Machine Translation Aid to the Test:
A study on the benefits of post-editing for translation into the weaker language

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Abstract

Post-editing is today a potential job assignment for both freelance and in-house translators. Therefore, it is important for linguists to test their suitability for this procedure. An action research study has been undertaken to shed light on whether machine translation output post-editing is more efficient than translation from the source text, considering time, quality and effort. This study also aims to find out if said procedure is effective for translation into the weaker language. The author, a certified English>Spanish translator, tested her translation and MT output post-editing performances with texts from three different domains: medical, legal and IT. The time and effort needed to elaborate the target texts, and the quality of the translations were analysed. Results indicate that, in the researcher's particular case, post-editing is more time-efficient than translation from the source text in both language directions and in most domains. In fact, a greater time difference was observed in post-editing into the weaker language (English). With regard to quality, MT output post-editing is efficient only for translation into the mother tongue. Contrary to expectations, target texts into the second language have better quality when translation from the source text is used. Similarly, as regards effort, post-editing efficiency is more noticeable in translation into the mother tongue (Spanish). Effort reductions when post-editing into the weaker language were only registered in the IT and Legal domains.

Keywords: machine translation, post-editing, inverse translation, action research

1 Introduction

With the need for achieving terminological consistency, meeting tight deadlines and reducing costs, a great number of translators have started working with software applications that support translation memories. At the turn of this century, these technologies started to include built-in machine translation (MT) systems that generate

target texts automatically. The aid of these systems is supposed to bring significant time and costs savings over human-only translation procedures. For this reason, several translation companies are now using MT systems and encouraging their linguists to work as post-editors. Therefore it is a good idea for professional translators to decide whether they should accept post-editing jobs or not, and if they would use this procedure even when they are not asked to. As a professional translator myself, I want to find out if post-editing is advantageous in certain areas of expertise and for translation into the foreign language. In this language direction, MT raw output provides at least an initial draft that language professionals can use as starting point. This might be a convenient use of MT output because translators generally have an advanced knowledge of the weaker language. This is very different from "native knowledge," defined as "the ability to write a language so fluently that the expression of thought is structurally, grammatically and idiomatically correct." (Art. 4.1 of the ITI Code of Conduct).

To evaluate post-editing suitability as a translation procedure and to know if MT is beneficial for me as a language professional to create target texts in the foreign language, I will conduct an action research project. Action research consists in the researcher conducting a simulation of normal practice with deliberate and conscious reflection on the tasks performed (Dick, 1993). This research modality was chosen as the most useful to describe the current procedures individual professional translators will follow and to elaborate an empirical opinion on whether MT plus post-editing will actually be of help.

I have considered it necessary to pose the following questions:

(a) Is translation time shortened, quality improved and effort diminished with MT output post-editing compared to translating directly from the source text?

(b) Is MT output post-editing more effective when translating into the weaker language?

(c) Given a particular language pair –in my case, English<>Spanish– which area of knowledge is MT post-editing best suited for?

In this action research project, it is hypothesised that

(a) by post-editing MT output, a target text can be created faster than by translating from the source text, with higher quality and less effort;

(b) post-editing is more effective when translating into the weaker language; and

(c) post-editing is better suited to translate texts in the translator's domain of expertise, which in my case is that of information technologies (IT).

The efficiency of MT output post-editing in different texts types and language combinations has been assessed in several recent studies (Costa-Jussà, 2011; Fiederer & O'Brien, 2009; García, 2010; Guerberof, 2009; Kirchhoff, 2011). This case study action research project builds on this by comparing the efficiency of post-editing into the native language with post-editing into the foreign, weaker language from the perspective of the individual translator. Therefore, its aim is to demonstrate the efficiency of post-editing machine translation output –understood in terms of time, quality and effort– to translate texts from different domains from Spanish into English as a foreign language.

2 Background

2.1 Machine translation and post-editing

The basic aim of this action research study is to contribute to machine translation research from the point of view of linguistics to evaluate the impact of new translation procedures on the work of translators. Machine translation systems, once viewed as subject of research in engineering (Nirenburg 1987), are now being explored by linguists to study how they can assist the translation process with post-editing, understood as the process of modifying a machine translated version of a source text as deemed necessary to make it acceptable fro the target readers.

This study will evaluate the efficiency of translation by post-editing with the aid of Lucy Software's automatic translator. Lucy Software was chosen because it has been developed as a corporate MT application for important multinationals that work with a great deal of translation material and that, for this reason, are constantly looking for ways to reduce translation budgets. Lucy Software's system is based in linguistic rules (rule-based machine translation or RbMT) with a transfer approach. Within this transfer architecture, some statistical mechanisms have been introduced to help improve the MT process. Other MT systems, such as Google Translate, are readily available online for non-professional purposes. They have recently been studied by translation specialists and researchers interested in MT output post-editing (García, 2010; Guerberof, 2010; Kirchhoff, 2011; Korošec, 2011; Pym, 2011; Ramos, 2010; Muñoz Muñoz & Vella Ramírez, 2011). In this study, I have chosen to focus on post-editing the MT output obtained from an application designed for professional purposes instead.

2.2 Language pairs

It is important to study the benefits –and the drawbacks– of post-editing in different language pairs and language directions. In this assessment we will study the potential benefits of translators' modification of MT output from Spanish into English as a foreign language. There is an unwritten rule that translation must be done by native speakers of the target language culture. Consequently, although it is possible to receive assignments into the foreign or weaker language, professional translation is generally done in the into-mother-tongue direction. In fact, any attempt for translation into the weaker language seems to be condemned by linguists. According to Dollerup (2000: 63), non-English speakers will never master English as natives do, because there are "uncharted domains in our linguistic and cultural mapping of English." As a result, non-English translators cannot produce a fluent, authentic text for the English-speaking audience.

However, specialists who advocate for translation to be done only into the native language neglect the relevance of translators' comprehension of the source text and culture for accurate target language rendition (Grosman, 2000: 23). Besides, translation into

English is an inevitable practice in current multicultural settings because of the need for communication in a universally understood language. According to Snell Hornby (2000: 37), it is important to train language professionals for translation into the foreign language, since "translation into English as a non-mother tongue has become a fact of modern life." In fact, some experts have argued that, for certain text types belonging to domains where translation accuracy is more crucial than naturalness, a translator's fluency in the source language is more important than fluency in the target language (Crystal, 1987: 344).

Thus, translating into the weaker language can be the preferable direction in the domains that will be used for post-editing efficiency assessment in this study. In the fields of Medicine, Information Technologies and Law, accuracy is more significant than style, and translators have easy access to direct equivalents and domain-specific syntactic structures with the help of glossaries, specialised dictionaries, and translation memories. Having considered the reasons for my focus on translation into English as the foreign language, I am interested in finding out if MT output post-editing can help translators in this task.

2.3 Subject areas

According to Gross (1992), machines can successfully handle translation within limited subject domains. Research conducted by Calude suggests that subject areas with texts genres containing "little pragmatic information, clear and short sentences and restricted semantic domains" can be translated successfully by MT. On the contrary, machines perform poorly in those domains where we typically find texts that are "dependent on contextual information, have long, elaborate sentences and a broad semantic domain" (2004: 17). Three subject areas were chosen to test how MT post-editing deals with them in terms of time, quality and effort.

Texts from the medical domain were chosen because of their monosemic nature, clarity, and usually concise structures that make them suitable for natural language processing. Some of its features that might not be as suitable for the MT system –and will therefore require human intervention– are passive and impersonal syntactic structures, and descriptions using several adjectives, which implies different word orders in English and Spanish sentences. Texts from the legal domain were chosen because of their repetitive nature which might imply a faster target text rendition with an automatic translator. However, MT post-editing of long and complex sentences, archaic and foreign expressions, use of passive voice, and distinctive modality and terminology can be challenging with the language pairs concerned. Extracts from the information technologies subject area were selected because of their repetitive nature and simple syntax that MT might be able to handle smoothly. Other characteristics might not be well suited for machine translation, though, such as impersonal constructions, specific terms in the form of compound nouns, and nominalizations which are expressed with different grammatical categories in the languages concerned.

2.4 Efficiency in translation

The efficiency of the translation procedures examined is measured considering time to complete the task, effort made towards the production of a final draft, and target text quality. These three parameters provide a holistic analysis of translation efficiency. The first two parameters are focused on the comprehension and production stages of the translation process, whereas the third one is related to the final translation product. The assessment of translation speed has been of special interest in MT research (García 2010; Guerberof 2009; Kirchhoff 2011; Koehn 2010; O'Brien 2011; Plitt 2010), and some MT systems have shown significant reductions in translation speed by post-editing. Time-efficiency is usually achieved when MT applications are customized for a particular organization. This customisation consists in complementing the MT engine with domain-specific term bases and alignments of source and target texts.

Quality will be analysed considering a linguistically-based approach in which the target texts obtained as samples will be compared with their target texts published, with an eye to discovering syntactic, semantic and lexical regularities of transfer (House, 2009). Normative in English/Spanish contrastive grammar (Butt & Benjamin, 2004) is used to judge the adequacy of the translation of grammatical structures. Mistranslations and wrong terminological choices will be judged according to the choices made in the published versions. This quality assessment method was developed following the standard format of quality reviews for editing and translator feedback used by translation companies I have worked for.

Effort is the third efficiency parameter in this study. There are different types of effort involved in the editing of translated and post-edited output. According to Krings (2001), post-editing effort should be studied at the technical, cognitive and temporal levels. Given limitations of time, resources and scope, this study will focus on temporal and technical effort only. Long pauses will be considered as indicators of temporal effort, and output changes and dictionary look-ups will be indicators of technical effort. It is assumed that if a translator starts working from a machine-generated draft, modifications to the post-edited target text will be considerably fewer than modifications to a translation from the source text without MT aids.

3 Methodology

To answer the research questions and confirm the hypotheses, I tested the efficiency of both translation from the source text and MT output post-editing in texts from three different domains: medical, legal and IT. An analysis of time, quality and effort in translation and post-editing tasks from and into the target language will indicate if post-editing is beneficial for a translator working into the second or foreign language.

3.1 Document collection and translation

Two texts –one in English, one in Spanish– were selected from each of the three domains, hence, six source texts were collected. In a random order, one fragment of each source text in English was translated and the other fragment was post-edited into Spanish (mother tongue). The same was done with texts written originally in Spanish which were translated and post-edited into English (second language). Thus, I performed twelve tasks –six post-editing tasks from MT output, and six translation tasks from the source text. Each source text had an approximate length of 200 words. They were obtained from the Web, searching for real publications with an accepted translated version which was used as reference. Machine-translated texts for the post-editing tasks were obtained from the web-based Lucy Software translator kindly provided by Lucy Software Ibérica S.L. for a few weeks for the purposes of this study. I used Lucy's web platform for automatic translation of extracts pasted in the text box provided, choosing translation directions: English-Spanish and Spanish-English. Subject areas were also indicated: Law & Legal Science, Medical Science, and Technology, Industry, Crafts & Trades. From the medical domain, I chose a scientific article written in Spanish by Argentinean medical doctors, and a web-based health fact sheet from an American health organization written in English. From the legal field, I chose an annual report on corporate governance written in Spanish and an anti-spam policy written in English. From the IT domain, I chose a text from web-based manuals of the Microsoft Developers Network (MSDN) written in English, and a web page from a Mexican IT company explaining their enterprise resource planning services.

This being an action research study, it may be relevant to describe the subject examined by introducing myself. I am a professional freelance translator who works mainly into the mother tongue, translating and editing texts in the specific domain of IT (around 600,000 words translated to date). I graduated upon completion of a 5-year university translation course. I am a native speaker of Spanish, with English as my second language. My second language instruction started in primary school at age six.

Each sample was translated in the following way: Twelve tasks were attempted randomly choosing any of the two procedures, any of the two language directions, and any of the three subject areas. The random order of the tasks was used so that familiarity with the text would not be considered a variable when measuring efficiency, as each pair of extracts belonged to the same text. Efficiency was measured in the translation/post-editing of each fragment from and into the second language considering time to complete the task, target text quality and effort.

3.2 Time evaluation

To measure the "time" parameter, I timed myself in each task setting start time and finish time, verifying these in the BB FlashBack Pro videos. BB FlashBack Pro is a screen recorder that creates video files which can be observed to analyse how a particular task was conducted in the computer. Time in minutes was registered in Table 1, divided into

translation/post-editing into the mother tongue and translation/post-editing into the second language. The differences between translation and post-editing values (time in minutes) were also recorded to have an indication of the degree of improvement with one of the procedures.

3.3 Translation quality evaluation

Online published translations in Spanish and English were compared with my own version considering mistranslations, terminology errors, and contrastive grammar errors. In a two-column table created in a word processor, the twelve target texts produced by translation and post-editing were pasted next to their corresponding published fragment. Mistranslations were spotted in instances of meaning distortions, ambiguities, unnecessary omissions and additions, lacks of parallelism, false friends and unnatural renditions that affect the text's suitability for publication. The terminology errors considered were those unacceptable lexical choices that did not belong to the particular domain or that implied a distortion of meaning. I did not compute lexical choices that were different from those used in the published version but were nevertheless acceptable. Contrastive grammar was considered in instances of language transfer-induced errors in the use of prepositions, articles, tense, capitalization, word order, gender and number agreement, and passive voice. Current normative in English-Spanish contrastive grammar was used to evaluate this aspect of quality (Butt & Benjamin, 2004). To measure the "quality" parameter, each error type was indicated with track changes and comment boxes tagged "mistranslation," "wrong term," and "contrastive grammar." As said, this criterion was chosen based on quality reviews that translation companies use for editing and translator feedback. Tagged boxes were counted and recorded in Table 2 showing both procedures in each language direction: translation/post-editing into the mother tongue and translation/post-editing into the second language. The differences between translation and post-editing values (number of errors) were also recorded to have an indication of the degree of improvement with one of the procedures.

3.4 Effort evaluation

Each task was recorded using our screen recorder. Videos were carefully examined to analyse the "effort" parameter by registering changes to human-translated and post-edited output. Such modifications were classified into dictionary look-ups, long pauses and output changes. Dictionary look-ups were counted every time bilingual and monolingual online resources were used to check equivalences and definitions. Search engine uses were also counted, as they are an important part of the translation and post-editing tasks for terminological documentation and usage verification. The long pauses computed were those that lasted five seconds or more, as they indicate a higher level of difficulty reading longer complex structures and figuring out appropriate equivalents in the human translation process. In MT output post-editing, longer pauses also imply the presence of complex

structures as well as the need to re-read and verify whether something really has to be changed or not. Changes to translated and post-edited outputs were counted in instances of typo corrections, word order modifications, omissions or additions for fluency, necessary stylistic changes, and grammatical corrections, such as gender and number agreement for Spanish texts. The number of output changes, pauses and dictionary look-ups was registered in Table 3. The differences between translation and post-editing values (number of modifications) were also recorded to have an indication of the degree of improvement with one of the procedures.

4 Results

In relation to time-efficiency, the data gathered in Table 1 shows that post-editing MT output is faster than translation from the source text in both language directions and in most subject areas. Thus, as regards time-efficiency, hypothesis (a) is confirmed. The only case in which post-editing was not time-efficient was in a Spanish-English task with a text from the legal domain. This is probably related to the subject's lack of experience working in that particular area of knowledge and in the Spanish-English language direction. Differences between translation and post-editing values in each language direction show a greater time difference in favour of post-editing into the second language. Consequently, as regards time-efficiency, we can confirm hypothesis (b) related to post-editing efficiency into the weaker language. As regards the areas of knowledge that are better suited for post-editing, a greater time improvement was observed in the field of IT, which confirms hypothesis (c). However, it is important to consider the time improvement observed in the English-Spanish post-editing task with a text from the legal domain. In this case, the time difference shows I performed faster with post-editing into Spanish, probably because I have more experience working into my mother tongue.

TABLE 1: Time-efficiency assessment - Time improvement highlighted

		INTO THE MOTHER TONGUE		DIF.	INTO THE SECOND LANGUAGE		DIF.
TIME (minutes)		TRANSLATION	POST-EDITING		TRANSLATION	POST-EDITING	
	IT	16	**11**	**5**	18	**10**	**8**
	LEGAL	23	**17**	**6**	**22**	24	2
	MEDICAL	17	**16**	**1**	30	**27**	**3**

As regards quality, my translations were compared with the published versions (see Appendix) and errors were counted dividing them into three groups: (1) mistranslations, spotted in the case of additions, omissions and distortions of meaning; (2) terminology errors; and (3) contrastive grammar-related errors and other infelicities of style. Amounts were registered in Table 2 which shows that, with regard to quality, there is no remarkable difference between MT output post-editing and translation into the mother tongue and into

the second language. Nonetheless, if we add the number of errors in each area, we can see that post-editing can be more beneficial for tasks into the mother tongue, not into the second language. Moreover, by observing the differences in post-editing and translation values (number of errors), we cannot see a great degree of improvement in any of the procedures. Thus, the part of hypothesis (a) on post-editing MT output efficiency related to quality is supported in the case of translation into the mother tongue. In opposition, a worse target text quality was registered with post-editing into the weaker language. Consequently, hypothesis (b) which claims that post-editing is more effective for translation into the weaker language is rejected seeing that the quality of texts translated into the weaker language was generally better with translation from the source text, contrary to expectations. Hypothesis (c), that claims that post-editing is better suited to translate texts in the IT domain, is not supported either, as I performed better with this procedure in the medical domain. Better performance in quality with post-editing in the IT and Legal domains was only observed in tasks into the mother tongue.

TABLE 2: Quality assessment – Quality improvement (fewer errors) highlighted

			INTO THE MOTHER TONGUE		DIF.	INTO THE SECOND LANGUAGE		DIF.
			TRANSLATION	POST-EDITING		TRANSLATION	POST-EDITING	
QUALITY	IT	TERM	4	1	3	1	1	=
		MISTRANSLATION	3	2	1	1	2	1
		GRAMMAR	1	2	1	0	3	3
		TOTAL	**8**	**5**		**2**	**6**	
	LEGAL	TERM	3	3	=	3	8	5
		MISTRANSLATION	6	4	2	5	3	2
		GRAMMAR	2	3	1	1	2	1
		TOTAL	**11**	**10**		**9**	**13**	
	MEDICAL	TERM	0	2	2	10	6	4
		MISTRANSLATION	3	2	1	2	3	1
		GRAMMAR	1	0	1	1	1	=
		TOTAL	**4**	**4**		**13**	**10**	

In relation to effort, the video files obtained with the screen recorder were examined and modifications were counted dividing them into three groups: (1) dictionary lookups, registered upon each web search and use of bilingual and monolingual online resources; (2) long pauses of 5 seconds or more; and (3) changes to output, that is, corrections made to translated and post-edited texts. Amounts were registered in Table 3 which shows that, as regards effort, post-editing efficiency is more noticeable in translation into the mother tongue. By adding the total number of errors in each area, effort reductions when post-editing into the second language were only registered in the IT and legal domains. Moreover, by observing the difference in post-editing and translation values (number of modifications), a greater degree of improvement is present in post-editing tasks into the mother tongue. Thus, the part of hypothesis (a) related to post-editing efficiency in effort is supported only if we consider translation into the mother tongue, as post-editing efficiency

into the second language seems to depend greatly on subject area which is, in turn, related to translator's expertise. This also means that hypothesis (b), which claims that post-editing is more effective for translation into the weaker language, cannot be supported if we consider all the areas of knowledge. It is important to notice, though, that fewer modifications were done in the post-edited version of a text from the legal field into the mother tongue. Hypothesis (c), related to post-editing suitability for the IT domain, is confirmed, as fewer modifications were made with MT output post-editing in this subject area, especially when post-editing into the weaker language.

TABLE 3: Effort assessment – Effort reduction (fewer modifications) highlighted

			INTO THE MOTHER TONGUE		DIF.	INTO THE SECOND LANGUAGE		DIF.
EFFORT			TRANSLATION	POST-EDITING		TRANSLATION	POST-EDITING	
	IT	LOOK-UPS	5	1	4	2	1	1
		LONG PAUSES	9	12	3	21	12	9
		OUTPUT CHANGE	16	7	9	18	7	11
		TOTAL	**30**	**20**		**41**	**20**	
	LEGAL	LOOK-UPS	11	4	6	15	7	8
		LONG PAUSES	26	20	6	27	35	8
		OUTPUT CHANGE	23	13	10	18	10	8
		TOTAL	**60**	**20**		**60**	**52**	
	MEDICAL	LOOK-UPS	10	8	2	19	23	4
		LONG PAUSES	8	12	4	18	35	17
		OUTPUT CHANGE	12	8	5	13	8	5
		TOTAL	**30**	**27**		**50**	**66**	

5 Conclusions

The results obtained show that adequate target texts –especially in the field of IT– can be generated faster by replacing the conventional procedure of translating from the source text with MT post-editing. Comparing post-editing into the mother tongue with post-editing into the second language, a greater difference in time-efficiency was observed in the latter. Contrary to expectations, in my case, post-editing into the second language was not more efficient than translation in relation to quality. My results indicate that post-edited MT outputs are similar in quality to human-only translations when working into the mother tongue. This demonstrates that, while MT accuracy certainly needs to be improved, an experienced translator's intervention will produce an acceptable target version, particularly when post-editing into the native language. In such a case, post-editing quality might also be improved if performed by experienced post-editors who are well acquainted with the types of errors MT systems produce in their mother tongue. Results obtained from the effort assessment show that post-editing involves less technical and temporal effort if we work into the mother tongue. Effort improvements into the second language were only observed in the IT and legal domains. Although I expected better results in post-editing quality into the second language, an improvement in time and effort was observed, and this

can help me elaborate an educated opinion on when MT output post-editing can be of help in my work as a translator.

While I was conducting the exercise, I noticed that post-editing is time-efficient for both language directions and that the effort involved in this procedure will vary according to the subject areas in which the translator is more experienced, and the findings presented here align with this view. Considering the results presented, it is likely that post-editing assignments are performed faster with texts from a domain in which the translator has a high level of competence as a result of work experience and/or technical training. Therefore, I would be willing to accept post-editing assignments if rates are competitive enough and if the translation project involves texts in my area of expertise (IT). Only if working in this domain would I use said procedure if the client does not request it, as I found it time-efficient and I perceived that effort was reduced in both language directions. Seeing that post-editing yielded better results into the mother tongue in my quality assessment, it can be concluded that I would not use this procedure to work into my second language, as native knowledge might be crucial to be a good post-editor who delivers high quality texts. It is important to notice, though, that high quality translation may not be related to the procedure used, but to work experience and ongoing training in translation skills, area of expertise, and grammar and use of the working languages. Because of the need for such ongoing training and the fact that MT systems today are still imperfect, it is probably not a good idea for inexperienced translators to work as post-editors.

In relation to the limitations of this action research study, its scope was restricted to a small sample of translated and post-edited documents determined by time and other constraints, and by access to already-translated texts published in the Web. The results would have been more specific if I had translated and post-edited more samples from each subject area. The findings presented here are likely to be replicable if I repeat the exercise with different texts belonging to the same domains. However, I cannot claim that these findings can be extended to other professional translators, even if they work with the same language pairs, subject areas, and MT system. Every translator will have a different experience using MT technologies, as attitudes toward these developments have a great influence on post-editing outcomes. These attitudes –which should be further described and analysed– may be determined by economic benefits, opportunities for professional development, and knowledge of technological trends. Moreover, this study will probably be difficult to reproduce with professionals who work with languages having highly dissimilar linguistic structures or which have not been thoroughly processed by MT systems yet.

Some translators may find post-editing useful for good quality translation of specialised material into the weaker language. This is due to the fact that source text comprehension by a native speaker is important for target text accuracy in domains where this aspect is more relevant than a natural and fluent style. Also, translators with an intermediate command of the weaker language may find MT output post-editing useful as compared to inverse translation from the source text because of the difficulty they have to communicate in the second language at and advanced or near-native level.

Further research needs to be done to find out at what point MT post-editing may be useful and to develop training methods for linguists to post-edit efficiently. Reflecting upon the different subjects who can be assessed, we can hypothesise on the influence of other factors which are not included in the scope of this study, such as training and experience in post-editing tasks, language pairs, bilingualism, specific text types, and attitudes towards translation technologies.

There is a growing need for information on post-editing efficiency in the translation industry. This action research experience was enriching, because it has a direct and evident relevance to my translation practice. Post-editing is now a potential job assignment for both freelance and in-house translators and, for this reason, it was important for me to test my suitability for this procedure, which was the purpose of this experiment. Hopefully, this study will provide a starting point for other translation professionals to test themselves in a similar way and find out if post-editing MT output suits them.

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