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Franca Daniele*A First Survey on Scientific Translations*

## Introduction

Although many researchers and experts more or less agree on the techniques, the processes, and the deep mechanisms involved with translating standard language, much controversy stews around technical translations and particularly around scientific translations. A common idea is that translations have to be performed respecting the original scheme and the original style of authors. Instead, others believe that translating is some kind of re-writing of the same concepts into a different language. I believe that no unanimous stand can be taken. Instead, it is crucial to remain open and versatile toward a process like that of translating that might simultaneously involve a number of different situations and techniques. Also, the type of translation seems to be very important. For example, poetic translation is closer to re-writing because the translator has to convey the deep meaning the author is expressing but this must be done in a way that respects poetry writing rules and also somehow the sounds and the feelings the original author wanted to raise in the reader. So in these conditions a specific style must be presented. On the other hand, technical translations seem to be more like a simple transfer of the corresponding words into the target language. This latter seems a more mechanical type of translation, and a word-word type style results. The main problems posed by these latter types of translations do not house in the source language that is being translated and neither in the target language, but in the translator. During the past years research has moved from the translation

focusing onto the translator. Today almost everybody agrees on the fact that the best translations are those done by translators who translate into their mother tongue language. Also, translators must be totally proficient in the source language. Furthermore, more recently researchers have highlighted that it is crucial that translators have a good understanding of the subject matter. In other words, the translator has to be somewhat familiar with the specific terminology, and even more importantly, the translator has to have a good knowledge of the specific concepts, mechanisms, situations and phenomena the special language is communicating. Unfortunately to date not many professionals are translators and so in order to overcome the obvious obstacles encountered when facing scientific translations, many researchers have suggested that the best scientific translations are the ones obtained through a shared cooperation between the translator and the expert or scientist. This represents a good compromise that joins both correct language utilization and correct scientific concepts. While most of us agree on what has been said up to now, and believe that a good scientific translation does indeed necessitate the hands of the expert, little is known as to what degree of knowledge of the special themes helps in producing a faithful translation.

To address these issues students were subjected to scientific translations. Aim of the present paper was to assess the degree of capability of first year medical school students to translate scientific abstracts derived from international scientific literature. Technical terms as compared to sub-technical vocabulary were assessed. Also a quantitative analysis was carried out to evaluate knowledge of non-Anglo-Saxon derived words as compared to Anglo-Saxon derived words. An attempt was made to compare terms belonging in first year register as compared to registers of the following years through the administration of three different types of Abstracts that cover three branches of bio-medical studies. From a syntactic point of view mainly compounds, impersonal sentences and conditional verbs were analyzed. Also, functional forms like: "both...and"; "either...or"; "whether"; "in addition to" were evaluated.

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followed by MA and then SA. Only the translations from students who were translating into their mother tongue language (Italian) were considered. Only the translations that were completed were included in the analysis.

## Results

Table 2 reports data on test population and on completed translations. The basic science abstract 1 (BSA) was translated by 150 students and 117 (78%) students completed the translation. The medicine abstract 2 (MA) was translated by 140 students and 105 (75%) students completed the translation. The surgery abstract 3 (SA) was translated by 143 students and 105 (73%) students completed the translation.

Tables 4, 5, and 6 depict data from the three abstracts that were administered to students, and the percentage of mistranslations. Seventy-nine percent (79%) of the technical terms (TT) in BSA were translated in the wrong way by the students (Tab. 4), while 80% and 79% of the technical terms (TT) were mistranslated in MA (Tab. 5) and SA (Tab. 6) respectively. However, the students did show some kind of knowledge of the roots of the terms.

This was also true for non-Anglo-Saxon derived words (NASDW), since most of the times scientific terminology has origins similar to Italian language. Indeed, 79% of such words in BSA (Tab. 4) were mistranslated, while 81% and 82% of NASDW were not translated correctly in MA (Tab. 5) and SA (Tab. 6) respectively.

Almost all students did not translate words like: *harbor, gauge, cues, harvested, harnessed, deliver*. These are clearly Anglo-Saxon derived words (ASDW) and 93% of these words were translated incorrectly in BSA (Tab. 4). Furthermore, 89% of words like: *kidney, onset, store, end organ, injury* in MA (Tab. 5) were not translated or mistranslated. Also, 89% of the words like: *purpose, breast, review,*

Only the translations from students whose mother tongue language (Italian) was Italian. Translations that were completed were

the population and on completed abstract 1 (BSA) was translated by students who completed the translation. It was translated by 140 students and 105 (73%) students

from the three abstracts that were the percentage of mistranslations. The technical terms (TT) in BSA were mistranslated by the students (Tab. 4), while 80% of the TT were mistranslated in MA respectively. However, the students did not know the roots of the terms.

Anglo-Saxon derived words and times scientific terminology has been used. Indeed, 79% of such words in BSA, while 81% and 82% of NASDW were mistranslated in MA (Tab. 5) and SA (Tab. 6)

to translate words like: *harbor, gauge, kidney*. These are clearly Anglo-Saxon words. 89% of these words were translated correctly. Moreover, 89% of words like: *kidney, breast, review*, were not translated or mistranslated in MA (Tab. 5) and SA (Tab. 6)

*assess, relapse* in SA (Tab. 6) were incorrectly translated or not translated at all.

Moreover words like: *finding, diseases, relapse, vessel, healing, wound, injury, complications, predictive, onset, differentiation purpose, breast, review, assess, median, recurrence rate, relapse* show double difficulty, since they are both sub-technical (STW) and most of them are ASDW. When evaluating these words a 78% of mistranslations can be evidenced in BSA, while 83% and 92% of wrong translations can be found in MA (Tab. 5) and SA (Tab. 6) respectively.

Ninety-three percent (93%) of the compounds in BSA were translated in the wrong way (Tab. 4). Some of the compounds were: "mesodermal precursor cell", "hematopoietic stem cell", "bipotential hemangioblast activity", "circulating endothelial progenitor cells", "adult hemangioblast activity", "hemangioblast stimulatory or inhibitory cues", "inhibiting vessel production", "harvested HSC or EPC". Instead, some of the compounds in MA were: "both BP-dependent and -independent mechanisms", "end-organ injury", "angiotensin-converting enzyme inhibition or angiotensin type 1 (AT (1)) receptor blockade", "several large randomized clinical trials", and an 89% of wrong translations were seen (Tab. 5). Also SA (Tab. 6) included compounds like: "adenoid cystic carcinoma", "lymph-node positive disease", "median follow-up time", "relapse free survival (RFS) rates" and 88% of these were mistranslated.

BSA (Tab. 4) and SA (Tab. 6) did not include any impersonals. MA included 4 impersonals: "antihypertensive regimens has been shown to provide"; "angiotensin-converting enzyme (ACE) inhibition or angiotensin type 1 (AT (1)) receptor blockade has been shown to prevent atherosclerosis"; "left ventricular hypertrophy has been shown to be predictive"; "the RAAS blockade has also been shown, in several large randomized clinical trials, to inhibit new onset of diabetes" and 96% of the times these were translated in the wrong way or not translated at all (Tab. 5).

One of the most surprising observations was to find out that only one student translated "as to whether" and "whether"

correctly. Also items like: "given that" had a high percentage of mistranslations. However, probably the most striking observation was to see that only one student translated "in addition to" correctly. Also items like: "both... and" and "either... or" were mostly translated in the wrong way. Indeed, these functional forms received a 98% mistranslation in BSA (Tab. 4) and SA (Tab. 6), a 97% mistranslation in MA (Tab. 5). Furthermore, another surprise was represented by conditional verbs like "could be" and "would allow", which were translated correctly only by 3 students. Also "may cause" and "may be responsible for" were mistranslated by almost all of them. These verbs received a 97% mistranslation in BSA (Tab. 4) and a 96% mistranslation in MA (Tab. 5). These items were not represented in SA (Tab. 6).

Globally 76% of the students completed the translation of the three abstracts. BSA and SA showed only a 2% difference (Tab. 2). BSA had a higher percentage of completed tests (78%) probably because the abstract involved a subject matter closer to students' knowledge (Tab. 1). Indeed, MA itself was bigger than the other two; it had globally 2111 characters as compared to 1204 characters in BSA and 1395 in SA. Indeed, MA received 75% of tests completed as compared to 73% for SA (Tab. 1). Although fewer students took the test, MA received a higher percentage of completed translations as compared to SA (Tab. 1). This suggests that SA included a register, (surgery) with which the students were even less familiar.

Table 3 shows total data on all abstracts. Seventy-nine percent (79%) of the TT were mistranslated as compared to 86% of the STW. Probably because most STW were also ASDW. Indeed, 91% of ASDW were mistranslated with either a wrong translation or without any translation at all. Instead, NASDW received an 80% mistranslation because of the common root with Italian language. Nonetheless, this number still remains high, especially when considering that most of the students reported the right root but the wrong translation.

Ninety-one percent (91%) of the compounds were misinterpreted by the students and some of them did not translate

given that" had a high percentage of probably the most striking observation: student translated "in addition to" both... and" and "either... or" were going way. Indeed, these functional forms on in BSA (Tab. 4) and SA (Tab. 6), a (Tab. 5). Furthermore, another surprise: modal verbs like "could be" and "would be" were translated correctly only by 3 students. Also "responsible for" were mistranslated: the verbs received a 97% mistranslation in MA (Tab. 5). These in SA (Tab. 6).

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(91%) of the compounds were elements and some of them did not translate

them at all throughout the three abstracts. Impersonals were present only in MA and 96% of these forms were not translated at all. An interesting datum is the one derived from translation of other functional forms like: "both...and", "either...or", "in addition to", "whether", etc. that had a 98% mistranslation. Also the conditional forms like: "would allow", "could be", "may be" received a 97% mistranslation (Tab. 3). Another unexpected result was to see that almost all students had difficulty in translating past tense especially when irregular verbs were involved (data not subjected to the statistical analysis in the present report).

## Conclusions

For this first phase of the present study only first year medical school students were subjected to the test because they were, so to say, the "most pure" from scientific terminology and syntax, thus they were the ones who were less familiar with these linguistic characteristics in scientific writings, and they were also "less contaminated" by scientific concepts and knowledge. These experimental conditions are a standard since they allow to discern the real difficulties of a student, or more generally of a person, in translating a scientific writing, and they provide an opportunity for understanding the elements on which we must concentrate and direct our future teaching strategies.

Many students were unable to finish the translation, and this could be due to multiple factors. First, it could be easily hypothesized that almost all first year medical students had never been subjected to a scientific translation before. Also, the students did not actually know whether these translations were going to be included in the final grade calculations, and this somewhat scared them. So, they spent a lot of the available time in trying to translate correctly, and this resulted in a lack of time to complete the translation. Probably 45 minutes were not enough. Indeed, MA was bigger than the other two (2111 characters vs. 1204 vs. 1395), and although a lower number of students (140 vs. 150 vs.

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143) took the translation, still 25% of them was unable to finish it. The same is true when comparing BSA with SA. Actually 78% of the students finished the BSA translation as compared to 73% in SA, SA having 1395 characters vs. 1204 characters in BSA (Tab. 2). So, when comparing the three types of registers, basic science, medicine and surgery, we can see that the lower percentage of completed tests was obtained by SA, showing that indeed knowledge of the specific terminology and subject matter does play a prominent role in scientific translations.

Indeed, most of the students were unable to correctly translate technical terms (TT) in all three types of abstracts. Although, technical terms do have similarities with Italian terms, nonetheless most of the students did show knowledge of the roots of the terms. However, they were unable to translate correctly into the corresponding Italian terms. This seems to be due to the total lack of knowledge of the corresponding registers in their mother tongue language and even more central, to the inadequate knowledge of the specific themes. This is supported by the results showing that MA had 33 TT and 80% of them were mistranslated, and that SA had 25 TT and 79% of them were mistranslated. When comparing SA and MA with BSA, I found that 79% of the 15 TT were mistranslated in BSA, and this was probably the consequence of the fact that the abstract was the first translation students were subjected to.

Globally (Tab. 3), students were unable to translate 86% of the sub-technical vocabulary (STW), and 91% of the Anglo-Saxon derived words (ASDW). Indeed, STW show two pitfalls. First, most STW belong in registers mostly unknown to first year medical students. And secondly, most of them are also ASDW. This is supported by the results showing that as the number of STW increased in the three abstracts (16 in BSA vs. 34 in MA vs. 40 in SA) so did the percentage of mistakes (78% in BSA vs. 83% in MA vs. 92% in SA).

However, when comparing ASDW with NASDW, a 9% difference can be shown (91% vs. 80%). Besides all the difficulties students have shown, these data further evidence that it is easier



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for students to translate words that are similar to their own mother tongue language. From compounds passing through impersonal and functional structures up to conditionals, these were almost all misinterpreted and mistranslated. Indeed, students did not translate them in the correct way or did not translate them at all 91%-98% of the times. Students had difficulties in structuring a correct Italian sentence conveying the correct meaning of the English sentences including these linguistic items. Furthermore, the overuse of both impersonals and compounds represents a main characteristic of scientific register, and first year students are not so familiar with such syntactic phenomena.

The following conclusions can safely be drawn from the analyses of the translations. Most technical and sub-technical words were mistranslated and the percentage increased as the number of TT and STW increased across BSA, MA, and SA. These data suggest that the lack of knowledge of the students of the correct corresponding term in their mother tongue language (Italian) could have played a role. Also these results seem to be a consequence of the fact that the translations were administered to first year students who had not had the necessary time to develop the scientific register not even in Italian language, and had little acquaintance with the scientific themes they were translating.

This seems to be true also for both non-Anglo-Saxon derived words and Anglo-Saxon derived words. This unexpected datum seems to be due to the fact that although almost all medical school students come from *Licei* and thus do withhold a good knowledge of Latin and/or Greek, this was not enough for them to translate the words correctly, for which they instead understood the root and probably also the meaning that they were unable to correctly reproduce in Italian. This seems to suggest that although knowledge of the specific root of the word helps translators in understanding the meaning the word it is conveying, it does not necessarily mean that it will help translators in reproducing the exact term in the target language, especially when the translators do not actually know the words in the source language they are

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trying to reproduce. So explaining, and further supporting the shared opinion that it is important that translators translate into their mother language because this increases the probabilities that the translators know, in their mother tongue language, the terms they are translating.

Concerning verbs, impersonal type structures were mistaken by practically all students. The first reason seems to be the fact that Italian language does not contain anything that even verges an impersonal. Thus students are not at all familiar with such structures in their mother tongue language. The second reason seems to dwell in the fact that standard English language uses these forms only rarely and thus although students did have a good knowledge of standard English, or at least they claimed so, they were not so familiar with these structures that more literally and frequently belong to scientific language and to other special languages.

This is also true for compounds. However, in this specific context compounds seemed to have been actually mistranslated as a consequence of the lack of knowledge of the concepts the compounds were conveying. The perception I got was that if these same students were fronted with compounds constructed with strings of words taken from standard language they would have been able to translate them more easily than they did with the strings of scientific terms.

The mistranslation of the functional forms seems to be due to the specific language background these students have. Certainly, the lack of deep knowledge of English grammar is indeed a shortcoming for students. However, the little knowledge of grammar depends on the fact that language teaching during the past years has moved away from grammar.

Probably 45 minutes for translating a standard scientific abstract are not enough and more time is needed to better refine the translation. This supports the hypothesis that scientific translations are not so mechanical. Instead, they do deserve the necessary meditation and contemplation to reach the best translation while attempting to transmit the meaning carried by

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whose structures were mistaken. One reason seems to be the fact that in anything that even verges on not at all familiar with such a language. The second reason is that standard English language uses although students did have a chance, or at least they claimed so, to use structures that more literally translate from their language and to other special

cases. However, in this specific case, it has been actually mistranslated. Lack of knowledge of the concepts the perception I got was that if these compounds constructed with standard language they would have been easier than they did with the

original forms seems to be due to what these students have. Certainly, English grammar is indeed a barrier, but the little knowledge of English language teaching during the grammar.

Translating a standard scientific text a time is needed to better refine the hypothesis that scientific texts are. Instead, they do deserve the opportunity to reach the best and to transmit the meaning carried by

the source language into the target language.

The general feeling I received while I was correcting the translations, and the most amazing observations I did when analyzing the results were that students evidence severe deficiencies in grammar and linguistics. Therefore, our future teaching strategies should be directed toward more rigorous teaching and testing on grammar and linguistic proficiency. Students should be faced with the problem of having to learn grammar and linguistics also in their mother tongue language, since some insufficiencies were present in this area as well. Concerning terminology and knowledge of subject matter, in general the basic science abstract was supposed to have been the easiest for students because it did carry some register they should have been familiar with. Actually, though students did a little better with BSA, the results are not so different from those of the other two abstracts, and the data are far from what I expected. However, when comparing the three types of abstracts students showed increasing difficulties when they passed from the BSA to the MA to the SA, which was for them the most difficult due to the total lack of knowledge of the subject (surgery).

The present study has focused only on first year students and only on a limited number of linguistic items. I am sure that further investigations are necessary to gain more insight into the phenomena that I was able to only mention in the present paper and which do indeed deserve further debate. Future studies will continue to investigate the aforementioned processes correlated with translating scientific writings that will further instruct us to which are the weak points of scientific translations and which strategies should be undertaken to improve them.

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Table 1 - Abstract characteristics

	Total Characters	Words
Abstract 1 BSA	1204	200
Abstract 2 MA	2111	354
Abstract 3 SA	1395	256

Table 2 - Test population and completed translations

	Total	BSA	MA	SA
No. of students taking the test	433	150	140	143
No. of completed tests	327	117	105	105
% of completed tests	76%	78%	75%	73%

Table 3 - Data from all Abstracts

	No. in English Abstracts	No. in all Translations	No. Mistranslated%	Mistranslated
Technical terms (TT)	73	7845	6236	79%
Sub-technical words (STW)	90	9642	8312	86%
Anglo-Saxon derived words (ASDW)	96	10476	9507	91%
Non-Anglo-Saxon derived words (NASDW)	127	13887	11174	80%
Compounds	28	3084	2792	91%
Impersonal forms	4	420	405	96%
Functional forms	10	1098	1074	98%
Conditionals	4	444	430	97%

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1098	1074	98%
444	430	97%

Table 4 - Data from BSA

	No. in English Abstracts	No. in all Translations	No. Mistranslated	% Mistranslated
Technical terms (TT)	15	1755	1380	79%
Sub-technical words (STW)	16	1872	1456	78%
Anglo-Saxon derived words (ASDW)	33	3861	3590	93%
Non-Anglo-Saxon derived words (NASDW)	46	5382	4230	79%
Compounds	12	1404	1300	93%
Impersonal forms	0	0		
Functional forms	4	468	460	98%
Conditionals	2	234	228	97%

Table 5 - Data from MA

	No. in English Abstracts	No. in all Translations	No. Mistranslated	% Mistranslated
Technical terms (TT)	33	3465	2789	80%
Sub-technical words (STW)	34	3570	2980	83%
Anglo-Saxon derived words (ASDW)	28	2940	2630	89%
Non-Anglo-Saxon derived words (NASDW)	40	4200	3400	81%
Compounds	8	840	750	89%
Impersonal forms	4	420	405	96%
Functional forms	3	315	306	97%
Conditionals	2	210	202	96%

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Table 6 - Data from SA

	No. in English Abstracts	No. in all Translations	No. Mistranslated	% Mistranslated
Technical terms (TT)	25	2625	2067	79%
Sub-technical words (STW)	40	4200	3876	92%
Anglo-Saxon derived words (ASDW)	35	3675	3287	89%
Non-Anglo-Saxon derived words (NASDW)	41	4305	3544	82%
Compounds	8	840	742	88%
Impersonal forms	0	0		
Functional forms	3	315	308	98%
Conditionals	0	0		

## References

No. in all translations	No. Mistranslated	% Mistranslated
2625	2067	79%
4200	3876	92%
3675	3287	89%
4305	3544	82%
840	742	88%
0		
315	308	98%
0		

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