النقطة إلى نقطة حتى الشبكات الخلوية اعتمادا على المواصفة القياسية	Transliteration & Communicative Translation
Grid	network: تُرجمت إلى «شبيكة» بسبب استخدام «شبكة» مقابل	Gloss Translation
residual photons	الفوتونات المتبقية	Transliteration & Gloss Translation
Spam	سبام وجمعها سبامات؛ وهو البريد الإلكتروني المزعج المرسل بكميات كبيرة إلى المتلقين دون رضاهم	Transliteration & Communicative Translation
ribosome	ريبوزوم أو جُسَيم ريبي، وهي بنية خلوية صغيرة يُترجم فيها الرنا الكودَ الجيني إلى بروتينات RNA	Transliteration & Communicative Translation
galvanizatiion	غلفنة (استثارة كهربائية)	Transliteration & Gloss Translation
gas chromatography	استشراب غازي (فصل لوني بالغاز)	Gloss Translation
gas-filter radiometry	قياس الإشعاع بمرشح غاز	Gloss Translation
gasification	تغويز (تحويل مادة إلى غاز)	Gloss Translation
Gasifier	مغوز	Gloss Translation
Gasohol	بنزحول	Calque
quantum bit (qubit)	بتة كمومية (كوبتة)	Transliteration & Gloss Translation
quantum chromodynamics (QCD)	ديناميكا لونية (كروموديناميك/تحريك لوني) كمومية	Transliteration & Gloss Translation
quantum computing	حوسبة كمومية (كوانتية)	Transliteration & Gloss Translation
quantum electrodynamics	الكترو ديناميك (كهرديناميكي/كهرديناميي) كمومي	Transliteration & Gloss Translation
Quarry	(كواري (طريدة	Transliteration & Gloss Translation
Quasar	كوازار (شبه نجم)	Transliteration & Gloss Translation
radio carrier wave	موجة حاملة راديوية	Transliteration & Gloss Translation
ultrasonic	فوق صوتي (فوصوتي)	Gloss Translation
ultraviolet B radiation	اشعاع بائي ما فوق بنفسجي (مافوسجي)	Gloss Translation & calque
Handheld Device Markup Language (HDML)	لغة تأشير للأجهزة المحمولة باليد	Gloss Translation
hard X-ray	أشعة سينية نفاذة (حادة/قاسية)	Gloss Translation
hardware	عتاد (عتاديات/معدات/مكونات مادية/تجهيزات) صلب	Gloss Translation
Hemangioma	وعاؤوم (ورم وعائي)	Calque
high-definition television (HDTV)	تلفزيون عالي الوضوح	Gloss Translation
immediate early gene	جينة مبكرة فورية	Gloss Translation
Kinin	كينين (قينين)	Transliteration
Laptop	حاسوب حمول (حضني/محمول/حجري/نقال)	Gloss Translation
laptop device	اداة حضنية (حجرية)	Gloss Translation
laser diode	ثنائي (ديود/صمام ثنائي) ليزري	Transliteration & Gloss Translation
laser fluorescence microscope	مجهر تفلور ليزري	Transliteration & Gloss Translation
laser force microscope (LFM)	مجهر القوة الليزرية	Transliteration & Gloss Translation
laser-projection system	منظومة الإسقاط الليزري	Transliteration & Gloss Translation
Lasing	ليزرة (ملازرة)	Transliteration & Gloss Translation
light emitting diode (LED)	ديود إشعاع (باعث/مصدر) ضوئي	Transliteration & Gloss Translation
Tab	بطاقة (حاسوبية)	Gloss Translation
Tablet	لويح حاسوبي (رقمي)	Gloss Translation
circuits and electronics	دارات والكترونيات	Gloss Translation
Universal Serial Bus (USB)	وصلة تسلسلية عالمية (مسرى تسلسلي شامل) (عميم)	Gloss Translation
Ultra Violet Coronagraph Spectrometer (UVCS)	مطياف راسم الإكليل لفوق البنفسجية	Gloss Translation
Ultrafiltrating	فلترة (تصفية) فائقة	Transliteration & Gloss Translation
Ultraviolet	فوق بنفسجي (فوسجي)	Calque & Gloss Translation
vision chip	شبية الرؤية	Transliteration & Gloss Translation
Microcell	خلية ميكروية	Transliteration & Gloss Translation
Microchimerism	كيمرة (خيمرة) ميكروية	Transliteration & Gloss Translation

Appendix II: Nature (Arabic Edition)

English Term	Arabic Translation	Type of translation
Photoelectro chemical energy	الكيمياء الكهروضوئية	Calque and Gloss Translation
Autostereoscopic multiview 3D display	آلة العرض ثلاثية الأبعاد متعدّدة المناظر ذات التجسيم الآلي	Gloss Translation
Nanomachine /molecular machine	آلة جزيئية	Gloss Translation
Clinical research	أبحاث إكلينيكية	Transliteration & Gloss Translation
Generic medicines	)أدوية جنيسة (غير محدودة الملكيّة	Gloss Translation
Hyperbolic metasurfaces	أسطح القَطع الزائد الفائقة	Gloss Translation
Nanowires	أسلاك نانوية	Transliteration & Gloss Translation
Hominin	أشباه البشر	Gloss Translation
Cosmic Microwave Background (CMB)	أشعة الخلفيّة الكونيّة	Gloss Translation
Fibromyalgia	ألم عضلي ليفي	Gloss Translation
Ischaemic heart disease	أمراض نقص تروية القلب	Gloss Translation
Photomultiplier tube	أنبوب تضخيم ضوئي	Gloss Translation
Anthropogenic activities	أنشطة بشرية	Gloss Translation
Diffraction patterns	أنماط حيود	Gloss Translation
Karyotypes	أنماط نووية	Transliteration & Gloss Translation
Limnetic species	أنواع سطحية التغذية	Gloss Translation
Subtype-selective	)أنواع فرعية انتقائية، نُمَيْط انتقائي (في تصنيف الأحياء	Gloss Translation
Benthic species	أنواع قاعيّة التغذية	Gloss Translation
Zinc-finger nuclease	إنزيم نيوكليز إصبع الزنك	Gloss Translation
Ideograms	إيديوجرامات/ صور رمزية	Transliteration & Gloss Translation
CITES	اتفاقية التجارة الدوليّة المتعلقة بالأنواع المهدَّدة بالانقراض من)الحيوانات والنباتات البرية (سايتس	Transliteration & Gloss Translation
Graviational Microlensing	استخدام عَدَسَة مُسْتَدِقَّة جاذبة	Gloss Translation
Chelation	استخلاب	Gloss Translation
Rotoscoping	استنساخ المشهد الحقيقي	Gloss Translation
Autism spectrum disorder	اضطراب طيف التوحد	Gloss Translation
Metabolic derangement	اضطرابات أيضية	Gloss Translation
Anaglyph 3D	الأسلوب التجسيمي	Gloss Translation
Ultra Luminous X-rays	الأشعة السينية فائقة التألق	Gloss Translation
Metabolic diseases	الأمراض الأيضية	Gloss Translation
Metabolic diseases	الأمراض الأيضية	Gloss Translation
Biosecurity	الأمن الحيوي	Gloss Translation
Carbon nanotubes	الأنابيب النانوية الكربونية	Transliteration & Gloss Translation
Adaptive radiation	الإشعاع التَكَيُّفي	Gloss Translation
Sonoluminescence	الإشعاع الضوئي الصوتي	Gloss Translation
Spintronics	الإلكترونيات المغزلية	Gloss Translation
RNA exonuclease enzymes	الإنزيمات المحفّزة للانفلاق الطرفي للحمض النووي الريبوزي	Gloss Translation
Stick-slip friction Phenomenon	الاحتكاك الارتجاجي	Gloss Translation
Bioethics	الاخلاقيات الحيوية	Gloss Translation
Genome-wide association	الارتباط على نطاق الجينوم	Gloss Translation
Spatial resolution	الاستبانة الحَيِّزيّة	Gloss Translation
Atomic resolution	الاستبانة الذرية	Gloss Translation
Biosustainability	الاستدامة البيولوجية - النظم البيولوجية المستدامة	Transliteration & Gloss Translation
Spatiotemporally chaotic flows	التدفق الفوضوي زمانيًا ومكانيًا	Gloss Translation
Cellular recycling	التدوير الخلوي	Gloss Translation
Computed microtomography	التصوير المُقَطّعي المُحوسَب المجْهَري	Gloss Translation
Confocal imaging	التصوير متشارك البؤرة	Gloss Translation
Inflationary Universe	التضخم الكوني	Gloss Translation
Recursive splicing	التضفير المتكرر	Gloss Translation
Magnetostriction	التضييق المغناطيسي	Gloss Translation
Structural genomics	الجينوميّات البنيويّة	Gloss Translation
Agroforestry	الحراجة الزراعية	Gloss Translation
Pharmacokinetics	الحركية الدوائية	Gloss Translation
Cenozoic Era	الحقبة المعاصرة	Gloss Translation
Competing endogenous RNAs	الحمض النووي الريبي الفطري المتنافس	Gloss Translation
microRNA	الحمض النووي الريبي متناهي الصغر	Gloss Translation
Gluconeogenic genes	جينات تخليق السكر	Transliteration & Gloss Translation
Incidentalome	جينوم المصادفة	Transliteration & Gloss Translation
Biome	جينوم مجموعة كائنات حية	Transliteration & Gloss Translation
Endosome	جُسَيْمٌ داخِلِيّ بالخليّة	Gloss Translation
Inclusion body	جِسْمٌ اشْتِمالِيّ	Gloss Translation
Oscillating electronic spin state	حالة دوران إلكتروني متذبذب	Gloss Translation
Genome-wide information studies (GWAS)	)دراسات معلومات الجينوم (جواس	Transliteration & Gloss Translation