Universidad de Valladolid

FACULTAD de FILOSOFÍA Y LETRAS
DEPARTAMENTO de FILOLOGÍA INGLESA
Grado en Estudios Ingleses

TRABAJO DE FIN DE GRADO

Popular Science Articles on Discoveries and Advances within the Field of Genetics Published on the Internet and Translated from English into Spanish: Analysis of Translations and Conclusions

Isabel de la Horra Calvo

Tutor: María Celsa Dapía Ferreiro

2013/2014

ABSTRACT

Popular science as a genre is becoming more and more important in our days, because it allows a closer relationship between the non-specialist public and the specialized field of science. Its role is considered by some authors as essential for the good development of any society. In this work we have analyzed the language of popular science, particularly in texts related to the field of genetics, through a corpus made up of translations from English into Spanish, and their originals. Our main aim was to obtain some determinant conclusions about the most frequently used translation strategies, although we have also analyzed other relevant aspects related to the use of language in the different translations. For this purpose we have carried out a detailed analysis of each pair of texts: translation and original, a recount and a revision of the obtained results, and a final reflection about the implications associated to the already mentioned results.

Keywords: popular science, translation strategies, transposition, modulation, amplification, translation mistakes.

La divulgación científica es un género cada vez más importante, ya que posibilita el acercamiento del lector lego al campo especializado de la ciencia. Su papel es considerado por algunos autores como imprescindible para el buen desarrollo de una sociedad. En este estudio hemos analizado el lenguaje de la divulgación científica, particularmente en textos relacionados con la genética, a través de un corpus compuesto de traducciones del inglés al español, y sus originales. Nuestro objetivo principal era obtener unas conclusiones determinantes sobre el uso de las estrategias de traducción más frecuentes, aunque también hemos analizado otros aspectos relevantes relacionados con el uso de la lengua en las diferentes traducciones. Para ello hemos realizado un análisis detallado de cada pareja de textos: traducción y original, un recuento y revisión de los resultados obtenidos, y una reflexión final sobre las implicaciones asociadas a dichos resultados.

Términos clave: divulgación científica, estrategias de traducción, transposición, modulación, amplificación, errores de traducción.

<u>INDEX</u>

1.INTRODUCTION

Science has always been a step apart from popular reach and thus, society has been split into two spheres: scientific and non-scientific. Snow reflects very well this separation when he says:

> I believe the intellectual life of the whole of western society is increasingly being split into two polar groups […]: at one pole we have the literary intellectuals […] – at the other scientists […]. Between the two a gulf of mutual   incomprehension – sometimes (particularly among the young) hostility and dislike, but most of all lack of understanding.(Broks, 2006: 98)

He also names these two groups as 'the two cultures' and, as he defends in his explanation, the most important issue that creates this great separation is the lack of understanding. This lack of understanding is – we would not say a lack of interest – a lack of communication, due to the barriers scientific jargon imposes for a common understanding, between scientists and non-scientists which has been solved thanks to what Brockman calls 'the third culture':

> Literary intellectuals are not communicating with scientists. Scientists are communicating directly with the general public. […] Today, third-culture thinkers tend to avoid the middleman and endeavor to express their deepest thoughts in a   manner accessible to the reading public. (Broks, 2006: 100-101)

The appearance of this third culture means the appearance of popular science, the revelation of science and the breaking of borders which stop common people from understanding scientific research and results; thus, finally allowing a communication between scientists and non-scientists.

According to Broks 'Popular science is the very thing that transcends the old two cultures divide.' (2006: 101). We could add popular science is also the very thing that satisfies people anxiety to know, to answer questions that only science can resolve. Everybody can imagine now the important role popular science has in every society but, since popular

science reaches a so huge amount of average people, what is the language of popular science?

Latin was the language of science until some scientists in the 17th century, like Newton, started publishing their studies in their mother tongue, that is, in different vernacular languages. This diversity of languages caused some problems to scientists to understand other scientists' publications, thus, in mid-19th century they accorded publications should be written either in German, French or English. These three languages were the ones with a major number of publications and they belonged also to the countries with a major economic development. German did not remain longer in this list. Later in the 1950s and 1960s English competed with Russian for the language of science position but in the 1970s English won this position definitely.

From the 1970s to our days the amount of scientific papers published in English has gone on growing. But, what about popular science? The answer is quite simple and logical. Popular science aims to reach the biggest amount of people possible, so it has to be written in a language everybody can fully understand, and that can only be each one's mother tongue, so popular science does not have a principal language, it can and must be written in many different languages so people from each place can fully understand it and know about science.

Popular science puts us a step closer to science itself, however, some authors like Fernández Bayo[1] (1995: 13), affirm that, though it is difficult to believe, we have never been so far from science as we are nowadays. Science advances follow a rhythm that we, non-scientific people, cannot follow and it is here where popular science performs its main role.

---

[1] Fernández Bayo in the prologue to Cabeza, Lorena. (1995). *Científicos en el fin del mundo. El conocimiento de los Polos como exploración*. Madrid: Hélice.

In this research we aimed to analyze the language of popular science by going through a corpus of translations from English into Spanish. We focused our attention on the different translation strategies found to prove if there was a predominant one in this kind of translation. We were also interested in some particular things we considered remarkable in the translations and we have also performed an analysis of them.

In this paper we present firstly a theoretical background on popular science and translation, secondly a description of all the issues concerning the research, such as the material and the procedure, and finally we go through the proper analysis and the results we have found, which have led us to some conclusions about the findings.

2.A THEORETICAL APPROACH TO POPULAR SCIENCE

Popular science has been well defined by the University of Duke[2] in a writing studio where it has been established that: 'Scientific writing for a popular audience takes scientific findings and translates them into a form both comprehensible by and captivating to a general audience of non-specialists.'

Looking closer at this definition we pick out some keywords as: *translates*, *comprehensible* and *non-specialists,* apart from *scientific findings* of course. With this we can affirm that this genre addresses popular readers without any specific knowledge on the treated fields. In order to make the texts comprehensible to the addressed readers, they have to be previously translated, not from one language into another but from a specialized register into a popular one. According to Jakobson's functions of language this process of changing the original or the expected addressee of science from an expert to a non-expert means a change within the code (Fernández Polo, 1999: 79). This coincides with what Laszlo relates to the spread of specialized subjects, which can also be applied to popular science: 'faire une traduction, d'un jargón technique vers la langue usuelle'(Fernández Polo, 1999: 79),

---

[2] Scientific writing for a popular science: http://twp.duke.edu/uploads/assets/science_pop.pdf

meaning that the spread of spealized subjects involves translating from a technical language to a common and generally comprehensible one.

The University of Duke gives also some patterns to successfully achieve this translation from specialized to non-specialized language. Through these patterns we also discover some of the characteristics to be found in the analyzed texts, as they have already suffered this translation. The given patterns are:

- First, to avoid scientific jargon as far as possible, but minding the meaning of the research.
- Second, to change the passive voices into active ones, as popular readers are usually more interested in who discovered something and not only in what was discovered, as scientific papers do.
- Finally, popular science texts should tell a little bit more about the research as the reasons for carrying it out and the means to accomplish it.

Now we can conclude this sort of translation that research papers suffer in order to become popular science texts is more an adaptation than a translation since the translator does not only have to simplify and translate the text but also he has to interpret it and completely reformulate it.

According to Álvarez Calleja (1991: 138) technical-scientific translation is essential to the good development of a modern society, like ours, since a constant and international exchange of knowledge is indispensable. Fernández Polo (1999: 78) also affirms that popular science is still a minor and not very known genre though it is constantly used by different channels, written or audiovisual, and it has a major role in the development of any society. Many people link the development of society and humanity to science, but not many people think like these authors do. They are very concerned not only about science but about people knowing, learning and understanding it; they go one step further and link the development of society to that of popular science.

All in all the importance of popular science relies on its capacity to transmit something which was originally directed to few people to huge amounts of people who are interested in science but who are not prepared to understand the scientific jargon. Thanks to popular science people can know what scientists are doing for them because the ultimate aim of scientific research is to improve the life of people, not only scientists but everybody else. This is why science research concerns everybody.

3. CONTEXTUALIZING TRANSLATION

Translation has had a place in society since the beginning of languages. Theories about the origins of translation have suffered changes all along history. Firstly it was thought translation emerged after the Tower of Babel events due to the necessity people had to communicate with each other. Communication became a necessity once languages differed from each other as a divine punishment. But later, with the emergence of translation studies as a science, researchers started to look for a more solid explanation. Eric Jacobsen[3] holds that Romans were the first ones to attempt a translation, thus its inventors. From those days up to ours translation has been developed both in style and techniques. It is becoming nowadays an automatic labour with the invention of the internet and the technological advances of our era but, in our opinion, translation will always have a human work behind it. Machines and electronic resources can be of great help for translators, but it is the translator who can judge if he agrees with what the electronic resources say or he wants to change it and give it a turn. In the end the translator will always have the last opinion since it is his task to do the translation and to later justify his decisions if he is required to.

It is difficult to give a clear and unique definition of translation since it is a huge concept which comprises many aims, schedules, techniques and fields. Therefore we have chosen three different definitions to illustrate the concept as well as possible.

---

[3]In *The history of translation*: http://www.translationdirectory.com/articles/article1695.php

Hatim and Mason[4]define translation as: 'an act of communication which attempts to relay, across cultural and linguistic boundaries, another act of communication.'

Communication includes any kind of verbal, non-verbal or written situation so translation as an act of communication can be found in any of these forms. As what translation allows is exactly the communication between people from different countries with linguistic barriers for a fluent communication, which translation has to go through and resolve, it can be found in any place all over the world.

Brislin[5]claims translation is:

> 'The general term referring to the transfer of thoughts and ideas from one language (source) to another (target), whether the languages are in written or oral form; whether the languages have established orthographies or do not have such standardization or whether one or both languages is based on signs, as with sign languages of the deaf.'

From this definition I draw some important ideas, such as translation is not only about words but also its meaning and interpretation, so it has mostly to do with thoughts. It is interference between two languages, but whether they share the same linguistic structure or not is not a big deal.

Nida[6]holds that: 'Translation consists of reproducing in the receptor language the closest natural equivalent of the source language message, first in terms of meaning and secondly in terms of style.'

Here we conclude translation is unidirectional, its aim is to transfer the message to the receptor language, that is to say, to the target language (TL). The aim of translation is also

---

[4]4,5 and 6 in *Good translation: art, craft or science?*: http://translationjournal.net/journal/43theory.htm

to find an equivalent in the TL which must fulfill the requirements of meaning and style. As we said before, translation is not only about words but also about all that surrounds them. In order to properly understand the conclusions we have reached, it is important to know in advance the translation strategies on which we have focused our attention during the analyzing process.

To describe the main strategies we will use the method of classification by Vázquez-Ayora (1977: 266-289), who differentiates between what he calls oblique strategies and direct strategies, being the former more elaborated techniques and the latter simpler ones. This will be complemented with Vinay and Darbelnet's (López Guix and Minett Wilkinson, 1999: 235-297) definitions.

Regarding the first group we have transposition, modulation, amplification, explicitation, omission and equivalence. Let us go through them one by one:

Transposition involves expressing the same idea in the target language though changing the categories of the words; it is mostly a modification within grammatical categories. Vinay and Darbelnet add transpositions can be necessary -that is, compulsory, due to the use of language-, or facultative, if it is the translator who decides to perform it, usually as a stylistic complement. For example, in text 1.a (lines 75-76) in the change from 'just as is currently possible with mouse neurons' to 'tal y como ya se hace con neuronas de ratones' (text 1.b, line 74) we have a facultative transposition since the translator could have literally followed the author's words but instead he has changed the adjective 'possible' by the verbal form 'se hace'.

Modulation conveys a change in the point of view to express again the same idea. Vinay and Darbelnet define it as a variation in the message due to a change in the perspective though the meaning should be maintained. A swift from a personal sentence to an impersonal one is a variation on the point of view as we can see in this example (text 3.a, lines 44-45): while the original text says 'I do not doubt that […]' the translation (text 3.b,

11

line 54) says 'No cabe duda de que […]'. We also want to highlight here, though it will be explained later as well, that in popular science texts it is not usual to find transparent author's opinions as we have in this example.

Amplification[7] means the use of more monemes in the target language than in the source language when communicating the same idea. This is the obligatory expansion for Vinay and Darbelnet, since English structures are more economic than Spanish ones linguistically speaking. Example; text 6.a (line 1) is entitled as 'Fearful memories haunt mouse descendants' and the translation (text 6.b, line 1), though almost literal, uses more monemes as it is necessary for the Spanish structure to be correct: 'Los miedos de los ratones persiguen a sus descendientes'.

Explicitation is the additional information the translator includes, which was implicit in the source text; he does this to avoid possible ambiguities. This would be the optional expansion; the author's added explicitations could be found either in the text or as translator's notes. Example; while the original text says 'Kerry Ressler, […], and a co-author or the latest study' (text 6.a, lines 24-25) the translation (text 6.b, lines 24-25) makes evident to which study does the author refer to by saying: 'Kerry Ressler, […], coautor de este último estudio sobre la herencia del miedo' though it was not really necessary to add it since it is the main topic of the article and the reader knows already what the author is talking about.

Finally,omission equates to the deletion of some elements which were explicit in the source text and which were considered unnecessary by the translator. Vinay and Darbelnet include an intermediate state between the original text and the omission; this is the reduction, considered also the opposite to expansion. Example (text 5.a, line 53); while the source text says 'stem cell treatment results in an average improvement of about 25% over the post-

---

[7] What Vázquez-Ayora understands by *amplification* and *explicitation* is included by Jean-Paul Vinay and Jean Darbelnet in just one single strategy named *expansion*.

injury performance' the translator considered the fact that the results were obtained after the injury performance was obvious and decided to omit it, obtaining as a result this shorter sentence (text 5.b, line 41): 'El tratamiento con células madre resulta en una mejora media de aproximadamente un 25%'.

Moving to the direct strategies Vázquez-Ayora includes literal translation in this group. In this method the translation is achieved by means of finding equivalents in meaning and structure in the target language word by word; when practicing this method the translator has to be especially careful with false friends. Although Vinay and Darbelnet admit that with this procedure a greater acceptability of the translation can be achieved, it is not always advisable to perform it, and it is the translator the one who must judge whether to be strictly faithful to the source text or to get a little bit away from it.

Literal translation embraces calques and borrowings. The former imitate the form or meaning of the source word and the latter imitate its form and meaning as well as its phonetic structure. According to Vinay and Darbelnet borrowings show a lack of vocabulary in the target language though they are sometimes used on purpose to give a touch of local feeling.

Although some authors, as Rosa Rabadán (2002: 36), do not agree to regarding as translation strategies some simple procedures of reformulation from one language to another, in our analysis we have also paid attention to some of those simple procedures, such as verbal changes – though in most cases they are necessary, as the target language requires them -, hyper-translations, in which the translator has over-interpreted the words of the author, or in an attempt to clarify something he ends by misinterpreting it. Finally, we have also taken into account possible errors in the translations and we have tried to find its cause.

4. AN APPROACH TO OUR ANALYSIS

4.1 The material

To carry out this research we have used some texts selected from the web page: www.divulgame.org,which we considered would be a good source, as in this webpage it is possible to find both the translation of popular science texts from English into Spanish, and a link to the original text which was indispensable in this work in order to analyze the target language texts.

We tried to choose texts from a common field, though this was not an easy task since the possibilities were quite limited as the texts are not really well classified following a thematic area, instead they are chronologically listed. Lastly our corpus is made up of twelve texts –six source articles in English and their corresponding translations into Spanish- all of them considering discoveries and advances within the field of genetics made on diverse kinds of subjects: animals or human beings.

Our selection of the texts[8] was guided by the following criteria:
- The texts should address a non-specialized public. Following Bowker and Pearson's classification of language for specific purpose communication (2003: 28), our texts address a public with a general education but who do not have a deep knowledge on any field. This way the texts would not contain technical terms or expressions or if so, the writer would explain them. No previous knowledge should be taken for granted either by the author or by the translator.
- The texts should be originally written in English and afterwards translated into Spanish.
- The texts should be objective, thus merely informative. Agreeing with Hulst (Pascua Febles, 2001: 158) informative texts aim to enhance the reader's general

---

[8] See annex I for detailed reference and numbering of the texts.

knowledge. And this is what popular science texts aim to do, though they may have some sub-aims which can filter the author's interpretation as García Álvarez (Pascua Febles, 2001: 158) highlights. We can see how this happens sometimes, as in the example we referred to when explaining modulation as a translation strategy in which we can perfectly notice the author is giving her own opinion.

Once the selection was completed, we obtained some more data which could help us with the description of our material. The texts vary in length; they go from 490 words up to 1,033. Target texts are always longer than source texts as it is usual in translations into Spanish, but the percentage of difference is even lower than that which Vinay and Darbelnet (López Guix and Minett Wilkinson, 1999: 256) establish as the average when performing a literal translation: between 15 and 20% more words in Spanish than in English. The percentages we have calculated go from a difference of 12% up to 16%. The reason for this little difference can be attributed to the limits translators must usually respect when handing over a source text.

Following Álvarez Calleja's classification (1991: 138) our selection belongs to the group of texts dealing with the results of a scientific research applied to the resolution of a particular problem. And finally our texts mix two of the three levels Newmark (Álvarez Calleja, 1991: 142) establishes for technical texts: the professional and the popular levels, being the professional the one which contains formal terms used by the experts though it does not reach the level of specialization of academic texts, and the popular the one with non-expert terminology which is achieved by the use of alternative terms.

Finally and going back to the features we wanted our texts to respect, referring to Hulst (Pascua Febles, 2001: 155) again we have found that our texts respond to one single macrostructure: each text focuses only in one topic as Hulst generalizes popular texts usually do.

4.2 Process of the analysis

The process of elaboration of this work took us through several stages, from the original conception of the research to the drawing of final conclusions. First of all, the selection of the material, which is very important as it is going to be the basis of the research. For this task a first reading of the whole texts was necessary in order to be sure they fulfilled all the requirements explained above. Then, we searched for the original texts, which were all written in English, and we made a closer reading of both the source and the target texts highlighting all the differences there were between the two of them. Afterwards, we classified those differences according to the translation strategies explained in the third section of this study. Finally we reached the results included in the following section.

4.3 Limitations of our research

Being this and academic research with imposed limitations of time and space, we have had to enclose our field of research as well as our texts in order to obtain a corpus of a suitable size to be able to work easily and comfortably with it.

We did also have some limitations dealing with time and resources since we decided to form our corpus just from the web page www.divulgame.orgwhere popular science articles are constantly uploaded but those dealing with genetics not so often.

5. RESULTS

We expected translations to be mostly correct as translators were all Spanish speakers both from Spain and South America. We hoped to stand out some translation strategy as the most widely used by translators working with Spanish as the target language in popular science texts, though at the same time we expected some natural changes because as Fernández Polo says: 'cada lengua tiende a desarrollar pautas de escritura que le son

propias.' (1999: 11), that is, each language develops some written rules which end by being their own and though there can be different possibilities to express something in one language, this language has a specific and predetermined preference among the possibilities. We would dare to say languages get some typical rules not only in the written form but also in the oral as, in the end, every kind of communication is connected within a language.

To start with the results we will point out the most significant strategy in terms of its use. It must be clarified we have followed two different forms of re-counting the occurrences of each strategy: first we added up all the examples found in the texts, so we considered the texts as a whole; and second, we considered the texts separately and extracted the most frequently used strategy in each of them.

Properly talking about translation strategies we have not found a really outstanding method as we had firstly thought. The most recurrent strategies are amplification, transposition and modulation. Among these three amplification turns to be the most frequent, which is quite an interesting finding, since it is the one in which the translator has a wider angle of decision, because the other two can often be submitted to language behavior.

It is also interesting to highlight the most widely repeated formulas within the most frequent strategies. Firstly, within transposition the transformation of adjectives into nouns is the most recurrent formula; example(text 1.a, lines 10-11): 'the relevant gene' becomes 'el gen de interés' (text 1.b, line 12). Secondly, within modulation the most frequent pattern is the change from personal to impersonal sentences; example (text 1.a, lines 47-48): 'You don't have that luxury with monkeys,' which turns into 'No se tiene esa suerte con los monos' (text 1.b, line 49). Following the second method of re-counting, modulation did not appear as the most recurrent procedure in any of the texts but it was used in all of them.

A detailed analysis of the texts has revealed that amplification, transposition, and modulation are the most common translation strategies used by Spanish-speaking

translators in popular science texts. However, maybe with an extended corpus clearer conclusions could be reached.

Although tense changes are not usually treated as a translation strategy we have included them here because from our point of view changes within tense are very frequent and essential for the natural working of each language. We agree with Newmark (Álvarez Calleja, 1991: 142) that verbs are one of the most common obstacles that can appear in a translation and that it is absolutely necessary to modify them in order to reach the desired natural result. Moreover, changes within verb tenses were also among the most recurrent strategies but, since there is a controversy on whether they are real strategies or not, we decided to treat them a little bit apart. The change from present participle to present simple is the most common modification we have found; example (text 2.a, line 14): 'The material, consisting of an activated carbon cloth support' becomes 'El material, el cual consiste en una malla de soporte de carbón activado' (text 2.b, lines 17-18).

Concerning direct procedures of translation, that is, literal translation, it must be said some parts of the analyzed texts were quite literally taken from the originals and did not sound natural in the target language. For example, we found the translation of 'since there are insufficient studies in primatology'(text 3.a, line 58) as 'dado que hay insuficientes estudios en primatología' (text 3.b, line 69); here the verb in the affirmative form plus the adjective in the negative form does not function very well in Spanish, we would rather propose a translation as: 'dado que no hay suficientes estudios en primatología'. The calques we have found have mostly to do with the use of some typographic symbols which change from one culture to another. It was surprising that in some cases where symbols did not need to be changed they were changed, and in cases where they needed to be adapted to the target language they were kept as in the original. We consider that in (text 4.a, line 25) 'more than 65 per cent of the time' is not necessary to transform and represent *per cent* with its symbol: %, as the translator did. However, in the case of (text 1.a, line 51) 'after a 5.5-month gestation' the decimal formatting should be properly adapted to the target culture

instead of leaving it the same, as the translator did. We can assume this lack of adaptation is due to the influence English exerts on the translator's mother tongue: Spanish.

We have found some cases in which translators have slightly changed the meaning of the original text; we consider this as an error in an attempt of clarifying the information to the readers. We classify these errors as hyper-translations. These cases overtake modulations, since at the same time the translator is facing the information from another point of view, it is somewhat modifying the meaning, which affects the reader's understanding of the text. We can illustrate this with an example, as it can be a little bit confusing. In text 2.b we find that the meaning has been completely altered when substituting one preposition by a conjunction. The original text says: 'Precedents exist in the development of materials that fulfil the basic function of stimulating cell differentiation' (text 2.a, line 31) while the translation says: 'Existen precedentes en el desarrollo de materiales que completan la función básica o simulan la diferenciación celular' (text 2.b, lines 33-34). We can appreciate that in the original the author explains what he refers to with 'basic function' whereas in the translation we get that information as an option to the 'basic function'. This example illustrate pretty well how careful we should be at the hour of translating because a very small alteration can modify the meaning of a whole sentence or even worse, the whole perception of the text.

The translation of proper nouns also called our attention. Regarding the methods employed to translate them we have concluded that there is not uniformity or an accord among translators on how to do it. In order to analyze them easily we made a distinction between institutions, private business and magazines as these were the instances we found. Within institutions we have comprised universities, research centers and societies. There were 19 cases of proper nouns in the analyzed texts, out of which 10 were of different universities. Translation of names of universities appealed to us since there were also two trends to name them: the first one located first the place and then the common noun *university* as in *New York University*(text 1.a, lines 78-79); the second one located first the common noun *university* and then the place, linked by the preposition *of* as in *University of Bonn* (text 4.a,

line 39). We realized translators tend to always translate the names that follow the second structure, and only sometimes the names that follow the first one. We selected two texts in which *Emory University* was named the same in the originals but translators followed different paths. In one of them the translator kept the original name(text 1.b, line 13), as he did with the rest of proper nouns in his translation with the exception of *Society for Neuroscience* (text 1.a, line 26), which he correctly translated into Spanish as *Sociedad de Neurociencia* (text 1.b, line 27). In the other case (text 6.a, line 24) *Emory University* was translated into Spanish as *Universidad de Emory* (text 6.b, line 24); in this text the translator decided to translate all the proper nouns but the title of a magazine: *Nature Neuroscience*. Magazine names could not be translated into Spanish since they are not published in our country; thus, it would not make any sense to find a translation as it would mean nothing to the readers. The rest of proper nouns have been left in the source language as they were private business and institutions. This procedure is comprehensible, since there is a mostly accepted rule among translators and society in general to respect the original names of private and public businesses as Álvarez Calleja (1991: 226) recommends. Nevertheless, we consider some translations would have been useful for readers to achieve a better understanding of the articles; for example in text 1.b when *McGovern Institute for Brain Research* is named (lines 66-67), we consider the translator could have freely added something indicating the translation into Spanish of *brain research,* since for the reader who does not understand English the name of the institution will mean just nothing. Finally, we have found another interesting thing about proper nouns in the second text we have analyzed. It talks about Spanish centers and universities. The authors, who are Spanish but wrote the original article in English, translated the names into English and then the translator converted them into Spanish again. We cannot know if the translator would have translated the names of the institutions, which were written in English in the source text, into any language or if he would have kept them if the translation wasto any other language but Spanish. What we try to say is that probably the translator recouped the original Spanish names since his task was to translate the text into Spanish, but if he would have had to translate the text into any other language, perhaps he would have maintained the translation the authors had already given.

There are also some interesting points concerning the translation of acronyms in the analyzed texts which we would like to comment. The most recurrent acronyms were *DNA* and *RNA*(texts1.a and 6.a)*,* which were obviously changed by their equivalents in the target language: *ADN* and *ARN*. We can accept everybody with an education will understand these acronyms. There are some more specific acronyms like *SHANK3* or *CRISPR*(texts 1.a and 1.b) which are two specialized terms related with genetics and which we consider the normal reader would not understand. In these two cases the translator could have added some reference or information in order to enhance the reader's comprehension. This also happens with the journal *PNAS*(text 3.b, line 29) which is the official journal of the *United States National Academy of Science* and once again, from our point of view, the reader would not have any notion about the meaning of the acronym. It caught our attention that in the same text, the same translator unpicks the acronyms UK and US (text 3.a, line 20) which could have been simply translated by their equivalents in Spanish: RU and EE.UU (text 3.b, line 26) respectively, as this information is perfectly understood, again, by every educated person. Regarding acronyms we conclude that sometimes translators do not take very much into account the kind of reader the texts address to. Translators would guess people from the United States can be able to identify acronyms like *PNAS,* but people from Spain where the journal is not published, would not get it, which could lead to a misunderstanding of the text.

Though generally less related to the purposes of translation analysis, we paid attention to some agreement mistakes to which we are unable to find a logic explanation since all the translators of the analyzed texts are native Spanish speakers. These mistakes are mostly about number agreement; for example, in text 2.b (lines 13-14) we have the sentence: 'el próximo paso es implantar el biomaterial en un animal para ver si puede regenerar hueso en ellos.' The pronoun 'ellos' alludes to 'un animal', and while the pronoun is in the plural form, its reference is in the singular which does not make any sense. Only if we take into account the source text where we see that both, the reference and the pronoun, are in plural we can suppose the translator got confused at this point. We got another case regarding

number agreement in text 4.b (lines 11-12) where the translator linked the verb form with the incorrect subject and as a result we obtain this sentence: 'Estos pueden durar desde segundos a varios minutos, y su naturaleza impredecible los hacen peligrosos'. 'La naturaleza' is the subject for 'hacen'; thus, the verb has to be in the third person singular form: 'hace' and not in the third person plural as it is. Obviously these grammatical mistakes do not block the native Spanish reader from understanding the text but, they interrupt the reading since the Spanish reader will notice something is wrong there and consciously or unconsciously he will stop to discover what it is. Going further with our conclusions, it could be a matter of research whether number agreement is a more common mistake than gender agreement as it seems according to our corpus analysis.

6. FURTHER COMMENTS ON THE TRANSLATIONS

In this part we will include some items we found remarkable regarding the translations but which do not have to do with translation strategies.

In text 6 we found what, from our point of view, is a very intelligent manoeuver to enable the reader's full comprehension of the text. Here the translator has taken the freedom to change the geographical references the author gave, adapting them to Spanish average knowledge. The source text says (text 6.a, line 24): 'at Emory University in Atlanta, Georgia' what the translator has freely changed for Spanish readers as: 'en la Universidad de Emory (Georgia, EE.UU.)' (text 6.b, line24). That Atlanta is the capital of the State of Georgia is not the most common thing to know, but that Georgia is a State that belongs to the United States is much easier identifiable so it simplifies the information and full comprehension. At the very first moment this modification can be seen as a loss of information and specification, as an omission. However, after considering it we agreed with the translator that assuring the reader will get the information, though with less specificity, is better than risking he will loss all the meaning. So what can be seen as an omission turns to be a suitable alteration that provides an aid to the reader.

Another interesting point is the typos that have been found in different texts, which are not justifiable since nowadays with the technologies we have any word processorcan correct them automatically. In text 2.b (line 16) we have the proper noun *Granada* written in lower case letter. This typo can only be due to an accident, since there is not any doubt about whether Granada must be written with capital letter or not. Moreover, in the same text the name of the city has been well written the rest of the times. In text 4.b (line 8) we have a written mistake for which dialect homophony is to blame. Some Spanish sounds are pronounced equally, though they are not, in some Spanish regions and in South America. This is what happens with letters 'c' and 'z' which can be pronounced like 's' in some places. In this text we have the word 'empiezen' which carries a spelling mistake as it is grammatically written 'empiecen'. We can assume the translator comes from a region in which the explained dialect homophony takes place, but this does not excuse him from transporting that oral particularity to the written speech. Once again we remark the role of word processors from which we can take a lot of advantages.

We would like to propose what we think would be an improvement in one of the translations, specifically in text 5.b. Where the source text says 'immunosuppressive drugs' (text 5.a, line 69), the translator literally says 'drogas inmunosupresoras' (text 5.b, line 55). If we consider that 'drugs' can be a false friend, and in this case we think it is, we would propose 'medicamentos inmunosupresivos' as a more proper translation since the noun 'drogas' has a hard connotation in Spanish which can partially change the meaning the author wants to transmit.

In text 2.b (lines 27-30) there is a lack of the auxiliary verb in one sentence. The sentence is 'Los científicos, del Centro de Investigación Biomédica […], conseguido este importante avance'. The auxiliary form 'han' should be placed just before 'conseguido' for the sentence to be complete. This kind of mistake is not maybe recognized by a word processor but it is easily observed by any native Spanish speaker so it would have been very easy to correct it if the translator had paid a little bit more of attention to the text.

Even though Spanish is a flexible language which accepts different forms of expressing the same idea moving its elements forwards or backwards within the sentence, some things overpass this flexibility and end up having no sense. This is what we have in this example (text 4.b, line 5): 'Las personas con sufren de epilepsia'. It would be correct to say either 'Las personas que sufren de epilepsia' or 'Las personas con epilepsia' but what is incorrect is to mix up the possibilities. If we look at the original text we see the author says: 'People with epilepsy' (text 4.a, line 4), thus, we can accept the translator wanted to follow literally the original but changed his mind later and did not revise the whole sentence. Again we repeat our opinion about this kind of accidental mistakes which can be so easily fixed with a further revision or a word processor.

Lastly, as it was expected from the characteristics of popular science texts, we did not find much specialized terminology, and if so, it was not particularly difficult. Authors of the original texts are in charge of avoiding technical terms and later translators must maintain that absence. Although the found terms were not difficult to interpret we do not want to reduce the role of the translator whose task is to find the proper equivalent in Spanish terminology. The found terms vary from crystal clear ones as 'DNA' to more complex ones as 'benzodiazepines' (text 4.a, line 37). Finding the right target language equivalent in these cases is a great responsibility, otherwise readers will not get the correct meaning, so the translator must have the previous knowledge to do it or, at least, the skills and resources to be able to find it.

7. CONCLUSIONS

After performing the analysis we can highlight some ideas we have gone through during the study. First of all that translations of popular science articles from English into Spanish use many different translation strategies but there is not an outstanding one, though the most widely used are amplification, transposition and modulation.

Secondly, with our analysis we found out that the transformation from a present participle to a present simple was the most recurrent technique in terms of verb use from English into Spanish. We can think about these two verbal tenses as the most frequently used in each of the languages respectively, taking our corpus as a representative sample of each of them.

Regarding literal translation we found translators maintained some typographic symbols which were not correctly used in the target language; we attribute this to the influence of English by which translator's knowledge of English has overflowed in his use of Spanish mixing both languages and cultures.

For the translation of proper nouns we did not find an agreement of behavior among translators. The only common line followed was the one of leaving in the source language, that is, respecting the original names of private and public business. However, we consider translators should take a more active role and make some interventions adding more explanations which could help the full comprehension of the articles by the non-specialist readers.

The same happens with the use of some acronyms which belong to the specialized field of genetics or which respond to the name of some cultural item which cannot be assumed as previously known by the reader, so the translator must make sure the reader will understand the information the author wants to transmit.

We were unable to find a valid explanation for the agreement mistakes we observed in the analyzed articles. Although we can conclude that they do not block the comprehension of the text, they complicate the reading, which is neither desirable.

As it was expected, not much specialized terminology was found, with the exception of those acronyms or proper nouns we have mentioned before and which could have been further explained by the translator in order to have a fully adapted text for non-specialist readers.

Not so much focusing on the results but on the general image we got of the translations, we consider that special care should be taken when translating since a very small confusion by the translator can lead to an alteration on the whole meaning of the text. The translator should also take into account the reader the text is addressing to and judge whether what the author is saying is accurate for the receptors or not, and if it is not, he can freely change the original words as far as he does not modify the meaning the author wants to transmit. Lastly and as we found some mistakes which were not expected for this kind of translations, which are published on the internet, we strongly recommend the use of a word processor which can be really useful in terms of orthography and revising texts, thus it allows translators to correct those small mistakes which are not really relevant but which, at the same time, should not be there.

As we have already said throughout this work we think further research could be done taking this study as a basis. We consider that with a bigger corpus clearer conclusions could be reached that could fulfill our expectations of finding a remarkable translation strategy, or, analyzing whether the influence of Englishis the cause of some of the wrongly used procedures, though this research would be more focused on the field of grammar.

Finally, with the analysis of the material and the results we extracted we can conclude that translation of popular science articles tends to adjust to the source text and that there is not much margin to perform a free translation, though when translators have the occasion they take advantage of it, which usually has a good result in the target text.

BIBLIOGRAPHY

Álvarez Calleja, Mª Antonia. *Estudios de traducción (Inglés-Español) Teoría, práctica y aplicaciones*. Madrid: Cuadernos de la UNED, 1991.

Bowker, Lynne and J. Pearson. *Working with specialized language: a practical guide to using corpora*. United Kingdom: Taylor&Francis e-library, 2003.

Broks, Peter. *Understanding popular science*. New York: McGraw-Hill House, 2006.

Callaway, Ewen. *Fearful memories haunt mouse descendants*. Nature. 2013. Accessed date: 1 February 2014. Retrieved from: http://www.nature.com/news/fearful-memories-haunt-mouse-descendants-1.14272

Cruz Campillo, Santiago. *Un implante cerebral avisa con tiempo de los ataques epilépticos.* Divúlgame.ORG. 2013. Accessed date: 1 February 2014. Retrieved from: http://divulgame.org/2013/05/27/un-implante-cerebral-avisa-con-tiempo-de-los-ataques-epilepticos/

E. Rosaleny, Lorena. *¿Curará la terapia con células madre las lesiones en la médula espinal?*. Divúlgame.ORG. 2014. Accessed date: 1 March 2014. Retrieved from: http://divulgame.org/2014/02/26/curara-la-terapia-con-celulas-madre-las-lesiones-en-la-medula-espinal/

Engber, Daniel. *FYI: How did English get to be the international language of science?* 2013. Accessed date: 8 June 2014. Retrieved from: http://www.popsci.com/article/science/fyi-how-did-english-get-be-international-language-science

Fernández Polo, Francisco Javier. *Traducción y retórica contrastiva. A propósito de la traducción de textos de divulgación científica del inglés al español.* Santiago de Compostela: Universidad de Santiago de Compostela, 1999.

Fernández-Rañada, Antonio. *El idioma científico*. 2000. Accessed date: 8 June 2014. Retrieved from:
http://www.elcultural.es/version_papel/CIENCIA/2819/El_idioma_cientifico

Izquierdo, Pablo. *Los miedos de los ratones persiguen a sus descendientes.* Divúlgame.ORG. 2014. Accessed date: 15 February 2014. Retrieved from: http://divulgame.org/2014/01/02/los-miedos-de-los-ratones-persiguen-a-sus-descendientes/

López Guix, J.G and J. Minett Wilkinson. *Manual de traducción inglés castellano*. Barcelona: Gedisa S.A., 1999.

Mendoza, Alejandro. *Científicos españoles generan con éxito huesos artificiales a partir de células madre de cordón umbilical*. Divúlgame.ORG. 2014. Accessed date: 13 February 2014. Retrieved from: http://divulgame.org/2014/01/01/cientificos-espanoles-generan-con-exito-huesos-artificiales-a-partir-de-celulas-madre-de-cordon-umbilical/

Oliver, Javier and José Mariano Ruiz. *Spanish scientists successfully generate 'artificial bones' from umbilical cord stem cells*. Ugrdivulga. 2013. Accessed date: 13 February 2014. Retrieved from: http://canal.ugr.es/health-science-and-technology/item/66787-spanish-scientists-successfully-generate-%22artificial-bones%22-from-umbilical-cord-stem-cells

Ordudari, Mahmoud. *Good translation: art, craft, or science?* 2008. Accessed date: 5 May 2014. Retrieved from: http://translationjournal.net/journal/43theory.htm

Pascua Febles (coord.), Isabel. *La traducción estrategias profesionales*. Las Palmas de Gran Canaria: Universidad de las Palmas de Gran Canaria, 2001.

Peris, Guillermo. *La edición precisa de genes allana el camino al uso de monos transgénicos*. Divúlgame.ORG. 2013. Accessed date: 7 February 2014. Retrieved from: http://divulgame.org/2013/12/10/la-edicion-precisa-de-genes-allana-el-camino-al-uso-de-monos-transgenicos/

Rabadán, Rosa. *La traducción inglés-español: fundamentos, herramientas, aplicaciones.*León: Universidad de León, 2002.

Reardon, Sara. *Brain implant gives early warining of epileptic seizure*. New Scientist. 2013. Accessed date: 1 February 2014. Retrieved from: http://www.newscientist.com/article/dn23475-brain-implant-gives-early-warning-of-epileptic-seizure.html#.U6GcALFGmZR

Regalado, Lucía. *Crisis de la mediana edad en grandes simios*. Divúlgame.ORG. 2014. Accessed date: 13 February 2014. Retrieved from: http://divulgame.org/2013/12/24/crisis-de-la-mediana-edad-en-grandes-simios/

Roberts, Roli. *Will stem cell therapy help cure spinal cord injury?* PLOS BIOLOGUE. 2013. Accessed date: 1 March 2014. Retrieved from: http://blogs.plos.org/biologue/2013/12/18/will-stem-cell-therapy-help-cure-spinal-cord-injury/

Shen, Helen. *Precision gene editing paves way for transgenic monkeys*. Nature. 2013. Accessed date: 5 February 2014. Retrieved from: http://www.nature.com/news/precision-gene-editing-paves-way-for-transgenic-monkeys-1.14098.

Teixidor, Patricia. *Mid-life crisis in great apes*. Mapping ignorance. 2013. Accessed date: 13 February 2014. Retrieved from: http://mappingignorance.org/2013/01/30/mid-life-   crisis-in-great-apes/

Vázquez-Ayora, Gerardo. Introducción a la traductología. Georgetown: Georgetown University,   1977.

Writing studio - Duke University. 2010. Accessed date: 3 May 2014. Retrieved from: http://twp.duke.edu/uploads/assets/science_pop.pdf

Zakhir, Marouane. *The history of translation*. 2008. Accessed date: 5 May 2014. Retrieved from: http://www.translationdirectory.com/articles/article1695.php

ANNEX I

Text 1.a – *Precision gene editing paves way for transgenic monkeys*: http://www.nature.com/news/precision-gene-editing-paves-way-for-transgenic-monkeys-1.14098

Text 1.b - *La edición precisa de genes allana el camino al uso de monos transgénicos*: http://divulgame.org/2013/12/10/la-edicion-precisa-de-genes-allana-el-camino-al-uso-de-monos-transgenicos/

Text 2.a – *Spanish scientists successfully generate "artificial bones" from umbilical cord stem cells*: http://canal.ugr.es/health-science-and-technology/item/66787-spanish-scientists-successfully-generate-%22artificial-bones%22-from-umbilical-cord-stem-cells

Text 2.b – *Científicos españoles generan con éxito huesos artificiales a partir de células madre de cordón umbilical*: http://divulgame.org/2014/01/01/cientificos-espanoles-generan-con-exito-huesos-artificiales-a-partir-de-celulas-madre-de-cordon-umbilical/

Text 3.a – *Mid-life crisis in great apes*: http://mappingignorance.org/2013/01/30/mid-life-crisis-in-great-apes/

Text 3.b – *Crisis de la mediana edad en grandes simios*: http://divulgame.org/2013/12/24/crisis-de-la-mediana-edad-en-grandes-simios/

Text 4.a – *Brain implant gives early warning of epileptic seizure*: http://www.newscientist.com/article/dn23475-brain-implant-gives-early-warning-of-epileptic-seizure.html#.U53M0ihGmZR

Text 4.b – *Un implante cerebral avisa con tiempo de los ataques epilépticos*: http://divulgame.org/2013/05/27/un-implante-cerebral-avisa-con-tiempo-de-los-ataques-epilepticos/

Text 5.a – *Will stem cell therapy help cure spinal cord injury?* : http://blogs.plos.org/biologue/2013/12/18/will-stem-cell-therapy-help-cure-spinal-cord-injury/

Text 5.b - *¿Curará la terapia con células madre las lesiones en la médula espinal?* : http://divulgame.org/2014/02/26/curara-la-terapia-con-celulas-madre-las-lesiones-en-la-medula-espinal/

Text 6.a – *Fearful memories haunt mouse descendants*: http://www.nature.com/news/fearful-memories-haunt-mouse-descendants-1.14272

Text 6.b – *Los miedos de los ratones persiguen a sus descendientes*: http://divulgame.org/2014/01/02/los-miedos-de-los-ratones-persiguen-a-sus-descendientes/