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DEVELOPING AWARENESS OF INTERFERENCE ERRORS IN TRANSLATION
An English-Spanish pilot study in popular science and audiovisual transcripts

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Abstract – The use of astronomy discourse in the form of written and web/audiovisual texts has been gaining ground in undergraduate courses of specialized translation. These materials have been used at the University of León for the last four years during the last semester of the degree *Filología Moderna: Inglés*, as part of the course *Traducción inglés -español II*, basically geared towards awareness raising of translation problems and solutions available. The aim of this paper is twofold: a) to show the main differences between the language of astronomy in different genres (Stolze 2009; Byrne 2012; Tessuto, Bait 2017) in English and in audiovisual texts (Díaz Cintas, Remael 2007; Chaume 2012) in English and Spanish and b) to show which linguistic areas are more problematic for undergraduate students, e.g. types of technical dialects, nominalization chains, metaphoric language, among others (Rabadán 1991; Shuttleworth 2014). We will use two small comparable subcorpora of written research articles and popular science, and an audiovisual corpus of popular science in order to identify a) similarities and differences at different levels and b) a hierarchy of relevance. Our taxonomy will include linguistic, cultural, genre-based, and semiotic problems and their linguistic manifestations. We will also use an En-Es parallel corpus (Gutiérrez Lanza 2011) which will include the originals mentioned above and the translations made by undergraduate students during this period. They will be compared with a "standard" target text in order to identify which features are more problematic in English-Spanish transfer. The results will be collated both statistically and qualitatively so as to produce a tagset of errors to be applied to learners' corpora. The procedure is replicable for other domains, genres, and language pairs. These corpus-based data En-Es will be used to produce language pair focused training materials (López-Rodríguez, Tercedor-Sánchez 2008; Rabadán 2010).

Keywords: interference, translation error, astronomy, popular science, audiovisual transcripts.

1. Introduction

Contemporary translation training relies on technology, from translation memories and machine translation to the more modest grammatical and spell-

checkers, to reduce the time and effort invested in the task. However, as with any use of language and translation technology, successful performance requires that the user can evaluate the outcome. A variety of (post)-editing strategies can be applied to both human and machine translation outputs, which require critical human assistance. Whether translating or (post)-editing, awareness of language-pair-dependent problems underlies successful performance. Human translation, partially informed by machine-mediated translation, is a given in student workflows, but errors can easily go unnoticed if cross-linguistic competence is not properly developed. An essential part of this competence is awareness of interference (Toury 1995/2012, p. 275), which frequently underlies translation errors, notwithstanding universal translation tendencies (Rabadán, Labrador, Ramón 2009).

Up to this date, errors have been discussed in three main contexts: institutions with responsibilities in language services, the industry, and academia. They obey to different interests: institutional guidelines such as EASE 2019 focus on providing simple, clear solutions to be implemented by authors and translators of scientific texts to be published in English. On the other hand, the industry has focused on maximizing the efficacy of machine translation post-editing, where time-rates are essential (O'Brien *et al*. 2014; Moorkens, O'Brien 2017; Massardo *et al*. 2016). Both institutional and industrial guidelines are addressed to professional language services providers and focus mostly on target language (TL) revision without recourse to the source text (ST), which makes them non-practical for the learning context. Academic approaches have traditionally addressed errors by producing taxonomies dependent on translation and linguistic models (Hurtado Albir 2001; House 1997, 2015, among others). These tend to be very efficient as a classification principle, but depend greatly on student proficiency in the source language (SL) and the underlying translation model. However, they do not address two conspicuous gaps: a) between translation errors and their textual triggers, and b) between translation errors and their pragmatic effects. Therefore, the relationship between formal decisions and textual outcomes is missing for the learner.

Another well-trodden academic path in the study of interference is the research into translation universals (Baker 1993; Mauranen 2004), i.e., trends of translated language considered to be independent of SL and directionality. Corpus-based studies have produced a substantial amount of work on the differences between translated and non-translated language, which has become known as "the third code" (Frawley 1984; Øverås 1998). Both quantitative and qualitative studies have pointed at phenomena such as simplification (Vanderauwera 1985), normalization, and explicitation (Blum Kulka 1986; Pápai 2004). The Explicitation Hypothesis, for instance, has

been linked to increased readability (Toury 1995/2012, p. 227). It has also been criticized for its language pair-independent formulation, which fails to account for other factors, such as SL interference (Becher 2010, p. 29).[1] A wealth of language pair-dependent studies (Rabadán 2011; Loock 2013; Ramón and Gutiérrez Lanza 2018, among others) suggests that interference is possibly the most conspicuous of translated language features (Toury 1995/2012; Mauranen 2004) and that it necessarily rests on language pair-dependent contrastive differences, which are commonly associated with "obligatory adjustments" into the TL (Nida 1964; Nida, Taber 1969; Pym 2016).

A more recent approach to the problem is the *Multilingual Student Translation* (MUST) project (Granger, Lefer 2018), whose long-term goal is to produce "a language-independent, standardized *translation-oriented annotation system* (TAS)" to be used on student translations.[2] TAS comprises three main parts: (1) ST-TT transfer, which refers to discrepancies between the ST and the TT or between the TT and the translation brief; (2) language features, concerned with erroneous TT solutions, not necessarily connected to the ST, and (3) translation procedures, dealing with problem-solving techniques as unveiled by TT-ST comparison. Each of these parts contains multilayered categories and subcategories, each marked by a specific tag. Still at an early stage of development, MUST capitalizes on previous learner corpus-based research, and language-dependent errors seem to be part of a meta-tag "to mark suspected SL intrusion" which could be added to any of the TAS multilayer (sub)categories. TAS is meant to become a training and research tool. As such, it will be useful for descriptive empirical work, but error identification *per se* does not directly result in enhanced translation performance.

We hypothesize that translation errors derived from interference are better understood by students when they are directly related to the language and textual features of STs on the one hand, and to communicative outcomes on the other, on the assumption that performance will improve if it is linked directly to genre-specific, language-dependent characteristics. This pilot study has four aims:

(i) To raise students' awareness of how genre-related features may underlie text processing difficulties, by focusing on the main differences between

[1] A conciliatory view is Klaudy's Asymmetry Hypothesis (2009), which claims that explicitation is present in several transfer operations, independent of language pair and direction of translation.

[2] Quotations come from the ECETT/PaCor 2018 Book of Abstracts. http://eventos.ucm.es/19308/section/15272/international-symposium-pacor-2018-parallel-corpora_-creation-and-applications.html (25.07.2019).

the language of astronomy in academic English, popular science and multimedia transcripts (Stolze 2009; Byrne 2012; Tessuto, Bait 2017).

(ii) To relate ST features to translation errors and TT outcomes, by identifying problem areas in each of these genres, e.g., types of technical dialects, metaphoric language, among others (Rabadán 1991; Shuttleworth 2014).

(iii) To formulate a clear, accessible and usable procedure for quickly identifying errors, by defining a limited, self-explanatory, language-bound checklist to be used in translation practice, revision and (post)-editing. This checklist will include cause, error, and consequence tags that will serve a double function: signaling the error and providing constructive input. Thus, it will be possible for the user to relate the problem to its source and translation solutions.

(iv) To test the degree of improvement in student performance once the procedure has been implemented in class.

2. Method

2.1 Academic context

This paper reports on a qualitative pilot study carried out during four spring semesters, from 2016 to 2019, in a final-year optional undergraduate course in specialized translation open to Modern Languages majors. The aims of this course are not so much extensive translation training as focused awareness-raising of typical translation problems and the solutions available.

The technology offered to students includes machine translation algorithms such as Google Translate, terminological banks, such as IATE, field-specific lookup tools such as Skynet Dictionary of Astronomy, and general language resources, e.g., Lexicool, Acronym Finder, etc. Also available to students is dubbing and subtitling software for the audiovisual texts. However, they were not offered translation memory technology, as this would have prevented students from producing their translation solutions.

2.2 Corpus

Materials from in-class and take-home commissions have been collected and organized in the ASTROfest corpus, which contains three small subcorpora:

Content/Corpus	En_ASTROfest			P_ASTROfest		Es_ASTROfest	
Type	Monolingual En Multigenre Multimodal			Parallel En-Es Multigenre Multimodal		Monolingual Es Multigenre Multimodal	
Materials	AW	PS	MT	PS	MT	PS	MT
Word Number	4822	6507	2117	6507-10540	2117-3916	3672	2403

Table 1
ASTROfest: subcorpora.

- An English monolingual comparable subcorpus, En_ASTROfest, comprising written abstracts of professional academic writing (AW: 4822 words), web/magazine articles of popular science (PS: 6507 words) and multimodal transcripts of web audiovisual materials (MT: 2117 words).
- A bilingual parallel subcorpus, En-Es_P-ASTROfest, which includes the English originals (nine PS and four MT texts) and the corresponding student translations. The number of translations of each text varies between 2 and 6 per semester and have been selected among submissions graded between 40% to 70%. Higher or lower grades were not considered as they would not attest to typical processing problems and mistakes. AW texts have not been included in this corpus because, as the Spanish astronomy research community usually reads –and writes– originals in English, translated texts are rarely available.
- A Spanish monolingual subcorpus, Es_ASTROfest, featuring popular science (PS: 3672) and multimodal transcription of audiovisual texts (MT: 2403 words). PS texts compiled so far have been published in science supplements of Spanish newspapers such as https://www.abc.es/ciencia/ and websites such as https://viajealcosmos.com/, whereas MT texts consist of transcriptions of general interest TV programs such as *Lab 24*, broadcast by Spanish RTVE 2: http://www.rtve.es/alacarta/videos/lab24/. Again, this corpus includes no AW, as the Spanish research community publishes overwhelmingly in English. In this respect, the very few texts we managed to obtain were either summaries of previous English texts or shortened reports of those texts as published by the Spanish Astronomy and Astrophysics Association, and amounted to 200 words.

In the case of monolingual En_ASTROfest, texts were selected as follows:

- AW texts were obtained from high ranking metrics, Q1-2 journals in the field of Astronomy and Astrophysics, mostly written by non-native speakers who use English as their professional language. The result is texts that follow scientific editors' guidelines (e.g., EASE 2019), which show features of English as a Lingua Franca (ELF) and offer a recognizable rhetorical structure (IMRAD) typical of argumentative texts.

Their function is to promote the advancement of knowledge and to foster constructive discussion within the research community.

- PS texts were retrieved from websites such as *LiveScience, ScienceDirect, Nasa*, etc. These are written by scientific reporters whose role is to make scientific knowledge available–and appealing–to the general public. They produce everyday texts written in standard (human) English including clearly explained scientific terminology: e.g., *black hole, galaxy, rogue planet,* etc. These texts are informative and show the typical rhetorical organization of expository texts. Their function is to inform and educate the general audiences of the latest findings in "Planet Science."
- MT texts were obtained from various YouTube channels (*SCI Science Channel*, *Life Noggin, JASA stargazer*) and from *Nasa Goddard TV*, devoted to bringing science closer to society and the lay public. These short clip-like texts have been chosen because they show the characteristics of documentaries: they are informative and interact with the prospective user through persuasive devices aimed at catching and keeping audience attention. These documentary-like expository texts show a hybrid rhetorical structure, which includes a talk show format, and a series of interviews with experts in the field. In these texts, tenor is particularly relevant, as their function is first and foremost to educate entertainingly.

Since this is a qualitative pilot study, and the size of the corpora is not large, we have used simple statistics to collate the English language data. Quantitative findings are indicated in frequency per million words. In the future, expanding the study will require custom-made tools and inferential statistics.

2.3 Procedure

Drawing on a standard inventory of linguistic, cultural, and semiotic translation problems (Nord 1997), monolingual En_ASTROfest has been queried to produce a list of the most salient genre-specific, language-dependent problematic areas in our STs (see Tables 2 and 3). En_ASTROfest materials have been PoS tagged with TreeTagger,[3] and the SketchEngine browser[4] has been used to implement the queries, which include wordlist, keyword, multiword, and combinations of PoS tags and their positions to the right and the left. The latter query was particularly useful when locating nominalization and heavy characterization chains (Figure 1).

[3] http://www.cis.uni-muenchen.de/~schmid/tools/TreeTagger/
[4] https://www.sketchengine.eu/

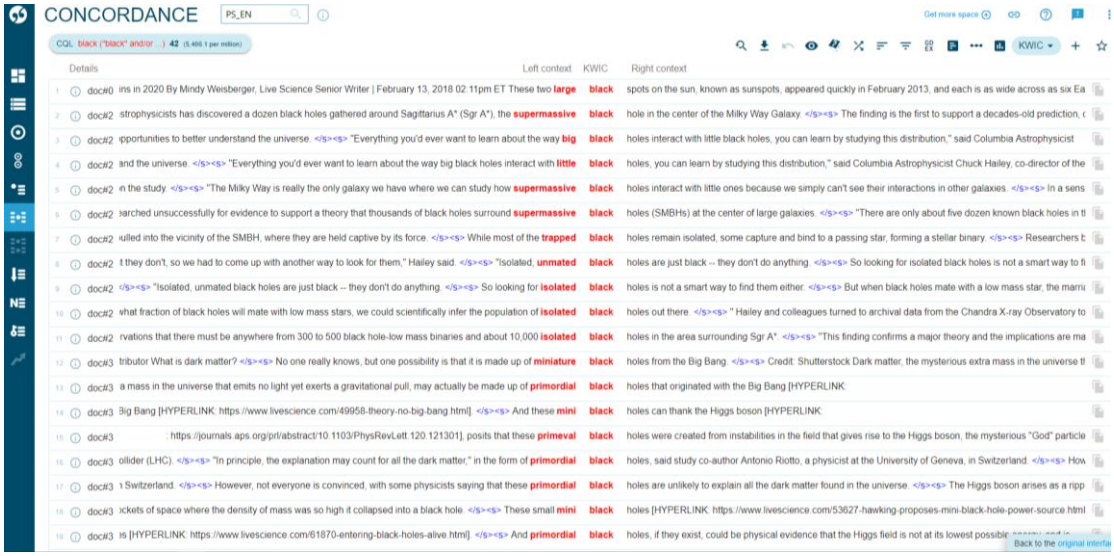

Figure 1
SketchEngine. En_ASTROfest: PS characterization chains.

The following part of our pilot study aims at relating those genre-specific, language-dependent problematic areas to translation errors, and undesirable outcomes. The English-Spanish parallel corpus En-Es_P-ASTROfest has been used to this effect. The texts were processed with TAligner 3.0,[5] which allows for the alignment of multiple TTs and their corresponding STs (Figure 2).

Our error classification benefits from already available taxonomies of translation techniques: explicitation, omission, word-for-word translation, etc. (Molina, Hurtado Albir 2002). Likewise, the parameters of textuality (intentionality, situationality, informativity, acceptability, intertextuality, coherence, and cohesion) have been used to identify TT areas suffering negative pragmatic effects (Rabadán, Fernández Nistal 2002, p. 26). Examples of causes, errors, and consequences are presented in a visual layout, accompanied by self-explaining tags to facilitate understanding. All of them have been annotated for the sake of awareness raising. We expect that, after some practice, students themselves will provide this information.

[5] This tool has been developed at the University of León and the University of the Basque Country. More information at http://www.ehu.eus/tralima/taligner.html and http://corpusnet.unileon.es/

Figure 2
TAligner 3.0: ST-TTs alignment.

To verify our working hypothesis that students will render better solutions by linking ST triggers to actual errors and consequences in the TT, our findings were made available to a group of students in the form of a checklist. This control group included ten students in the 2019 spring semester that, as part of their regular workload, had already contributed their commissions to the ASTROfest corpus. The testing was organized in two different formats: first, they were asked to apply the checklist to translations of a text they had previously translated; second, they were asked to identify errors in texts produced in previous semesters by other students and to produce alternative solutions. The results of the testing, i.e., the degree of improvement in the translations produced by the control group, will serve to (in)validate the usefulness of our checklist.

3. Results

3.1 Identifying genre-specific, language-dependent features of STs

Our analysis distinguishes three main types of textual features, which, in turn, derive from the linguistic, cultural, and semiotic characteristics of the STs.

3.1.1 Linguistic features of STs

AW texts constitute the default genre for scientific language, the *tertium comparationis* against which PS and MT texts are measured. They follow a strict rhetorical structure; generally, the IMRAD template (Swales 1990, 2004), often constrained by instructions from the journal's editors, and the vast majority of them are authored by writers who use English as a professional language but not necessarily as their first language. Scientific language is characterized by the use of expert terminology, which typically shows an absence of polysemy and ambiguity (Byrne 2012). Expert terms are often lexicalized metaphors that have acquired domain-specific meaning and may have learned, less well-known designations (e.g., *Cigar Galaxy = Messier 82*). AW avoids ambiguous strings and redundancy, fosters clarity, and favours highly conceptual language. Our corpus reveals that authors' stylistic preferences include an abundance of (i) definite articles (e.g., *the results of the present study, to estimate the dust composition*), (ii) nominalization and characterization chains (e.g., *mineral dust long-wave refractive index, ultra-strong radial magnetic field*), (iii) -ing forms (e.g., *Understanding the role of natural forcings, incoming ultraviolet radiation*) (iv) passive constructions (e.g., *is compared with grand solar minimum simulations, are predicted to be significant*), (v) –ly adverbs (e.g., *increasingly powerful storms, nonlinearly growing sea level rise, markedly reduced warming*) and (vi) hedging by means of tentative reporting verbs (e.g., *Our observations also suggest that…, […] have been proposed in the SMSMM model, imply that 2 °C global warming…*). All of the above results in the concept-laden language which defines expert-to-expert communication.

PS texts combine conceptual stringency with accessibility as their function is both to entertain and to educate readers (Byrne 2012, pp. 49-50). This stringency is achieved through fresh, lively language together with proper scientific terminology as well as illustrative pictures or multimodal simulations. Corpus findings indicate that defining features are (i) the use of pronouns, which, apart from indicating deixis and anaphora (Huddleston, Pullum 2002, pp. 1463-1482), allow experts to bring concepts closer to the reader (e.g., *If we had this monster sitting at the center of our Milky Way galaxy…*) (ii) the alternance of present and past tenses, which mark the exposition and narration of facts respectively (e.g., *the Cigar Galaxy is a starbust galaxy / the astronomers counted pixels of dust…*), (iii) informal features such as contractions (e.g., *could've, that's, isn't*) or very colloquial terms (e.g., *monster, sucks, stogie*), (iv) adverbial grading (e.g., *incredibly bright star, very large distance*), (v) everyday idioms (e.g., *eat them for breakfast*), (vi) comparisons with everyday phenomena used to relate astronomic concepts and dimensions to our known world (e.g., *like all growing*

boys, this supermassive black hole has a hefty appetite), (vii) the frequent use of "light verbs" (e.g., *get, take, make, put: which makes the universe more transparent, taking the form of an incredibly powerful galactic wind*), which transfer the semantic load to the verbal complements, (viii) intertextual references to culture-bound aspects, such as popular narrative and TV series (e.g., *"dark ages"*), (ix) anaphora (e.g., these *extremely short flashes, and* hence *gamma-ray emissions*), and finally, (x) nominalization and characterization chains, also typical of AW texts, as a way of explaining abstract concepts in everyday language (e.g., *These massive, black-hole-powered beacons*).

MT texts also aim at entertaining and educating audiences through audiovisual channels. They are defined by language and image synchronization and by the differences between the language of narrators on the one side, and that of expert guests on the other: whereas narrators move in the neutral range of language written-to-be-delivered-orally, guest speakers favour a more informal and colloquial variety of English congruent with–real or fictitious–spontaneous conversation. This form of pre-fabricated orality includes the use of discourse markers, phonetic reduction, interjections, or hesitation periods (Baños Piñero, Chaume 2009). Our corpus-based analysis has revealed that defining features in MT texts include a massive use of (i) present tenses, for the presentation of facts (e.g., *identify, orbits*), (ii) definite articles (e.g., *The Earth, the violence*), (iii) nominalization and characterization chains (e.g., *our own cosmic neighborhood, a big, empty, sucking piece of space*), (iv) hedging by means of epistemic modals (e.g., *that might actually happen, one of them could be heading our way*), as opposed to AW preference for tentative reporting verbs (e.g., *propose, suggest*), (v) exclamative, interrogative, and conditional sentences (e.g., *watch out!, what if that home suddenly changed?*), in contrast to straight enunciation in AW and PS texts, (vi) markers of informal language and of orality (e.g., *burp, crush, spurt, anyway, you see, as a matter of fact, damn, hey, well, gonna, I'm, don't, you'd, there's, won't*), (vii) comparisons (e.g., *the more Earth there is, the more it will heat up*), analogies (e.g., *It was like… a vision of hell*), examples (e.g., *to say… Jupiter*) and anecdotes (e.g., *When I was a kid…*), (viii) everyday lexicalized metaphors, frequently based on culture-bound references (e.g., *Goldilocks Zone*), and (ix) rhetorical questions to retain the viewer's attention (e.g., *could it really happen?*).

Additionally, our genres share some basic, very frequently used (14,000 tokens per million and above, Table 2 in bold) language-dependent features, e.g., definite articles, nominalization, and characterization chains, present tenses, and -ing forms.

This review has resulted in a corpus-informed cross-genre *tertium comparationis*, where both genre-shared and genre-specific linguistic features are represented (see Table 2).

	AW		PS		MT	
	Raw	**Per million**	**Raw**	**Per million**	**Raw**	**Per million**
Definite article	**270**	**47,863.85**	**281**	**54,637.37**	**90**	**57,952.35**
Nominalization and characterization chains	**597**	**31,908.88**	**200**	**38,888**	**54**	**32,973.76**
Present tense	**72**	**12,763.69**	**98**	**19,055.03**	**28**	**18,029.63**
-ing forms	**107**	**18,967.89**	**78**	**15,166.32**	**22**	**14,166.13**
Pronouns	38	6,736.39	**100**	**19,443.90**	14	9,014.81
Anaphora						
Passive voice	119	8,509.13	39	7,583.12	11	7,083.07
Past tense	15	2,659.10	**57**	**11,083.03**	13	8,370.90
Light verbs						
Degree adverbs	3	531,81	15	2,916.60	7	4,507.44
-ly adverbs	39	6,913.53	44	8,555.36	**18**	**11,590.56**
Hedging	28	4,963,56	**52**	**10,110.88**	**20**	**12,878.40**
Epistemic adverbs	1	177.27	2	388.88	1	643.92
Epistemic modals	13	2,304,51	39	7,583.16	**16**	**10,302.72**
Tentative reporting verbs	14	2,481,78	11	2,138.83	3	1,931.75
Informal language	0	0	3	583.32	**36**	**23,181.12**
Orality	0	0	17	3,305.48	**41**	**26,400.72**
Contractions	0	0	12	2,333.28	**26**	**16,741,92**
Discourse markers	0	0	3	583.32	7	4,507.44
Interjections	0	0	0	0	5	3,219,60
Hesitation/Causing expectation	0	0	2	388.88	3	1,931.75
Conditional sentences	1	177.27	24	4,666.56	**41**	**26,400.72**
Exclamative sentences	0	0	1	194.44	9	5,795.24
Interrogative sentences	1	177.27	8	1,555.52	7	4,507.44
Analogy	0	0	6	1,166.64	13	8,370.96
Comparisons	4	709.08	23	4,472.12	**29**	**18,673.68**
Examples	0	0	1	194.44	1	643.92
Anecdotes	0	0	0	0	1	643.92

Table 2
Linguistic features across genres.

3.1.2 Culture-based features of STs

Acronyms, names, measurements, and culture-bound intertextual metaphors are also sources of translation problems[6]. Acronyms and names appear in two different contexts: when an institutionalized, descriptive equivalent exists (e.g., *James Webb Space Telescope (JWST) > Telescopio Espacial James Webb*), or when there is no equivalent, and the source term is accepted in the TL regardless of the meaning it stands for (e.g., *NASA*, *ESA*). Measurements tend to be localized, but there are occasions when critical revision is imperative since the equivalents designate different amounts in each of the languages (e.g., 1 *billion* in English corresponds to one thousand million, whereas in Spanish 1 *billón* equals one million of millions). More demanding

[6] Other types of intertextuality such as cross-referencing have not been considered here, since they belong to the scientific community as a superposed speech community.

are culture-bound intertextual metaphors, frequent in MT texts as a way of bringing specialized concepts within grasp of non-expert audiences (e.g., *balls rebounding off bumpers in a pinball machine*).

	AW		PS		MT	
	Raw	Per million	Raw	Per million	Raw	Per million
Acronyms / Names			17	2,188.18	1	401,45
Measurements	7	1,240.89	15	2,916.60	9	5,795.28
Overt (culture-bound intertextual) metaphors	8	1,418.16	7	1,361.08	11	7,083.12

Table 3
Culture-based features across genres.

3.1.3 Semiotic features of STs

Typical semiotic features of AW include formulae, tables, and graphs and charts. PS texts offer graphs and charts as well, together with photos, artistic recreations, and simulations. The latter may be combined with audiovisual features (e.g., a short video with spoken language). Although language-image synchrony is the most apparent feature of MT texts, they also include artistic recreations, simulations, and captions. All of them play a significant part in meaning-building and relate to written and oral materials in different ways. Ignoring their contribution to the text's make-up may have consequences in the coherence and intelligibility of the TT.

	AW	PS	MT
Formulae	√		
Tables	√		
Graphs and charts	√	√	
Photos		√	
Artistic recreations		√	√
Simulations		√	√
Captions		√	√
Synchrony: Isochrony			√

Table 4
Semiotic features across genres.

3.2 Relating causes, errors, and consequences

The linguistic, cultural, and semiotic problematic areas identified above have been linked to errors and consequences in students' commissions.

3.2.1 Errors depending on linguistic features of STs

1) Unidentified ST idioms or metaphors. Frequent errors include word-for-

word translation and poor choice of phraseology. These solutions detract from TT acceptability, and they may also affect informativity and audience engagement.

Unidentified idiom <un_id/met>	**Word-for-word TR <wwTR> Poor phraseology <p_phr>**			**Negatively affects:**
… eats suns like ours for breakfast [PS001]	… come soles como el nuestro para desayunar [PS001_TT5]	Se come el sol como si fuera un desayuno [PS001_TT8]	Se come al sol como nosotros el desayuno [PS001_TT6]	Acceptability <acc> Informativity <inf> Intentionality <int>: audience engagement

Example 1
Unidentified ST idioms or metaphors.

2) English characterization chains. Frequent errors include wrong word order, and, as a consequence, poor syntax. Abnormal text flow affects intelligibility and acceptability in the TT.

Characterization chains <ch_ch>	**Word order <wo> Poor syntax <p_sy>**			**Negatively affects:**
… busy star-forming centres [PS009]	… centros ajetreados donde surgen las estrellas [PS009_TT1]	… centros activos de formación estelar [PS009_TT2]	nuevas estrellas nacen en su activo centro [PS009_TT5]	Acceptability <acc>: intelligibility

Example 2
English characterization chains.

3) Cohesion markers. These are either omitted or poorly rendered. Since cohesion is unclear, the TT is difficult to follow and may present weak coherence.

Cohesion markers <coh_mk>	**Omission <o> Word-for-word TR <wwTR>**			**Negatively affects:**
See, there's a limit for how tall a tree can grow [MT002]	Mira, hay un límite hasta el que puede crecer un árbol [MT002_TT4]	Hay un límite de altura que puede llegar a tener un árbol [MT002_TT5]	Verás, hay un límite de altura para los árboles [MT002_TT6]	Cohesion and Coherence <coh>

Example 3
Cohesion markers.

4) (In)formal language. Informal language tends to suffer an upgrade in the Spanish TTs. This feature suffers from avoidance strategies: it is either ignored, and, therefore, the TT becomes more formal, or students use word-for-word translation, resulting in negative effects in tenor and audience engagement.

Informal language <(in)for_lg>	**Omission <o> Word-for-word TR <wwTR>**		**Negatively affects:**
… as it [the black hole] whipped through the solar system leaving disaster in its wake [MT001]	… por el sistema solar, dejando desastre a su paso [MT001_TT1]	... como si batiese el sistema solar, causando el desastre a su paso [MT001_TT3]	Situationality <sit>: tenor, formality scale Intentionality <int>: audience engagement

Example 4
(In)formal language.

5) Hedging is a staple feature in all three genres and is often a recurrent problem. Epistemic modals and adverbs, and tentative reporting verbs tend to be translated by their formal lexical equivalents, which do not have the same pragmatic functions in Spanish. In non-translated Spanish, these are conveyed by grammatical means such as verbal mood or certain tenses as the conditional.

Hedging <hed>	**Word-for-word translation <wwTR>**			**Negatively affects:**
Several ideas […] suggest that space and time are not actually smooth and uniform [MT004]	Varias ideas […] sugieren que el espacio y el tiempo no son en realidad lisos y uniformes [MT004_TT4]	Varias ideas […] sugieren que el espacio y el tiempo no es en realidad de una textura lisa y uniforme [MT004_TT5]	Varias ideas […] sugieren que el espacio y el tiempo no son, en realidad, suaves y uniformes [MT004_TT6]	Acceptability <acc>: intelligibility and text flow

Example 5
Hedging.

6) Intensifiers and emphasis markers are one of the most salient features of MT texts. When synchronized with speakers' gestures and supra-segmental features of speech, their function is to play up and focus on essential bits of information so catching viewers' attention. However, these are usually omitted by students, scaling down this foregrounding function. When used, they tend to be translated literally, producing unacceptable noise and hindering text flow in the TT.

Intensifiers/ emphasis markers <em_mk>	**Omission <o> Word-for-word TR <wwTR>**				**Negatively affects:**
It really is lost in space… [MT003]	Está perdido en el espacio [MT003_TT7]	Está perdido en el espacio [MT003_TT8]	Está perdido en el espacio [MT003_TT10]	Realmente está… perdido en el espacio [MT003_TT9]	Acceptability <acc>: intelligibility Intentionality <int>: scaling down of didactic function

Example 6
Intensifiers and emphasis markers.

7) Features of orality constitute a further error-prone area affecting MT texts. Students tend to omit or tone down contractions, interjections, exclamative and interrogative sentences, hesitation marks, etc. Since this popular "avoidance strategy" moves away from the recreation of pre-fabricated orality, the resulting dialogue lacks credibility, which affects acceptability, tenor, and audience engagement.

Orality <ora>	**Omission <o> Word-for-word translation <wwTR>**			**Negatively affects:**
Oh! Are we already living in that? Damn! [MT002]	Ah, ¿Ya vivimos ahí? [MT002_TT1]	Oh, esperad. ¿No vivimos así ya? [MT002_TT2]	¿Ya estamos viviendo ahí? [MT002_TT3]	Acceptability <acc> Situationality <sit>: tenor Intentionality <int>: audience engagement

Example 7
Features of orality.

8) Obligatory adjustments are also problematic. Among them, tense sequence tends to be one of the main sources of student errors from English into Spanish, which produces a broken timeline, distorts the narrative, and affects both PS and MT texts. A possible-and likely-reason for this behaviour may be the sentence-by-sentence processing of the ST. Time sequence follows relatively fixed rules in Spanish, a heavily inflected language. Obligatory adjustments affecting function words such as articles or pronouns (Ramón, Gutiérrez Lanza 2018) may also contribute to lower acceptability if not dealt with according to TL usage.

Obligatory adjustment <ob_ad>	Distorted narrative sequence <nar_sq>		Negatively affects:
Superbubble formation could be a side effect of the mighty winds that gush out of newborn stars, NASA researchers wrote in a statement about the discovery. [PS010]	La formación de superburbujas podría ser un efecto colateral de los potentes vientos que desprenden estrellas recién nacidas, investigadores de la NASA escribieron sobre este descubrimiento. [PS010_TT02]	La formación de las burbujas podría ser un efecto secundario de los fuertes vientos que salen de las estrellas recién nacidas, los investigadores de la NASA escriben un informe sobre lo ocurrido. [PS010_TT03]	Acceptability <acc> Cohesion and coherence <coh>
If you haven't seen Gaia's new map of the Milky Way, you really should. [PS003]	Si no has visto el nuevo mapa de Gaia de la Vía Láctea, deberías hacerlo. [PS003_TT01]	Si no has visto el nuevo mapa de Gaia de la Vía Láctea, deberías. [PS003_TT03]	

Example 8
Obligatory adjustments.

3.2.2 Errors dependent on culture-based features of STs

9) Both in PS and MT, measurements (e.g., *billions*, *feet*) are not as stringent as in calculations given in AW, as their role is to give non-experts an idea of the magnitudes of the phenomena under discussion. Solutions range from unlocalized, word-for-word translation, which can be deceitful, to completely off the mark figures.

Measurements <ms>	Unlocalized <unL10N>		Negatively affects:
… a mass greater than 20 billion suns… [PS001]	… con una masa superior a la de 20 billones de soles… [PS001_TT1]	… es mayor que 20 millones de soles… [PS001_TT3]	Informativity <inf>

Example 9
Measurements.

10) Students do not identify many ST intertextual cultural references. Poor understanding results in word-for-word translation and in the absence of intertextual links in the TT, which significantly affects the semantic fabric of the text and readers' engagement.

Intertextual references <intxt_ref>	**Word-for-word translation <ww_TR>**		**Negatively affects:**
… is like studying the early "dark ages" of the Universe… [PS001]	… es como estudiar los días oscuros del universo… [PS001_TT2]	… es como estudiar las primeras Eras del Universo… [PS001_TT4]	Informativity <inf> Intertextuality <intxt> Intentionality <int>: readers engagement

Example 10
Intertextual references.

11) Acronyms are also problematic when they have an institutionalized equivalent in the TL, but it goes unnoticed. Wrong solutions include word-for-word translation and the addition of footnotes that do not clarify much and may affect the informativity and the understanding of the TT.

Acronyms <acr>	**Word-for-word TR <wwTR> Explicitation <exp> Footnote <ftn>**			**Negatively affects:**
… were the first two sources identified by HESS's Cherenkov telescopes [PS003]	… las dos primeras fuentes identificadas por los telescopios Cherenkov de HESS [PS003_TT7]	… las primeras dos fuentes que los telescopios Cherenkov del sistema estereoscópico de gran energía… [PS003_TT4]	… las primeras dos fuentes que los telescopios Cherenkhov de HESS[1] …[PS003_TT3] _____ [1] Sistema Estereoscópico de Alta Energía	Informativity <inf>

Example 11
Acronyms.

3.2.3 Errors dependent on semiotic features of STs

Semiotic features (see Table 4) such as formulae, photos, artistic recreations, and simulations remain the same in the TT. When the information included in captions is relevant, it is usually provided in subtitles. Tables and graphs may also include translatable information, but the primary source of errors remains ST-TT isochrony in MT texts.

12) Isochrony: MT texts chosen for this study are short documentaries, about five minutes each. Following the Spanish norm, the narrator's speech is to be dubbed, whereas guest experts' discourse tends to be voiced-over. Synchronization in dubbing traditionally involves matching spoken discourse to lip movement, i.e., "phonetic synchrony" (Fodor 1976, p. 10), to body movements, i.e. "kinetic synchrony" (Fodor 1976, p. 72), and to the length of the utterances, i.e., "isochrony" (Whitman-Linsen 1992, p.

22). In this respect, classroom experience shows that isochrony is the most relevant of the three, as shorter or longer utterances severely disrupt the viewing experience, reducing the quality of both dubbing (Chaume 2007, p. 76) and voice-overs. Poor isochrony, understood as the wrong use or absence of expansion and condensation strategies, is one of the most conspicuous semiotic errors students make when dealing with MT texts: a significant variation in the length of translated utterances as opposed to the original ones negatively affects the acceptability of the TT. In the following example, although word count is very similar (ST: 61w. TTs: 62 and 60 w.), utterances tend to be shorter in English.

Isochrony <isch>	**Poor isochrony <p_isch>**		**Negatively affects:**
Destroying an entire solar system is nothing to a black hole. **But it's more than just a big, empty, sucking piece of space.** It's incredibly heavy. **To get an idea of just how heavy and dense a black hole is, imagine the Earth.** Now, start to crush it, and keep crushing until it's packed so tight, even the atoms themselves collapse [MT001] 61 w.	Destruir un sistema solar entero no es nada para un agujero negro. **Sin embargo, es más que un trozo de espacio vacío que lo absorbe todo,** es extremadamente pesado. **Para haceros una idea de lo pesado y denso que es un agujero negro, imaginad la Tierra**… ahora, empezad a aplastarla…y seguid aplastándola hasta que esté tan apretada que incluso los átomos colapsen [MT001_TT1] 62 w.	Destruir un sistema solar entero no es nada para un agujero negro. **Pero es más que un gran vacío absorbente.** También es increíblemente pesado. **Para hacerse una idea de lo pesado y denso que es un agujero negro, imagine la Tierra.** Ahora comience a apretarla, y siga hasta que esté compacta, tan apretada que hasta los propios átomos se colapsen [MT001_TT3] 60 w.	Acceptability <acc>

Example 12a
Isochrony.

However, the most frequent error in the translation of MT texts is word-for-word translation, whose cause may be found in the very nature of multimodal audiovisual texts: isochrony restrictions are so relevant that translations tend to be much too literal. As a result, the acceptability of the TT is negatively affected.

Isochrony <isch>	Word-for-word TR <wwTR>		Negatively affects:
Astronomers identify a new planet one hundred light years from Earth, at least four times more massive than Jupiter, and it's gone rogue [MT003]	Unos astrónomos identifican un nuevo planeta a 100 años luz de la Tierra, al menos cuatro veces mayor que Júpiter, y que vaga en solitario [MT003_TT7]	Astrónomos han identificado un nuevo planeta a 100 años luz de la Tierra, cuatro veces más grande que Júpiter y es uno errante [MT003_TT8]	Acceptability <acc>

Example 12b
Isochrony: word-for-word translation.

3.3 Generating the checklist

This account of the most frequent causes, errors, and consequences has led us to compile the following checklist:

CAUSES: problematic areas	ERRORS: absence/wrong use of TR techniques	CONSEQUENCES: negative effects
LINGUISTIC CULTURAL SEMIOTIC	Distorted narrative sequence <nar_sq> Explicitation <exp> Footnote <ftn> Omission <o> Poor phraseology <p_phr> Poor isochrony <p_isch> Poor syntax <p_syn> Unlocalized <unL10N> Word order <wo> Word-for-word translation <wwTR>	Intentionality <int> Situationality <sit> Informativity <inf> Acceptability <acc> Intertextuality <intxt> Cohesion and Coherence <coh>

Table 5
Checklist of main causes, errors, and consequences.

Not surprisingly, the most frequent problems are not strictly translational, but rather have to do with ST processing and, more importantly, with the poor connection among problematic areas, translation techniques, and pragmatic effects. Regarding textual reformulation, problematic parts are not properly dealt with. Rather, students avoid having to apply translation/compensation techniques that would produce more accurate, but formally dissimilar translation solutions. Besides, when they make use of machine translation, they either do not edit their drafts or do so haphazardly. In general, they pay very little attention to the revision stage.

3.4 Testing the checklist

After 8 hours of in-class training using the checklist of causes, errors, and consequences presented in the previous section, control group students' results show improvement in the following targeted areas:

1) ST idioms are translated with acceptable, functional solutions such as "… se merienda soles como el nuestro" [PS001_TTcontrol], which perfectly reflect tenor and phraseological idiomaticity in Spanish (i.e., "merendarse" > "to easily overcome somebody or someone," "to eat a quick snack, mainly children"). This solution conveys adequate information, ensures audience engagement by keeping colloquial usage, and favours acceptability.
2) ST characterization chains are translated by more acceptable and intelligible options, such as "… centros de formación estelar muy productivos" [PS009_TTcontrol].
3) Cohesion markers, which are frequently ignored and greatly affect TT's cohesive force, are translated according to context: "Claro está, los árboles tienen un límite de altura" [MT002_TTcontrol].
4) ST informal language, aimed at ensuring audience engagement, is kept in fully functional translations which can be highly dissimilar formally to the ST resources, reproducing both tenor and meaning: i.e. "… como si Atila y su ejército pasaran por el sistema solar y destrozasen todo lo que se cruzara en su camino" [MT001_TTcontrol].
5) Hedging is translated by more economical and acceptable solutions such as a conditional tense: "… según varias teorías, el espacio-tiempo no sería homogéneo y uniforme" [MT004_TTcontrol].
6) Intensifiers and emphasis markers, which particularly in MT texts have an important function signaling viewers' involvement, tend to be omitted or reduced to unwanted noise in the TT. When reconsidered, control group students provided more efficient-and proficient-solutions, such as "Lo cierto es que (the truth is that) …", which conveys emphasis more clearly [MT003_TTcontrol].
7) Orality features, which had frequently disappeared altogether from students' translations, benefit from a more contextualized-and easier to follow-reinterpretation: "¡Uf! ¿Ya estamos en esas? ¡Mierda!" [MT002_TTcontrol].
8) Our checklist also called the students' attention to "obligatory adjustments," such as tense sequence. Pilot study evidence suggests that processing the text as a semantic unit instead of a succession of sentences reduces significantly this type of error, resulting in more acceptable sequences: "Los investigadores de la NASA anunciaron que la formación

de superburbujas podría ser un efecto colateral de los fuertes vientos que sueltan las estrellas recién nacidas" [PS010_TTcontrol]. In the case of pronouns, after the error training sessions, the generalized role of "you," used to address the receptors in general–and no one in particular–, gets a pragmatically accurate rendering as "Merece la pena ver el nuevo mapa de la Vía Láctea registrado por Gaia" [PS003_TTcontrol].

9) After training, figures for measurements were in all cases localized and correct: "… una masa 20 mil millones de veces mayor que el sol" [PS001_TT control].

12) Isochrony became the students' priority over purely semantic or word-for-word translation, which made TTs more acceptable: 12a: "Vale, hay que aplastarlo hasta que quede tan apretado que hasta los átomos se rompan" [MT001_TTcontrol], 12b: "Los astrónomos han identificado un nuevo planeta a 100 años luz de la Tierra. Cuadruplica la masa de Júpiter y va por libre" [MT003_TTcontrol].

There are areas, however, for which no noticeable upgrade has been observed after the awareness-raising training, among them, intertextual references to everyday life (example 10) and acronyms with an institutionalized equivalent in the TL (example 11). Both involve noticing and predictability skills, as well as content researching, but these tasks were not fully implemented by students. The solution remained word-for-word translation.

4. Conclusions and Further Work

This pilot study indicates that, independently of translation technology, the bottom line is cross-linguistic and translational competence; that is, how well students can produce equivalent text and how able they are to identify poor performance into the TL. The erroneous use of translation techniques such as omission or word-for-word translation, together with the frequent abuse of unedited machine translation, results in a fragmentary and, at times, unintelligible TT.

Awareness-raising work has focused on linguistic, cultural, and semiotic phenomena such as characterization chains, idioms, orality features, cohesion markers, culture-bound intertextual references, or isochrony, among others. The use of a clear, usable checklist including cross-linguistic differential tags related to salient features of the language, genre, and mode, seems to be more effective than research-based error taxonomies, as student errors are better addressed on a more concrete, language-and-direction-dependent basis. This checklist has been very welcomed by students, as it has helped them identify ST problematic areas underlying potential translation

errors, and their likely negative effects in the TT. They also reported that the procedure also contributed to improving their foreign language and contrastive studies expertise. Plans include testing it with a wider group of students to enlarge our corpus for both PS and MT texts, revisiting the usability of error tags, and, eventually, using them to check the translation and (post)-editing performance in other domains.

However, the question remains whether interference, as an inherent, universal feature of translation behavior, can be trained. To further investigate the possibilities and limitations of our proposal, this qualitative pilot study also needs extensive quantitative verification in published translations. To this end, we have started to compile CETRI (Corpus de Español TRaducido del Inglés, Corpus of Spanish translated from English), which contains translations from English into Spanish published from 2010 onwards. It replicates the subcorpora in CORPES XXI, the corpus of contemporary Spanish sponsored by the RAE (2018), and includes a subcorpus of popular science, astronomy. Non-translated materials will facilitate the systematic contrast between translated solutions and original non-translated Spanish. This "verification of target-language-fit," which will show the degree of tolerance of native Spanish texts towards (accepted) cross-linguistic interference, has been successfully tested on general language texts (e.g., Rabadán 2007). It will also be used to verify other interference phenomena (e.g., changes in grammaticalization processes caused by cross-language contact), to unveil genre/domain-specific translation norms and strategies, or, more generally, to study the impact of language choices in the reception of the target texts. Our long-term aim is to verify the type of interference phenomena that can be attributed to "third code" performance, and those which cannot, so as to focus on actually feasible improvement. Our position remains that third code expressive solutions may underlie certain additions to the TL, but that TL grammatical capabilities are perfectly able to convey the functions expressed in the SL.

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