

MACHINE TRANSLATION AND POST-EDITING IN WILDLIFE DOCUMENTARIES: CHALLENGES AND POSSIBLE SOLUTIONS

Traducción automática y posedición para documentales de naturaleza: desafíos y posibles soluciones

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ABSTRACT: This article presents some of the challenges that may have to be overcome in order to introduce Machine Translation (MT) into the process of translating wildlife documentary films. Until now, MT has mainly been applied to general and specialized written texts. However, in the past few years, EU-financed projects have started to work in the field of audiovisual translation with an aim to introducing MT into subtitling. It has already been proven that post-edited machine-translated subtitles can attain the appropriate quality levels. Nevertheless, in the case of documentaries, not only subtitling but also voice-over and off-screen dubbing can be found in countries where subtitling is not the main audiovisual transfer mode. Therefore, similar research in voice-over and off-screen dubbing is deemed to be worthwhile. This article aims to describe the challenges of machine-translating documentary scripts by presenting a preliminary analysis of the translations produced by MT engines.

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Firstly, an overview of the characteristics of voice-over and off-screen dubbing is provided, as well as a brief review of MT and post-editing in audiovisual translation. Next, the methodology used to carry out the analysis of both a corpus of documentary scripts and a corpus of machine translations of documentary scripts is explained. Finally, before summarizing potential new avenues of research, the challenges that may have to be faced in order to achieve high-quality translations of documentary scripts using MT are pointed out, the results of the analysis are presented, and some possible solutions are suggested.

Key words: post-editing, audiovisual translation, voice-over, off-screen dubbing, documentaries, machine translation, pre-editing.

RESUMEN: Este artículo presenta algunos de los desafíos que pueden presentarse si introducimos traducción automática (TA) en el proceso de traducción de documentales de naturaleza. Hasta ahora, TA se ha usado para traducir textos escritos de carácter general y especializado. A pesar de ello, en los últimos años, proyectos financiados por la UE han empezado a trabajar en el ámbito de la traducción audiovisual con el objetivo de usar TA para traducir subtítulos y ya se ha demostrado que los subtítulos poseditados pueden llegar a niveles de calidad adecuados. Pero los documentales no solo pueden traducirse mediante subtítulos que, en países donde la subtitulación no es el principal modo de transferencia audiovisual, se usan voces superpuestas y doblaje en *off* para hacerlo. Es por este motivo que creemos necesario investigar la introducción de TA para traducir documentales de naturaleza mediante voces superpuestas y doblaje en *off*. Este artículo describe los desafíos que conlleva traducir automáticamente guiones de documentales presentado un análisis preliminar de las traducciones producidas por distintos motores de traducción automática. En primer lugar aportamos una visión general de las características de las voces superpuestas y el doblaje en *off*, así como un breve resumen de anteriores investigaciones en las que se intenta introducir TA en el ámbito de la traducción audiovisual. A continuación presentamos la metodología usada para llevar a cabo el análisis de un corpus de guiones de documentales, por un lado, y de un corpus de traducciones automáticas de estos mismos guiones, por el otro. Finalmente, antes de resumir posibles nuevas investigaciones derivadas de este artículo, esclarecemos los posibles desafíos con los que podríamos encontrarnos para conseguir traducciones de guiones de documentales de calidad usando TA, presentamos los resultados de los análisis y sugerimos posibles soluciones a estos desafíos.

Palabras clave: posesición, traducción audiovisual, voces superpuestas, doblaje en *off*, traducción automática, preedición.

1. INTRODUCTION

Research on Machine Translation (MT) and post-editing (PE) has attracted great interest over the last decade, not only among Translation Studies scholars, but also among translation industry stakeholders. TAUS (Joscelyne 2009) market study indicates that 92.23% of the language server providers included in its study already use or intend to use MT and PE as part of their translation process. However, in the Audiovisual Translation (AVT) market, professional experiences in MT and PE are limited (Volk *et al.* 2010) and industry voices in favour of MT are just beginning to be heard (Georgakopoulou 2010). Interest in academia has increased in recent years, focussing on the implementation of MT and PE in subtitling, in part due to EU-financed projects such as eTITLE (Melero *et al.* 2006) EU-Bridge (Waibel 2012) or SUMAT (Del Pozo *et al.* 2012). The promising results of these studies (Fishel 2012; Bywood *et al.* 2013; Freitag *et al.* 2013) have encouraged other researchers to study the inclusion of MT in other AVT modes such as audio description (Ortiz-Boix 2012; Fernández *et al.* 2013).

Inspired by existing research, I have started an investigation based on the hypothesis that MT can be successfully implemented when translating wildlife documentaries for oral transfer modes such as voice-over (VO) and off-screen dubbing. This research will assess the quality of MT output, and most importantly, PE effort as compared to a standard human translation. However, before carrying out this experimental part of the research, I have considered it relevant to do a bibliographical survey and carry out a qualitative analysis on a corpus of documentaries, in order to point out the specific problems that will probably have to be addressed. As documentary films can deal with a wide variety of subjects, such as arts, health, history, music or wildlife, to mention but a few, and each topic has its own terminological specificities, a specific domain has been selected to narrow down the analysis: wildlife. This is due to the fact that there is a wide variety of wildlife documentary films; while some present species or ecosystems through beautiful images, the voice of a narrator, and sometimes, of experts (*Planet Earth* 2006), others are almost reality programs (*The Crocodile Hunter*, 1997-2004). Furthermore, wildlife documentaries are

frequent in TV's daily schedule – both in Spanish and English-speaking countries, illustratively on channels such as Animal Planet, BBC One, BBC Four, National Geographic Wild, La 2, and Canal Plus. The article aims to present the potential challenges arising from the use of MT engines and PE software when translating for VO and off-screen dubbing, two audiovisual transfer modes which can be often found in wildlife documentary films.

The article focuses on eight challenges and their possible solutions: (1) spotting, (2) synchronization, (3) access to audiovisual content, (4) variety on the script format, (5) register variety within a same script, (6) terminology, (7) errors and inaccuracies in the original script, and (8) linguistic inconsistencies in the original script. In order to identify the challenges, two approaches have been taken: on the one hand, a bibliographical survey of existing literature on VO and off-screen dubbing has been conducted, and on the other, an analysis of two corpora, namely a corpus of wildlife documentary scripts in English and a corpus in Spanish. An error analysis of a corpus of 50 sentences machine translated using eight free online engines provides additional insight into the most common errors produced by MT engines.

The article is divided as follows: a short overview on the two transfer modes under analysis (VO and off-screen dubbing), as applied to the translation of documentaries, as well as a short review of previous MT and PE research within AVT are presented in sections 2 and 3 respectively. In section 4, the methodology used to identify the challenges is explained. Sections 5, 6 and 7 present the challenges: section 5 focuses on the challenges found in previous academic works, section 6 describes those derived from the analysis of corpora 1 and 2, and section 7 lists the challenges found through both the automatic and human evaluations of the corpus of 50 sentences. In section 8, possible solutions are proposed, and in the last section, conclusions and further research are presented.

2. VOICE-OVER AND OFF-SCREEN DUBBING

The branch of Translation Studies that deals with documentary films is AVT, which can be described as the field of Translation Studies concerned with the transfer of multimodal and multimedia texts into another language and/or culture (Baldry & Thibault 2006). Although there are many AVT transfer modes (subtitling, dubbing, audio description, surtitling, voice-over, subtitling

for the deaf and hard of hearing, live subtitling, video-game localization, etc. [Remael 2010]) and almost all of them could be used in a documentary film, this article focuses only on off-screen dubbing and VO of wildlife documentary films, from English into Spanish. These two modes have been selected as they are the most used in open and closed TV channels in Spain, for instance, where it is common to find documentaries in which the narrator is re-voiced by using off-screen dubbing, whilst interviewees are rendered via VO. Although research in these transfer modes and genres initially received little attention, the trend has changed in recent years with some more works being published: Espasa (2004), Franco (2000, 2001a, 2001b), García Luque (2011), Matamala (2002, 2004, 2008, 2009a, 2009b), and Orero (2004, 2007).

Díaz Cintas and Orero (2006: 473) define voice-over as follows:

Technique in which a voice offering a translation in a given target language is heard simultaneously on top of the SL voice. As far as the soundtrack of the original program is concerned, the volume is reduced to a low level that can still be heard in the background when the translation is being read. It is common practice to allow the viewer to hear the original speech in the foreign language at the onset of the speech and to reduce subsequently the volume of the original so that the translated speech can be inserted. The translation usually finishes several seconds before the foreign language speech does, the sound of the original is raised again to a normal volume and the viewer can hear once more the original speech.

According to Franco *et al.* (2010: 25), voice-over translation in factual programmes is said to help reproduce the feeling of reality, truth and authenticity that the original audiovisual product gives, which is supported both by visual evidence (images of events, people, documents and archival footage) and by verbal evidence (interviews with experts and witnesses). The delivery of VO does not usually show regional accents in the target text and does not generally reproduce specific oral features such as fluffs, hesitations or grammatical mistakes. Orero (2006) highlights the importance of three types of synchrony in VO: kinetic synchrony –the voice delivering the translation matches the body movements which can be seen on screen–, action synchrony –the voice delivering the translation matches the actions taking place on screen–, and voice-over isochrony –the translated message fits between the beginning and

the end of the original speech, leaving some time before it starts and after it ends during which the original soundtrack is heard.

Off-screen dubbing, also termed commentary and narration by authors like Pönniö (1995), shares kinetic and action synchrony with voice-over but not voice-over isochrony. This is because the original voice is not heard but instead substituted by the target language. Additionally, VO is generally used for semi-spontaneous or spontaneous interviewees, whilst off-screen dubbing is usually applied to narrators with a planned discourse, and this also has implications in the language register.

Other shared features pointed out in the literature (Franco *et al.* 2010) are the lack of postproduction scripts or, if available, the poor quality of the transcriptions provided to the translators, which may contain linguistic errors and inaccuracies, etc. (see sections 6.2.4 and 6.2.5). Furthermore, as Matamala (2010) states, wildlife and scientific documentaries –the specific focus of this research– make use of a vast array of terminology, which might be a challenge for their translation (see section 6.2.3).

3. MACHINE TRANSLATION IN AUDIOVISUAL TRANSLATION

So far, implementing MT into the translation process has proven successful in limited domains, such as meteorology or finances, and when working with general texts, in which case MT is used for gisting purposes and for interpersonal communication (Ray 2004: 8-9). MT engines are becoming more and more domain-specific, which guarantees a better quality translation for the post-editors to work with (Läubli *et al.* 2013: 2). In the case of AVT, the implementation of MT is falling behind, as it has only been researched in subtitling (Melero 2006; Armstrong *et al.* 2006; Volk 2008; Bywood 2013), and to a far lesser extent, audio description (Ortiz-Boix 2012; Fernández *et al.* 2013).

Different approaches have been adopted to implement MT in the field of subtitling. Armstrong *et al.* (2006) have researched quality improvement when translating subtitles in the language pair English <> German with an EBMT engine with homogeneous data in comparison with an EBMT with heterogeneous data. The completed eTITLE Project (Melero 2006) intended to increase the efficiency of subtitling by automating various processes within its workflow, achieving a good BLEU score (36.9) in the English-Spanish combination.

Research in this field has also been carried out by Volk (2008), who has investigated whether it is feasible to use MT in subtitling by focusing on the language combination Danish <> English and checking three criteria: number of users, customer satisfaction, and long-term usage of the MT system. He concludes that it is feasible as the statistical MT based system reached high BLEU scores (average 57.3) and saved time in the translation process. Furthermore, he points out the possibility of adding pre-editing to control the language of the source documents so that the MT system is more competitive.

In the case of audio description, Ortiz-Boix (2012) presents a preliminary study on the application of MT to audio description process in the Catalan <> Spanish language pair. Although it is a preliminary study within the context of an MA dissertation, the first results are reassuring as the lowest BLEU score was 67.00. MT is envisaged by this researcher as a tool to increase accessibility in multilingual environments by working with closely related languages (Matamala *et al.* forthcoming).

Finally, the most recent project on the topic, SUMAT (Online Service for Subtitling by MT, see <http://www.sumat-project.eu/>), works with 14 different language pairs and initial BLEU results of 25.5 are promising (Bywood 2013). The project aims to provide not only automatic measures but also to test human PE effort, an approach taken in general translation (De Almeida *et al.* 2010) but almost absent in AVT (Sousa *et al.* 2011).

To sum up, the existing results regarding the application of MT and PE to subtitling and audio description processes have compelled us to put forward the hypothesis that MT with PE could also be successfully implemented into the translation of documentary films. Before carrying out experimental research to prove this hypothesis, a qualitative analysis has been done to foresee possible challenges, as described in the next section.

4. METHODOLOGICAL CONSIDERATIONS

Two methodological approaches have been adopted: on the one hand, a bibliographical review, which has led us to identify three challenges (discussed in section 5), and on the other, an analysis of three corpora which has allowed to confirm some of the issues found in the bibliographical survey, and to add some new ones (see sections 6 and 7). The main features of the corpora and how they have been analysed are explained next.

4.1. CORPUS CREATION

In order to find the characteristics of documentary scripts that can impact MT and PE processes, 108 documentary scripts in English (original texts) and 92 in Spanish (translations) have been collected and analysed. Some of the documentaries (66) only contain a narrator to be revoiced using off-screen dubbing, whilst others (54) contain a narrator plus interviewees and spontaneous speech to be voiced-over. These scripts were divided into three corpora:

1. En-Doc: 108 English documentary scripts in English, containing 504,368 words in 13,426 sentences (see table 1).
2. Spa-Doc: 92 documentary scripts in Spanish containing 440,651 words in 7,053 sentences. 80 of them are human translations of the documentaries included in En-Doc, whilst the remaining 12 are also human translations whose original script is not included in the previous corpus (see table 1).

CORPUS	SCRIPTS	SEGMENTS	WORDS
En-Doc	108	13,426	504,368
Spa-Doc	92	7,053	440,651

Table 1. En-Doc & Spa-Doc Corpora

3. Bil-Doc: constituted by a random selection of 50 original English segments (meaning group of words, *i.e.* whole sentences or syntagmas the MT engine is fed with) next to their human translation and eight MTs into Spanish. It contains 6,592 words (633 English and 5,959 Spanish words), as shown in table 2:

CORPUS	LANGUAGE	SEGMENTS	WORDS
Bil-Doc	English	50	633
	Spanish	450	5,959

Table 2. En-Doc & Spa-Doc Corpora

The 50 random segments in English and their translations in Spanish were extracted from the 80 documentary scripts the Spanish translation of which was already available. Only text that has to be voiced –and therefore needs

to be translated– was considered and additional information on the visuals or music –generally omitted from the translation but sometimes included in the original scripts– was disregarded in this selection. The segments were translated using the English into Spanish free online MT engines that were found on the web, (of which there are only eight) when the analysis took place (see table 3):

MT Engine	Website
<i>Apertium</i>	www.apertium.org/#translation
<i>Bing</i>	www.bing.com/translator
<i>Google Translate</i>	http://translate.google.com/
<i>Lucy MT</i>	www.lucysoftware.com/english/machine-translation/lucy-lt-kwik-translator-/
<i>Prompt</i>	www.online-translator.com/
<i>Reverso</i>	www.reverso.net/text_translation.aspx?lang=ES
<i>Systran</i>	www.reverso.net/text_translation.aspx?lang=ES
<i>Yandex</i>	https://translate.yandex.com/

Table 3. MT Engines

4.2. CORPUS ANALYSIS

En-Doc and Spa-Doc corpora helped determine some of the challenges regarding wildlife documentary scripts’ features. Both micro- and macro-structures of documentaries in English and Spanish were analysed and compared. Macro-structures are “the overall structures of a text” (Van Dijk 1973: 73), whilst micro-structures are understood as the connections between words and sentences within a text which become the basis for its general meaning (Van Dijk *et al.* 1983: 73).

1. *Macro-structure analysis in both En-Doc and Spa-Doc corpora*: a manual analysis of the script layout was carried out and divergences were found in the formatting of time codes and the inclusion of additional contents (description of visual information, details about the music heard, etc.). The results of this corpus-based bottom-up analysis, which was not based on any previous categorisation, were compared with the script layouts found in Franco *et al.* (2010). This analysis, the results of which can be found in sections 5.1 and 6.1,

was carried out for both En-Doc and Spa-Doc corpus independently, and the results were then compared.

2. *Micro-structure analysis in both En-Doc and Spa-Doc corpora*: this analysis adopted a different approach, resting on a pre-established categorisation from previous literature. A list of categories (namely terminology, register, linguistic inconsistencies, inaccuracies and errors in the original script) was searched manually in the corpus in order to confirm or reject their presence, hence offering qualitative data through a top-down corpus-based analysis. This analysis, the results of which can be found in sections 5.2, 6.2, 6.3, 6.4, and 6.5, was carried out for both En-Doc and Spa-Doc corpora independently, and then results were compared.

3. *Analysis of the Bil-Doc corpus*: this corpus was used to confirm some of the previously found challenges regarding micro-structure, as well as to run a preliminary test on the possible application of MT to wildlife documentary films, and to determine the most common errors when machine translating wildlife documentary films. Therefore, an automatic and a human subjective evaluation were made.

In order to analyse the Bil-Doc corpus and to evaluate the translations, several steps were followed:

1. An automatic evaluation, the results of which can be found in section 7.1, was made using Asia Online software (www.asiaonline.net), providing BLEU and TER automatic measures of the eight MT engines' translations against the existing human translations.

2. A subjective assessment of the output from all eight MT engines was made by one researcher (results can be found in Section 7.2). All errors were marked and classified according to a table based on the Multidimensional Quality Metrics Error Typology (MQM) proposed by Uszkoreit *et al.* (2013). Quality assessment of human translations has been researched by many authors in Translation Studies (*e.g.* Hurtado Albir 2001; Williams 2001; Eckersley 2002; Hurtado Albir 2007; Nord 2014), who have proposed different categorizations of errors. However, they do not take into account the specificities of MT. This is why a categorization of errors specifically for MT output was considered the most appropriate for the presented assessment, as the analysed output was machine translated. Among all error categorizations available that

asses MT output (e.g. Font Llitjós *et al.* 2004a; Koponen 2010), MQM was selected as a starting point because it is the most exhaustive and allows researchers to introduce domain-specific categories or erase unneeded categories. In any case, only categories regarding accuracy, issue, type and mechanical issues included in fluency were used for the purposes of this article as they are considered the most relevant (Uszkoreit *et al.* 2013). Table 4 lists all error categories used in this article:

A C C U R A C Y	Terminology	A term is translated with a term other than the one expected for the domain or otherwise specified.	
	Mistranslation	The target content does not accurately represent the source content.	
		Overly Literal	The translation is overly literal.
		False Friend	The translation has incorrectly used a word that is superficially similar to the source word.
		Should not have been translated	Text was translated that should have been left untranslated.
		Date/time	Dates or times do not match between source and target.
		Unit conversion	The target text has not converted numeric values as needed to adjust for different units.
		Number	Numbers are inconsistent between source and target.
		Entity	Names, places or other “named entities” do not match.
	Omission	Content is missing from the translation that is present in the source.	
	Addition	The target text includes text not present in the source.	
	Untranslated	Content that should have been translated has been left untranslated.	

F L U E N C Y	Spelling	Issues related to spelling of words.	
		Capitalization	Issues related to capitalization.
		Diacritics	Issues related to the use of diacritics.
	Typography	Issues related to the mechanical presentation of text. The category should be used for any typographical errors other than spelling.	
		Punctuation	Punctuation is used incorrectly for the locale or style.
		Unpaired quote marks or brackets	One of a pair of quotes or brackets is missing from the text.
	Grammar	Issues related to the grammar or syntax of the text, other than spelling and orthography.	
		Morphology	There is a problema in the internal construction of a word.
		Part of speech	A word is the wrong part of speech.
		Agreement	Two or more words do not agree with respect to case, number, person or other grammatial features.
		Word order	The word order is incorrect.
		Function words	A function word is used incorrectly.
	Unintelligible	The exact nature of the error cannot be determined. Indicates a major break down in fluency.	

Table 4. Used Metrics for human evaluation based on MQM (Uszkoreit et al. 2013)

After categorising the errors by marking and processing them with an Excel spreadsheet, the results of each MT engine were analysed and compared.

Before introducing the results of the analyses, namely the foreseen challenges if MT is included in the process of translating wildlife documentaries to be voiced-over and off-screen dubbed, a summary of the methodology -including in which Section the results can be found- is presented in table 5.

Approach	CORPUS	Type of Analysis	Results in...
(a) Bibliographical review			Section 5
(b) Corpus analysis	EN-DOC corpus	Micro- and macro-structure analysis	Section 6
	SPA-DOC corpus	Micro- and macro-structure analysis	Section 6
	BIL-DOC corpus	Automatic analysis	Section 7
		Subjective assessment	Section 7
		Final comparison	Section 7

Table 5. Review of the methodology

5. CHALLENGES BASED ON BIBLIOGRAPHICAL REVIEW

The bibliographical review has allowed us to identify three fundamental challenges which are dealt with in this section: spotting, synchronisation, and access to the audiovisual content.

Synchronisation is a key feature of both voice-over and off-screen dubbing. Synchronisation is reached thanks to the careful work of audiovisual translators, who rephrase, condense or adapt the text so as to match the images and the time slots available. Moreover, to facilitate the recording by the voice talent, time codes are also included in their script, a task called spotting. Should MT be implemented in the work flow, a specificity would be that translators (or post-editors) would not only correct possible MT errors, but also adapt the text so as to comply with the various types of synchronies (Orero 2006). Ideally, this would require a PE software which displays the audiovisual content and not only the written text.

5.1. SPOTTING

Spotting, also called timing or cueing, is the process of defining in and sometimes out time codes of each voice-over or off-screen dubbing unit. As stated by Díaz-Cintas and Remael (2007: 94), time codes are an essential tool, not only for subtitling, but also for the rest of AVT modes such as dubbing and voice-over. Spotting can be done by an audiovisual translator or by another

professional, as it is also the case in subtitling (Sánchez 2004), either before or after the translation. Various scenarios can be found in the profession: (1) the translator is given an already created spotting list, which is the case of templates (Sánchez 2004; Díaz Cintas *et al.* 2007; Kapsaskis 2011; Artegianni *et al.* 2014); (2) the translator is required to do the spotting and decide the time codes; or (3) the translator produces a translation without time codes and another professional does the spotting afterwards. In the second and the third scenarios, the ones considered by Franco *et al.* (2010) in their seminal book on voice-over, it is often the case that translators are given a transcript which includes time codes which do not correspond to the timing of the actual audiovisual content they receive. In the En-Doc corpus, scripts with and without time codes can be found, as illustrated in tables 6 and 7.

25m up in the treetops, old king Zog keeps everything in order...
 His kingdom of leaves and branches rises above the Pantanal, the largest wetland in the world, and when the rainy season returns and the floodplains are submerged, his tree becomes a kind of island.
 This marsh is so large that the only ones who really know where its boundaries lie are the migrating birds, who leave when it once again becomes dry and yellow.

Table 6. Spotting. En-Doc. No Time Codes

02;15 Kala's father and mother spent the winter on Hudson Bay. Each on its own, they trailed polar bears on the pack ice, feeding on the remains of seals left behind by the bears.
 02;28 Before the end of the season, they returned to the tundra, mated and after 52 days of gestation, the female gave birth to her young.
 02;43 For the first two weeks of her pups' lives, she had to stay with them deep in the den without ever coming out. At birth, they were blind and weighed only 50 grams each.

Table 7. Spotting. En-Doc. Time Codes

However, all translated scripts in our corpus contain time codes (see table 8), which not always coincide with the time codes in the original script (compare, for instance, the Spanish spotting in table 8 which corresponds to the original in table 7). Thus, translators needed to either introduce the spotting when translating the script or check and rewrite the time codes because they were different.

02:15
El padre y la madre de Kala pasaron el invierno en la bahía de Hudson. Cada uno por su lado, siguieron el rastro de los osos polares en la banquisa, alimentándose de los restos de focas que los osos dejaban atrás.
02:30
Antes de que terminara la estación, regresaron a la tundra, se aparearon, y, tras cincuenta y dos días de gestación, la hembra dio a luz a sus crías.
02:41
Durante las dos primeras semanas de vida de las crías, debía quedarse con ellas en el fondo de la madriguera, sin salir nunca de ella. Al nacer, las crías eran ciegas y pesaban solo cincuenta gramos cada una.

Table 8. Spotting. Spa-Doc. Time Codes

A specificity of voice-over and off-screen dubbing in the corpora and confirmed by the examples in Franco *et al.* (2010) is that, generally, only time codes in (and not out) are included.

An additional difference related to time codes is that in the English original scripts they appear in various formats whilst in the Spanish scripts -for voice-over and off-screen dubbing- the formatting is limited to two. This comes to show that, even in the uncommon scenario in which the time codes in the original script coincide with the target language time codes, adapting their format would be an additional requirement. As summarized in table 9, time codes within En-Doc corpus may indicate minutes and seconds (from type 1 to type 6); hours, minutes and seconds (types 7 to 10); hours, minutes, seconds and frames (from type 11 to 13) or feet (type 14). However, type 6 is the most commonly found among them. In the corpus Spa-Doc only two

different time code formats are found: 00:01 (type 6) and 00.01 (type 5), the former being the most common one.

Type	Time code		Type	Time Code
1	(00.02)		8	01:00:10
2	01 08		9	10 04.06
3	0304		10	10.00.03
4	00;04		11	01:00:22:27
5	00.06		12	10 00 07 00
6	00:19		13	(01:08:18:00)
7	00.00.08		14	6.5

Table 9. Types of Time Codes Spotting

All in all, spotting is a must before a documentary is recorded. If MT with post-editing is implemented, dealing with the spotting might be a challenge, be it because time codes will have to be modified (if available) or included (if they do not appear in the original script). Therefore, introducing or correcting the time codes in the script which will be fed into the MT engine, might be an adequate task to increase PE productivity.

5.2. SYNCHRONIZATION

The spotting or assignation of times codes can facilitate the synchronization of text and the audiovisual content according to the three types of synchronies to be reached when translating documentaries (Orero 2006): kinetic synchrony, action synchrony, and isochrony. These synchronisations can only be achieved by confronting the actual translation to the audiovisual content, and in a scenario in which MT is implemented in the working flow, they may have to be carried out during the post-editing phase. However, some automatic strategies to reduce this load may be considered such as limiting the minimum and maximum number of characters per sentence, as already done, for example, by PET (Post-Editing Tool, see <http://www.clg.wlv.ac.uk/projects/PET/>), a post-editing research tool designed to help users post-edit and assess both MT output and human translations.

5.3. ACCESS TO AUDIOVISUAL CONTENT

As Franco *et al.* (2010) state, the source text in AVT is the audiovisual product, which is made of images and audio. Scripts or transcripts, *i.e.* written texts, are sometimes provided to help the translator but it is not always the case. When machine translating, however, a written original text is needed, be it in the form of a pre-existing script, transcript, or automatic transcription of the audio. As visuals and audio are not considered in the automatic process, it is of the essence that the MT output is revised during the post-editing phase, not only in terms of language adequacy and fluency, but also in terms of written text-audiovisual content synchronisation. In order to do so, access to the visuals is needed, which, to the best of my knowledge, can only be achieved nowadays by using post-editing software plus video player. Available post-editing software, be it commercial CAT tools or applications for research purposes, do not allow rendering of audiovisual content in their interface. This is the case of PET (Aziz *et al.* 2012), CASMACAT (Ortiz-Martínez *et al.* 2012) or TCTool (Font Llitjós 2004b). Although SUMAT looks into the possible integration of MT with AVT, its platform and infrastructure does not integrate neither image nor audio (Del Pozo *et al.* 2013), which means that when carrying out SUMAT tests, participants had to work with standard subtitling software.

6. CHALLENGES BASED ON EN-DOC AND SPA-DOC CORPORA ANALYSES

This analysis is based on the observation of En-Doc and Spa-Doc corpus and takes a closer look at some of the linguistic issues which affect either scripts' macro- or micro-structures, or both: variety on script format, register variety within the same script, terminology, errors and inaccuracies in the original script, and lexical problems in the original script.

6.1. VARIETY ON THE SCRIPT FORMAT

As Franco *et al.* (2010) explain, original scripts formats provided to audiovisual translators differ substantially. After analysing the macro-structure (information contained within the scripts and how it is presented) of all the compiled scripts in the En-Doc corpus, several types of script layouts have

been found. The obvious characteristic shared by all scripts is the transcription of narrations plus other speeches, from experts to spontaneous participants. However, it has been observed throughout the corpus that the transcription can be either included in a table which contains additional information or in a plain text document with nothing else but the time-codes.

When the script layout is presented in a table, narrations, also called commentaries, tend to be included under the heading *commentary*, or *comm*, whilst words from experts or spontaneous participants generally follow the term *sync*. It must be stressed that some scripts contain no differentiation between these two types of speakers, and when they appear together, they usually appear under the heading *audio, description, sync/comm* or *script*. Another feature of the table-based scripts comprised in the corpus is that time codes are always included, under the heading *time codes, time code, timecode* or *TC*. Many of these scripts also contain additional information, referring to elements such as images, music or even the mood of each character when talking, with varying degrees of detail. Two examples can be found in tables 10 and 11. Whilst the former indicates that the visuals correspond to boats on a river with no further details (“River-boats”), the latter describes more precisely what is seen (“Local people dancing & playing instruments. Cuts to landscapes”) and gives details as to the music that can be heard (“Siddhi Drumming”).

TIME CODE	VISUALS	DIALOGUE/NARRATION
10 00 25	River boats	In 1998, I left Italy and set off for the heart of Africa, to the Congo basin. The focus of my quest... lowland gorillas.

Table 10. Variety of Scripts - En-Doc 1

Timecode	In-Vision	Music	Sync	Narration
10.00.39	Local people dancing & playing instruments. Cuts to landscapes	10.00.44 Siddhi Drumming OUT		African features and rhythms, low thorny forests and the king of the beasts – all establish where we are –or does it?

Table 11. Variety of Scripts - En-Doc 2

On the other hand, and when the script layout is not presented in a table but in a basic text document, it only contains the transcription of the words with speech turns separated into paragraphs and with time codes at the beginning, if available (see table 12).

01 08 Butterflies are particularly well-known for their beautiful shapes and the splendid colours of their wings...
01 17 Their beauty has made them familiar to humans.
01 29 But butterflies are only part of a large family that we are not well acquainted with, the insects, the largest and most successful family of animals on planet Earth.

Table 12. Variety of Scripts - En-Doc 3

Despite the original English scripts can be presented in many different formats, the variety of script layouts in the case of their Spanish counterparts is not as large. Similarly to the original scripts, the translation of the scripts can be either presented in a table (see table 13) or in a plain text document (see table 14), which is the most common option. The latter option sometimes contains indications of the voice talents concerning the pauses to be made (see the slashes in table 14).

Chyros - TC'S	DECLARACIONES	NARRADOR
02.14		Antiguas leyendas de marineros hablan de islas misteriosas que se mueven empujadas por la corriente en un mar de tiempo.
02.26		Pueden aparecer y desaparecer de Nuevo en cualquier punto de la enorme extensión del océano. Y llevan el desastre a cualquiera que se acerque demasiado.

Table 13. Variety of Scripts - Spa-Doc 1

00.01
NARRADOR: Éste es el parque nacional de Denali, en Alaska. / Aquí las alturas sobrecogedoras...
00.13
ESCALADOR: No veo bien...
00.15
NARRADOR: Y las tormentas sub-árticas / son los elementos de la vida y la muerte.
(es-59)

Table 14. Variety of scripts - Spa-Doc 2

A correlation between the original script layout and the audiovisual transfer mode used in the translation can be found. The speeches which are normally introduced by the word *narrator* or by no specific heading in the original script correspond to a disembodied voice that is usually off-screen dubbed. They are generally transferred onto the translated script by indicating *narrador* (narrator) or nothing. The ones that are introduced by a specific proper name in the original script correspond to people talking on screen and are usually voiced-over. This is transferred onto the translated scripts by including the name of the on-screen speaker, a nick-name to identify the person, the symbol *VO* or the heading *declaraciones*. On occasions, a narrator or talking head may speak both on- and off-screen, in which cases, the symbols *sync* or *comm* are generally added to indicate whether they appear on- or off-screen in the original version.

All in all, two obvious but relevant conclusions for the use of MT should be highlighted: on the one hand, not all information contained in the original script is to be included in the translated version, and, on the other, translated script layouts are different from the original ones. This means that, most prob-

ably, an adapted translation script or template without all the extra information should be created before feeding the MT engine with it. Additional research is needed on how this additional task would impact the productivity and in which scenarios it would be worth it.

6.2. VARIETY OF REGISTERS WITHIN THE SAME SCRIPT

While VO is used to translate the words of interviewed experts and spontaneous dialogue, generally on camera, off-screen dubbing is mostly used for narrators off-camera. Different speakers can coexist within a same wildlife documentary film, and depending on who is talking and the communicative situation, the register may vary:

1. Third person narrator: as stated by León (1998: 18), “(t)he narrator-presenter plays a very important role in television documentary since his voice and statements to camera are the backbone in the structure of the programme.” Narrators present and explain facts with the help of images, and sometimes, the presence of experts in the documentary. Their discourse is usually planned, based on a previously written script. In the corpus, their language is generally formal, although more colloquial or non-standard forms may appear occasionally, so as to engage the audience. See for instance, the rhetorical questions used to address the audience in table 15.

00:05
5 extraordinary stories from the wild.
00:08
But watch out because <i>there's</i> a twist. One of them is a <i>fake</i> created just to test you. Can you tell fact from fiction? Or will you be Fooled By Nature?
00:23
Nature's fantastic feeders.

Table 15. Variety of registers - En-Doc 1

2. First person narrator: narrators may change from a third person commentary to a first-person in order to interact with other participants or to adopt a more subjective approach, as can be seen in table 16.

<p>00:03 COMM Stephen Fry</p> <p>Twenty years ago my good friend Douglas Adams spent a year tracking down endangered animals together with the zoologist Mark Carwardine. Now it's my turn.</p> <p>00:15 COMM Stephen Fry</p> <p>Mark and I are heading off to find out exactly what happened to those species that he'd seen dangling on the edge of extinction two decades ago.</p>

Table 16. Variety of registers - En-Doc 2

Despite being planned, the language on these instances often contains less formal features, as can also be seen in table 16. These fragments can be re-voiced using voice-over or off-screen dubbing, depending on the market or client.

3. Expert interviewee: interviewees usually appear on-screen and are normally voiced-over in the translated audiovisual product. They do not normally speak from a written text but reply to the questions posed by the interviewer, bearing in mind that they are addressing a wider audience. This means that the language used is spontaneous or semi-spontaneous. As Matala (2009: 115) points out, this implies that standard language is generally used, containing some informal features -typical from oral discourse- such as hesitations, false starts, repetitions or anacolutha, *i.e.* syntactical inconsistencies in a sentence.

4. Spontaneous dialogue: it is normally voiced-over in the Spanish product. It varies in its degree of informality depending on the communicative situation and the speaker's idiosyncrasies: from less informal utterances by a speaker talking to the camera, as if addressing the audience, to more infor-

mal dialogue exchanges between participants who are almost unaware that the camera is there. As stated by Matamala (2009: 115), interaction between two people who know each other and who do not directly address the audience are more prone to contain informal language and recurrent hesitations, false starts, repetitions, anacolutha, unfinished sentences, interjections and other oral features.

5. Foreign interviewee: non-native speakers might participate in documentaries as experts. When they appear on screen, they can either speak in English or in their own language. If they talk in English, which is a foreign language for them, their speech may contain errors because of lexical and syntactic interferences, and in some cases, borrowed terms from their mother tongue may appear (see table 17).

01:06:11 Alex Saragoza
The <i>científicos</i> were the people who implemented his economic policies. These were the people who wrote the legislation for the passage of laws. These were the people who put together the contracts between the Mexican government and foreign companies and so on. They were elitist, some of them were racist, that is they believed in the notion that the biggest problem that Mexico faced was its backward Indian population.

Table 17. Variety of registers - En-Doc 7

If they talk in their own language, sometimes a translation into English is provided in the scripts, as can be seen in table 18, where the interviewee talks in Spanish and the English translation is provided in italics:

01:03:25 Jesus Vargas
La revolución es un proceso social que tiene una relación íntima con toda la historia de México del siglo diecinueve.
<i>The revolution is a social process intimately related to the history of 19th century Mexico.</i>

Table 18. Variety of registers - En-Doc 8

To guarantee higher quality levels, MT is normally used with texts using one register. The fact that documentaries tend to combine both formal and informal registers, either planned (based on a written script) or spontaneous, proves more demanding for MT. Additionally, specific features such as some repetitions, hesitations and discourse markers may be more difficult to deal with automatically. Still, when translating documentaries from English into Spanish, it is often the case that many of these features (hesitations, repetitions, etc.) disappear in order to reach voice-over isochrony because informative content is prioritized over expressive features (Orero 2006). As these features are not usually translated and they make MT processing more difficult, an option would be to delete them, either manually or automatically, from the script that will be fed into the MT engine.

6.3. TERMINOLOGY

A relevant feature of wildlife documentary films is the inclusion of specific terminology, which varies depending on the topic of the documentary and the general approach, from more to less specialised. Thus, while a documentary film may deal with fishing, another may approach diseases in animals or show the beautifulness of forests and all the fauna and flora they contain. Even if dealing with the same general topic, every wildlife subfield has its specific terminology which may coexist in the same documentary with terminology from other fields.

6.4. ERRORS AND INACCURACIES IN THE ORIGINAL SCRIPT

As pointed out by Franco *et al.* (2010) and Matamala (2009, 2010), original scripts can contain errors and inaccuracies. Dates, names of places and terminology may be wrong, text may be missing from the written script, or may appear in the wrong place. Possible errors and inconsistencies in the scripts would not affect the work produced by MT engines, although they could slow down the post-editing process. However, if scripts were checked before being machine translated, the number of errors and inconsistencies in the MT output could be minimized and translators would not have to deal with them during the post-editing process.

6.5. LINGUISTIC INCONSISTENCIES IN THE ORIGINAL SCRIPT

According to Franco *et al.* (2010: 60), it is not uncommon to find an original script with many linguistic mistakes, poor composition and different ways of spelling the same word; a statement that is also proven in the corpus. In the En-Doc corpus, both spelling (*e.g. though* instead of *thought*) and grammar mistakes (*e.g. worlds* instead of *worlds*’; *this* instead of *these*) have been found, as well as punctuation (*e.g.* interrogation or exclamation marks may appear in the middle of a sentence), and capitalization errors (*e.g.* words without a capital letter may appear after a full stop).

It is also worth stressing that sometimes the script presents the sentences cut into neither non-semantic nor grammatical chunks, as they are fit in different rows (see table 19). When this happens, the semantic and grammatical load of the segments is broken and the MT engine performs worst, as the segment can be split in incoherent syntagmas:

00:25
Listen to the
stories each of us
tells you about
ways of obtaining
Unbelievable
food. Then try to spot the fake from this line-up.

Table 19. Linguistic inconsistencies. En-Doc

As Daems *et al.* (2013) explain, errors in the source text affect the efficiency of MT engines and may influence the quality of the target text even after post-editing. Thus, all the previously described mistakes and segmentation problems inevitably have a bearing on the translation produced by MT engines, and ways to overcome these problems need to be found.

7. CHALLENGES BASED ON THE BILINGUAL CORPUS ANALYSIS

An automatic evaluation of the translations produced by eight MT engines and a human-based analysis of the errors found in the MT output was considered an adequate way to predict the challenges of using MT to translate documentary scripts. The results of both the analyses are presented next.

7.1. AUTOMATIC EVALUATION

BLEU and TER measures were produced to evaluate the 50 sentences translated by the 8 selected MT engines (see table 3). These two measures were chosen as they are the more established among MT researchers at present. On the one hand, and according to Papieni *et al.* (2002), the higher the BLEU score is, the better the MT output. On the other, the lower the TER is, the better the MT output is, as it means that the error rate is low (Snover *et al.* 2006). Table 19 presents BLEU and TER scores for each engine:

MT engine	BLEU	TER
<i>Google Translate</i>	29.32	39.41
<i>Apertium</i>	14.19	27.26
<i>Lucy MT</i>	21.20	33.48
<i>Bing</i>	26.88	43.41
<i>Prompt</i>	23.99	38.22
<i>Reverso</i>	18.39	25.93
<i>Systran</i>	12.15	3.11
<i>Yandex</i>	27.48	33.63

Table 20. Automatic evaluation scores

Results presented on table 20 show that the engines could be divided into four groups according to their BLEU scores. The top quartile would be formed by the MT engines with higher scores *Google Translate*, *Yandex* and *Bing* (BLEUs from 26.88 to 29.32). The second quartile would include *Prompt* and *Lucy MT* (BLEUs from 23.99 to 21.20). In the third, there would only be *Reverso* (BLEU of 18.39), and in the bottom quartile, there would be *Apertium* and *Systran*, the engines with the lower scores (from 12.15 to 14.19). However, if this categorization was made according to TER scores, results would be divided in four different groups. The top quartile would include *Bing*, *Google Translate* and *Prompt* (38.22 to 43.41), the middle one would have *Yandex*, *Lucy MT*, *Apertium* and *Reverso* (25.93 to 33.63), and the bottom one would only contain *Systran* (3.11).

The highest BLEU score is reached by *Google Translate*'s engine (29.32 points) and the best TER score is attained by *Bing*'s (43.41 points). BLEU scores

do not differ much from scores achieved in other experiments that worked with the same language pair, English > Spanish, within the same translation field of AVT (Nakov 2008; Kohen *et al.* 2006; Kohen *et al.* 2007), as their scores also fluctuated between 23.18 and 35.09. Some of these MT engines achieved better BLEU scores than those presented by the SUMAT project (Bywood 2013) and are only six points below the eTITLE's results (Melero 2006). Nevertheless and as an example, the best results are still far from the ones reached in Vilar *et al.* (2006), where they presented a BLEU score of 48.6 points when they applied customized MT to subtitling (En <> Spa). It should be taken into account, however, that these results are the first available dealing with documentary film translation and are based on free online engines. Engines created specifically for this domain could, of course, yield better results.

7.2. HUMAN EVALUATION

Human evaluation results do not exactly correlate with automatic measures but are to some extent similar. *Google Translate* is the engine that produces fewer errors (69), followed by *Bing* (78) and *Prompt* (82). *Yandex* (102) and *Lucy MT* (114) are the next engines with the fewest errors. The three engines that produce more errors are *Apertium* (151), *Systran* (131), and *Reverso* (129). Thus, if engines were grouped according to their number of errors, the group with the highest scores would include exactly the same engines as in the classifications based on TER and BLEU scores.

Engine	Accuracy		Fluency		Total
	Num.	%	Num.	%	
Google	39	56.52	30	43.48	69
Apertium	87	57.61	64	42.38	151
Lucy MT	59	51.75	55	48.38	114
Bing	30	38.46	48	61.54	78
Prompt	45	54.88	37	45.12	82
Reverso	69	53.49	60	46.51	129
Systran	64	48.86	67	51.15	131
Yandex	54	52.94	48	47.06	102
TOTAL	447		409		856

Table 21. Human Evaluation. Accuracy & Fluency

As seen in table 21, the majority of errors produced by *Bing* and *Systran*'s engines are related to fluency, while all the other engines have more errors that regard to accuracy. The difference between accuracy and fluency errors produced by *Systran*, *Lucy MT* and *Yandex* is minimal (less than three points between them).

To provide a more detailed analysis, 22 subcategories were considered (12 dealing with accuracy errors and 10 dealing with fluency mistakes), as listed in table 4. No mistakes were found concerning 6 categories: date and time, unit conversion, entity, diacritic accents, punctuation, and unpaired quote marks or brackets. On the contrary, 16 categories reported mistakes: (a) terminology, (b) overly literal, (c) false friend, (d) should not have been translated, (e) number, (f) mistranslations: non-specified errors, (g) omission, (h) addition, (i) untranslated, (j) capitalization, (k) morphology, (l) part of speech, (m) agreement, (n) word order, (o) function words, and (p) unintelligible. Before presenting the results in table 21, an example of each category is presented:

a) *Terminology*

Original sentence: “Okay, so the next dish is monkey faced eel from Port Baker”

Systran's translation: “La autorización, así que el plato siguiente es anguila hecha frente mono del panadero del puerto”

Back translation: “The authorization, so the dish next is eel done in front of monkey from baker of the port”

Human translation: “De acuerdo, el próximo plateo es anguila cara mono de Port Baker”

b) *Overly literal*

Original sentence: “In a small Ugandan fishing village, nestled along the shores of Lake Victoria, crocodiles have recently killed people”

Reverso's translation: “En un pequeño ugandés el pueblo de pesca, recostado a lo largo de las orillas del lago Victoria, cocodrilos recientemente ha matado a la gente”

Back translation: “In a small Ugandan [from Uganda] the fishing village, nestled along the shores of Lake Victoria, crocodiles have recently killed people”

Human translation: “En un pequeño pueblo de pescadores de Uganda enclavado en la orilla del lago Victoria, últimamente los cocodrilos han matado gente”

c) *False friend*

Original sentence: “Oh, right”

Yandex’s translation: “Oh, a la derecha”

Back translation: “Oh, to the right”

Human translation: “Ah, perfecto”

d) *Should not have been translated*

Original sentence: “Okay, so the next dish is monkey faced eel from Port Baker”

Apertium’s translation: “Okay, así que el plato próximo es monkey anguila afrontada de Panadero de Puerto”

Back translation: “Okay, so the dish next is monkey eel faced from Baker of Port”

Human translation: “De acuerdo, el próximo plato es anguila caramono de Port Baker”

e) *Number*

Original sentence: “My gun won’t fire. My gun won’t fire”

Yandex’s translation: “Mis armas no de fuego. Mis armas no de fuego”

Back translation: “My guns not of fire. My guns not of fire”

Human translation: “La escopeta no dispara. La escopeta no dispara”

f) *Mistranslations: non-specified errors*

Original sentence: “She quietly leaves the group and lies down on a secluded spot to await her delivery”

Lucy’s translation: “Silenciosamente deja el grupo y se tumba en una mancha/sitio retirada para esperar a su entrega”

Back translation: “She quietly leaves the group and lies down on a secluded spot [patch/place] to await her delivery”

Human translation: “Abandona silenciosamente el grupo y se tumba en un lugar apartado para esperar el momento del parto”

g) *Omission*

Original sentence: “But he suspected something else was at work as well”

Bing’s translation: “Pero sospechaba que algo [missing: más] estaba obrando así”

Back translation: “But he suspected something [missing: else] was at work as well”

Human translation: “Pero sospechaba que había algo más”

h) *Addition*

Original sentence: “This is better with garlic”

Systran’s translation: “Esto es mejor con el ajo”

Back translation: “This is better with the garlic”

Human translation: “Están más buenos con ajo”

i) *Untranslated*

Original sentence: “Then a group of killer whales headed towards shore, as if they intended to strand”

Apertium’s translation: “Entonces un grupo de killer las ballenas encabezadas hacia shore, cuando si pretendieron a strand”

Back translation: “Then a group of killer the whales headed [meaning “led”] towards shore, when if intended to strand”

Human translation: “Entonces un grupo de orcas se dirigió hacia la orilla, como si quisieran quedarse varadas”

j) *Capitalization*

Original sentence: “He’s dominated the prairie for some years now, and few have dared comfort him face to face”

Prompt’s translation: “Ha dominado la Pradera durante algunos años ahora, y pocos se han atrevido a oponerse a él cara a cara”

Back translation: “He’s dominated the Prairie for some years now, and few have dared comfort him face to face”

Human translation: “Ya hace algunos años que domina la llanura y pocos se han atrevido a enfrentarse a él cara a cara”

k) *Morphology*

Original sentence: “Between the people, the pavement, and the most overprotective laws in the country”

Lucy’s translation: “Entre la gente, la acera, y las leyes más sobreproteccionistas del país”

Back translation: “Between the people, the pavement, and the most overprotectionist laws in the country”

Human translation: “Entre la gente, el pavimento, y estas leyes tan sobreprotectoras del país”

l) *Part of speech*

Original sentence: “Her body strength is recovering quickly, and her calf now kicking”

Google’s translation: “Su fuerza del cuerpo se está recuperando, y su cría ya patadas”

Back translation: “Her strength of the body is recovering, and her calf already kick [noun]”

Human translation: “Está recuperando las fuerzas rápidamente y la cría ya le da patadas”

m) *Agreement*

Original sentence: “It’s surprising crocs would spend so much energy climbing up this cliff”

Bing’s translation: “Es sorprendentes crocs pasaría tanta energía subiendo este acantilado”

Back translation: “It’s surprising [plural] crocs would spend [singular] so much energy climbing up this cliff”

Human translation: “Es increíble que los cocodrilos gasten tanta energía subiendo por este acantilado”

n) *Word order*

Original sentence: “Her body strength is recovering quickly, and her calf now kicking”

Systran’s translation: “Su fuerza del cuerpo se recupera rápidamente, y su becerro ahora dando patadas”

Back translation: “Her strength of body is recovering quickly, and her calf now kicking”

Human translation: “Está recuperando las fuerzas rápidamente y la cría le da patadas”

o) *Function words*

Original sentence: “I feel that it’s so important for me to try to get the Toga people understand what we have in our own back yard is something very unique”

Google’s translation: “Siento que es tan importante para mí tratar de conseguir [que] la gente Toga entienden [que] lo que tenemos en nuestro propio patio trasero es algo muy especial”

Comment: In Spanish it is to introduce function words that are not used or necessary in English

Human translation: “Es muy importante que haga entender a los tonganos que lo que tenemos aquí es algo único”

p) *Unintelligible*

Original sentence: “If it’s swimming towards you, get it over the entire head and tighten it up”

Systran’s translation: “Si esto nada hacia usted, conseguirlo sobre la cabeza entera y apretarlo encima de”

Back translation: “If this swims towards you, get it [achieve it] over the entire head and tighten it up above”

Human translation: “Si nada hacia vosotros, la metéis por la cabeza y tensáis”

As shown in table 22, the categories with most errors are (m) *agreement* with 186 cases, (f) *mistranslations: other* with 133, and (i) *untranslated* with 86. While the majority of errors in *Google Translate* and *Apertium* are *untranslated* and *mistranslations: other*, all the others engines deal mostly with problems regarding *agreement*. The categories following the lead are (b) *overly literal* with 77 errors, (n) *word order* with 72 and (a) *terminology* with 63. In the central part of the table there are the categories (l) *part of speech* with 56 errors, (g) *omission* with 44, (p) *unintelligible* with 42, (o) *function words* with 39 and (h) *addition* with 37. The categories with lower errors are (j) *capitalization* with 13 errors and (c) *false friends* with 5, as well as three categories with a single error: (d) *should not have been translated*, (e) *number* and (k) *morphology*.

Engine	a	b	c	d	e	f	g	h	i	J	k	l	M	n	o	p	TOTAL
Google	5	4	0	0	0	15	2	8	5	0	0	7	13	5	3	2	69
Apertium	11	12	0	0	0	14	5	1	44	0	0	13	23	16	4	8	151
Lucy MT	12	9	0	0	0	21	6	1	10	0	1	6	28	10	4	6	114
Bing	7	1	0	0	0	10	8	1	3	1	0	6	25	5	7	4	78
Prompt	7	13	2	0	0	11	3	2	7	2	0	1	18	6	4	6	82
Reverso	7	16	3	0	0	21	9	8	5	5	0	3	28	9	5	10	129
Systran	9	11	0	0	0	25	7	6	6	4	0	3	32	14	9	5	131
Yandex	5	11	0	1	1	16	4	10	6	1	0	17	19	7	3	1	102
TOTAL	63	77	5	1	1	133	44	37	86	13	1	56	186	72	39	42	859

Table 22. Human evaluation. Types of errors

To sum up, human evaluation results give us an indication of the most frequent type of mistakes audiovisual translators would have to correct in a post-editing phase: agreement, mistranslated, and untranslated words. Additionally, it indicates that, from the freely available online engines in the English > Spanish combination, *Google Translate* appears to be the best MT engine, followed by *Bing* and *Prompt* at least for this study’s sample excerpts from documentaries. Although this data may not be relevant for a company deciding to develop their own MT system, (as the analysis is only based on 50 segments and companies normally rely on internal systems specifically developed to satisfy their needs) it is a first step in an underexplored area that might be useful for other scenarios, such as journalistic translation, in which online software can be used.

8. DISCUSSION: POSSIBLE SOLUTIONS

The bibliographical review and the three corpora analysis have shown several challenges that would have to be addressed in order to integrate MT into the translation process of wildlife documentary films. Before presenting a new workflow to help overcome the challenges, some solutions are proposed for each of the above mentioned challenges.

First of all, solutions regarding the challenges encountered in the bibliographical review –spotting, synchronization and access to the audiovisual content– will be presented. In professional practice, audiovisual translators usually synchronize the visuals and their translation, and are sometimes required to do the spotting, *i.e.* to include the time codes. If MT was to be included in the process of translating documentaries, the MT output would not only have to be cor-

rected during the post-editing stage, but also revised to comply with the various types of synchronies at stake. Correct time codes would also have to be included during post-editing. In order to do so, full access to the visual content would be required. A suggested scenario to solve these issues would be to include a pre-editing phase (Volk 2009; Gerlach *et al.* 2013) in which a time-coded script to be used by translators working into different languages would be created, and additionally, it would be necessary that PE software includes a video player. A tool to limit the maximum number of characters or words per sentence could be also helpful, like PET does for subtitling, as it could help post-editors know how much space they have for each voice-over or off-screen dubbed unit.

Secondly, solutions to the issues found in the analysis of the corpora are proposed. According to the analysis, there are many types of script layouts in English, and to a lesser extent, in Spanish. Therefore, standardizing the script layouts in the original language seems a field in which further work needs to be done. In the meanwhile, creating an MT friendly template every time a documentary is to be translated seems to be a possible solution. This template would contain plain text (not tables) and would be created, again, in a pre-editing phase, ideally with automatic tools that extract the original dialogue from the audiovisual product. It remains to be seen whether this proposed scenario would be feasible when the original documentary is to be translated into one single language or would rather be used in multilingual contexts. Researching this aspect, though, is beyond the scope of this paper.

As for the mixing of various language registers in the same audiovisual programme, a possible solution could be to create a domain-specific engine with wildlife documentaries. Although register-related problems would persist, terminological and lexical problems would hypothetically decrease and reduce the post-editors workload. In order to minimize register challenges, features such as hesitations or repetitions could be erased from the scripts in the pre-editing phase before feeding them into this domain-specific engine.

As for linguistic inconsistencies and errors, they could be rectified either in pre- or post-editing. On the one hand, spelling mistakes and other linguistic problems due to original text formatting could be pre-edited, as they might influence the quality of the MT output. On the other hand, capitalizations and other types of linguistic inconsistencies and errors could be solved during post-editing, as they do not have an impact on the output. Nevertheless, correcting them in the pre-editing phase would be better, as the MT output

would drag almost no errors from the original script. In this way post-editors could focus mainly on correcting linguistic errors produced by the MT engine (mainly agreement mistakes and mistranslation, according to our analysis) and solving problems regarding domain-specific issues.

All in all, the analysis has shown that there are problems broadly found in MT which are generally solved through post-editing, but there are also specific challenges related to this text type and audiovisual modality which may be better dealt with in an additional pre-editing phase. What remains to be seen is the impact of this phase in the whole process in terms of time and productivity. However, the availability of a script specifically prepared for MT would have two clear implications. On the one hand, the same script could be used when translating into a different language. On the other, it could let post-editors concentrate more on voice-over and off-screen dubbing specific features. Thus, the following workflow, divided in three steps, is proposed in table 23:

Phase	Tasks
Before translating	1. Build a domain-specific MT engine for wildlife documentary scripts
Pre-editing	1. Spotting 2. Creation of an MT-friendly template 3. Elimination of linguistic inaccuracies 4. Elimination of specific features such as hesitations, repetitions and fluffs
Machine Translating	1. Machine translate the template
Post-editing	1. Check synchronization between text, images and sound 2. Check register 3. Check terminology 4. Check grammatical and syntactical errors and inaccuracies 5. Solve linguistic inconsistencies especially in terms of accuracy and fluency In order to do so more efficiently, a PE tool including a video display and tool to count words should be used

Table 23. Possible solutions. Workflow

9. CONCLUSIONS AND FURTHER RESEARCH

In conclusion, this article has presented the results of a corpus analysis which has allowed us to identify the main challenges that using MT for the translation of wildlife documentaries might pose: spotting, synchronization, access to audiovisual content, variety on the script format, register variety within a same script, terminology, errors and inaccuracies in the original script, linguistic inconsistencies in the original script, and typical errors in the machine translated output. Three solutions have been proposed to increase the efficiency of post-editing machine translated wildlife documentaries: firstly, pre-editing, as it has been considered to be the answer to challenges such as the inclusion of time-codes, the elimination of certain problematic features (repetitions, hesitations, etc.), and the revision of language of content-related mistakes. Pre-editing has been proposed as a potential solution as it would allow for faster post-editing, an aspect already proven in other contexts such as user-generated content translation (Sertan *et al.* 2014). Secondly, building a domain-specific engine has been proposed as a possible solution to deal with specific terminology, and thirdly, working with templates has been considered a possible strategy when dealing with a large variety of script formats. Furthermore, the analysis has pointed out the relevance of having access to the audiovisual material, as without it, no successful spotting or synchronization could be made. However, the lack of PE software that allows the inclusion of audiovisual content is still a technical challenge to be overcome. Were all these proposed solutions implemented, post-editing would probably be more efficient and would allow translators to focus on the most specific aspect of this translation mode: synchronisation. Therefore, taking into account the specificities of the genre and the layout characteristics of the scripts, a combination of pre- and post-editing seems to be the most feasible scenario if MT is included in the process of translating wildlife documentary films. Still, further research to prove this hypothesis and its impact on the final workflow needs to be carried out.

Additionally, the analysis has considered a scenario in which a specific engine cannot be built and free online software is used. The analysis of a corpus of machine translated wildlife documentary excerpts has allowed us to identify the main mistakes produced by free online MT engines, namely agreement, mistranslated and untranslated words. This analysis has also shown that, even when using non-specific MT engines, the results of the automatic quality measures are

similar to those achieved in other relevant experiments with the same language pair. Such results seem to indicate that future research can be promising as there is still much room for improvement by using, for instance, domain specific MT. Moreover, as many mistakes found in the analysis are of a repetitive nature, and the use of automatic systems to constrain propagation could speed-up the PE task.

To sum up, both the results of the analysis and the presented challenges and solutions seem to indicate that further research on the inclusion of MT in the process of translating wildlife documentaries is advisable. Future investigations could include a similar analysis with other language pairs and translation engines, as well as an analysis of the post-editing effort compared to the human translation effort in which both objective measures and subjective data could be obtained. This future study could also consider other variables such as the inclusion or non-inclusion of a pre-editing phase. All in all, the MT of wildlife documentaries is a novel topic which opens new research opportunities to which I have tried to contribute by carrying out this exploratory research.

BIBLIOGRAPHICAL REFERENCES

- Almeida, Giselle de and Sharon O'Brien. "Analysing Post-Editing Performance: Correlations with Years of Translation Experience." *Proceedings of the 14th Annual Conference of the European Association for Machine Translation*. Ed. EAMT. May 2010. 27-28. Available at: <http://www.mt-archive.info/EAMT2010-Almeida.pdf> [Consulted: 29-June-2016].
- Armstrong, Stephen *et al.* "Improving the Quality of Automated DVD Subtitles via Example-Based Machine Translation." *Translating and the Computer*. Ed. ASLIB28. November 2006. 13 pp. Available at: <http://www.mt-archive.info/Aslib-2006-Armstrong.pdf> [Consulted: 29-June-2016].
- Artegiani, Irene and Dionysios Kapsaskis. "Template files: Asset or Anathema? A Qualitative Analysis of the Subtitles of *The Sopranos*." *Perspectives* 22.3 (2014): 419-436.
- Aziz, Wilker *et al.* "PET: a Tool for Post-Editing and Assessing Machine Translation." *The 8th International Conference on Language Resources and Evaluation (LREC2012)*. Ed. LREC'12. May 2012. 3982-3987. Available at: http://www.lrec-conf.org/proceedings/lrec2012/pdf/985_Paper.pdf [Consulted: 29-June 2016].

- Baldry, Anthony and Paul J. Thibault. *Multimodal Transcription and Text Analysis. A Multimedia Toolkit and Coursebook*. London & Oakville, UK: Equinox, 2006. 270 pp.
- Bywood, Lindsay *et al.* "Parallel Subtitle Corpora and their Applications in Machine Translation and Translatology." *Perspectives: Studies in Translatology. Special Issue: Corpus Linguistics and Audiovisual Translation: in Search of a Integrated Approach* 21. 4 (2013): 595-610.
- Daems, Joke *et al.* "On the Origin of Errors: A Fine-Grained Analysis of MT and PE Errors and their Relationship." *Proceedings of the 10th International Conference on Language Resources and Evaluation (LREC2014)*. Ed. LREC'14. May 2014. 62-66. Available at: http://www.lrec-conf.org/proceedings/lrec2014/pdf/5_32_Paper.pdf [Consulted: 29-June2016].
- Díaz Cintas, Jorge and Pilar Orero. "Screen Translation, Voice-over." *Encyclopedia of Languages*. Ed. Keith Brown. London: Elsevier, 2005. 473-475.
- Díaz Cintas, Jorge and Aline Remael. *Audiovisual Translation: Subtitling*. Manchester: St. Jerome, 2007.
- Dijk, Teun A. van "A Note on Linguistic Macro-Structures." *Linguistische Perspektiven*. Ed. Abraham P. Ten Gate and Peter Jordens. Tübingen: Niemeyer, 1973. 75-87.
- Dijk, Teun A. van and Walter Kintsch. *Strategies of Discourse Comprehension*. New York: Academic Press, 1983.
- Eckersley, Helen. "Systems for Evaluating Translation Quality." *Multilingual Computing and Technology* 3.3 (2002): 39-42.
- Espasa, Eva. "Myths about Documentary Translation." *Topics in Audiovisual Translation*. Ed. Pilar Orero. Amsterdam: John Benjamins, 2004. 183-197.
- Fernández, Anna *et al.* Enhancing Sensorial and Linguistic Accessibility with Technology: Further Developments in the TECNACC and ALST projects. Paper presented at the *VI Media4All Conference*. Dubrovnik, 25-27 September 2013.
- Fishel, Mark *et al.* "From Subtitles to Parallel Corpora." *Proceedings of the 16th Annual Conference of the European Association for Machine Translation EAMT 2012*. Ed: Cettolo, Mauro *et al.* May 2013. 3-6. Available at: <http://hnk.ffzg.hr/bibl/eamt2012/EAMT-2012.pdf> [Consulted: 29-June-2016].

- Font Llitjós, Ariadna *et al.* “Error Analysis of Two Types of Grammar for the Purpose of Automatic Rule Refinement.” *Proceedings of the 6th Conference of the Association for Machine Translation in the Americas (AMTA)*. Ed. AMTA. 2004a. 187-196. Available at: http://works.bepress.com/jaime_carbonell/10/ [Consulted: 29-June-2016].
- Font Llitjós, Ariadna and Jaime G. Carbonell. “The Translation Correction Tool: English-Spanish User Studies.” *Proceeding of the 4th International Conference on Language Resources and Evaluation (LREC2014)*. LREC’04. 2004b. 4 pp. Available at: <http://repository.cmu.edu/cgi/view-content.cgi?article=1430&context=isr> [Consulted: 29-June-2016].
- Franco, Eliana P.C. “Documentary Film Translation: A Specific Practice?” *Translation in Context: Selected Contributions from the EST Congress, Granada 1998*. Ed. Andrew Chesterman *et al.* Amsterdam: John Benjamins, 2000. 233-242.
- . “Inevitable Exoticism: The Translation of Culture-Specific Items in Documentaries.” *La traducción en los medios audiovisuales*. Ed. Frederic Chau-me and Rosa Agost. Estudios sobre la Traducción, vol. 7. Castelló de la Plana: Publicacions de la Universitat Jaume I, 2001a. 177-181.
- . “Voiced-over Television Documentaries: Terminological and Conceptual Issues for their Research.” *Target* 13.2 (2001b): 289-304.
- Franco, Eliana *et al.* *Voice-over Translation: an Overview*. Bern: Peter Lang, 2010.
- Freitag, Markus *et al.* “EU-BRIDGE MT: Text Translation of Talks in the EU-BRIDGE Project.” *Proceedings of the 10th International Workshop for Spoken Language Translation (IWSLT 2013)*. IWSLT’13. 2013. 8 pp. Available at: http://workshop2013.iwslt.org/downloads/EUBRIDGE_MT_Text_Translation_of_Talks_in_the_EUBRIDGE_Project.pdf [Consulted: 29-June-2016].
- García Luque, Francisca. “De cómo ‘domesticar’ un documental de divulgación científica en el proceso de traducción. Estudio de la versión en español de *L’Odyssée de l’espèce*.” *SENDEBAR* 22 (2011): 235-263.
- Georgakopoulou, Yota. “Challenges for the Audiovisual Industry in the Digital Age: Accessibility and Multilingualism.” *MetaNet Forum*. Ed.

- MetaNet. 2010. 1 p. Available at: http://www.meta-net.eu/events/meta-forum-2010/slides/META-FORUM2010_Georgakopoulou.pdf [Consulted: 29th June 2016].
- Gerlach, Johanna *et al.* “Combining Pre-editing and Post-editing to Improve SMT of User-Generated Content.” *Proceedings of MT Summit XIV Workshop on Post-editing Technology and Practice*. Eds. EAMT. September 2013. 45-53 Available at: <http://www.mt-archive.info/10/MTS-2013-W2-Gerlach.pdf> [Consulted: 29 June-2016].
- Hurtado Albir, Amparo. *Traducción y traductología*. Madrid: Cátedra, 2001.
- Hurtado Albir, Amparo. “Competence-Based Curriculum Design for Training Translators.” *The Interpreter and Translator Trainer* 1.2. (2007): 163-195.
- Hutchins, William John. *Machine Translation: Past, Present, Future*. Ellis Horwood Series in Computers and their Applications. Chichester, UK: Ellis Horwood, 1986.
- Joscelyne, Andrew. *LSPs in the MT Loop: Current Practices, Future Requirements*. TAUS Report. 2009. Available at: <https://www.taus.net/think-tank/reports/translate-reports/lsp-in-the-mt-loop-current-practices-future-requirements> [Consulted: 29 June-2016].
- Kapsaskis, Dionysios. “Professional Identity and Training of Translators in the Context of Globalisation: the Example of Subtitling.” *The Journal of Specialised Translation* 16 (2011): 162-184.
- Kohen, Philipp and Christov Monz. “Manual and Automatic Evaluation of Machine Translation between European Languages.” *Proceedings of the Workshop on Statistical Machine Translation*. Ed. ACL. 2006. 102-212. Available at: <http://homepages.inf.ed.ac.uk/pkoeHN/publications/shared-task-wmt2006.pdf> [Consulted: 29-June-2016].
- Kohen, Philipp and Hieu Hoang. “Factored Translation Models.” *Proceedings of the 2007 Joint Conference on Empirical Methods in Natural Language Processing and Computational Natural Language Learning*. Ed.: ACL. 2007. 868-876. Available at: <http://homepages.inf.ed.ac.uk/pkoeHN/publications/emnlp2007-factored.pdf> [Consulted: 29 June-2016].
- Koponen, Maarit. “Correctness of Machine Translation: a Machine Translation Post-editing Task.” Paper presented at the 3rd MOLTO Project Meeting.

(Helsinki, 2011). Available at: http://www.molto-project.eu/sites/default/files/mol_to_2011_0902_mkooponen.pdf [Consulted: 29-June-2016].

Läubli, Samuel *et al.* "Combining Statistical Machine Translation and Translation Memories with Domain Adaptation." *Proceedings of the 19th Nordic Conference of Computational Linguistics (NODALIDA 2013)*. Ed: NEALT. Proceedings Series, vol. 16. Oslo: Oslo University, 2013. 9 pp. Available at: <http://stp.lingfil.uu.se/nodalida/2013/pdf/NODALIDA30.pdf> [Consulted: 29th-June-2016].

León, Bienvenido. "Science Popularisation through Television Documentary: A Study of the Work of British Wildlife Filmmaker David Attenborough." *5th International Conference of Science and Technology*. Ed. Nigel Sanitt. Berlin: The Pantaneo Forum, 1998: 17-19.

Lommel, Arle. *Multidimensional Quality Metrics*. Paper presented at the *META-FORUM 2013*. (Berlin 2013). Available at: <http://www.meta-net.eu/events/meta-forum-2013/talks/arlelommel.pdf> [Consulted: 29-June-2016].

Matamala, Anna. *La traducción para voice-over: Online Module for the Master's Degree in Audiovisual Translation*. Barcelona: Universitat Autònoma de Barcelona, 2002.

—. "Teaching Voice-over Translation." *Languages and the Media: New Markets, New Tools. Conference Proceedings*. Ed. ICWE. Berlin: ICWE, 2004. 24-26.

—. "Teaching Voice-over Translation: A Practical Approach." *The Didactics of Audiovisual Translation*. Ed. Jorge Díaz Cintas. Amsterdam: John Benjamins, 2008. 231-262.

—. "Main Challenges in the Translation of Documentaries." *New Trends in Audiovisual Translation*. Ed. Jorge Díaz Cintas. Bristol: Multilingual Matters, 2009a. 109-120.

—. "Translating Documentaries: from Neanderthals to the *Supernanny*." *Perspectives: Studies in Translatology* 17.2 (2009b): 93-107.

—. "Terminological Challenges in the Translation of Science Documentaries: a Case-Study." *Across Languages and Cultures* 11.2 (2010): 255-272.

Matamala, Anna and Carla Ortiz-Boix. *Accessibility and Multilingualism: An Exploratory Study on the Machine Translation of Audio Descriptions*. Forthcoming.

- Melero, Melero *et al.* "Automatic Multilingual Subtitling in the eTITLE Project." *Proceedings of ASLIB Translating and the Computer* 28. Ed: ASLIB. 2006. 18 pp. Available at: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.107.6011&rep=rep1&type=pdf> [Consulted: 29-June-2016].
- Nakov, Preslav. "Improving English-Spanish Statistical Machine Translation: Experiments in Domain Adaptation, Sentence Paraphrasing, Tokenization and Recasing." *Proceedings of the Third Workshop on Statistical Machine Translation*. Ed. ACL. 2008. 147-150. Available at: <http://dl.acm.org/citation.cfm?id=1626414> [Consulted: 29-June-2016].
- Nord, Christiane. "Text Analysis in Translator Training." *Teaching Translation and Interpreting: Training, Talent, and Experience*. Ed. Cay Dollerup and Anne Loddegaard. Amsterdam: John Benjamins, 1991. 39-47.
- . *Translating as a Purposeful Activity: Functionalist Approaches Explained*. Manchester: St Jerome Publishing, 2014.
- O'Brien, Sharon. "Pauses as Indicators of Cognitive Effort in Post-editing Machine Translation Output." *Across Languages and Cultures* 7.1 (2006): 1-21.
- Orero, Pilar. "The Pretended Easiness of Voice-over Translation of TV." *The Journal of Specialized Translation* 2 (2004): 76-96.
- . "Synchronization in Voice-Over." *Aspects of Translation*. Ed. José María Bravo. Valladolid: Universidad de Valladolid, 2006. 255-264.
- . "Voice-over: A Case of Hyper-Reality." *EU High Level Scientific Conference Series. MUTRA Proceedings.* Ed. MuTra. 2007. 9 pp. Available at: http://www.euroconferences.info/proceedings/2006_Proceedings/2006_Orero_Pilar.pdf [Consulted: 29-June-2016].
- Ortiz-Boix, Carla. *Tecnologies per a l'audiodescripció: estudi sobre l'aplicació de la traducció automàtica i la síntesi de parla a l'audiodescripció en castellà*. Master Thesis. Universitat Autònoma de Barcelona, 2012.
- Ortiz-Martínez, Daniel *et al.* "The CASMACAT Project: The Next Generation Translator's Workbench." *Proceedings of the 7th Jornadas en tecnologia del Habla and the 3rd Iberian SLTech Workshop (IberSPEECH)*. Ed. ATVS *et al.* 2012. 326-334. Available at: <http://www.casmacat.eu/uploads/Main/iberspeech1.pdf> [Consulted: 29-June -2016].

- Pönniö, Kaarina. "Voice over, narration et commentaire." *Communication audiovisuelle et transferts linguistiques/Audiovisual Communication and Language Transfer*. Ed. Yves Gambier. Special issue of *Translatio* (FIT Newsletter / Nouvelles de la FIT). Strasbourg: Fédération Internationale des Traducteurs (FIT), 1995. 303-307.
- Pozo, Arantza del *et al.* *SUMAT: An Online Service for Subtitling by Machine Translation. Annual Public Report*. Ed.: Pozo, Arantza del. 2012. Available at: <<http://cordis.europa.eu/fp7/ict/language-technologies/docs/sumat-annual-report-2012.pdf> [Consulted: 29-June-2016].
- Ray, Rebecca, ed. *LISA Best Practice Guides. Implementing Machine Translation*. 2004. 74 pp. Available at: http://www.translationoptimization.com/papers/DillingerLommel_MT_BPG.pdf [Consulted: 29-June-2016].
- Remael, Alice. "Audiovisual Translation." *Handbook of Translation Studies*, vol. 1. Ed. Yves Gambier, Yves and Luc van Doorslaer. Amsterdam: John Benjamins, 2010. 12-17.
- Sánchez, Diana. "Subtitling Methods and Team-Translation." *Topics in Audiovisual Translation*, vol 56. Ed. Pilar Orero. Amsterdam/Philadelphia: John Benjamins, 2004. 9-17.
- Sertan, Violeta *et al.* "A Large-Scale Evaluation of Pre-editing Strategies for Improving User-Generated Content Translation." *Proceedings of the 10th International Conference on Language Resources and Evaluation (LREC2014)*. Ed. LREC'14. May 2014. 1793-1799. Available at: http://www.lrec-conf.org/proceedings/lrec2014/pdf/676_Paper.pdf [Consulted: 29-June-2016].
- Sousa, Sheila de *et al.* "Assessing the Post-editing Effort for Automatic and Semi-automatic Translations of DVD subtitles." *Proceedings of Recent Advances in Natural Language Processing*. Ed. ACL (2011): 97-103. Available at: <http://aclweb.org/anthology/R11-1014> [Consulted: 29-June-2016].
- Uszkoreit, Hans and Arle Lommel. *Multidimensional Quality Metrics: A New Unified Paradigm for Human and Machine Translation Quality Assessment*. Ed. QT Launch Pad Project. 2013. Available at: <http://www.qt21.eu/launchpad/sites/default/files/MQM.pdf> [Consulted: 29-June-2016].

- Vilar, David *et al.* "Error Analysis of Statistical Machine Translation Output." *Proceedings of the 5th International Conference on Language Resources and Evaluation (LREC'06)*. Ed. LREC. 2006. 697-702. Available at: http://hn.k.ffzg.hr/bibl/lrec2006/pdf/413_pdf.pdf [Consulted: 29-June-2016].
- Volk, Martin. "The Automatic Translation of Film Subtitles. A Machine Translation Success Story?" *Journal for Language Technology and Computational Linguistics* 23.2 (2008): 113-125.
- Volk, Martin *et al.* "Machine Translation of TV Subtitles for Large Scale Production." *Proceedings of the Second Joint EM+ICNGL Bringing MT to the User: Research on Integrating MT in the Translation Industry (JEC '10)*. Ed. Zhechev, Ventsislav *et al.* 2010. 53-62. Available at: <http://www.mt-archive.info/10/JEC-2010-Volk.pdf> [Consulted: 29-June-2016].
- Waibel, Alex. *EU-Bridge Newsletter. 1st Edition*. (2012): 8 pp. Available at: http://project.eu-bridge.eu/img/Newsletter_1_edition.pdf [Consulted: 29-June-2016].
- Williams, Malcolm. "The Application of Argumentation Theory to Translation Quality Assessment." *META* 46.2 (2001): 327-344.

FILM REFERENCES

- Planet Earth*, Alistair Fothergill. Producer: BBC Natural History, UK 2006.
- The Crocodile Hunter*, John Staiton. Producer: The Best Picture Show Company, Australia 1997-2004.

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