Translator Education in Chile: Effects of Translation Memory Systems on the Reception of Scientific Translations

Eduardo Andrés Véliz Ojeda

BA (English-Spanish Translation), MA (Translation Studies)

A thesis submitted for the degree of Doctor of Philosophy at

Monash University in 2020

School of Languages, Literatures, Cultures and Linguistics

Faculty of Arts

Copyright notice

Abstract

This thesis investigates the effects of the use of translation memory (TM) systems on English-to-Spanish translations produced by undergraduate translation trainees. Since their use in the translation industry became widespread, scholars have called attention as to the unwanted effects of TM systems, particularly signalling the unnatural, de-contextualised focus on the sentence as unit of meaning, and the degree of linguistic transfer observed when translation is mediated by the use of TM software. As concerns translator education, calls have been made to determine if appropriate training for novice translators in the use of TM software and other computer-aided translation (CAT) tools would enable them to use technology more effectively.

This study examines how the recent introduction of TM software in Chilean undergraduate translation classrooms may have an impact on the quality and, especially, the readers' reception of scientific translations produced by student translators. To achieve this aim, the study was designed in three stages: a corpus-based study to determine the textual and grammatical features of research article abstracts in conservation biology written in English and Spanish; a translation experiment to look at how the textual and grammatical features devised from the corpus-based study are represented in translation; and a translation reception study to obtain insights into how specialist readers receive TM-mediated scientific translation.

The results indicate that the translations produced by undergraduate students in the translation experiment adhere to the textual and syntactic features of the target language identified in the corpus-based study. However, the informants in the translation reception study detected translation-induced problems in the students' translations that are not accounted for by the use of TM software. Instead, they relate to the translators' lack of experience and incipient development of translator competence. Moreover, the translation

reception study identified explicit *expectancy norms* for English-to-Spanish scientific translation. A translation that conforms too closely to the conventions of the Spanish language may not be accepted as belonging to the text genre in question; conversely, a translated text that is too closely aligned to the norms of English may be deemed linguistically inappropriate and discarded as an appropriate member of the text genre. This finding reinforces the position of English as the lingua franca of science and emphasises that the norms of scientific writing are, to some extent, culturally universal and discipline-specific.

This thesis concludes with a survey of the latest developments in translator training, the industry and the profession, which leads to a series of recommendations regarding how best to apply the findings to the context of translator education in Chile.

Declaration

This thesis is an original work of my research and contains no material which has been accepted for the award of any other degree or diploma at any university or equivalent institution and that, to the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the text of the thesis.

Signature:

Print Name: Eduardo Andrés Véliz Ojeda

Date: 6 June 2020

Acknowledgements

TABLE OF CONTENTS

List of tables

List of figures

Acronyms and abbreviations

CA   Contrastive analysis

CAT   Computer-aided translation

CTAP   Common Text Platform

DET   Determiner

HCC   High-context culture

LCC   Low-context culture

LCTT   Language contact through translation

MSW   Microsoft Word

MT   Machine translation

NMOD   Nominal modifier of nouns

NMT   Neural machine translation

SL   Source language

SMT   Statistical machine translation

ST   Source text

T&I   Translation and Interpreting

TL   Target language

TM   Translation memory

TT   Target text

INTRODUCTION

Students, scholars, and, indeed, anyone interested in the future of human cultures and languages, would be well advised to watch carefully what is happening to translation in the digital age. (Cronin, 2013, p. 2)

A great deal of current academic discussion revolves around how the material artefacts critical for human existence, whose analysis has been largely overlooked in the humanities (Littau, 2016a, p. 82), can affect or even completely change particular human activities and society as a whole. Until recently, this was the case in Translation and Interpreting (T&I) Studies. However, scholars have now turned their attention to the effects that the technologies that assist translators can have on translation professionals, the translation process, the translated product, and the users of translations. As Bowker (2002, pp. 17-18) suggests, "technology can sometimes change the very nature of the task it was designed to facilitate." In fact, such is the pervasiveness of digital technology in the environments in which translation is nowadays carried out and received that there is well-founded evidence to suggest "that translation is living through a period of revolutionary upheaval" (Cronin, 2013, p. 1). The present research project is a response to these changes, where technology not only permeates through its topic and motivations but also the methods and practicalities of the research itself.

This thesis centres on investigating the effects of the use of one particular technological tool: translation memory (TM) systems. Ubiquitous in the translation industry today, TMs are databases which store chunks of source text, usually delimited by punctuation, and their translations in order to speed up the translation process of related-subject texts by "remember[ing] the content of past translations" (Melby & Wright, 2015, p.

662). Ever since their use in the translation industry became widespread, scholars have called attention as to the unwanted effects of these systems, particularly signalling the unnatural, de-contextualised focus on the sentence as a unit of meaning, and the degree of linguistic transfer observed when translation is mediated by the use of TM software (Bowker, 2005; Dragsted, 2006; Pym, 2011; Martín-Mor, 2011). With regard to translator education, calls have been made to study whether appropriate training for novice translators in the use of TM software and other computer-aided translation (CAT) tools would enable them to use technology more effectively (Dragsted, 2006; Martín-Mor, 2011). Furthermore, if we see translation as a communicative writing activity, it is imperative to find out if translations produced using technological translation tools satisfy the needs and expectations of translation users belonging to specific discourse communities in terms of acceptability and communicative effectiveness. In this context, this project aims to study how the recent introduction of TM software in Chilean undergraduate translation classrooms may affect the quality and, especially, the readers' reception of scientific translations produced by student translators.

In this thesis I argue that T&I Studies and the T&I professions have developed at a slower pace in Chile than in other parts of the world. The results of this research may therefore spark discussion around the implications of the use of technology in the T&I classroom among Chilean trainers and academics, and perhaps be extrapolated out to regions with similar characteristics. By the same token, the present work aims to contribute not only to the training of translators in the use of relevant technology but to the overall development of translator training, trainer training and competence (as termed by Kelly, 2002), the translation profession and industry, and T&I Studies in Chile and the neighbouring regions.

Research motivations and aims

I think it is important first to establish my relationship as a researcher to the topics examined in the present thesis and the particular context that motivates this study. I am a professional English and Spanish translator from Chile, where I teach translation in an undergraduate translation program at a state university in the city of Arica. Isolated from the rest of the country, Arica is a small town in the Atacama Desert on the Chilean border with Peru. Given the remoteness of the area, the translation market is almost non-existent. The only possibility translation graduates have to practice their profession and earn a living without leaving town is by becoming freelancers. In this particular context, I believe that advanced training in translation technology should not be left for the later stages of professional development, such as postgraduate courses and professional experience. Instead, graduates' technological competence should ideally match that required of more experienced professionals. In other words, as I posit in the review on translator education in Chapter 1, we, as teachers, should take a realistic approach and strive to train graduates who can successfully function and compete in the working world. Ultimately, proficiency in the use of translation technologies is what distinguishes professional translators from non-professional translation practitioners (Corpas Pastor & Durán-Muñoz, 2018).

Undergraduate translator training in Chile usually lasts for five years, and can last up to six years when programs include interpreting training. Once they receive their undergraduate diploma, graduates can start in the profession. The translation program at the university where I teach is an offspring of a 40-year-old English teacher training program. A colleague translator and I were the first translators to teach in that program and were responsible for introducing the professional technological component in the curriculum. My initial interest and motivation to carry out this project stems from my own experience as a translator trainer, where I have witnessed issues trainees usually face when using TM software. This view is in

line with the results of the accreditation processes of translator training programs in Chile, which have suggested that there is a lack of alignment between training and the demands of the industry, with training in CAT tools being one aspect that employers demand from training institutions. Although this research project deals with one specific CAT tool, my overriding aim is to contribute to the improvement of translator education in Chile, where translation is not a regulated profession and lacks clear educational standards. On a personal note, this research is guided by my personal desire to be an excellent translation teacher.

Also stemming from my teaching experience, and especially from my professional practice, my interest in scientific translation is reflected in the text genre this thesis focuses on: research article abstracts in conservation biology. I believe that scientific translation in general is under-researched, and that we know very little about its role in the dissemination of science cross-culturally. Particularly, I aim to determine what defines a successful scientific translation at the textual and grammatical level from the point of the view of its final users. Put in Chesterman's (1993/2017) words, I intend to find out about the "expectancy norms" of scientific translation from English into Spanish; in other words, what specialist readers expect from a translation and what they deem to be "good" scientific writing in their field. Described in terms of learning objectives, professional and expectancy norms can inform training and help graduates to produce translations that live up to the readers' expectations (Chesterman, 1993/2017).

In order to engage with the discussions regarding translator training and technology, the present thesis aims to assess the effects of the TM segmentation system, and by extension the development of translator competence, by means of an evaluation of student translators' TM-mediated work from two different perspectives: (a) a contrast of TM translations against features of target language texts of the same genre, and (b) an analysis of the reception of TM translations by specialist readers. Since translation reception seeks to capture the views of

real translation users, it is a realistic, authentic measure of quality that can inform translator training in a manner that resembles the actual working conditions graduates will face when they join the work force.

Research questions

This study is framed around the research question *Does the TM segmentation system affect the quality and reception of scientific translations?* In order to address this research question, the following sub-questions were initially formulated: *What are the textual features of environmental science articles written in English and Spanish? Do student translators replicate the source language (SL) genre features in their translations using TM software? Or do students' translations stray from target language (TL) genre features? What are the expectations TL specialist readers have of this textual genre? Do TM students' translations fulfil these expectations? What can be done in translator training to improve the quality of scientific translations using TM software?*

As my awareness of the centrality of the reader to this study, and of the potential of reception research, grew, new questions came to light regarding the readers' evaluation of TM translations: *What are the expectations of the readers in terms of grammaticality? Do readers rate translations better when translations stick closer to native writing in the TL? Does the reader's proficiency in the SL influence their assessment of translations? Can the reader tell between a translation and a non-translated text? What social repercussions do the readers' reactions and responses to translations have?* These new questions reflect the progression of the research project from the more general questions I initially formulated: *What are the expectations of target language specialist readers of scientific translations? Do TM students' translations fulfil these expectations?*

Methodology

Once the initial research questions were set, I was confronted with the task of finding the best way to answer them, and to determine how one can investigate the effects of TM software on the quality and reception of scientific translations. The methodology I devised in order to resolve this issue included a corpus-based study to determine the textual and grammatical features of scholarly abstracts written in English and Spanish in the field of conservation biology, a translation experiment to look at how the textual and grammatical features devised from the corpus-based study are represented in translation, and a translation reception study to obtain insights into how specialist readers receive TM-mediated scientific translation.

In my view, it was necessary first to draw a comparison between translations obtained with and without the use of TM software. However, since the source text (ST) is insufficient as a reference for quality and acceptability, one would need to contrast translations against valid TL native writing found in contexts similar to those where the translations would be used. To this end, the first step would be to establish regularities in non-translated source and target language writing, and this would in turn require compiling a significant amount of text samples. Corpus-based research therefore appeared to be the most obvious and practical approach to determine the differences between source and target language writing, and between translated and non-translated texts in the TL.

Initially, this project involved the analysis of full research articles. However, in the development of the study, I became aware that certain adjustments were needed in order to make the completion of this project more realistic within the time frame of a doctoral project. Thus, I decided to focus on just one section of research articles, the abstract, and narrow down the text sample topic to the field of conservation biology. Since the early 1980s, a significant number of studies of rhetorical features of research articles have focused on specific sections of papers (see, for example, Swales, 1981; Swales & Najjar, 1987; Hopkins

& Dudley-Evans, 1988; Holmes, 1997), suggesting that each section features different rhetorical and textual patterns and content communication needs. The abstract, however, can be considered an independent genre since it provides a summary of the entire research article without depending on its other sections to fulfil its purpose (Martín-Martín, 2005). Therefore, abstracts are more homogenous in terms of rhetorical and textual structure. This maximises the comparability between languages, and between translated and non-translated texts. Having identified the distinctive features of scientific abstracts, I realised that I needed to make a clear distinction between rhetorical, textual, and grammatical (syntactic) features. Although rhetorical conventions may be realised by particular textual and syntactic elements, this study analyses the influence of TM systems on (a) textual features (as measured in terms of syntactic complexity), and (b) syntactic features (as measured in terms of syntactic dependencies), leaving aside the study of rhetorical aspects of the genre. The study of features such as text structure, rhetorical moves, hedging and personal attribution, among others, within the abstract genre is beyond the scope of the present study. These rhetorical features of research article abstracts have been widely studied, as with the work of Martín-Martín (2003; 2005) that extensively elaborates on the rhetorical differences between research article abstracts written in English and Spanish. Moreover, since translators are reluctant to make changes to the global organisation of texts (Hoey & Houghton, 2001), the exploration of translation-induced rhetorical changes seemed difficult to evaluate within this thesis as it was initially structured.

Once the features of non-translated SL and TL texts were determined, I carried out a translation experiment with three groups of advanced translation trainees from Chilean training institutions. Each group was divided into a control group who used Microsoft Word and no TM software, and an experimental group who used SDL Trados Studio. The source texts used were independent article abstracts published in English journals to be translated by

the informants into Spanish, their native tongue. In an effort to identify differences in terms of textual and syntactic features, the resulting translations were then compared to non-translated source and target language texts from a previously built and analysed corpus. In attempting to understand the workings of highly specialised texts such as scientific research articles, it is crucial to consider the views of the readership of specialised translation. In this context, in a translation reception survey, I consulted 13 native Spanish-speaking scientists regarding translations produced by students in the translation experiment and non-translated Spanish texts. I designed a questionnaire that was then used by the informants to evaluate the translations. Each informant was asked to evaluate five different texts, including translations and texts written originally in the TL. However, the respondents were not aware of the fact that some texts were translations and others were not. Answers were later correlated with variables such as the informants' self-perceived English language proficiency, their degree of experience in their field of expertise, and whether they were able to distinguish between a translation and a text originally written in the TL.

The nature of the methodology devised to answer the research questions required the use of mixed methods, producing a combination of both quantitative and qualitative data which strengthened the validity of the current study.

Thesis outline

Chapter 1 is the most extensive chapter of the thesis and presents a review of the literature on topics that are relevant to the present study in that they frame its motivation and conduct: translation and technology, translation tools, translator education, translation evaluation, and translation reception. In the first part of the chapter, I review the academic discussion around the interaction between technology and translation. The first topics discussed in this section include the consequences of our inevitable dependence on technology and the lack of

attention previously paid to how material artefacts affect and have changed human activities such as translation. In the last part of this section, I refer to the manner in which technological advancements, such as ubiquitous machine translation (MT), can affect the position of English as a lingua franca and the recognition of human agency in translation, among others.

In the second part of Chapter 1, I discuss the different approaches to categorising electronic tools for translation: the function(s) they are assigned in the translation process, the level of automation they bring about (CAT versus MT), the stages of the translation process in which they are used, and whether they have been designed for general purposes or for translation specifically. I then discuss translation memory. I start the discussion by providing a definition of TM and the distinction between "formal translation unit" and "cognitive translation unit" made by scholars in relation to the way TM systems divide text (Dragsted, 2006; Melby & Wright, 2015). I go on to discuss the way TM changes the "natural" translation process, and how it may increase linguistic interference in target texts (TT) and affect their cohesion and textual coherence. This section also touches on the need to train students to reflect critically on the effects of TM, and on how, with the advent of neural MT, the combined use of TM and MT is both changing the role of the human translator and obscuring the distinction between CAT tools and MT.

In the third part of Chapter 1, I discuss translator education, theorised in Holmes' (1988) map of the field as a branch of "applied translation studies". I provide an account of the evolution of translator training, from objectivist, instructivist, teacher-centred approaches to postmodern, constructivist, student-centred views, in line with the developments of learning theories such as social constructivism, student-centred curriculum, and situated learning. Moreover, I touch upon the need raised by scholars to establish a cyclical relation among professional practice, translation research, and translator training (Gile, 1995; Orlando, 2016). I then examine the role of technology in the translation classroom, and how

the incorporation of technology into training has been dealt with in the Chilean context. Finally, I review the literature on *translation competence*, a complex, multi-faceted notion of what makes someone competent in translation, conceptualising an individual's progress from "novice" to "expert" (Chesterman, 2000).

The fourth part of Chapter 1 deals with translation evaluation, or what constitutes quality in translation. I discuss the approaches to translation quality assessment taken in T&I Studies, and how quality is measured and treated in translator training and the translation industry. Criticism of the traditional approaches to translation quality has been salient in recent scholarly work, and mostly refers to these approaches being purely product-oriented. Scholars now posit that this is not productive in translator training, and call for a rather process-oriented approach where quality is appraised against clear learning objectives and expected outcomes, and where the constraints of the industry are considered and incorporated in the evaluation of students' performance (Orlando, 2011; Galán-Mañas & Hurtado Albir, 2015). If evaluation should focus on the process, rather than a translation product, I argue that insights from the users of translation would be a valuable factor for developing and evaluating the competence of trainee translators. Finally, I incorporate into the discussion the most recent views regarding quality assessment of MT output.

In the last part of Chapter 1, I review the literature on translation reception in order to provide justification for the translation reception study included in this thesis. Although translation reception can be examined at the wider social level, the translation reception study presented in this thesis looks primarily at the effects of TM-mediated scientific translations on real individual readers, in particular their response to and assessment of translations. Nevertheless, in the concluding chapter, I comment on the potential consequences of these effects at the broader level of the scientific discourse community and society as a whole. Moreover, I conclude Chapter 1 with an overview of Chesterman's (2007) framework of

"expectancy norms", which allows translation effects to be explored in terms of *reactions*, *responses* and *repercussions*. I argue for the need to incorporate the final users' views in translator training to help future graduates to make better, evidence-based decisions.

Chapter 2 presents the first stage of my doctoral research project: a corpus-based study aimed at examining the textual and grammatical features of English and Spanish research article abstracts in the field of conservation biology. By way of introduction, I review the comparative approaches to the study of translation, contrastive analysis, contrastive rhetoric and cultural orientations in general, and the comparative work carried out in the English-Spanish language pair for translation purposes. I refer to the way in which knowledge resulting from linguistic comparisons has been used in the teaching of languages and the development of alleged "scientific methods" for translating. I also address the criticism this approach has received, and address how the shift from linguistic comparison to the comparison of cultural orientations can be useful in the analysis of scientific translation and its reception. I focus on what scholars have traditionally identified as the most salient difference between English and Spanish: the tendency of English to favour shorter, independent sentences (parataxis), and the preference in Spanish for complex, subordinate sentences (hypotaxis). This general difference at the syntactic level is used as a starting point for the study of the two languages in a more restricted context of use such as scientific discourse.

In the second part of Chapter 2, I explain the methodology for the first stage of the project: the design, compilation, and analysis of a comparable English/Spanish corpus of research article abstracts in conservation biology. I discuss how corpus linguistics can be useful to study the patterns of authentic, non-translated texts, and how these patterns vary between English and Spanish in abstracts as a text genre. In explaining the criteria used to select the text samples, I briefly discuss scientific discourse, the research article, and the

abstract as a distinct text genre, and refer to the debate about whether scientific discourse is discipline-specific or culture-dependent, a topic that becomes prominent in the translation reception study in Chapter 4. I also explain how I parsed the corpus using the Universal Dependency (2018) framework. I go on to explain the corpus-driven approach used to find differences between English and Spanish in terms of *syntactic dependencies*, and how, if the appropriate tools were available, *syntactic complexity* analysis might have helped to confirm or reject the differences between the languages described in the introduction to this chapter. In the final part of Chapter 2, I present the findings yielded from the analysis of the comparable corpus in terms of syntactic dependencies, and the conclusion to the corpus-based study.

Chapter 3 presents the second stage of this research project: the translation experiment with Chilean undergraduate trainees. The aim of this study was to compare the English-to-Spanish translations produced by the informants to their source texts and a non-translated sub-corpus in order to find out if the segmentation feature of TM systems encourages syntactic interference from the SL to the TL. Since the predicted effects of TM on translation have been previously studied in terms of *linguistic interference*, in the introduction to this chapter I review the literature on cross-linguistic influence. Here, I map the evolution of the concept of "linguistic interference" to "linguistic transfer" to "cross-linguistic influence". I examine how it has been approached in second language acquisition and in T&I Studies. The second part of the chapter describes the methodology used in both the pilot study and the full-scale translation experiments, including details of its administration and the profile of the participants. In the last part of this chapter, the results of the full-scale experiment are presented in a detailed manner.

Chapter 4 explores the implications of the results of the translation experiment in the way TM-mediated translations are received and appraised by their final users, in this case

Spanish-speaking scientists in the area of conservation biology. I introduce the translation reception study by foregrounding the centrality of the reader in the successful production of a translation, and provide support for the inclusion of the views of users in translator training and translation evaluation. I then present the aims and methodology of the study, and provide justification for the use of questionnaires to elicit evaluative information from translation users.

The next section of Chapter 4 presents the demographic and categorical data, including the respondents' profile (country of origin, academic experience in the field, and area of research) and the informants' language competence (proficiency in English and the language in which they mostly read and write for academic purposes). Subsequently, I provide a quantitative and qualitative analysis of the respondents' evaluation of texts (translations produced using TM software and non-translated texts). Finally, the evaluation of texts is associated with the demographic and categorical data retrieved in the first sections of the questionnaire and statistically analysed in order to strengthen the validity of the overall results.

Chapter 5 concludes the thesis. There, I discuss the overall results of the study, positioning the thesis within the broader context of current T&I research. I elaborate on the relevance of the results for theory, the translation industry, translator training, and avenues for future research. Given the rapid changes in the field, driven by new technological developments, I survey the latest trends in the translation industry, the profession, and translator training. I consider recommendations for the critical use of technologies in translator education in light of the current training trends, market needs and demands, and the sustainability of the profession in the digital age. I place emphasis on how constructivist and student-centred pedagogical views can help trainers and trainees in the Chilean context to tackle the challenges imposed on the profession by technological developments.

Throughout this thesis, I do not strongly advocate for technology but for the inevitable need to acknowledge its benefits and drawbacks. I explore the impact of technology in translator education in Chile and its potential effects on the reception of scientific translation. Moreover, I look for ways in which technology can be best taught and turned into an instrument of life-long learning. To this end, in the following chapter I set out to provide a review of translation technology and translation memory, within the context of translation education, evaluation, and reception.

CHAPTER 1:   Literature Review

Since the present research project deals with a CAT tool, CAT tools in general and TM software in particular will be conceptualised in the broader context of the relationship between translation and technology. A discussion of the approaches to translator education will shed light on the position held by TM systems and CAT tools in the context of translator training in general and in the Chilean context in particular. Following this, a review of the literature on translation competence will highlight what the results of this project reveal about the development of translator competence in the student participants. The subsequent section will discuss translation evaluation in order to contextualise the two strategies of translation evaluation undertaken in this project: the corpus-based study and the translation reception study. Finally, a review of the research on translation reception will highlight the relevance of this project for the study of the reception of non-literary translation.

1.1.   Translation and technology

Cronin (2013) undertakes a thorough analysis of the social consequences of our dependence on technological tools, and the radical and undeniable change of circumstances in which translation occurs. He draws the attention of those involved and interested in translation and calls them "to watch carefully what is happening to translation in the digital age" (p. 1). Cronin positions his reflection in the context of digital humanism, an area of scholarly enquiry aimed at critically examining the impact of the interaction of society and culture with the digital, without necessarily advocating for technology. He argues that "[h]uman presence in the world can only be understood through and in the context of the made objects that mediate human existence" (p. 9). Therefore, the advancement of such a social but physically

limited species as humankind has been dependent on the tools that it has come to create as much as the human-tool symbiosis has allowed humanity to evolve.

Cronin (2013) draws a parallel between the invention of the printing press and today's massive demand for translation to highlight the significance of the media for the dissemination of ideas, since "the afterlife of the text, dependent on...the artifacts of 'ink and paper', relies also on the tool of language, and, by extension, translation, for its ability to reach 'readers' in a different time and space" (p. 22). Put in the context of the digital age, this allows for the linguistic diversity we can see represented today in Google Translate, to give an example. Given the endless varieties of outputs which are possible due to the "convertibility" of technological media, translation serves as a metaphor for the flexibility of technology. Therefore, Cronin suggests that the digital age is actually the translation age, and thus disregards the utilitarian view of translation, as simply a tool used to fulfil a specific purpose, put forward by the functionalist theories of translation.

In a provocative paper, Karin Littau (2016a) calls the T&I community to engage in a debate on the interaction between technology and translation, since, she argues, the "overly anthropocentric emphasis on mind, consciousness, language, meaning, discourse, critique, etc." in the humanities and social sciences disregards the material conditions that make cultural practices such as "reading, writing, [and] translating" possible at all (p. 84). This lack of humanistic enquiry into the "materialities of communication" signalled by Littau might be the cause of the widely extended belief (and hope) among translators and scholars that machines will never overtake human translators. In this regard, Austermühl refers in 2001 to MT, an automated translation tool that is nowadays catching the attention of the translation industry and research community, and points out that "since MT systems neglect the communicative, cultural and encyclopedic dimensions of translation, it is questionable whether they provide 'translation' at all" (p. 1). Although we all may agree on the

distinctiveness of human communication as the primary driving force for translation, the documented increase to date in the use of MT may render Austermühl's previous assertion somewhat naive as to whether the outcome of MT can be considered as "translation", at least from the point of view of translation commissioners and users. It thus may not come as a surprise if the latest (and future) advances in MT systems eventually bring about a change of paradigm as to how the whole concept of translation and the role of the human translator are to be conceived and understood.

Based on the premise that "time, critical mass, and cost are [the] factors informing the organization of translation as an activity", Cronin (2013, p. 3) observes that digital technologies have linguistic, economic, political, social and cultural consequences, which, at the same time, have transformative effects. The use of digital translation tools, such as MT, reduces production costs by making translation less dependable on humans, the most expensive resource in a company. MT also requires the use of controlled natural languages in order to improve and optimise the translational outcome, and if this practice and MT became widespread, the way original texts are written would inescapably change. Another example of the impact of technology is how the use of TM encourages the reuse of previous translations to the detriment of new contextualised translation choices, perpetuating errors and further disseminating linguistic influence that results in hybrid language.

One social effect of digital technology in translation is the sense of instantaneity that free online MT engines such as Google Translate or DeepL may produce, with their users failing to acknowledge the translator's agency and the fact that MT is paradoxically based on human translation. A political consequence of the use of technology might be the fact that today's vast need for translation and the extensive use of English as a lingua franca mean that English is used by non-native speakers and, consequently, is influenced by their native languages. Thus, English becomes a complex instrument of communication that results in a

hybrid that, together with the ubiquitous availability of cheap MT, ultimately weakens the position of English as a lingua franca. This is reaffirmed by Bowker (2002, p. 12), who argues that "[w]hile it was once feared that the English language would dominate the marketplace, many companies are actually finding that failing to translate results in a loss of international sales", especially considering the "massive increases in content" and the increased number of "different kinds of texts" (Drugan, 2013, p. 183). Along the same line, in addressing the impact of technology and globalisation on the English language, Taviano (2013) contends that "the traditional notions of texts written in a clearly identified language and addressed to a specific culture and readership are no longer valid", since in the age of technology and globalisation, translation from and into English implies negotiation between a variety of "rheotical and discourse norms" that reflect different cultural and linguistic values. Therefore, "the notion of the native speaker is now being heavily questioned", as translation out of the translator's mother tongue is gaining ground despite the norms of the industry that dictate otherwise. This, Taviano argues, must be addressed in translator training, as the rhetorical norms of English are being forced upon other languages through translation (Bennett, 2013). This issue is discussed further in the thesis in relation to translation evaluation and translation reception.

Littau (2016a) points out that the omnipresence of technology in our daily lives demands that we look into the effects of technology that have already taken place. She argues that "technology is a rechannelling, or mediation, of laws of nature", implying, contrary to Cronin's position, that technology could go as far as becoming a model for thinking. The translator would hence be "part of a material, medial and technologized ecology that shapes every aspect of mind". This is, according to Littau (2016a, p. 86), a "displacement of one medium by another", or the displacement of language by technological media as a modelling system for interpreting the world. To embrace technology in this way, as central to cognitive

processes, poses the following question: Will translation ever make the full transition from machine-assisted human translation or human-aided machine translation to fully automatic high quality machine translation?

One major issue that emerges in the debate over the relationship between translation and technology is the question of agency in translation. Olohan (2011) posits that, even though the use of technology is extensive in both the practice and teaching of translation, little attention has been given to the relationship between the cognitive factors that drive translators' choices and the influence that technological tools may have on translation decision-making. Dragsted (2006) and Pym (2011) warn about the effects of distributing the cognitive load of translation work, previously assigned primarily to the human translator, among the translator(s) and supporting technological tools such as the computer. In this regard, Bundgaard et al. (2016, p. 106) point out that, since translators are less in charge of translation, they "are being pushed towards the periphery of the translation profession". Cronin (2013, p. 62) highlights the fallout from current translation practices such as crowdsourcing, wiki-translations, fan translation, and remote translation management, and draws attention to the consequences of "split agency", or distributing the workload among the different individuals contributing to a single translation project.

All instances of the intersection of technology and translation referred to by the cited scholars suggest that studying digital technologies can provide us with a better understanding of what translation is today (Cronin, 2013, p.63), and shed light on how the non-human agents have changed the configuration of translation (Littau, 2016b, p. 923). Particularly, this thesis will contribute to the understanding of the effects of TM systems on the quality of students' translations as perceived by the end users of scientific translation.

1.1.1. Translation tools

Austermühl (2001) notices three approaches to categorising electronic translation tools. The first model is based on the functions that each tool performs, as in Melby's "translator workstation". The second is that which classifies tools in terms of "the degree of automation that they introduce to the translation process" (p. 9). And the third one is Austermühl's own model, based on the utility of each tool to the different stages of the translation process. In this model, electronic translation tools are subdivided into those which assist the management of the translation workflow (for example, communication among those involved in the translation process such as translators and clients) and those that support the actual linguistic and cultural transfer. Within the proper translation process, Austermühl (2001) distinguishes three phases: reception (retrieval of missing and conceptual information to understand the ST), transfer (linguistic and cultural comparative analysis), and formulation (production of the TT). Therefore, he subdivides electronic translation tools according to which of these phases they contribute to.

Bowker (2002, p. 4) points out that two distinctions should be made in translation technology: machine translation (MT) and computer-aided translation (CAT) tools, and defines both of them in terms of agency or the responsibility for the translation work they imply. "In MT, the computer translates the text, though the machine output may later be edited by a human translator". However, "[i]n CAT, human translators are responsible for doing the translation", with CAT being defined as the electronic tools or software that "help the [translators] complete [the translation] task and increase their productivity". In other words, CAT would not involve artificial intelligence but would assist human translators in their work. Nevertheless, both MT and CAT have had an impact on the translation profession, changing the way translators work in areas ranging from the time necessary to meet deadlines to the degree of quality of the translation product. These changes in the

translation profession and industry become particularly true with the increased quality of MT output brought about by the development of statistical machine translaiton (SMT) and the recent advent of neural machine translation (NMT).

Similar to Bowker, Alcina (2008) asserts that the most basic classification of translation technology is that dividing computer applications between MT software and CAT tools. Yet she points out that the continuous development of translation technology and the growing number of new tools and resources have produced further subclassifications. She summarises the criteria used to subdivide translation technology as "the degree of automation in the translation process", "the point at which the tools are used in the translation process", "the level of knowledge about computing required", "their relationship to translation", and "the dimension of translation to which the computer tool is applied" (p. 81). Alcina then argues that "the need to combine computer processes and tools with those used to translate, together with their continuous development, has given rise to a new discipline known as **translation technologies**" (p. 80, emphasis in original), and puts forward the criteria to be considered in defining, structuring and delimiting this proposed new academic field.

Alcina (2008, p. 90) defines "translation technologies" as "the field of study that deals with the design and adaptation of strategies, tools and technological resources that help make the translator's job easier, as well as facilitating the research and teaching of such activities". In this definition of the field, a distinction is made between *tools*, or "the computer programs that enable translators to carry out a series of functions or tasks with a set of data that they have prepared and, at the same time, allows a particular kind of results to be obtained" (p. 94), and *resources*, or "all sets of data that are organised in a particular manner and which can be looked up or used in the course of some phase of processing". Alcina then sets to classify technological translation tools and resources based on the following subdivisions: (a) the translator's computer equipment, (b) communication and documentation tools, (c) text

edition and desktop publishing tools, (d) language tools and resources, and (e) translation

tools. As is evident in the proposed categories, Alcina makes a distinction between material

tools (the translator's computer equipment) and computer software. In the case of language

tools and resources, they can assist translators in completing their task but are not strictly

translation tools; that is, they have not been specifically designed for translation. Concerning

the last subdivision, translation tools, they would not be strictly necessary to carry out

translation work, but it can be argued that the current working environments and the demands

of the translation industry dictate that translators must be fairly proficient in the use of these

sophisticated tools in order to be employable.

Alcina's proposal, which builds upon previous classifications, provides a

categorization of technological tools and resources that is flexible enough to continue adding

new ones, such as subtitle editors and cloud computing, or subtracting those that become

obsolete with new technological developments. Within this framework, a tool that is touched

upon in this research project is the personal computer in general, since it is integral to today's

professional translation environments; it is its interface with the translator (and user in

general) that allegedly causes transformative effects on cognition and practice. Nevertheless,

the CAT-MT distinction initially observed by Bowker (2002) is being contested by the recent

developments in translation technologies, since the integration of MT into current TM

systems is obscuring the boundaries between the roles of the translator and the machine, a

phenomenon that scholars call "the blurring of technologies" (Doherty, 2016; Kenny, 2020;

O'Hagan, 2020).

1.1.2. *Translation memory*

One electronic translation tool that is of particular interest to the present study, and

consequently requires further discussion, is translation memory (TM). TMs are databases

which store chunks of ST–usually delimited by punctuation—and their translations in order to speed up the translation process of related-subject texts by "remember[ing] the content of past translations" (Melby & Wright, 2015, p. 662). The program searches for ST chunks that fully or partially match the text chunk being translated. If a match is found, the translator is provided with a translation suggestion they can either accept or reject; that is, the new translation is being informed by translations carried out in the past by the same or other translators (Carl & Planas, 2020). The reutilisation of previous translations is believed to increase productivity and terminological consistency (LeBlanc, 2013); however, the benefits of the use of TM software will be relative to the degree of repetition or matches between the segments stored in the TM and the new text being translated. Indeed, Pym (2020, p. 439) refers to the assumption of increased productivity of TM as "promotional discourse".

In TM, the chunks of text are called segments, and "the process of dividing text into segments…is called 'segmentation'" (Melby & Wright, 2015, p. 662). In order to ease the interaction between the translator and the TM, TM systems have a graphical interface that separates the ST from the TT in two different windows (Carl & Planas, 2020). More recent systems include a variety of features that allow the translator to perform additional tasks such as "concordance search, terminology management, quality assurance, [and] alignment" (Zaretskaya et al., 2018, p.53).

For TM purposes, segments are termed "formal translation units". However, a distinction is made between formal translation units and the "'stretch of source language' on which the translator focuses during the cognitive translation process" (Malmkjaer, 1998, p. 373, as cited in Melby & Wright, 2015), or the "segment that is limited by the capacity in working memory and identifiable through pauses in the translation process" (Dragsted, 2006, p. 445). This is a very important distinction to make since there can be a disagreement between the extent and focus of a formal translation unit (or segment) and the human or

cognitive translation unit (Melby & Wright, 2015). Because the "retrieved segments have a coercive effect, prompting the translator to use them even if the conceptual reality of the TL might dictate otherwise" (Melby & Wright, 2015, p. 663), it can be inferred that enforced sentence-based segmentation changes the "natural" way the human translation process occurs. Moreover, since languages segment texts and delimit sentences in different ways, it may be argued that the use of TM software could encourage the translator to partition the TT following the norms of the SL.

Based on theories of cognitive psychology and working memory, Dragsted (2006) argues that this unnatural focus on the sentence affects translation both as a process and a product. In her study, she compares translations with and without the use of TM, and concludes that the interaction between human translators and TM systems, and the unnatural focus on the sentence, change the translation process in that translators spend more time on revising each segment while translating. Consequently, the time spent on the final revision is reduced, lessening the importance of the post-translation stage. Dragsted (2006) also stresses that post-translation observations of informants on the translation process lead to the conclusion that translators' awareness of TM advantages and disadvantages is a decisive factor in the number of sentence structure alterations in TTs.

Martín-Mor (2011) goes one step further to investigate the effect of the use of TM systems on both the translation process and translated texts, and observes that TM-translated texts show a higher degree of "linguistic interference". He agrees with Dragsted (2006) regarding the effects TM may cause on the translation process, and observes that the frequency of linguistic interference varies depending on the translation environment in which a TT is produced (with or without TM software). Martín-Mor (2011) contrasts linguistic interference caused by the use of TM in the translation environment against users' expectations, concluding that TMs may affect the readability, cohesion and textual coherence

of translations. Nevertheless, in a more recent empirical study with professional translators only, Bundgaard et al. (2016, p. 106) found that TM systems have a "restraining influence" in that "the translator resists the influence of the tool by interrupting the usual segment-by-segment method encouraged by translation technology." At the same time, they argue that technology has an "aiding influence" which contributes to meeting specific translation requirements (p. 106). Bundgaard et al.'s findings suggest that translator trainers should strive to develop in their trainees a level of awareness and cognitive behaviour that is as close as possible to those achieved by more experienced translators.

Pym (2011) explores the effects of modern technology on memory capacity and, particularly, on the reading and comprehension processes, and asserts that the paradigmatic is frequently imposed on the syntagmatic, meaning that the linearity of a text is "repeatedly interrupted" (p. 2). He adds that the external extension of the capacity to store and retrieve information provided by technology undermines human memory, forcing the translator to work on segment after segment without checking for syntagmatic cohesion. This not only may change the way texts are read but also the way they are produced in the age of electronic language technologies, since "[t]he more technology, the less easy it is to make decisions in terms of linearity, and the less we tend to see translation as communicating between people" (pp. 3-4). Pym's view seems to be in line with those of Dragsted (2006) and Martín-Mor (2011), in that the three of them signal the implications of technology in general and of TM in particular in the process of translation and, eventually, in the translation product.

Earlier in 2005, Bowker warned about the uncritical attitude of translators towards the proposals of TM systems which undermine the quality of the translation. She suggests that more training for novice translators is needed in the appropriate use of translation technology to "question the suitability of the [decontextualized] TM's proposals" (p. 19). In the same vein, Dragsted (2006) suggests the need for adjusting the segmentation system to agree more

with the cognitive translation unit, and recommends that student translators should use TM with caution and be made aware of the potential negative effects of translation technology. Additionally, Martín-Mor (2011) proposes further research to determine whether appropriate training for novice translators in the use of translation technology would enable them to avoid the unwanted effects of the use of TM.

From the findings cited above, it can be inferred that there is a great need to investigate how to make student translators aware of the interference phenomenon and train them to use translation technology wisely, favouring a more natural translation process and reaching better translation standards. It is in this area that this thesis intends to contribute. Given the "blurring of technologies", the discussion appears to have moved on to analysing MT, focusing on issues such as pre- and post-editing and, most recently, the development of NMT systems based on the use of large neural networks. As a result, scholars are now calling for the inclusion of the development of "technology literacy" (Drechsel, 2019) and "machine translation literacy" (Bowker, 2019) in the training of translators and interpreters. The growing demand for translation, together with the fact that MT is based on human translations and that it usually requires pre- and post-edition carried out by humans, seems to support Bowker's (2002, p. 4) assertion that "[a]lthough advances in machine translation continue to be made, for the foreseeable future at least, human translators will still have a large role to play in the production of translated texts". This is reaffirmed today by scholars who suggest that translators should use MT in their favour and enhance their skills beyond linguistic competence (Schäffner, 2020), and act as "intercultural consultants" (Way, C., 2020) or "language-services advisors" (Melby & Hague, 2019). Such consultants would not only keep abreast of the latest translation technologies, but would also make use of their distinctive human skills, such as "intuition, creativity and ethical judgment" (Massey & Ehrensberger-Dow, 2017, p. 303), to tailor their services to clients' needs and expectations in

scenarios where these skills can be of particular value (Koskinen, 2020). This view is shared

by technology-aware translation practitioners, who believe that translators should now

become "students of human nature and culture" or "anthro-linguistics", who can "make sure

that the soul of the context is properly conveyed", "ensuring that the result is well-

understood" and that "it maintains the same cultural spirit as the source" (Shitrit, 2019).

Similarly, the need for human intervention in MT is well recognised by the industry, as

declared by DeepL's CEO, Jaroslaw Kutylowski, who asserts that the translator's role today

consists of applying "their specialist knowledge to deliver a final product far better than what

can be achieved by either human or machine alone", and that "this synergy of highly-

educated professionals and a top-of-the-line tool like DeepL is currently the gold standard in

translation" (Faes, 2019).

If there were no need for human translators, it would make no sense to put our efforts

in improving translator training or developing strategies to improve translation competence in

students, which is the principal concern that drives the present study. Despite the growing

number of technological developments and, particularly, the breakthrough that MT has

achieved recently, this thesis only focuses on the use of TM software by undergraduate

translation trainees in the Chilean context. Nevertheless, the literature on translation and

technology here reviewed serves to put the use of TM in the wider context of translation

technologies, and to highlight how the translation landscape has evolved from the outset of

this research project until its completion.

1.2. Translator education

Although the present work deals with technology, the overall objective of this research

project is to contribute to the improvement of translator education in Chile. The terms

translator training and *translator education* are often used interchangeably; however, Kelly

and Martin (2020) argue that the use of "training" implies a market-oriented or vocational approach, whereas the use of "education" suggests that the acquisition of skills occurs in the broader social context of higher education. Similarly, Bernardini (2004) asserts that training involves the application of cumulative knowledge to specific tasks in the area in which one is being trained, while education entails a view of learning as "a generative rather than cumulative process"; that is, education produces knowledge that can be extended infinitely and applied to a wide range of new situations. In this thesis, I use the term education in the sense suggested by Kelly and Martin (2020), since I myself operate in the context of translator education at the university level. Moreover, I hold on to Bernardini's (2005) definition of education, since I believe that in the fast-growing, ever-changing professional landscape of translation and, particularly, in the heterogeneous educational context of Chile (which I describe below), we should train graduates who are capable of reflecting on their practice, self-learning, and adapting to new working conditions. However, I use the term training throughout the thesis to refer to practical skills and discrete or more focused areas of education. This being said, a discussion of key issues concerning the training and education of translators (and interpreters) is paramount to analyse the influence and implications of technology in the teaching and learning of translation.

Considering the foundational map of the discipline proposed by James Holmes (1988), translator education (curriculum design, teaching methods, and evaluation) would fall under, and constitute the major area of, the branch of "applied translation studies". Along the same line, Colina and Angelelli (2016, p. 108) add that "[a]pplied research is conducted directly on issues related to teaching, learning, or testing, in classrooms or virtual environments, on persons, materials, or activities, with the goal of having a direct impact on pedagogical practice". The research questions of interest here involve the nature and acquisition of translation and interpreting competence, the learning stages and factors

affecting acquisition, and the impact that teachers' and students' attitudes have on the teaching and learning of T&I (Colina & Angelelli, 2016).

T&I has borrowed perspectives on teaching and learning from theories that "debate the nature of knowledge, ranging from objectivist, modernist theories to more recent postmodern, constructivist approaches, which see knowledge and learning as essentially dialogic, constructed in social interaction, rather than as objective reality that can be transmitted." (Colina & Angelelli, 2016, p. 109). Therefore, T&I training practices, in terms of curriculum design and teaching and evaluation methods, have been associated with different approaches and have evolved on a par with developments in fields such as "psychology, sociology, and educational theory" (Colina & Venuti, 2017, p. 203).

As has occurred in education and training in other fields, T&I "pedagogy has evolved from a teacher-centered to a learner-centered model" (Colina & Angelelli, 2016, p. 108). Research in T&I pedagogy has shown that until two decades ago, teaching was mainly informed by the teacher's own intuitive observations, where knowledge was seen as objective and possessed by the instructor, who in turn was to pass it on to the student (Colina & Angelelli, 2016). Consequently, teaching was hardly ever based on empirical research (Colina & Angelelli, 2016). Instead, the focus was placed on translation as a product with learning viewed as achieved mainly by translating (Orlando, 2016), and these "anecdotal and asystematic" approaches "reflect[ed] an intuitive inclination to teach as the teacher was taught" (Colina & Venuti, 2017, p. 203). In this respect, Kiraly (2000) suggests that the idea of the teacher as an expert owning and controlling knowledge derived from the transmissionist model has been responsible for the lack of pedagogical training of T&I instructors, which has resulted in teaching practices that do not prepare the graduate for work in the real world.

Research into the cognitive aspects of T&I has informed pedagogy in the field in the last two decades, with an emphasis on the differences between the translation/interpreting processes of practitioners and students (Colina & Angelelli, 2016, p. 111). Early studies in cognitive processes originated in the area of conference interpreting, and theoretical contributions to pedagogy comprise concepts such as "working memory constraints" and the distinction between "declarative memory" and "procedural memory" (Angelone et al., 2016, p. 44) to understand how T&I competence could be developed in formal education. Adding to early studies using think-aloud protocols, new research methods such as keystroke logging, eye-tracking, and retrospection are now being used to carry out research in areas such as writing processes and the "translation processes in student and expert translators" (Colina & Angelelli 2016, p. 112). Similarly, some scholars (Bowker, 2005; Pym, 2011) have called attention to the effects of technology on the student translator's cognition, with studies (Christensen & Schjoldager, 2016; Dragsted, 2006; Martín-Mor, 2011) suggesting changes in the natural translation process when the translation task is mediated by TM systems. Recent trends in the study of cognitive processes involve the post-editing of MT with a view to analysing the human-machine interface and comparing human translation processing and MT processing (Angelone et al., 2016, p. 50).

From the perspective of second language acquisition, the interest in the 1990s and the following decade was in topics such as "the nature and relevance of communicative translation pedagogies...the nature of translation competence…and the effects of translation directionality", with calls for "a more scientific and theory-driven approach to training...by several scholars whose training models were developed directly from a more cognitive, process-oriented paradigm" (Orlando, 2019, p. 218). At the same time, translation pedagogy saw contributions from functionalist approaches that provided students with clear instructions for every specific translation commission (Colina & Angelelli, 2016), and where the focus of

translation activities was no longer placed on linguistic equivalence but on communication and on producing a text that could function appropriately in the target context (Schäffner, 2009). Learning activities were then student-centred and focused on translation as a process rather than a product, with teaching intervention in the classroom still being significant (Kelly, 2005).

The shift of the focus of translation teaching and learning from the teacher onto the student paved the way for a movement in the direction of *situated translation*, which aims to empower learners as the agents of their own knowledge-construction process. T&I pedagogy has thus drawn on notions such as Vygotsky's social constructivism and Nunan's student-centred curriculum, and on "scholarly discussion of teaching objectives, goals and assessment" (Colina & Angelelli, 2016, p. 109). The works of scholars such as Kiraly (1995), Vienne (1994), and Gouadec (2002) promote situated learning models (Orlando, 2019), or the development of translation skills in environments that are as close as possible to those in which graduates will operate, using authentic materials and learning by experience, so that trainees can transition successfully from the classroom to a professional community of practice (González-Davis & Enríquez Raído, 2018). The situated translation approach remains valid today, especially considering the technologisation of the profession, as is evident in fairly recent publications edited by Kiraly (2016) and González-Davis and Enríquez Raído (2018).

As pointed out by Orlando (2016), both constructivism and student-centred approaches have been influential in the curricular suggestions of T&I authors and in the actual curricula designed by trainers. According to Kiraly (2000), social constructivism proposes that knowledge is "intersubjectively constructed"—rather than replicated or imitated—and that "learning must be socially situated", since knowledge and learning are both dynamic and interactive processes aimed at liberating the future professional "from the

domination of the teacher and from the institution as the designated distributors and arbiters of truth" (pp. 17-18). In the same vein, Orlando (2016) puts forward the notion that the educators' actions should aim to achieve the gradual emancipation of the trainees as self-directed and self-reflective learners, suggesting that "[t]o do so...T&I curricula should follow a constructivist approach and be centred chiefly on the learner/student and take into account problem-solving strategies and metacognitive approaches whereby trainees are given the right academic tools to learn how to reflect on their own practice and learning, or 'learn how to learn'" (p. 15). This implies that trainers fulfil new roles in the education of translators, such as "project coordinator, negotiator, co-learner, collaborator, facilitator and diagnostician" (Washbourne, 2020, p. 597).

A recurrent discussion that relates and is critical to T&I training is the relationship between theory and practice. Mayoral Asensio (2007) claims that "it is more efficient to introduce practical experience of translation before any attempt to theorize", and goes on to argue that, since the boundaries between theory and practice are so blurred, theoretical categories may even be "an obstacle to efficiency" if one is to fully adhere to them (p. 89). Since it is at higher education institutions where translators receive education in the theories of translation, but at the workplace—virtual or physical— where practitioners apply these theories to solve practical problems, it is logical to think that trainers and employers have different expectations of translator education. In this regard, Kelly and Martin (2020, p. 593) point out that there is a disagreement between employers and universities as to how to prepare students for work in the translation industry: employers expect graduates to be trained "in the software of the moment" to satisfy short-term market demands, whereas education institutions aim at "a more long-term knowledge- and competence-based approach". Orlando (2016) persuasively addresses the way to bridge "the alleged gap between practice and research in Translation and Interpreting Studies" (p. 11), advocating for

a cyclical interrelation of practice, research, and training, in view of the proposition that "practice can inform research which can inform training which will in its turn inform practice" (p. 55). Building on Gile's (1995) concept of *practisearchers*, Orlando argues that in order that theory and practice may come together, it is necessary to train future translators and interpreters as practitioners able to "find ways to turn their experience into a more academic form of knowledge, and to conceptualise their basic questions" (p. 55), proposing that training is "the most productive conduit between theory and practice" (p. 67). Therefore, T&I curricula should strive to strike a balance between theory (translation competence) and practice (translator competence), or between "vocational skills and education in the theories of the discipline" (Orlando 2016, pp. 65-69). This would require that T&I trainers be trained as such, since "being a T&I practitioner or/and a PhD holder does not make one a T&I teacher" (Orlando, 2016, p. 82), and teachers would tend to teach as they were taught (Colina & Venuti (2017). This would be particularly necessary in relation to the teaching of translation technology, since many teachers were trained as translators when the technology was still not prominent in the profession (Bowker, 2015), and people usually react against new technologies, "often in the interests of unconscious or perceived self-preservation" (Li, 2012, p. 93).

The current discussions on T&I education suggest that a collaboration of theory/research, practice/industry, trainer training, and technology is needed to adapt to the actual current needs in T&I training. In relation to technology in the T&I classroom, Kiraly (2000, p. 126) points out that "[t]he very fact that each student has immediate and direct access to a complete set of electronic tools obviously promotes the integration of extensive hands-on experience in the classroom." Similarly, Li (2012, p. 93) observes that the changes in the translation industry "have not yet been fully reflected in the training of translators, who need to develop appropriate skills and knowledge in information and communication

technology to satisfy the requirements of their prospective employers." Nevertheless, it is important to consider that, in the translation classroom, electronic translation tools are not only the object of study but also an element that mediate the acquisition of knowledge and the development of translation and translator competencies. In this regard, Orlando (2016) calls for attention to how technology should be addressed in the T&I classroom, and argues that "future graduates need to be exposed to some of the theories underlying current developments in T&I Studies and be introduced to research principles so that they can reflect on their practice and the processes at stake" (p. 69). Along the same line, a large number of recent pedagogical initiatives advocate for the inclusion of digital competencies in translator training, highlighting the need for technological training to go beyond the instrumental (Kenny, 2020), so that future graduates are able to adapt to the fast-growing number of, and advances in, translation technologies (Hurtado Albir, 2019; Nitzke et al., 2019), and dissipate their fear of being replaced by MT (Nitzke et al., 2019; Melby & Hague, 2019, Way, C., 2020). This implies that students ought to be trained to fulfil newly created roles in the industry (Angelone et al., 2020; Way, C., 2020) and in the practicalities, underlying models, and research of MT and pre- and post-editing of MT output (Kenny & Doherty, 2014; Doherty & Kenny, 2014; Koponen, 2015; Mellinger, 2017; Moorkens, 2018; Buysschaert et al., 2018).

1.2.1. *Translation competence*

In the attempt to find out how translation is best learned and taught, we first need to answer the tricky question of what makes someone competent in the practice of translation, i.e., what has been termed by a number of scholars as *translation competence* (Hurtado Albir, 1999; Beeby, 2000; Schäffner & Adab, 2000; Kelly, 2003; PACTE, 2003; among others). By viewing the ability to translate competently as the centre of translator training, translation is

conceived as something that is different from, and goes beyond, linguistic ability. In the current post-modernist educational paradigm, where learning is seen as the emancipation of students (Kiraly, 2000; Orlando, 2016; Orlando; 2019) achieved through situated learning (Kiraly, 2016; González-Davies & Enríquez Raído, 2018) and where the teacher acts as a guide rather than owning the truth (Kiraly, 2000; Orlando, 2016), scholars advocate for teaching methods that limit purely linguistic training and encourage the development of a number of *subcompetencies* that act interconnectedly and should be assessed not only based on a final product, a translation, but in terms of competent professional behaviour (Hurtado Albir & Pavani, 2018).

  As Schäffner and Adab (2000) put it, it is now a well-accepted fact that translation is a truly complex activity and, therefore, what constitutes competence in translation is not at all easy to identify and evaluate quantifiably. What is clear, however, is that translation competence can only be assessed in performance (Beeby, 2000, p. 185). As the competence to perform a task requires both knowledge and skills, translation competence is usually broken down into a set of sub-competencies which are studied either in isolation or all together, and which require basic expertise that includes "at least knowledge of the languages, knowledge of the cultures and domain-specific knowledge" (Schäffner & Adab, 2000). The term competence is, thus, used to encompass the combination of a set of other concepts and qualities, such as *knowledge*, *skills*, *awareness*, and *expertise* (Schäffner & Adab, 2000, p. x), and has been studied from two different perspectives: the translational product and the translation process. In terms of training, two questions arise from the recurrent product-process dichotomy: can the final product of the performance, the translated text, be indeed taken as evidence of translation competence? Otherwise, can the development of translation competence actually be quantified through the translation process? (Schäffner & Adab, 2000).

Based on Dreyfus and Dreyfus's (1986) five-stage model of skill acquisition, Chesterman (2000) refers to human expertise as one in which a person progresses from novice to expert, that is, from a stage in which learning requires explicit information about the features of a skill, to a level in which behaviour is holistic and characterised by a balance between rational and intuitive decision-making, to a point in which intuition "takes over", yet "monitoring behaviour" is still resorted to (p. 79). From this Chesterman concludes that teaching should first occur overtly, then progress to decision-making, then allow trainees to work intuitively but critically should the need for rationality arise. Therefore, the characteristics and roles of the translation teacher and the expert translator would be as follows (Chesterman, 2000, 79):

> A good teacher of expertise might then be defined as an expert who normally exercises a given skill at the level of expertise, but who can access his or her conscious rationality *at will*, when asked, and verbalise about his or her own performance, thus making it accessible to the consciousness of trainees.

> An expert translator is seen as someone who works largely on intuition, on automatic pilot as it were, but who retains the ability to draw on critical rationality when the need arises, for instance in solving particularly tough or unusual problems, or when justifying solutions to the client.

Two models of translation competence influential in curriculum design of undergraduate training programs in the context of Chile are those put forward by PACTE (Hurtado Albir, 1999) and Kelly (2002). Building on Hymes's (1971) concept of *communicative competence*, the PACTE group aimed to develop a model of translation

competence, and in particular a model of how translation competence is acquired, that could be validated empirically (PACTE, 2003). In this model, *bilingual competence* is considered as only one of a number of components of translation competence. In other words, translation competence would not be equal to linguistic competence (Hurtado Albir, 1999). Translation competence is basically procedural knowledge dominated by automated processes, as is the case in all expert knowledge (Hurtado Albir, 1999; PACTE, 2019). Although it originally encompassed six subcompetencies, the model has been revised continuously and now includes five subcompetencies: bilingual, extra-linguistic, knowledge of translation, instrumental, and strategic (including psycho-physiological components) (PACTE, 2015; 2019). Kelly (2002) argues that models of translation competence such as that developed by the PACTE group are useful for pedagogical purposes, since the concept of competence they propose allows curriculum designers to establish the general objectives of a training program, and the subdivision of competence into subcompetencies can help define specific objectives. Similar to PACTE, Kelly (2002) proposes a model for translation competence that is comprised of seven subcompetencies: strategic, communicative (in at least two languages), cultural, thematic, instrumental-professional, interpersonal, and psycho-physiological, with the strategic sub-competence guiding the application of all other subcompetencies. As to the acquisition of translation competence, PACTE (2015; 2019) defines it as a spiral, non-linear process involving the restructuring and development of subcompetencies and learning strategies.

Regardless of the model, the research reviewed here has shown the complex, multi-layered nature of translation competence. It is also clear that translation competence should not be equaled to proficiency in two or more languages, since bilingual competence is, in fact, only one of the subcompetencies that an individual should possess in order to be considered a professional translator. Therefore, it is crucial that this be considered throughout

the duration of the training process, from curricular design, through teaching and learning methods, to evaluation. Moreover, the new roles of translators and the new forms of multimedia and multimodal textuality, dictated by the latest technological developments, demand that the competence framework be redefined (Washbourne, 2020).

1.2.2. *Translator education in Chile*

As Orlando (2016, p. 32) points out, "the differences in views in translator training are often the result of different contexts in which training occurs." In Chile, T&I training programs emerged in the 1970s as an enterprise by modern languages departments (Samaniego, 2017), with most of those involved in training being foreign language teachers and linguists, plus a few T&I practitioners invited to collaborate in teaching. However, in a study of the inclusion of the "instrumental-professional competence" in T&I education in Chile, Micheli (2013) finds that most of the teachers surveyed had been formally trained as translators and/or interpreters (95.55%), and were actual translation and/or interpreting practitioners (80.65%). From this it follows that trainers are familiar with the actual working conditions of the profession and the demands of the industry, as is reaffirmed by Samaniego's (2017) assertion that "Chilean educators are experienced professional practitioners of the trade". Furthermore, Samaniego (2017, p. 143) found in her study of Chilean undergraduate education that teachers "are cognizant of communicative perspectives on translating and translation teaching, as well as socio-constructivist philosophies of learning." Since the 1970s, T&I training in Chile has been provided primarily at the undergraduate level (Diéguez Morales, 2008, p. 330) in four- to five-year courses, which implies that a great deal of the training is devoted to developing foreign language proficiency. Although T&I training is provided at the vocational training level by some "technical training centres", the vast majority of programs are offered at the undergraduate level by universities and professional institutes, with only

one master's degree in English-to-Spanish translation being offered in the country. Samaniego (2017) highlights that there is a significant socioeconomic divide between the T&I student profile in the Central Region of Chile and that of universities in the rest of the country; students enrolled in higher education institutions outside the central metropolitan areas score lower in the University Selection Test, and are usually first-in-family university students.

With regards to the practice of T&I, there are no clear professional standards or guidelines to regulate the profession, as is evident from the fact that the figure of the sworn translator/interpreter is not sufficiently described in the Chilean legal framework. Due to this, one could argue that the field of T&I in Chile, both as a profession and as an academic discipline, is in its early stages of development. Accordingly, this extends to T&I education and to training quality assurance, with no profession-specific standards for T&I against which the quality of vocational and academic programs (and their graduates) could be appropriately measured. The linkages between "the T&I industry, T&I research and T&I training institutions" suggested by Orlando (2016, p. 54) are especially relevant in the Chilean scenario, since, apart from the incipient academic and professional development of T&I, the accreditation processes of several training programs have yielded suggestions precisely related to the weak linkages between training, the training needs of practitioners, and the demands of employers. However, I believe that the current Chilean accreditation system for undergraduate programs, as implemented to date, makes little contribution to the linkage between training and the industry, since it does not give consideration to the specifics of the T&I professions. A quick analysis of the arguments that frame accreditation decisions for different translation programs reveals the need for improved consistency and specificity of the current evaluation criteria.

In my own experience as a faculty member involved in accreditation processes, one of the weaknesses of T&I program accreditation stems from the lack of peer evaluators with an expertise in T&I made available by accreditation agencies. Peer evaluation committees are composed mostly of linguists and foreign language teachers, with one member (if any) usually being a T&I specialist, which is somewhat justified by accreditation agencies by the fact that a great part of the training provided in the programs is devoted to developing foreign language proficiency. My interpretation for this is that (a) a great deal of T&I trainers are inexperienced in peer-evaluation for accreditation purposes, and (b) translation agencies fail to gather a pool of T&I experts most likely thinking that specialists in applied linguistics would suffice. Although the views of peers from closely related disciplines can be of great value, they may be unaware of the specifics of developing translator/interpreter competence. Moreover, if the reviewers are unfamiliar with the actual working conditions of the profession (for instance, how untraditionally the translation industry works in terms of employment), they may form an inaccurate view of how graduates perform in their professional life. As discussed above, one difficulty that adds to the makeup of peer evaluation committees is the lack of evaluation criteria devised specifically for T&I programs. On the website of Chile's National Accreditation Commission (CNA-Chile), it is possible to find criteria for evaluating programs in a number of areas, mainly science, engineering, medicine and pedagogy, but courses in the realm of humanities are still largely neglected. In addition to this, the Ministry of Education has established national standards for the training of a limited number of professions, such as pedagogies, with T&I not being considered whatsoever.

The literature on T&I training in Chile is scant. One study that touches on the topic of technology in the training of translators and interpreters is a master's degree dissertation by Paula Micheli (2013). In her study of the presence of the instrumental-professional

competence (as termed by Kelly, 2002) in T&I education in Chile, Micheli finds that not all training programs have explicit technology components in their curricula, and that those that include them intend to develop general computer competence with very few references to specific CAT tools. However, Micheli's findings show that trainers are aware of this weakness in the curriculum and, consequently, endeavour to include actual teaching practice activities aimed at developing translation/interpreting-specific technological skills. In her view, this awareness and its reflection in the enacted curriculum could be explained by the fact that, as discussed above, most of the teachers surveyed had been formally trained as translators and/or interpreters, and were actual translation and/or interpreting practitioners who had graduated after 1999. From this it can be inferred that, contrary to what the origin of Chilean training programs may suggest, (a) most T&I instructors in Chile would not be foreign language teachers but translators and/or interpreters, (b) trainers are familiar with the actual working conditions of the profession and the demands of the industry, and (c) teachers feel comfortable dealing with technology. Thus, there would be a great need to consider input from the industry in the design of T&I curricula and in teaching and assessment practices, as well as a need to train the trainers in how to use and teach technology in the T&I classroom.

Academic reflection on the teaching and learning of T&I technology has been rare in the Chilean community of T&I trainers. By browsing the programs of the annual National Symposium on the Teaching of Translation and Interpreting, organised by the Chilean Network of Translator and Interpreter Trainers—the only forum for teachers to discuss specific pedagogical issues in T&I in the country—it can be established that few presentations on issues relating to technology have been included in the eight occurrences of the symposium that have taken place so far: one on collaborative technological environments, one on the effects of computer interface in reading comprehension, one on the effects of text segmentation on student translators' cognition, and two on terminology management. If

future translation practitioners are to be prepared to face the challenges of the profession, as a translator trainer one would want to replicate the ever-changing conditions of a real working environment (Orlando, 2016; Kiraly, 2016; González-Davies & Enríquez Raído, 2018; Buysschaert et al., 2018; Melby & Hague, 2019), and encourage students to reflect on the scope and limitations of technology. This is where theory can assist training within a constructivist pedagogical framework, and support the trainees' learning independence from the teacher's authority. Translation is a complex activity, and Orlando's concept of practisearchers seems to be of particular relevance here, since in their professional endeavours future graduates will surely face a myriad of unexpected problems for which they will have to adapt solutions and strategies from their cognitive repertoire that should ideally be supported by both practical experience and theoretical insights.

In the specific Chilean context, there is an evident need for critical discussion among Chilean T&I trainers on how to make the best use of technological tools in the classroom. With universities being the biggest agent of social mobility in Chile, teachers should not only make students aware of, and able to assess, the scope and limitations of technology, but also train graduates who can successfully enter the working world. Meaningful academic conversation would most probably lead to an increase in research in T&I and T&I training produced in the country, as well as encouraging a better linkage between training and the industry and improving the training of translators and interpreters. Hence, this reinforces the need to establish a quality assurance model that systematises input from the T&I industry and includes profession-specific standards for both the training of the translators and interpreters, and the quality control of T&I education. This would eventually help increase the prestige of the profession and develop T&I studies in the country, and by extension, in the region. Morever, quality assurance then takes even greater significance when we take into perspective that, in the Chilean context, higher education has a crucial role in social mobility,

and that, as put by Samaniego (2017), the number of T&I training courses is "enormous" considering the country's small population.

Although a great deal of the latest discussions in T&I studies revolve around machine translation and related issues, such as pre- and post-editing (Doherty & Kenny, 2014; Kenny & Doherty, 2014; Bowker, 2015; Koponen, 2015; Mellinger, 2017; Massey & Ehrensberger-Dow, 2017; Buysschaert et al., 2018; Corpas-Pastor & Durán-Muñoz, 2018; Rodríguez-Castro, 2018; Moorkens, 2018; Gough, 2018; Drechsel, 2019; Melby & Hague, 2019; Nitzke, et al., 2019; Schäffner, 2020; Guerberof Arenas, 2020; Kenny, 2020; Way, C., 2020), the present study is relevant in a training context such as that of Chile, where TM has recently been introduced into the translation classroom, and where training occurs principally at the undergraduate level and mostly with the English-Spanish language pair. The results may spark discussion among the Chilean trainers and academics regarding the implications of the use of technology in the T&I classroom, and be extrapolated to regions with similar characteristics. By the same token, the present work aims to be a contribution not only to the training of translators in technology but to the overall development of translator training, trainer training and competence (as termed by Kelly, 2002), the translation profession, and T&I studies in Chile.

1.3.   Translation evaluation

In reference to the limitations of descriptive translation studies, Chesterman (2007) points out that the mere description of translations does little to help fulfil the needs of society and professional translators; instead, he argues, we need to know "what makes a *good* translation" (p. 169). Chesterman posits that once we start asking *why*, we move beyond descriptivism and are able to tackle the question of translation quality by complementing description with causality. Translation quality is, therefore, a matter of social relevance.

Drugan (2013) asserts that the assessment of translation quality has been a long-held preoccupation in translation theory. However, given the problematic nature of the concept of quality, scholars have not reached to an agreement on one single quality assessment model. Moreover, academic efforts are largely neglected in the profession, with quality being reduced to "editing" or "revision". Conversely, professional models for quality assurance have, to a great extent, been excluded from translation theory, where the traditional focus has been placed on categorising errors from a product-based approach.

Translation quality has traditionally been approached in T&I studies either from a linguistic point of view, where translation is evaluated in terms of ST and TT relationship, or from a functional perspective, where quality is assessed against the impact or function accomplished by the TT. Koby and Lacruz (2017) argue that, regardless of the approach taken, three basic assumptions can be traced in T&I quality research: that the ability to translate is independent of language proficiency, that the researcher is qualified to investigate quality, and that the translation product is inherently flawed. In any case, the answer to the question of what constitutes quality and how to measure it in translation will vary depending on how one conceptualises the nature of translation (House, 2013; Koby & Lacruz, 2017). Different theoretical stances will thus yield different concepts of quality and different methods to measure quality (House, 2013). Furthermore, the nature of each model will depend on its object of assessment—the translation product, the translation process, or translation/translator competence (Drugan, 2013).

Seminal in the topic of translation quality assessment is Juliane House's work (1977, 1997). Although approaches in T&I have not necessarily proposed explicit or complete models for translation quality assessment, House (2013) identifies two major trends: psychological approaches, and text- and discourse-oriented approaches. Psychological approaches can be subdivided into "mentalist views" and "response-based approaches".

Mentalist views are rooted in a hermeneutical approach to translation, based on subjective, intuitive statements on "how good or bad one finds a translation" (House, 2013, p. 359). Translation is here seen as a creative activity, where the translator's own interpretation holds a key role in creating meaning, since "[t]here is no meaning itself; the meaning is, as it were, in the 'eye of the beholder'" (p. 359). Response-based approaches, in turn, feature "behaviouristic views" and "functionalist, skopos-related views". The behaviouristic views are linked to Nida's (1964) concept of *dynamic equivalence* and his work with Taber (Nida & Taber, 1969). Nida's aim was to come up with a set of tests to help evaluators to produce "objective" quality statements about a translation, based on broad concepts such as "intelligibility" and "informativeness" (House, 2013, p. 359). In this view, a translation is expected to produce in its readers a response that is equivalent to the response caused by the ST in its own readers. The functionalist approach is based on the concept of *skopos* or the prospective function a translation will have in the context where it will be received. Translation quality is then assessed against the degree in which the skopos is fulfilled and the TT conforms to target culture norms. House (2013) finds faults in the behavouristic approach, in that the tests embedded in it fail to capture the complexities of overall translation quality. She also contends that skopos theory fails to distinguish a translation from other forms of ST-based text production she terms "versions".

Among the text- and discourse-oriented approaches, House (2013) distinguishes "descriptive translation studies", "post-modernist and deconstructionist approaches", and "functional-linguistic and pragmatic approaches". Descriptive translation studies is a target-oriented approach focused on the "forms and functions" of translation in the receiving culture. The importance of the ST is therefore undermined, and quality is assessed in terms of the effects of "actual translations" in the receiving cultural system, which are in turn objectively described as they are perceived by the members of the receiving culture. House's

criticism of this model lies in the fact that it does not shed light on the relation between source and target texts; that is to say, it does not feature equivalence as a primary concept in the study of translation and, therefore, no distinction is made between translations and versions. Proponents of post-modernist and deconstructionist approaches put forward the view that translation should be assessed from a "philosophical and political stance", unveiling issues of manipulation, domination, and inequality, as in the work of Venuti (1995). Functional-linguistic and pragmatic approaches are those that build on linguistics-oriented approaches to incorporate "speech act theory, discourse analysis, pragmalinguistics and sociopragmatics" into the assessment of translation quality (House, 2013, pp. 541-542). They aim to account for the relationship between texts and "how these are perceived by authors, translators and readers" (p. 542). House identifies herself with the views of quality assessment that make a link between text and context, since, she argues, "the link between language and the real world is definitive in meaning-making and in translation". House therefore places her own model for translation quality assessment within this approach. Regardless of this, Drugan (2013) argues that theoretical models for translation quality assessment have largely neglected professional models for quality, and, in most cases, these models cannot be realistically applied in professional translation scenarios.

Central to House's model are the concepts of *covert* and *overt* translation, the former being a text produced to operate in the receiving situation as if it were an original text, and the latter being overtly a translation. Consequently, in overt translation, the readers are not being addressed, as is the case in covert translation, and although the ST is linked to the SL and its receptors, the translation transcends the ST context to become of general human interest, and is hence not addressed to a particular audience (House, 2013). In the case of covert translation, the TT has the status of an original text, is not marked as a translation, and its source is not aimed at a particular source culture readership. Accordingly, the covert-overt

distinction has consequences as to the visibility of the translator and the responsibilities they are assigned. In overt translation, the translator is visible, since their job is to allow the reader access to the ST and its impact on the source culture and readers, whereas in covert translation the translator is invisible, as she is expected to "recreate an equivalent speech event" in the target situation, and "reproduce in the target text the function the original has in its frame and discourse world". Since functional equivalence is aimed at in covert translation, linguistic and textual manipulation of the original is seen by House as legitimate. In order to achieve functional equivalence, "sociocultural differences in expectation norms and stylistic conventions" between source and target cultures need to be determined by the use a "cultural filter" (House, 2013).

As put by House herself, the concept and methods of translation quality assessment will be dependent on how one conceptualises translation. In her view, translation is "the replacement of a text in the source language by a semantically and pragmatically equivalent text in the target language, and an adequate translation is a pragmatically equivalent one" (House, 2013, p. 542). In order to assess if a translation is pragmatically equivalent to its ST, the function of the TT needs to be determined. The function of a text is defined as "the application or use of the text in a particular context of situation" that is composed of an ideational and an interpersonal component (p. 534). The function of a text serves as the yardstick for measuring translation quality, and is realised by linguistic elements that correlate with situational dimensions and determined thorough linguistic-pragmatic analysis. House's model centres on Halliday's register concepts of *field*, *mode*, and *tenor*. Generally, field refers to the text's topic and its contextual information and level of specificity. Tenor captures information about the participants in communication, and how they relate to each other in terms of emotions, attitudes, social power and social distance. Finally, mode refers to the channel of communication (written, spoken, or other combinations of theses) and the

degree of writer/reader interaction allowed for. To the original model, House (2013) later incorporates the concept of *genre*, stating that "[w]hile register captures the connection between texts and their 'micro-context', genre connects texts with the 'macro-context' of the linguistic and cultural community in which the text is embedded" (p. 543). In the present thesis, the linguistic correlates of translations are assessed against the linguistic correlates of non-translated texts in both the SL and the TL, and against one aspect of register—tenor. Since tenor includes the readers of texts, this study examines how the final users of scientific texts receive, and thus evaluate, scientific translations.

One important point that House (2013) makes that is highly relevant to the present study concerns the impact of the use of English as a lingua franca on the textual norms and conventions of other languages. She argues that in the discussion of the tension between specificity and universality, universality has come to be associated with Anglo-Saxon norms. This, she notes, may mean that the cultural filter that translators apply may not be deemed necessary in the near future. In fact, this thesis aims to discover if the use of grammatical and textual features of the SL,which in this case happens to be English, is imposed on the TT when translation is mediated by TM software. House (2013) thus notes that the global influence of the English language would imply that covert translations would now in fact be translated overtly, as the norms for applying a cultural filter would be modified. This in turn would result in the need for a new translation typology and a redefinition of the concepts of overt and covert translation.

In connecting translation evaluation with reception, House (2013, p. 545) protests that socio-cultural, political and ideological factors tend to be "far more influential [on translation quality assessment] than linguistic considerations or the translator herself", and posits that "[t]he primary concern for translation evaluators remains linguistic-textual analysis and comparison". In a scientific translation scenario, one could disagree with House and argue

that solely linguistic evaluation seems to be rather unpractical. Especially when one translates

for a direct client, the primary evaluator of that translation is the client, who might also be the

receptor. In the case of the translation of scholarly papers, the ultimate evaluators will be

journal reviewers, who do not necessarily know if the text they are reviewing is a translation.

Therefore, the views of intermediaries and final users of translation are decisive in the

circulation of translated texts and their potential socio-cultural impact.

There is established agreement among teachers and scholars that evaluating

translations and translation competence is, to say the least, a complex enterprise (Gile, 1995;

Kelly, 2005; Orlando, 2011; Drugan, 2013). This complexity lies in the fact that there is

series of variable elements involved in evaluation: the objectives of the task being evaluated,

the criteria for assessment, the evaluation methodology, and the assessor(s) (Orlando, 2011).

Thus, in order to deal with this instability, learning (and translations) should always be

assessed against the objectives and expected outcomes of the task, and evaluation should

strike a balance between the variable and stable elements in translation (function, quality and

overall effect) (Orlando, 2011). Orlando (2011) advocates for a formative perspective in the

evaluation of translations in the training of translators, one that takes into account not only

the evaluation parameters used in the industry and the profession, but also the trainees'

progression in the course of their training. In a formative approach to evaluation, he argues,

"students/trainees will get involved in the process and should always know what the

objectives, criteria and methodology of the evaluation are" (Orlando, 2011, p. 297).

Galán-Mañas and Hurtado Albir (2015, p. 67) point out that in translator training the

object of assessment is not the quality of translations per se but the quality of training

programs, and particularly, the trainees' development of translator competence. In fact, in his

attempt to model translation competence, Campbell (1998, p. 163) posits that "the assessment

of translation quality is best seen as a matter or [sic] profiling the competence of learners,

rather than simply measuring the quality of their output". In this regard, Galán-Mañas and Hurtado Albir (2015) lament that most quality assessment models in Translation Studies take a product-oriented approach; that is, their main focus is on translated texts, thus taking attention away from the role of quality in professional translation activities and translator training. Although a few proposals have been specifically developed for teaching, most of them "focus exclusively on criteria and categories to be taken into account when appraising translations, thus limiting the notion of assessment to correcting translations" (Galán-Mañas & Hurtado Albir, 2015, p. 67). In the translation classroom, assessment can be diagnostic, formative or summative, performed at the start of translation activities, continuously throughout the process, or at the end of it, by trainees themselves, their peers, or others such as the teacher (Galán-Mañas & Hurtado Albir, 2015). However, most teaching-specific proposals reflect a view of assessment as only summative; in other words, the focus is heavily placed on the appraisal of a specific action carried out in the classroom (a translation), but not on "the process students have followed, their ability to identify and resolve problems...their assimilation of implicit theories, their ability to regulate their own learning process, etc." (p. 69). Therefore, Galán-Mañas and Hurtado Albir (2015) advocate for—and indeed put forward–a model for the assessment of translation competence that involves the appraisal of the students' translation process as whole, using an array of assessment techniques and tasks. If the current trends in translator training advocate for the assessment of competencies based on the simulation of real activities (Galán-Mañas & Hurtado Albir, 2015), rather than the assessment of products or contents, one could argue that, in real life, translations are aimed at a particular audience, and thus the insights from their readers and users would constitute valuable input for training and the evaluation of the development of translator competence. From this it follows that the results of the translation reception study of the present thesis

could contribute to translator training by incorporating the receptors' and final users' view into the different stages of the teaching and learning process.

In the translation industry and profession, although quality assessment is present throughout the translation process in the form of revision and editing where revisers and editors act as "the bastions of quality" (Mellinger, 2018, p. 312), formal translation evaluation is mainly product-oriented (Orlando, 2011). Despite the omnipresence of revision in the translation process, Mellinger (2018) argues that revision has been largely overlooked in translation quality assessment models. This supports Galán-Mañas and Hurtado Albir's (2015) view that quality assessment models in T&I have all taken a product-oriented approach. In so doing, they fail to conceptualise translation as a process comprised of several layers in which not only the translator but other intermediaries are involved in the production—and quality assurance—of the final text. The appraisal of quality throughout the translation process takes greater importance in the age of TM software and MT, since editing may occur at any time before, during and after translation, thus changing the way the translation process has been traditionally conceptualised. Doherty et al. (2018) believe that "the industry will continue to have its own [translation quality assessment] metrics and models" (p. 103), and advocate for the inclusion in translator education of training in the human- and machine-based translation quality assessment models and tools that are currently used in the industry. In this way, they argue, "human translators...can enter the industry with confidence in their value in the face of developing technology and increasing...automation" (Doherty et al., 2018, p. 103).

The incorporation of technology in the translation process, and the changes it has brought about to the translator's roles and tasks, has ignited debates over translation quality. In this regard, Pym (2020) asserts that discussions over quality are highly political, in that the fear of technology prevents some from recognising technology's advantages, whereas

technology developers inflate the benefits of tools with their "promotional discourse". Koby and Lacruz (2017, pp. 1-3) posit that with the emergence of CAT tools and MT, the discussion has centred on the nature of quality, posing the question whether the quality of a translation should be measured against a "gold standard of perfection" or defined only in terms of the extent to which it satisfies the needs of the consumer. They conclude that the former indeed applies to the quality of human translation, that is to say, a quality translation would be that which is as close as possible to a pre-defined ideal text or "gold standard" (Koby & Lacruz, 2017, p. 3). Dragsted (2006) argues that the unnatural focus on the sentence that is imposed by TM systems affects translation both as a process and a product, changing the translation process in that translators spend more time on revising each segment while translating. Similarly, Mellinger (2014, as cited in Mellinger, 2018) signals that translators' drafting and editing behaviour changes when they work with TM software, and since they are presented with (sometimes) flawed translation proposals, translators are forced to negotiate "multiple renditions and translation decisions" (p. 324). As for MT, the cost factor would dictate that, when it is not acceptable, the raw product be post-edited to a degree that is only "good enough", prioritising the rendering of content over the use of well-formed language (Koby & Lacruz, 2017, p. 3). In terms of translation reception, as suggested by Koby and Lacruz (2017), it is still uncertain if the need to convey content as cost-effectively as possible will overrule the need for linguistic correction in the communication of content, and it is the task of T&I studies to reveal the cultural and linguistic implications of the current changes in text production practices such as pre- and post-editing.

The present research assesses translation from a product-oriented perspective, that is to say, quality appraisal is based on actual translations but not on the process student translators followed to carry out the translations. However, the present study does incorporate and advocate for the further incorporation of the views and expectations of end users of

translations into pedagogical translation quality assessment. The views of specialist readers and end users may contribute to an improved overall effect of translation, as featured in Orlando's (2011) translation assessment proposal. Moreover, the incorporation of the views of other translation parties into training activities may help to reduce the centrality of the teacher in the learning process. It goes without saying that the audiences' views by themselves are not a complete measure of quality; instead, the receptors' needs and expectations are one of many aspects that may serve as input to take into consideration in the evaluation of trainees' performance and their translation competence. In this way, in-class training can incorporate issues encountered in real life and the working world, and move towards situated learning.

1.4.   Translation reception

Although interest in how texts are received by their readership has always been part of translation inquiry, the formal study of text reception became prominent in the 1960s within the realm of literary studies, on the premise that "a text has no meaning without the contribution of the reader" (Brems & Ramos Pinto, 2013, p. 142). Within the German tradition, Hans-Robert Jauss (1982) proposed the "aesthetic of reception", defining reception as the process in which the full potential of a text is realised by the reader, whose expectations, based on "cultural norms, assumptions and criteria", shape the understanding and assessment of a literary work (Brems & Ramos Pinto, 2013). Another influential German theorist within reception theory is Wolfang Iser (1978), who maintained that text structure has gaps that could only be filled by the readers, with text meaning thus being dependent on the reader's subjective and imaginative interpretation (Brems & Ramos Pinto, 2013). On the American side, Stanley Fish (1980) was one of the most influential proponents of "reader response criticism" (Brems & Ramos Pinto, 2013), and coined the term

interpretive community to emphasise that the cultural assumptions shared by this community limit and determine the way in which readers make sense of texts. This entails that reader expectations are not individual but collective and based on "aspects such as history, geography, status, education, age or gender giving the concept of 'reception' a political dimension" (Brems & Ramos Pinto, 2013, p. 142).

In Translation Studies, the focus on the reader has allowed the study of translation "as a product of the target context", particularly since it has afforded researchers the opportunity to move away from an ST-oriented approach to look at the role and impact of translated texts within the receiving cultural system, in line with the development of descriptive translation studies (Brems & Ramos Pinto, 2013). The study of translation reception has mainly focused on literary translation and, most recently, audiovisual translation (Koskinen, 2020), extending the concept of reader to include viewers. It has approached the readers/viewers at two levels: the social (theoretical readers) and the individual (real readers) (Brems & Ramos Pinto, 2013). Consequently, there are two main approaches to the study of translation reception; one is at the social level, the other at the individual level. Itamar Even-Zohar (1978/1990) pioneered the study of translation as a cultural product, with a focus on the position of translated works in the literary polysystem of a culture, and the accrual of cultural capital in the case of cultures where literature is weak or young. Translation Studies at this (social) level can range from the reception of particular authors or literary works in the receiving cultural system to more abstract topics where translation is used as a metaphor for the way certain conceptual views are received in different cultures (Brems & Ramos Pinto, 2013). Other topics cover political translation (Baker, 2006) and news translation (Chen, 2011).

The approach that concerns the present research project, however, is the study of translation reception at the individual level. Brems and Ramos Pinto (2013, p. 145) point out that, contrary to the "first approach [which] focused on how translations are received at a

supra-individual level, this second perspective focuses on the 'real reader' and how specific translation strategies affect readers' response and assessment". Although reception-related research in Translation Studies has focused on the cognitive processes of the translator, more attention has been gradually paid to the readers' "competence, needs and expectations" in search of empirical data that can help translators make decisions based on evidence rather than intuition (Brems & Ramos Pinto, 2013).

Although the first two stages of the present study focus on the textual/grammatical level—believed to be affected by the use of TM software segmentation—, investigating how micro-level features affect the way translations are received can also contribute to understanding the reception of translated scientific discourse at the wider social level. This is reaffirmed by Chesterman (1993/2017, p. 175), who points out that "the key issue here is not, for instance, grammaticality per se, but rather a degree of grammaticality that meets the expectations of the readership". The methods used in this research approach are usually observation, questionnaires, interviews, and technological devices for eye-tracking, among others (Brems & Ramos Pinto, 2013). One drawback of interviews and the method used in the present study, questionnaires, is that reception evaluation is based on the informants' subjective perception, and readers' views are usually influenced and determined by translational, sociological, contextual, linguistic, and other factors which are difficult to isolate (Brems & Ramos Pinto, 2013). Unlike studies at the social level, most of the studies at the individual level deal with topics in audiovisual translation such as "the effectiveness of subtitling and dubbing, the translation of humour, culture specific items, and linguistic variation" (Brems & Ramos Pinto, 2013, p. 146), hence the need to fill the gap of research in the reception of scientific translation.

Chesterman (1993/2017) discusses reception within the framework of translation norms, and distinguishes two types of norms governing translation: *professional norms* and

expectancy norms. The latter concerns "the form of the translation product, based on the expectations of the prospective readers" (Chesterman, 1993/2017, pp. 167, 173). Chesterman states that for the establishment of laws of translation behaviour, one basic condition should be met: that the final product of translation be accepted as a translation by both the translator as an expert, and the expected readership as the receiving community. From a descriptive point of view, a translation could be considered as such regardless of the strength of the relation between the ST and the TT or the quality of the translated text. However, it is the readership that would have the last word in determining whether a text is or is not a translation; the translator could claim that an ST-TT relation exists, but the receivers would have to agree on the existence of such relationship. In fact, the "claim of translation status is obviously the stronger, the larger the proportion of receivers who agree" (Chesterman, 1993/2017, p. 169). Nevertheless, Chesterman questions the effectiveness of a purely descriptive approach to the study of translation and points out that, apart from description itself, what we need to know is "what makes a *good* translation" (Chesterman, 1993/2017, p. 169; emphasis in original). He goes on to argue that, even though translation norms can be approached descriptively, once they are accepted by a community, they become prescriptive, desirable behaviour, and agrees with Bartsch (1987) that "norms function basically as expectations". The onus of validating norms is therefore on the expected readers, since "their violation usually arouses disapproval of some kind among the community concerned" (Chesterman, 1993/2017, p. 172). In the particular context of scientific translation, it may be inferred that the violation of expectancy norms may have the potential effect of having a piece of translation rejected by the receiving community in the form, for instance, of a manuscript (or abstract) not being accepted for journal publication or conference presentation. This is the kind of translation repercussion that my study attempts to reveal. In a similar vein, Martín-Martín (2005) introduces his rhetorical comparison of English and

Spanish research article abstracts commenting on the difficulties Spanish scientists face when they try to publish in English-language journals, suggesting that even though norms for scientific writing have been argued to be culturally universal and discipline-specific, cultural and linguistic differences still play a big part in the success of non-native writing.

According to Chesterman, "expectancy norms are in effect kinds of product norms" (1993/2017, p. 175). As such, texts validated as translations by their receivers become part of the target language community, as is evident in the fact that translated scientific papers may compete for publication (and many times succeed) against native speaker-authored articles:

> These [expectancy norms] are established by the receivers of the translation, by their expectations of what a translation (of a given type) should be like, and what a native text (of a given type) in the target language should be like (Chesterman, 1993/2017, p. 174).

Expectancy norms, Chesterman argues, should be in part defined in relation to "*good* native texts" (1993/2017, p. 175; emphasis in original), and translations should then be at least partly evaluated in terms of how close or far they are from the conventional features of non-translated writing in the TL. This is not to suggest, however, that the texts produced by experienced, professional translators would be of lower quality than those written by professional writers who are not translators (De Sutter et al., 2017). The degree to which translation resembles or strays away from non-translated texts in the TL and receiving context is touched upon in the corpus-based study and the translation experiment, and is later analysed from a reception point of view in the last stage of the present study.

In discussing the sociology of translation, Chesterman (2007) points to causality as one of the most relevant concepts in Translation Studies, arguing that cause-effect models

allow translation research to move beyond descriptivism, since "[a]s soon as we begin to ask why, rather than what, we open up new avenues of research questions" (p. 171). Mere description of translations should be then complemented with finding causal relations in translation behaviour, so that research becomes relevant in fulfilling the needs of society and, particularly, of professional translators (Chesterman, 2007, p. 171). Translation quality is undoubtedly, he argues, of social relevance, and studying what constitutes quality in different cultural contexts "can become a natural part of the descriptive branch [of Translation Studies]" (p. 172). Within this framework, three of the social aspects of translation that determine the way translated texts are received are *reactions*, *responses* and *repercussions*. Translations are not only consequences of "causal conditions of various kinds" but they produce "effects" themselves, and these effects pertain to quality assessment (p. 172).

Reactions, according to Chesterman (2007, p. 179), are the effects of the textual (translations) on the cognitive ("mental and emotional reactions of the readers"), e.g. readers' positive or negative comments on a particular translated text. Responses are the actions produced by translations, such as complaints regarding the quality of a translation. Repercussions are "the effects of translation at the cultural level", as for instance, "the canonization of literary works, changes in the evolution of the target language, changes in norms and practices, changes in the perception of cultural stereotypes" (p. 180). Chesterman further argues that prescriptive statements are no more than predictive hypotheses of translation effects.

From Chesterman's propositions it follows that it is fundamental to elicit the expectations of the potential readers of translation. However, to this end, first we need to characterise the receiving community in order to set a standard to evaluate translation in specific contexts, and resorting to the concept of *discourse community* could be useful to this aim. Swales (1990) puts forward the concept of discourse community, which encompasses a

group of individuals who share a set of characteristics: (1) "a broadly agreed set of common public goals", (2) "mechanisms of intercommunication", (3) the use of their "participatory mechanism primarily to provide information and feedback", (4) the use and possession of "one or more genres in the communicative furtherance of [their] aims", (5) the coinage and use of "some specific lexis", and (6) a significant number of "members with a suitable degree of relevant content and discoursal expertise". Therefore, those at the centre of the potential readership of a research article will share the research article authors' interests and expertise (Burgess & Cargill, 2013).

In concluding this literature review of translation reception, it should be noted that even though English is unquestionably the lingua franca of science, scientific discourse (in all languages) is not necessarily untouched by cultural values and, thus, it cannot be stripped of cultural bias. The knowledge yielded from this study will be useful in helping translation trainees to develop strategies to deal more effectively with scientific translation, particularly when using TM systems, and to be able to produce translations that live up to the expectations of specialist readers and translation users. In this regard, Chesterman (1993/2017) states that if "the professional and expectancy norms are formulated in a learnable way, they can be explicitly taught to trainees: they can become part of the trainees' knowledge base and thence help to determine appropriate translational action" (p. 182). But most importantly, translation quality assessment "needs an explicit statement of the relevant norms against which quality is judged". The translation reception study embedded in the present research project can hence shed light on the norms governing the translation of research article abstracts that may, perhaps, be extrapolated to research articles and scientific discourse in general.

As for the practical implications for translation reception studies, such as the one considered in the present research project, one important consideration is that it is necessary

to isolate linguistic and age factors by separating monolingual from bilingual informants and by eliciting information from participants regarding their professional history and their experience in the discourse of their field of expertise. Questions will lead first to the characterisation of participants in order to ensure that they qualify as proper members of the discourse community informing the translation reception study. Last, but not least, the translation reception study devised in the present project uses the framework proposed by Chesterman (2007), based on the concepts of reactions, responses and repercussions of translation behaviour, as the basis for analysis.

CHAPTER 2: Investigating inter-linguistic difference – A corpus-based study of English and Spanish research article abstracts in conservation biology

2.1. Introduction: Comparative perspectives of translation

Traditionally, the study and teaching of translation have been approached from a comparative perspective, looking for differences and similarities between languages at different linguistic, textual, contextual and cultural levels. These comparisons have been conducted based on the premise that the resulting comparative knowledge may help to develop "scientific methods" for translating, or "translation procedures", or at least provide some guidance on how better to fulfill the communicative purpose of a translation.

Contrastive analysis (CA), the comparative study of two languages, emerged in the context of second and foreign language teaching in the United States, and most of the work in this discipline has been thus carried out "with language teaching rather than translation in mind" (Hoey & Houghton, 2001, p. 46). Based on the belief that second and foreign language learners would transfer the rules they internalised when learning their first language, and therefore mistakenly use these rules in the new language, scholars in CA posed that teaching materials built on an a priori analysis of linguistic systems and commonly made errors would prevent learners from making errors caused by linguistic interference (Hoey & Houghton, 2001). This approach permeated T&I Studies, where the comparison between source and target languages has been seen as an essential aid in the teaching and learning of translation.

Coined by Kaplan (1966), the term *contrastive rhetoric* refers to an area that grew separately from CA but, also with teaching in mind, puts forward that linguistic influences from the learner's first language would be transferred on to the second or foreign language. However, contrastive rhetoric proposes that cross-linguistic transfer is caused by cultural

influences, and therefore transfer-induced inaccuracies would be errors because of "cultural reasons rather being linguistically inaccurate" (Hoey & Houghton, 2001, p. 46). This approach finds inspiration in the Sapir-Whorf hypothesis, which is based on the premise that language influences culture and thought, and focuses on writing skills in particular (Hoey & Houghton, 2001). If we consider translation as more than a mere linguistic operation, the way languages work at the level of cultural preferences is believed to help translators in their communicative task.

CA has been abandoned as an influential approach to language teaching, as it did not prove effective in preventing problems in the learning of a second or foreign language. As for translation, Hoey and Houghton (2001) synthesise the problems identified in the application of this perspective in T&I Studies. The first and most basic problem is that for a comparison to be feasible, one would always assume that there is some common ground between the two linguistic systems being compared, the *tertium comparationis*, which is not easily identifiable in translation. Although some grammatical structures may exist in both of the languages being compared, the function, frequency and necessity of a given structure may differ from language to language. Therefore, translators cannot rely on formal correspondence to determine how accurate or appropriate a translation choice is. The second problem lies in the description of languages for further comparison. Different methods may be used to describe each of the languages being compared, and even if the same method were used for both, some descriptions may rely on pre-determined categories that may apply to one language but not the other. As certain features may not be accounted for by already described categories, new categories may arise while describing a language that do not exist—and thus have no equivalent—in the other. The third problem is that CA focuses on the translational product but not necessarily on the translation process or the users of languages, be they translators, translation intermediaries, or the translation audience. Therefore, CA sheds little light on the

cognitive or sociocultural factors that intervene in the production of (quality) translations. Although contrastive rhetoric deals with the ways languages organise written discourse, its application to translation is considered by some as unpractical, particularly because translators would be reluctant to make changes to the global organisation of texts (Hoey & Houghton, 2001; Martín-Mor, 2019). However, the contributions of contrastive rhetoric should serve as guidance to consider the needs and expectations of translation readers in particular genres. The fourth issue lies in the fact that CA would pay little attention to the extratextual factors of translation, especially concerning ideological issues, and intertextual relations. Nevertheless, the area of contrastive pragmatics incorporates ideological issues into the study of translation. Despite criticism, there is no doubt that CA is an aid in translation, as it "may provide explanations for difficulties" and no analysis of translation, at any levels, could be carried out without resorting to linguistic categories (Hoey & Houghton, 2001, p. 49).

In the English-Spanish language pair, Gerardo Vázquez-Ayora's (1977) *Introducción a la traductología* is perhaps the epitome of the CA approach. Presented as an introductory course to translation, Vázquez-Ayora's work was highly influential in the teaching of translation, especially in Chile. In this book, the author aims to bring together the basic theoretical and practical aspects of translation, which, in his view, is a branch of applied linguistics. The linguistic orientation of this work and the author's firm belief in linguistics as the provider of explanations for translation phenomena and the *liberator* of translation from *literalism* is evident in the following excerpt:

> *En la presente obra se trata de fijar una meta a la que se debe tender: la explicación de los fenómenos y proceso de traducción por medio de la teoría lingüística. Acogidos a la influencia liberadora de esta teoría llegaremos a la traducción en el*

verdadero sentido del término, y a la emancipación del literalismo milenario [The

present work intends to establish a goal we should all aim for: the explanation of

translation phenomena and process by means of linguistic theory. Under the liberating

influence of this theory, we will achieve translation in the true sense of the term, and

free ourselves from millennial literalism].

Vázquez-Ayora applies the principles of generative-transformational grammar to build on the

work of others, particularly Vinay and Darbelnet's (1958*) Stylistique comparée du français et

de l'anglais. Méthode de traduction*, and provide practical propositions of "oblique

translation" he terms *procedimientos técnicos de ejecución traductológica.*

Similar to Vinay and Darbelnet's model (1958), Vázquez-Ayora proposes

"translation techniques" that work mostly at the micro-linguistic level (e.g. *traducción literal,*

equivalencia, transposición, modulación, amplificación, omisión, etc.). However, one point

that touches on syntax, and is of relevance to the present thesis, is Vázquez-Ayora's (1977)

view of the differences between Spanish and English in terms of "lexical density" and its

effects on sentence complexity. He points out that Spanish tends towards the use of complex,

subordinate sentences (hypotaxis), whereas English favours shorter, independent sentences

(parataxis). Even though he acknowledges that the "stylistic effects" of hypotaxis would be

more typical of literary Spanish language, Vázquez-Ayora argues that the frequent use of

parataxis in non-literary Spanish gives the impression of "difficulty of reasoning": "…*en los*

escritos generales, donde prevalence la lengua común y sus niveles funcionales, las series de

frases cortas dan la impresión de dificultad the raciocinio" […in general writing, dominated

by common and functional language, series of shorts phrases give the impression of difficulty

in reasoning]. This is in line with the views found in more recent works, such as Beeby

(2000, p. 192), who points out that "what is perhaps the most obvious cohesive difference

between Spanish and English" is that "Spanish tends to use longer sentences with more subordinate clauses and parentheses than English does". Similarly, López Guix and Minnet Wilkinson (1997/2003, p. 73) allege that, in relation to the "syntactic architecture" of its phrases, modern English differs from Spanish in that it favours parataxis to the "detriment" of hypotaxis. Indeed, they further argue that the confusion between language as a system and the author's individual style would lead the (English to Spanish) translator to produce a "servile imitation" of the original's patterns and an unjustified distortion of the syntax (p. 74).

Although a more recent work, López Guix and Minnet Wilkinson's (1997/2003) *Manual de traducción inglés / castellano* is very much in line with Vázquez-Ayora's propositions. In their English to Spanish translation manual, the authors argue that a comparative perspective is a valuable aid to solve concrete translation problems, and assert that they take both a linguistic and a cultural approach to translation, since translation deals not only with correspondence between two languages but also between two systems and an external reality.

Besides suggesting that translators working from English to Spanish should strive to expand the sentence and incorporate shorter English sentences into one, internally-articulated sentence, López Guix and Minnet Wilkinson (1997/2003) point to word repetition in Spanish as an undesirable cohesive device. They argue that Spanish favours lexical variation (and, by extension, the use of subordinating devices), since it is a way to avoid repetition when it lacks a rhetorical purpose. When repetition has no rhetorical aims in Spanish, they posit, it becomes monotonous and denotes a poor command of linguistic resources, with its use being more typical of colloquial or children's speech. Moreover, in Spanish a lack of elements signalling the relationship between clauses and sentences may be viewed as "poor stylistics" (p. 146).

The translation procedures put forward based on the CA approach, as presented in Vinay and Darbelnet (1958), Vázquez-Ayora (1977), López Guix and Minnet Wilkinson (1997/2003), have been criticised on the grounds of being a posteriori observation of translation behaviour instead of translation rules, and because of their focus on language rather than discourse (López Guix & Minnet Wilkinson, 1997/2003). López Guix and Minnet Wilkinson (1997/2003, p. 235) acknowledge the validity of these critiques but state that establishing certain parallels and connections between languages may help to find solutions for concrete translation problems, since

> *[l]a comparación en el plano más abstracto de las lenguas constituye un paso previo para la transferencia en el plano más específico de los textos y las situaciones y sirve para poner de manifiesto todo lo que separa los diferentes sistemas lingüísticos* [the comparison of languages at the most abstract level is the previous step to the transfer of texts and situations at the more specific level, and allows us to bring to light all the differences between linguistic systems].

On the supra-linguistic level, David Katan (2004) studies how cultural differences are reflected in linguistic systems and how they can affect translation. He relies on studies of cultural variability to reveal communicative preferences that are characteristic of different cultural groups, which he terms *cultural orientations*. These orientations "act as frames in which the transmission and reception of messages are interpreted" (Katan, 2004, p. 220). One of these orientations, which Katan (2004) considers "a meta orientation", is *contexting*. The term was coined by Hall (1989) to postulate that cultures differ in the degree of contextual information they require for communication to be successful. Hall proposed that in communicating a message, *text* (explicit verbal information) interacts with *context* (implicit

information stored in the speakers' mind and shared by the members of a culture), but the amount of text and context required may vary significantly across cultural groups. Therefore, some cultures would be *low context* (LCC) and more inclined towards the KISS principle (keep it short and simple), whereas others would be *high context* (HCC) and value the KILC principle (keep it long and complete). From this it follows that translation, and any form of intercultural communication, would need to conform to the principle preferred by the receiving cultural community for it to be felicitous. In the same way, what is considered good writing in one language is bound to the cultural values of the groups that speak that language or a given variety of that language. A particular orientation is neither "good" nor "bad" but is rather more or less appropriate for a particular group of speakers in a particular spatial and temporal context.

Particularly in the case of transactional communication—a category in which scientific discourse falls—, an LCC would be addressee-oriented and strive for clarity, with the following textual characteristics: low information load, reader friendly, clarity, synthetic, single task logic, relevant facts in text, inductive, and black and white photos (KISS principle) (Katan, 2004). On the other extreme of the contexting spectrum, an HCC would be author-oriented and aim for completeness, with texts showing the following features: high information load, completeness, writer friendly (expert talking to a non-expert), detailed, multitask logic, situations explained in text, deductive, and oil paintings (KILC principle) (Katan, 2004). Therefore, the concrete implications of translation from the language of an HCC into the language of an LCC is that the translator "should look for the information, highlight it, and reduce the context to a minimum so that the textual information can shine through" (p. 272). In terms of syntax, this means that the translator should render long, complex sentences into shorter, less complex sentences. Likewise, the opposite behaviour would be expected when translation occurs from an LCC language (such as English) into an

HCC language (such as Spanish), as suggested by López Guix and Minnet Wilkinson (1997/2003).

Hall's (1989) model has been criticised on the grounds of its lack of an empirical basis, but the inextricable relation between language and culture can hardly be contested. In addition to this, Katan's (2004) application of the contexting model, together with other models of culture, may be a valuable starting point for the study, teaching and learning of translation as a form of cross-cultural communication.

This thesis aims to answer the question as to whether the propositions of CA and cultural studies indeed apply to the translation of scientific discourse, and particularly, to the translation from English to Spanish of research article abstracts in conservation biology. The corpus-based study in this chapter aims to find empirical evidence for the claims made by CA and studies of cultural orientations regarding English (LCC) and Spanish (HCC); the translation experiment in Chapter 3 sheds light on whether the translations produced by undergraduate translation trainees adhere to target language textual and syntactic features, and the translation reception study in Chapter 4 reveals if the expectations of translation end users correspond to the cultural orientations expected for an HCC language such as Spanish.

2.2.   Methodology: Corpus-based study

As discussed in the literature review that provides the framework for this study, Martín-Mor (2011; 2019) investigates the effect of the use of TM software on both the translation process and translated texts in terms of linguistic interference. Martín-Mor (2011) observes that the distribution of linguistic interference in translated texts varies depending on the translation environment in which a TT is produced (with or without the use of TMs), and translators' professional experience (whether they are students or experienced practitioners) (Martín-Mor, 2019). This suggests that observing the presence or absence of transfer in TM translations

could serve the purposes of the present study: to find out if translations produced by student translators using TM systems are influenced by the software, and if these translations are received differently from original texts in the TL in terms of communicative effectiveness. Weinreich (1953) suggests that for the analysis of *grammatical interference* "both languages be defined in the same terms" (p. 29). This requires determining a degree of a priori structural differences and similarities that could be tested later in the conduct of the translation experiment, and corpus linguistics is an appropriate methodological framework for this purpose (see e.g. Teich 2003). In fact, as regards the characterisation and analysis of texts grouped as a genre, Burgess and Cargill (2013) argue that the study of "collections of naturally occurring texts", or corpora, is suitable for genre analysis. As Giannossa (2016, p. 195) puts it, "[c]orpus linguistics studies language use by means of collections of texts selected according to specific criteria and ad hoc tools designed for textual analysis". This methodology allows one to search for specific patterns and analyse the way these patterns vary across languages, varieties and registers (Bennett, 2010). Prior to conducting a study of translations carried within two different conditions, a corpus-based study of authentic, non-translated texts is therefore necessary to investigate textual conventions and grammatical features in the SL and TL in the specific text genre this research deals with, abstracts for environmental science research articles. Such a study provides an objective method for identifying probable loci of transfer.

2.2.1. Corpus design

The initial plan for the corpus-based study consisted of three steps:

1. Build a comparable English/Spanish corpus composed of
   a) English environmental science research articles.
   b) Spanish environmental science research articles.

2. Identify specific features that differ between English and Spanish texts, which might be loci of transfer in translation, in order to interpret underlying reasons for differences between the two sub-corpora.

3. Draw conclusions on the studied features.

Comparable bilingual corpora are sets of texts in at least two languages "which share similar criteria of composition, genre, and topic" (Zanettin, 1998). This corpus type allows the analyst to draw comparisons on the features of two different languages regarding one specific text genre, and to draw conclusions on the implications of these differences for translation in terms of what is expected by the readers of the said genre in the particular TL.

The first step in building the corpus was to structure a sampling frame. Environmental science articles were chosen for this study due to the relevance of environmental science in the Chilean context. With an economy based on the exploitation of natural resources and as a signatory of the Antarctic Treaty, Chile has recently embraced environmental awareness and protection. The country has signed international treaties committing to taking action on climate change, and implemented policies to boost the interest and encourage knowledge creation in environmental science. This suggests an increase in translation in this scientific field, the adequate availability of informants for participation in the translation reception study, and significant research impact.

A scientific article is "a written report describing original research results whose purpose is to inform and persuade peers as to the validity of observations and conclusions as well as the effectiveness of the methods used" (Byrne, 2012, p. 74). However, scientific communities of practice may differ from culture to culture in their preferences for communicating research. In this regard, Fløttum et al. (2006) found that disciplines play an important role in revealing cultural identities in scientific discourse, in that many features of academic writing are shared by authors from different linguistic backgrounds in one

particular field. Along the same line, the "universality hypothesis" of scientific discourse claims that technical and scientific communication has characteristic discourse structures that are independent of the way they are represented in particular languages (Martín-Martín, 2005). However, Martín-Martín (2005) points out that not all aspects of academic communication are influenced by genre in the same way, and some are therefore culture-specific. In the same vein, Fløttum et al. (2006, p. 2) note that great differences between languages and even among individual papers may occur:

> There are a number of similarities *within* disciplines across different languages (for example, a relatively low frequency of first person pronouns in medical articles), there are, however, notable differences *within* languages (as regards for example the use of pronouns, negations, and metatext). It is therefore difficult to postulate a "typical" research article, even within one and the same discipline and language, because of great individual differences [emphasis in original].

Corpus linguistics can therefore be of help to objectively identify and quantify similarities within genres, and differences between different languages in one specific genre. It can thus be concluded from the studies here cited that both cultural and disciplinary factors are highly influential, although in different degrees, in the success of scientific communication. This implies that the translator's task is two-fold: they need to be fully aware of the differences between languages and cultures A and B, and have a good understanding of the specific discipline the ST and TT will deal with. Indeed, Olohan (2016, p. 137) points out that if translators intend to specialise in scientific translation, they should possess "[a]n in-depth understanding of the conventions of these genres and an ability to compare and contrast Anglophone and other language conventions." This is where the present research project may

also contribute, since no empirical studies have been found during the conduct of this research project on the differences between English and Spanish environmental science research articles for translation purposes and on particular textual dissimilarities between languages within this same genre. It is important to set research articles apart from other scientific genres such as scientific reports, popular science articles, theses, and editorials, whose conventions might differ from those of research papers.

Subsequently, it was necessary to narrow down the text genre to a specific text topic or sub-genre, conservation biology, in order to allow for better comparability. Conservation biology is "a new stage in the application of science to conservation problems", which "addresses the biology of species, communities, and ecosystems that are perturbed, either directly or indirectly, by human activities or other agents. Its goal is to provide principles and tools for preserving biological diversity" (Soulé, 1985, p. 727),

I then decided to restrict the sample to a single section of research articles, abstracts. By focusing on abstracts only, I could have samples that are more homogenous in terms of genre and part of a larger translation market. Most Spanish-language journals require an English translation of abstracts. Moreover, many journals from non-English speaking countries are now publishing in English only, and researchers from those countries are resorting to English as their preferred language for writing and publication. This means that even when the publications are in English, they include a Spanish—and sometimes Portuguese or French—version of the abstracts. Research articles are composed of several sections which have usually been researched separately but not as independent genres as the abstract has (see, for example, Swales, 1990 on research article introductions). Moreover, analysing entire research articles would have been time-consuming and place the project's focus on the corpus-based study, possibly neglecting the following two stages: the translation experiment and the translation reception study. Abstracts "have the main function of serving

as a time-saving device by informing the readers about the exact content of the article, indicating in this way whether the full text merits their further attention" (Martín-Martín, 2003, p. 26), and typically present a structure that is similar to the IMRaD format (introduction, method, results, and discussion) described by Swales (1990) for the research paper: I-M-R-C (introduction, method, results, and conclusion). Although word restriction in abstracts does not allow for the research article topic to be fully developed and demonstrated, abstracts are aimed at persuading the reader of the novelty and relevance of the entire article (Burgess & Cargill, 2013). Finally, although abstracts as a discourse genre have been studied and cross-linguistically compared, in the case of the English-Spanish language pair the available literature mostly refers to the general structure of abstracts (see, for example, Martín-Martín, 2005), rhetorical moves (as in Martín-Martín, 2003), and coherence relations (as in Ibáñez Orellana et al., 2015). Therefore, I posit that the study of the internal, syntactic structures of abstracts is an under-researched topic whose results may be of interest in themselves, as well as serve to measure the potential cross-linguistic influence that the segmentation feature of TM software can have on translations.

2.2.2. *Corpus compilation*

The corpus is comprised of two sub-corpora, one of English non-translated texts and one of Spanish non-translated texts, and was built and analysed with the collaboration of Professor Silvia Bernardini and Dr Ilmari Ivaska from the University of Bologna, Italy. One important issue that arose while compiling the corpus was the fact that the majority of conservation biology articles found had been written collaboratively. This seems to be a feature that distinguishes academic publications in this particular area from those of other academic fields such as the humanities. In Spanish texts particularly, it can be noticed that Spanish-speaking researchers publish jointly with some authors who are native speakers of other languages,

mostly English and Portuguese. This is an important point to make, since it might be difficult to ensure that the sampled texts show native writing conventions or features. However, this corresponds to the reality of the particular genre on which this study focuses and should be considered as such if the researcher wishes to study the samples in their natural state and authentic production conditions. Therefore, the main criterion when selecting the samples was to ensure that at least one of the authors of each paper was a native speaker of English or Spanish. In his study of the rhetorical differences between Spanish and English research article abstracts, Martín-Martín (2005) considered that the mere fact of a paper being accepted in a highly cited journal would validate the paper as following the rhetorical conventions of the language of publication and of the genre the text belongs to. Even so, I ensured by the authors' names and academic affiliations that they were native speakers of the language in which each paper was published, without taking into account other demographic data such as their gender or nationality.

In terms of dialectal variations, it was unpractical to choose a specific variety for Spanish, since publications in this language are significantly fewer in number than those in English, and there is usually only one specialized journal per Spanish-speaking country. In addition to this, English-language journals have a rather international pool of authors, which makes it difficult to focus on one specific variety of English.

The time frame of the sample publications is 2010 to 2018. This study does not carry out a diachronic comparison. Initially, text collection focused on the 2017-2018 period but that was not practical for Spanish, since the number of publications is significantly smaller than in English, and no Spanish journal was found to specialise particularly in conservation biology. Thus, I selected only those articles that dealt with conservation biology topics as per the definition provided above. In contrast, three of the English-language journals that fed the corpus specialise in conservation biology, as is evident from their names alone.

The corpus is comprised of 100 texts in English and 100 texts in Spanish retrieved from the following journals: *Biological Conservation*, *Conservation Biology*, *Conservation Letters*, and *Nature* for English; and *Ecología Austral*, *Ecosistemas*, *Gayana*, and *Revista Mexicana de Biodiversidad* for Spanish. The English-language journals are highly-cited, according to the SCImago Journal & Country Rank, and therefore, prestigious within the scientific community. The Spanish-language journals are indexed and relatively highly-cited among their same language counterparts, but their citation rankings are lower than those of English-language journals. The number of highly-cited journals in Spanish is significantly smaller than their English-language counterparts, and this limited the number of samples that could be obtained for Spanish. This is an important point to consider, since in my search for sources of texts for the corpus, I came across some Spanish-language research papers that had evidently not gone through a thorough editing process. In fact, some seemed to have been originally written in English and then poorly translated into Spanish. Including such texts in the corpus would have distorted the data, to the extent that they could not be used as a baseline for evaluating differences observed in translated language. Table 1 below summarises the sampling frame structure.

Table 1. *Structured sampling framework*

English/Spanish comparable corpus of conservation biology	English	Spanish
Text genre	Research article abstract	Research article abstract
Text topic	Conservation biology	Conservation biology
Language	English (non-translated)	Spanish (non-translated)
Geographical dialectal variations	Any	Any
Time frame	2010-2018	2010-2018
Sources (journals)	Biological Conservation Conservation Biology	Ecología Austral Ecosistemas

	Conservation Letters Nature	Gayana Revista Mexicana de Biodiversidad
Number of texts	100	100
Authors' gender	Not relevant	Not relevant
Authors' nationality	Not relevant, as long as one of the authors is identified as a native speaker of English by their name and academic affiliation	Not relevant, as long as one of the authors is identified as a native speaker of Spanish by their name and academic affiliation

As regards corpus preparation, for the sake of syntactic analysis, titles and keywords were excluded from the corpus, and all the samples selected had no subheadings within the body text. Once the corpus was compiled, I encoded the text samples as UTF-8 plain text to strip them of any format marks and then parsed and tagged the data using UDPipe, as explained in the section below.

2.3. Corpus analysis

2.3.1. Syntactic dependency relations

The corpus was parsed using UDPipe, "a trainable pipeline which performs [automatic] sentence segmentation, tokenization, POS [parts of speech] tagging, lemmatization and dependency parsing" (Straka & Straková, 2017), based on the Universal Dependencies (UD) framework. This is an unusual procedure in Translation Studies, where the universal syntactic annotation scheme acts as a *tertium comparationis*, a sort of external point of reference that allows one to compare syntactic structures in two or more languages. This procedure makes it possible to predict the areas in which the two languages differ and, consequently, may serve to anticipate aspects in which translated texts might exhibit traces of linguistic transfer, such

as those proved to be more salient in TM-translated texts by Dragsted (2006) and Martín-Mor (2011).

The Universal Dependencies (2018) project states that their general philosophy is "to provide a universal inventory of categories and guidelines to facilitate consistent annotation of similar constructions across languages, while allowing language-specific extensions when necessary." The success of these aims require that the following conditions be met (Universal Dependencies, 2018):

1. UD needs to be satisfactory on linguistic analysis grounds for individual languages.
2. UD needs to be good for linguistic typology, i.e., providing a suitable basis for bringing out cross-linguistic parallelism across languages and language families.
3. UD must be suitable for rapid, consistent annotation by a human annotator.
4. UD must be suitable for computer parsing with high accuracy.
5. UD must be easily comprehended and used by a non-linguist, whether a language learner or an engineer with prosaic needs for language processing. We refer to this as seeking a *habitable* design, and it leads us to favor traditional grammar notions and terminology.
6. UD must support well downstream language understanding tasks (relation extraction, reading comprehension, machine translation…).

Once parsed, the English and Spanish sub-corpora were compared in order to identify syntactic differences. A corpus-driven approach was used here to study potential transfer in translation. This means that although I did have an a priori idea of what could be found in the study, the features to be analysed were not chosen intuitively but based on the results of this

first analysis of the bilingual comparable corpus. Ivaska and Siitonen (2017, p. 226) explain that the corpus-driven approach is

> a somewhat heterogeneous array of different techniques which typically allow the researcher to refrain from choosing the features to be studied based on intuition and subjective evaluation, and instead support using computational techniques and the data at hand to lead the enquiry by identifying patterns of language use that are somewhat characteristic or uncharacteristic to the data.

For the comparison, the statistical method *Random Forest* (Breiman, 2001) was used. By means of trial and error analysis of the available data, random forests determine if a specific variable is a useful predictor (Tagliamonte & Baayen, 2012). In other words, once a subset of data is selected for analysis, the method randomly selects a set of variables and compares them to establish the best predictors for comparison, and this is repeated a large number of times (Ivaska & Siitonen, 2017).

2.3.2. *Syntactic complexity*

Another way to measure the differences between the English and Spanish sub-corpora, which is useful for the purposes of this study, is by assessing the linguistic complexity of the text samples. Broadly speaking, linguistic complexity analysis consists of measuring the number of lexical and syntactic constituents of a given construction so as to calculate the frequency of occurrence of certain linguistic elements in relation to other constituents. This has been used, for example, to support the selection of reading material or to assess the variedness and sophistication of writing in second language acquisition. In this study, the assessment of syntactic complexity could provide a second method for identifying objective, quantifiable

differences between the writing of research article abstracts in English and Spanish which could later serve to scientifically assess linguistic transfer in translation. Syntactic complexity measures are key to analysing interlinguistic differences such as syntactic density (subordination, number of clauses per sentence, etc.) that are closely related to the way each language defines sentence limits, and could therefore be affected by the segmentation feature of TM systems. Connor (1996, p. 52, as cited in Martín-Martín, 2005) surveys studies contrasting Spanish to English, and concludes that writing by Spanish-speaking scientists exhibits a tendency towards "'elaborate and ornate language' and 'loose coordination', longer sentences, fewer simple sentences, more synonyms, and more additive and causal conjunctions" as compared to their English-speaking counterparts. Thus, analysing syntactic complexity can be useful to determine if TM translations stray from Spanish features and conventions or stick to them, or if they are somewhere in between English and Spanish. The results of this method of analysis may also be correlated with the qualitative results yielded from the translation reception study.

One tool for the conduct of syntactic complexity analysis is the Common Text Platform (CTAP), a system developed at the University of Tubingen, Germany, as part of "an ongoing project that aims at developing user-friendly environment for automatic complexity feature extraction and visualization" (Chen & Meurers, 2016). The platform allows the extraction of a wide range of syntactic features by both counting the number of constituents in corpora and assessing the frequency of given constituents in relation to others, expressed in terms of means and ratios. Table 2 and Table 3 show a selection of complexity features and their values for the English sub-corpus. Unfortunately, CTAP supports German and English only.

Table 2. *Analysis by number of syntactic constituents in the English sub-corpus*

Constituents	English
Number of sentences	883
Number of clauses	1,463
Number of dependent clauses	470
Number of complex T-units	461

Table 3. *Analysis by syntactic complexity features*

Features	English
Mean length of T-units	23.42
Mean sentence length in tokens	24.67
Mean length of clauses	15.00
Dependent clauses per T-unit ratio (number of dependent clauses/number of T-units)	0.52
Average Complex T-unit ratio (number of complex T-units/number of T-units)	0.51
Average Dependent clause ratio (number of dependent clauses/number of clauses)	0.31
Average T-unit complexity ratio (number of clauses/number of T-units)	1.59

The only electronic tool found during the conduct of this study to measure syntactic complexity in Spanish is an adaptation of Coh-Metrix (Graesser et al., 2004), which measures cohesion, language and readability in English. The adaptation for Spanish was developed by Quispesaravia et al. (2016); however, the only aspect of syntactic complexity that this tool assesses is the number of modifiers per noun phrase.

The lack of electronic tools for the Spanish language means that an estimation of the syntactic complexity measures for the Spanish sub-corpus requires a manual process. Manual processes have been used in other studies using the same or similar types of syntactic

complexity measures for Spanish as those I devised for the present project (Torres González, 1993; Meneses et al., 2013; Muse & Delicia, 2013), but in the study of the native writing of students from pre-school to the undergraduate level. All of these studies have used the adaptation of syntactic complexity estimation for the Spanish language proposed and validated by Véliz (1988). Nevertheless, a manual comparison of the Spanish sub-corpus would be time-consuming and not comparable to the electronic analysis of English carried out using CTAP. However, as the STs and TTs for the translation experiment were less in number, it was possible to conduct a comparison of syntactic complexity for those texts to which I refer in Chapter 3.

2.4.   Findings

The potential predictors in this study were syntactic dependency relations (relations between a head element and its dependent). Those syntactic relations that differed the most between the English and Spanish sub-corpora were identified as useful for comparison. The results of this comparison show that the three main differences between the two sub-corpora lie in the highest frequency of three syntactic features in the Spanish text samples: the relation between a noun and its determiner (DET); the relation between a noun and a preposition or English genitive (CASE); and the relation for nominal modifiers of nouns (NMOD)—in English, prepositional complements and genitive -'s complements. Examples of each of three syntactic relations are provided further below. The results of the English-Spanish comparison can be observed in the variable importance analysis in Figure 1. Although these values are model-specific and not externally meaningful, having different predictors in one model makes the method more reliable.

Figure 1. *Best distinguishing predictors of syntactic dependencies between English and Spanish*
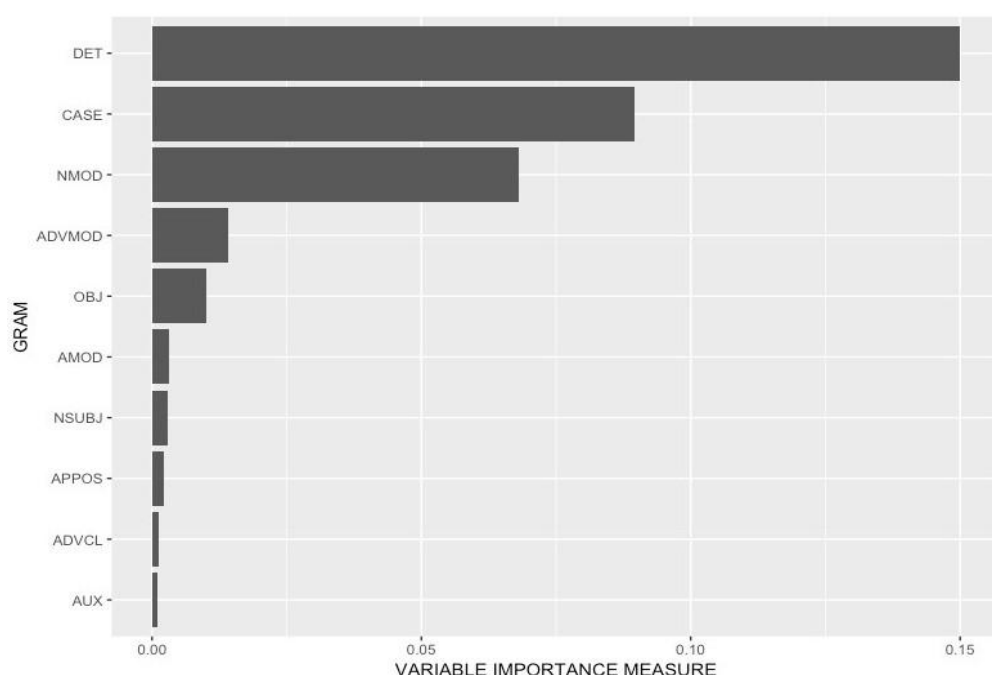
A convenient way to graphically represent and compare two large sets of data, in this case, the English and Spanish sub-corpora, is by means of a box plot. A box plot spreads data along a numbered line and breaks a data set into four groups based on five values: the minimum, the lower quartile, the upper quartile, the median, and the maximum. The *minimum* is the lowest value found in the data, the *lower quartile* is the median of the first half of the data, the *median* is the central value of all the data set, the *upper quartile* is the median of the second half of the data, and the *maximum* is the highest value found. The range between the lower and upper quartiles is the *interquartile range*, which shows how far from the central value or median the rest of the values are. This method makes visible the level of variation or dispersion within a data set and between two or more data sets, and displays outliers. The box plot in Figure 2 shows the difference in the frequency of occurrence of DET between English and Spanish in the corpus. In the English sub-corpus, the median for DET is around 60 occurrences per every 1000 words, which is significantly lower than the median in

the Spanish sub-corpus, around 145 occurrences per every 1000 words. Moreover, the

dispersion from the median is not significant and about the same in both sub-corpora.

Figure 2. *Frequency of DET in English and Spanish*
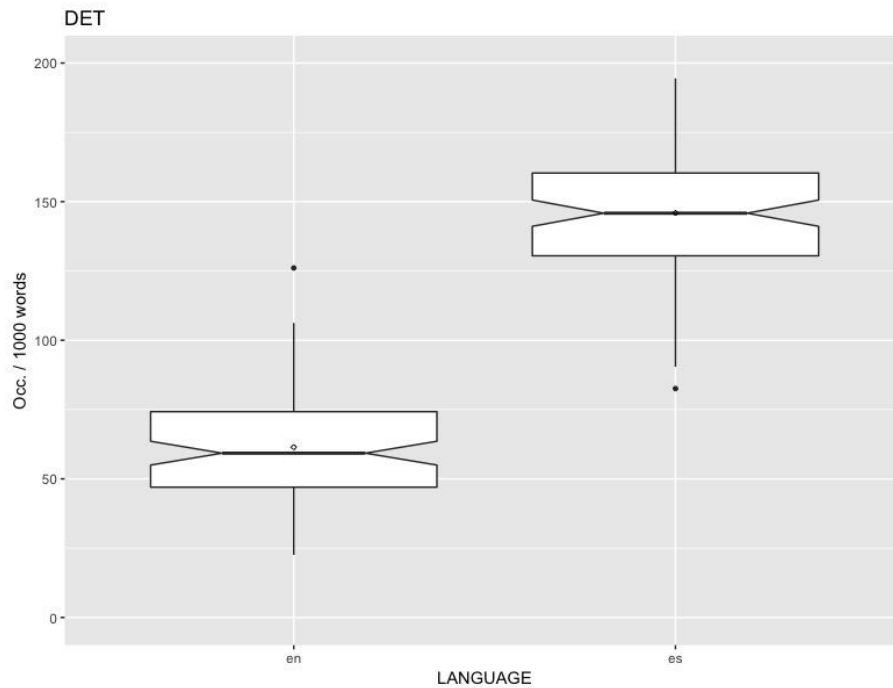
An example of DET can be observed in the sentence below, taken from the English sub-

corpus, whose dependency relations can be observed in the tree in Figure 3, where a

relationship is held between the article *the* and the noun *cluster*:

> *Hawaiian and Southern African populations group within **the** west Pacific **cluster**.*

Figure 3. *Syntactic dependency tree for a DET example in an English sentence*
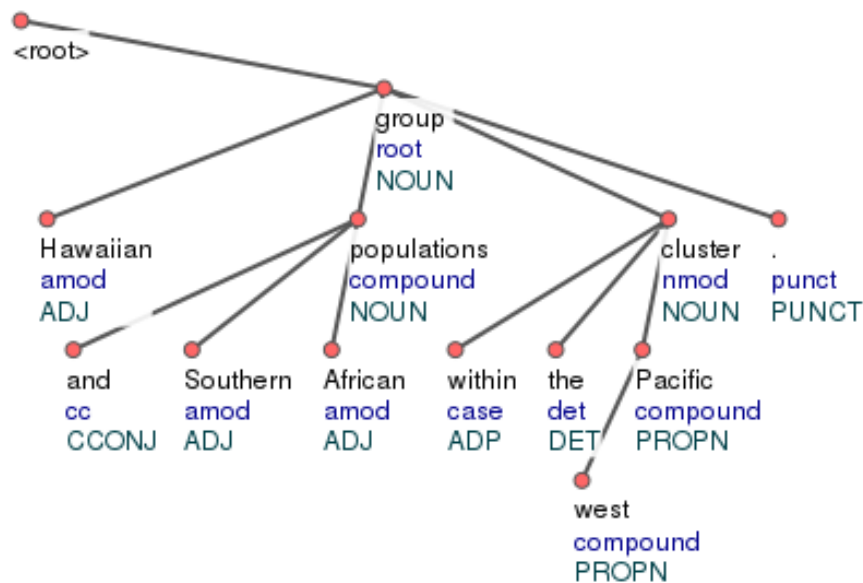
Likewise, in the sentence below, represented in the tree in Figure 4, taken from the Spanish sub-corpus, a relationship is held between the article *los* and the noun *estudios*, between the article *la* and the noun *ecología*, between the article *las* and the noun *aves*, and between the article *los* and the noun *organismos*. This example is also evidence that the DET relationship occurs in Spanish with a higher frequency than in English, or that Spanish uses DET where English would not.

> ***Los estudios*** *dietarios contribuyen a comprender **la ecología** de **las aves** y son relevantes en programas de conservación de **los organismos**.*

Figure 4. *Syntactic dependency tree for DET examples in a Spanish sentence*
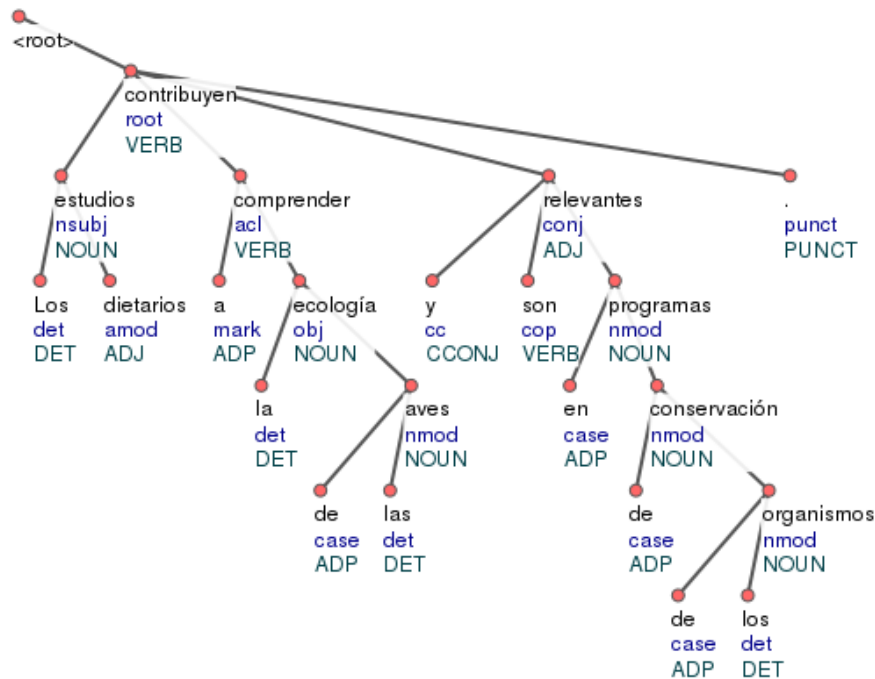
Figure 5 below shows the difference in the frequency of occurrence of CASE between English and Spanish in the corpus. In the English sub-corpus, the median for CASE is around 120 occurrences per every 1000 words, which is lower than the median in the Spanish sub-corpus of around 170 occurrences per every 1000 words. Similarly to DET, the dispersion from the median is not significant and about the same in both sub-corpora.

In the same English sentence as the DET example in Figure 3 and reproduced below, a CASE relationship can be observed between the preposition *within* and the noun *cluster*. It should be noted in this case that English would also use a more compact form of CASE, which does not pre-modify the noun, such as the genitive -'s.

*Hawaiian and Southern African populations group **within** the west Pacific **cluster**.*

Figure 5. *Frequency of CASE in English and Spanish*
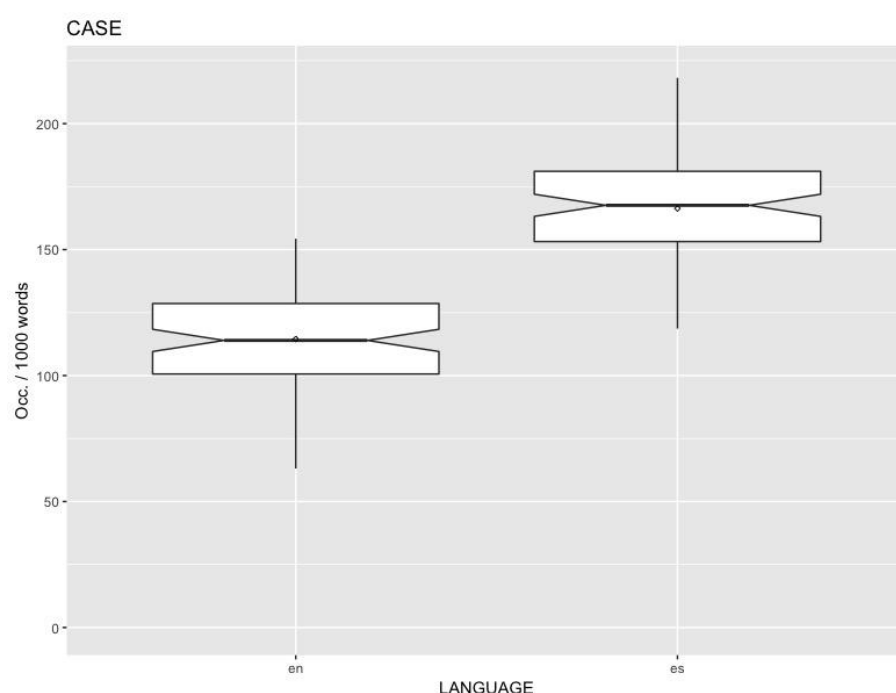
As evidenced in the Spanish sentence below, which is graphically represented in the syntactic dependency tree in Figure 4 above, a CASE relationship is held between the preposition *de* and the noun *aves*, between the preposition *en* and the noun *programas*, between the preposition *de* and the noun *conservación*, and between the preposition *de* and the noun *organismos*. Again, these examples reinforce the higher frequency of CASE in Spanish.

> *Los estudios dietarios contribuyen a comprender la ecología **de** las **aves** y son*
>
> *relevantes **en programas** de conservación **de** los **organismos**.*

Figure 6 below shows the difference in the frequency of occurrence of NMOD between English and Spanish in the corpora. In the English sub-corpus, the median for NMOD is around 60 occurrences in every 1000 words, which is lower than the median in the Spanish sub-corpus of around 115 occurrences in every 1000 words. Similarly to DET and

CASE, the dispersion from the median is not significant and about the same in both sub-corpora.

Figure 6. *Frequency of NMOD in English and Spanish*
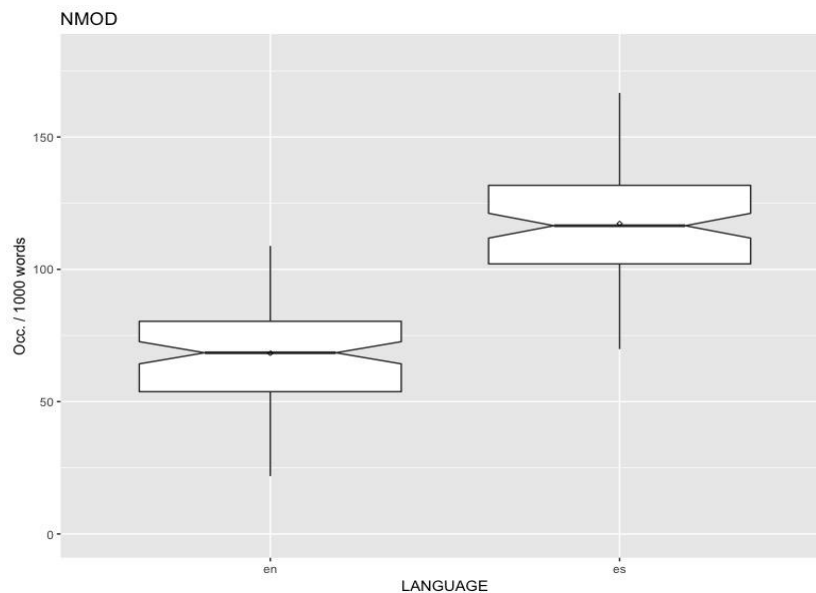
As can be observed in the English sentence in Figure 3 above and in the sentence below, an NMOD relationship is held between the noun *group* and the noun *cluster*.

Hawaiian and Southern African populations **group** *within the west Pacific* **cluster**.

As for Spanish, an NMOD relationship can be observed in the sentence below, and in Figure 4 above, between the noun *ave* and the noun *ecología*, between the noun *programas* and the modified predicate represented by the adjective *relevantes*, between the noun *conservación* and the noun *programa*, and between the nouns *organismos* and *conservación*. As occurs with DET and CASE, this example shows a higher frequency of NMOD in Spanish in relation to the English example.

*Los estudios dietarios contribuyen a comprender la **ecología** de las **aves** y son*

*relevantes en **programas** de **conservación** de los **organismos**.*

As the evidence from the comparison of syntactic dependency relations above shows, although DET, CASE and NMOD are present in the two languages compared, the three syntactic relationships are used in higher frequency in Spanish. It could be therefore inferred that a potential effect of translation could be the underrepresentation (negative transfer) of DET, CASE and NMOD in Spanish translated conservation biology research article abstracts. However, in order to confirm or reject the possibility of these syntactic relations being underrepresented in translation in general, and TM-mediated translation in particular, these results were later compared to the translations obtained from the translation experiment (see Chapter 3). The average occurrences of DET, CASE, and NMOD in the English and Spanish sub-corpora are shown in Table 4 below.

Table 4. *Average occurrences of DET, CASE and NMOD in the English-Spanish corpora*

Feature	English	Spanish
DET	14.87	38.08
CASE	28.02	42.99
NMOD	16.73	30.29

2.5.   Conclusions

Even though the insights of CA and contrastive rhetoric seem evident to the eye of a user of two or more languages, corpus-based research has been shown to provide a more objective comparison of grammatical features. By comparing English and Spanish sub-corpora of non-translated conservation biology research article abstracts, I was able to determine the main

features in which the two languages differ (at least in the genre here analysed) in terms of syntactic dependency relations, with DET, CASE, and NMOD being the most prominent ones.

Unfortunately, the lack of electronic resources to analyse syntactic complexity in Spanish did not allow for a comparison of complexity features between the English and Spanish sub-corpora.

CHAPTER 3:   Investigating the effects of translation-memory text segmentation: A translation experiment with undergraduate translation trainees

3.1. Introduction: Cross-linguistic influence

Linguistic interference has traditionally been associated with the acquisition of a second or foreign language and the learning problems caused by the influence of the learner's mother tongue. Moreover, it has been widely studied in the context of languages in contact, with the focus placed on the linguistic changes that interference might cause in one of the languages in contact (Matras, 2013). In fact, the study of language contact has led to the study of pidgin and creole languages.

Numerous works up to the present cite Uriel Weinreich's (1953) study on language contact as the classic work on interference and thus attribute the coinage of the term *linguistic interference* to this author. According to Weinreich, two or more languages are in contact when they are used alternately by the same persons, and the primary locus of contact are thus the bilinguals or the individuals using those languages. It is, therefore, in situations of language contact where interference phenomena occur. However, when employed by monolingual speakers of a language, the use of elements previously introduced to the linguistic system by influence of another system would not be considered as interference, since "the consumer of imported goods only rarely has the same awareness of their origin as the importer or investigator" (pp. 11-12). In this context, Weinreich (1953) defines linguistic interference as "[t]he instances of deviation from the norms of either language which occur in the speech of bilinguals as a result of their familiarity with more than one language; i.e. as a result of language contact" (p. 1).

Weinreich (1953, p. 1) highlights the complexity of the phenomenon and suggests that using the term *borrowing* as a synonym for interference would oversimplify the intricacies of linguistic influence, since it would imply that the foreign elements are just a "mere addition to the inventory" of the receiving language or that the receiving system suffers no significant impact from linguistic transfer. In fact, Hickey (2013, p. 18) asserts that borrowings are mostly confined to words and phrases, and Weinreich (1953, p. 1) adds that

> [t]he term interference implies the re-arrangement of patterns that result from the introduction of foreign elements into the more highly structural domains of language, such a as the bulk of the phonemic system, a large part of the morphology and syntax, and some areas of the vocabulary (kinship, color, weather, etc.).

Although interference can be evident in linguistic production, it derives from the interplay of structural or internal (linguistic) factors and non-structural or external (extra-linguistic) factors.

Among the structural factors of interference, Weinreich (1953) distinguishes interference at three levels: phonic, grammatical, and lexical. *Phonic* interference would occur when a speaker identifies a phoneme in the secondary language (usually L2) as one pertaining to the primary language (usually L1), and thus reproduces this phoneme following the phonetic rules of the primary system. In terms of *grammatical* influence, the author makes a distinction between interference affecting *morphemes* and that modifying *grammatical relations*. *Lexical* interference refers to the various ways in which the vocabulary of a language can be transferred to another language, or the replication of lexical or semantic functions of an element of one language in another. In the same line of thought as Weinreich, and in an attempt to further categorise linguistic transfer, Heine & Kuteva (2013)

point out that when linguistic material is transferred from one language to another, it may involve form (sounds or combination of sounds), meanings (including grammatical meanings and combinations of meanings), form-meaning units or combinations of them, syntactic relations (the order of meaningful elements), or any combinations of these kinds of transfer.

Since the present study investigates whether TM software imposes replication of SL syntactic elements in the TL, it is interference at the level of grammatical relations that demands more attention here. Weinreich (1953) asserts that interference of relations can be classified into that which results in the conveyance of unintended meaning, and that in which there is violation of existing patterns, producing nonsensical utterances or speech that might only be understood by implication. Another type of interference would be the use of obligatory relations which do not exist or are not equally compulsory in the receiving system. This third type is rather theoretical in that it cannot be accurately tested, essentially considering that the linguistic elements transferred to the receiving system do exist in this language but can be recognised as foreign only because they sound strange, exotic or monotonous to the ear of a native speaker. By the same token, Kabatek (1997) uses the term *negative interference* to refer to the cases in which elements of the receiving language are missing by influence of another language. The imposition of grammatical relations in a language where these relations do not necessarily occur with the same frequency is of great interest to the purposes of this research project. An example of such an imposition that is embedded in the present study is the replication in Spanish translation of English cohesive devices, such as word repetition, which would prompt the translator to overuse independent (paratactic) sentences and avoid more frequent cohesive devices available in the Spanish language such as subordination.

Hickey (2013) discusses linguistic influence of one system over another in terms of *transfer*, where, in the context of language switching, bilingual speakers transfer features of

their original language to another. Hickey also distinguishes between *supportive transfer*, which occurs when a specific element is present in and pertains to the two languages in contact, and *innovative transfer*, where the presence of an element that is characteristic of one language is present in but not typical of another, constituting an innovation. Hickey's definition of innovative transfer agrees with Weinreich's concept of linguistic interference but interference is perceived by Hickey as bearing an evaluative meaning, especially as applied in second language acquisition. This is reaffirmed by Kellerman (1995), who argues that interference implies an error, whereas transfer, or *crosslinguistic influence*, assumes a non-prescriptive approach to the phenomenon, and by Matras (2013), who asserts that contact-related change has to do with functional purposes in communication, and therefore "contact phenomena are in this respect seen as *enabling* rather than *interfering* with communicative activity" (p. 67; emphasis in original). In addition, Kabatek (1997) considers interference not necessarily as an error but as a technique used by speakers to identify themselves with a community and define their social position through the selection of linguistic variations. Concerning the evaluative load of the concept of linguistic interference, it is convenient here to take a stance on whether the term, as proposed by Weinreich (1953) and revised by Kellerman (1995) and Matras (2013), among others, is appropriate for the purposes of the present research project. The approach taken in the present study considers interference, transfer or cross-linguistic influence, not intrinsically as an error, but as a phenomenon that might eventually hamper communication in translation or have undesired effects on translation reception. The terms preferred in this work are *transfer* or *influence*, unless discussed in association with other authors' propositions.

Weinreich (1953), in line with his focus on individuals as the centre of interference, states that the non-structural factors that contribute to interference are inherent to the speaker's relation to the languages in contact. This relation can be defined in terms of the

speaker's communicative competence and their ability to separate the languages that come into contact, the speaker's proficiency and specialisation in the use of each language, the way in which each language was learned, and the speaker's attitudes towards each language, whether personal or due to cultural stereotypes. Although the focus on bilingual speakers shifted later to the influence of specific linguistic systems over others (Matras, 2013), Weinreich did recognise earlier in his seminal work that individual non-structural factors may be extrapolated to broader groups of speakers. In such a case, the impact of interference on the receiving linguistic system would be more significant and interdependent on both linguistic and extra-linguistic factors. Thus, he admits that "[p]urely linguistic study of languages in contact must be coordinated with extra-linguistic studies on bilingualism and related phenomena", and that language can only be understood in "a broad psychological and socio-cultural setting" (p. 4). From this, it follows that the environment in which translation is performed and received may constitute one source or cause of cross-linguistic influence. Therefore, it is sensible to analyse the impact that TM software, for example, may have on TTs and the reception of translations.

Toury (2012), in his attempt to establish laws of translational behaviour on an empirical rather than speculative basis, refers to linguistic influence in translation as *discourse transfer*, and states that "in translation, phenomena pertaining to the make-up of the source text tend to force themselves on the translators and be transferred to the target text" (p. 310), this constituting the *law of interference*. This assertion therefore implies that interference would be inherent to any translational act, and seems to relate to what some scholars have come to term *universals of translation*, or features characteristic of translations, not found in original texts, that are, however, independent of the influence of the languages involved in translation (Baker, 1993, p. 243). Pym (2014) identifies an interrelation between these two concepts and regards universals as identified linguistic tendencies which are

explained by laws in terms of social, cultural or psychological factors. Although Baker's definition seems to set interference apart from the concept of universals of translation, if the use of technology in the translation environment caused some sort of influence, it would be sensible to closely analyse the implications of such an influence in the translator's cognition and the quality of translation.

Toury (2012) suggests that interference is rooted at mental processes and is "an external manifestation of a general cognitive law" that makes discourse transfer universal. However, the choices made in translation are not the same for all translators nor is the output of translation the same in all cultures, because tolerance of interference is influenced by the socio-cultural conditions under which translation is carried out. The amount of interference observable in a given translation would then be dependent on "whether the source text was approached and processed as *one entity*, a holistic message in an act of communication, or as an *organization of lower-level linguistic entities*" (Toury, 2012, p. 31, emphasis in original). Therefore, interference is expected to be more pervasive when lower-level features of the ST are taken as the main units of meaning for the production of a translation but less foreseeable if translation is guided by a functional communicative purpose. Yet interference could be so natural to translation that it may even be present in the work of renowned, experienced translators.

Being dependent on socio-cultural factors, resistance to discourse transfer may result in translations showing less manifestations of this phenomenon, which is often resolved in the revision or editing stages of the translation process (Toury, 2012). Nevertheless, not all languages hold the same prestige in a given culture. Hence, interference may be more or less tolerated based upon the "relative prestige" of the SL in the target culture (Toury, 2012, p. 314). Another factor that may determine tolerance of, or resistance to, interference is text-type, meaning that certain types of texts, because of their context of production or reception

and their users' expectations, may tolerate more or less amounts of linguistic transfer. Finally, Toury (2012) recognises the possibility of interference occurring in varying degrees at different text levels, stating that "even for one and the same text, neither interference nor tolerance of it are necessarily the same with respect to all linguistic and textual levels" (p. 315).

Cross-linguistic influence has also been examined in the context of scientific translation. Franco Aixelá (2009) discusses interference specifically in technical translation, and expands Toury's classification of the phenomenon to the level of genre conventions (structural and pragmatic interference). He stresses the fact that interference has been traditionally regarded as something to avoid in translation for the sake of fluency and correction in the TL. This would apply mostly to technical translation (with the exemption of sworn translation), since, he adds, there have been advocates of "controlled interference" in the translation of sacred and canonical texts (p. 76), and some theorists, such as Venuti (1998), call for the use of foreignising strategies in literary translation to resist the cultural domination exercised by mainstream groups over minority cultures. Venuti's proposition, for instance, seems to be impractical in the case of technical translation, considering that in the industry (unlike academic or literary settings) translators do not usually get to choose the texts to be translated and need to conform to the client's instructions and the norms of the receiving culture and discourse community.

Kranich (2014) offers a review of the study of *language contact through translation* (LCTT), and argues that linguistics has failed to investigate the effects of language contact in written interaction, much as Translation Studies has failed to provide explanations of language change through translation. By providing an account of the results yielded in different studies involving lexical, morphological, syntactic, and pragmatic/stylistic innovations in translated texts, she concludes that the most significant factors of interference

in present-day LCTT are the orientation of the translator (towards overt or covert translation), socio-political dominance relations, prestige of the SL, and attitudes towards the SL. Kranich (2014) further proposes that most interference in present-day LCTT occurs at the pragmatic and stylistic level, for example in terms of author-readership interaction, and that the evidence available so far suggests that innovation does not spread to monolingual text production but remains limited to translations.

One of the causes of interference is the tension between the force exerted by the proposals of the ST and the expectations of linguistic correction and proper writing in the target context (Franco Aixelá, 2009), allegedly ingrained in translator training and reaffirmed by the professional narratives of experienced translators. In this regard, Franco Aixelá points out that the translator is required to strike a balance between these two forces, considering that favouring TL linguistic correction would take away the technicality of the TT, whereas guiding the translation task by the "frequency" of occurrence of certain linguistic elements would yield a translation that may not be well-received by highly specialised readers. This suggests that there is a need to investigate further readability and acceptability of technical translation, with a view to assisting the translator's decision-making process. Other motives for interference that affect technical and scientific translation in particular would be "the creation and preservation of a specific terminology or jargon, the nonexistence of a given term or structure in the TL, and the prestige of the source culture" (p. 79). Given the generally accepted status of English as the language of science and technology, its prestige may have consequences in the way interference is perceived in translation from, and into, English.

Martín-Mor (2011) investigates the effect of the use of TM software on both the translation process and translated texts in terms of linguistic interference. He concludes that the distribution of linguistic interference in translated texts varies depending on the

translation environment in which a TT is produced (with or without the use of TMs). Morover, Martín-Mor (2019) observes that linguistic interference is more pervasive in translations produced by students than in those performed by experienced professionals. Martín-Mor (2011) analyses linguistic interference at the level of formal correspondence ("close translations" versus "distant translations") and its impact, suggesting that acceptability of interference would depend on the expectations of the discourse community receiving the translated text. Although Martín-Mor's (2011) work suggests that TMs may affect readability, cohesion and textual coherence of translations, it does not refer to the concrete textual implications of TM translations nor does it elaborate on translation acceptability or communicative effectiveness, opening an interesting avenue for further research.

In reviewing the literature on linguistic interference, it is possible to infer a number of methodological suggestions to guide the analysis of interference in translation in terms of both the object (texts) and subjects (translators) of study. Weinreich (1953) notes that for the analysis of grammatical interference, "[t]he main requirement is that in a given contact situation, both languages be defined in the same terms" (p. 29). This implies that the main linguistic features of the genres and the languages to be analysed should be described thoroughly, with a view to picturing a degree of a priori structural differences and similarities that this study aims to test.

Another suggestion from the literature is that it is necessary to characterise the subjects involved in the present research project. As Weinreich (1953) proposes, the non-structural factors of interference are inherent in the bilingual person's relation to the languages in contact. Therefore, it is important for the present study to isolate factors such as the subjects' individual (written) communication skills, proficiency in source and target

languages, and attitudes towards each language, among others. These should be later extrapolated to the groups of individuals studied for comparative analysis among them.

Since "[i]t is thus in a broad psychological and socio-cultural setting that language contact can be understood" (Weinreich, 1953, p. 4), linguistic analysis of cross-linguistic influence could be thoroughly understood only if correlated with extra-linguistic factors associated with it. This is a very important point to make, since the context of language contact in translation differs significantly from the loci of contact described in the first conceptualisations of interference and the empirical work carried out in the field of linguistics. To name a few differences, translation not only occurs from L1 to L2 but frequently from L2 to L1, involves written communication rather than oral speech production, and is usually mediated by technology. Other contextual factors that might determine the degree of language influence in translation include the environment in which the translation is performed, training and professional experience of translators, globalisation, cultural resistance to—or tolerance of—interference, genre standardisation, and language standardisation, such as in the case of Spanish and its regulating body, the *Real Academia Española*. Finally, characterising the profile of the intended reader of translations could shed light on the effects of linguistic transfer on the reception of translated texts.

3.2. Methodology: Translation experiment

As stated in Chapter 1, Chesterman (2017) argues that expectancy norms should be in part defined in relation to "*good* native texts" (p. 175; emphasis in original), and translations should then be at least partly evaluated in terms of how close or far they are from the conventional features of non-translated writing in the TL. Attending to this, I carried out a translation experiment in order to find out if the TM segmentation system encourages syntactic transfer in TTs when students use TM software, and if students' TM translations

stray from Spanish textual conventions and grammatical features. In this experiment, translations produced by undergraduate translation trainees were compared to their source texts and the corpus of non-translated Spanish texts discussed in Chapter 2, in terms of the three syntactic dependency relations (DET, CASE, and NMOD) and syntactic complexity features.

As stated above, Martín-Mor (2011) analyses the impact of linguistic interference at the level of formal correspondence ("close translations" vs. "distant translations'), suggesting that acceptability of interference would depend on the expectations of the discourse community receiving the translated text. Martín-Mor operationalises interference based on classifications previously proposed by other authors, considering categories such as "typography and spelling", "vocabulary", "morphology and syntax", "text conventions", "encyclopaedic knowledge", "coherence", and "cohesion" (p. 390). For example, for the morpho-syntactic category, Martín-Mor (2011) considers the overrepresentation of English possessives in Spanish translation as "interference", whereas the absence or replacement of a possessive by a definite article in Spanish is regarded as "absence of interference". Also, in the described study, samples used as STs were assessed by linguists, translators and editors, and later manipulated so as to ensure uniformity in terms of complexity and to introduce certain textual features meant to observe translational behaviour. However, since the aim of the present study is to analyse the effect of TM segmentation at the syntactic and textual level, this research project only focuses on the textual and syntactic features observed in the corpus-based study. Moreover, the samples serving as STs were not manipulated since they were later assessed by specialist readers in their capacity as potential translation end users. It is worth mentioning here that, in contrast to Martín-Mor's study, the corpus-based phase of the project does intend to evaluate the acceptability of linguistic transfer in TM-mediated translations by those involved in the translation industry. Instead, the translation reception

study described in Chapter 4 analysed how specialist readers, the end users of scientific translations, evaluate and receive TM-mediated scientific translation.

The differences in translation results caused by uneven levels of experience (professional and novice translators) have already been proven empirically (see, for example, Dragsted, 2006; Martín-Mor, 2011; Martín-Mor, 2019). Therefore, my study does not aim to draw the same kind of comparison but to focus on the development of translator competence by offering an evaluation of TM-mediated student translators' work from two different perspectives: (a) a contrast of TM translations against the conventions of TL texts of the same genre, and (b) an analysis of the reception of TM translations by specialist readers. Studies (Martin-Mor, 2001; Dragsted, 2006) have concluded that dissimilar translation environments (with and without TM software) yield different translation results. Since this study intends to analyse the effects of the segmentation feature of TM software, it is necessary to isolate this variable by comparing the results of one group of student translators translating with a TM system to another group with a similar profile translating without a TM system. In this context, the dependent variable is the quality of translations, as measured by the translation reception study, and the under- and over-representation of ST/SL features (transfer), whereas the independent variable is the translation production condition or environment, that is, the use of TM software or the MS Word text processor. The controlled variables are the source texts, the students, and instructions for the translation task.

3.2.1. Pilot translation experiment

A small pilot study was carried out to test the experimental phase of the project and improve the design of the full-scale experiment. A group of six Spanish-language undergraduate students from Monash University, with no previous training in translation, was introduced to the use of TM software in one 90-minute session, and was asked to translate a text using TM

software during a second 90-minute session. Students were given the same instructions devised for the students of the experimental groups in the full-scale experiment (see instructions under *Full-scale translation experiment*), but the ST was the same for all the participants. Considering the fact that the students were more likely to be native speakers of English than of Spanish, the translation direction was Spanish to English. However, and although all participants demonstrated a high level of proficiency in English as estimated by the researcher, two of the six volunteers were native speakers of Italian. This variable was difficult to control, since the experiment was conducted in Australia and it was, therefore, not possible to have participants with a similar profile as those considered for the full-scale study, undergraduate students majoring in translation from their language B into their language A. No control group was considered for the pilot experiment given the small number of participants. Therefore, since I could only compare translated texts to one source text, this pilot study served solely to streamline the administering of the actual translation experiment.

The same kind of analysis, of syntactic dependency relations, conducted for the corpus-based study was carried out with the ST and TTs in the pilot experiment. As Table 5 shows, CASE is slightly lower in English than Spanish, and NMOD is definitely lower, but DET is surprisingly higher in the English translations. These results are not conclusive given the small number of samples, only one ST and six TTs. Therefore, more data are needed for the results of the full-scale translation study to be statistically valid.

Table 5. *Analysis of syntactic dependency relations of ST and TTs*

	Source text (Spanish)	Target texts (English)
DET	36	44.50
CASE	49	44.50
NMOD	34	26.33

Similarly, ST and TTs were analysed for syntactic complexity (Table 6 and Table 7). Because CTAP does not support Spanish and another method was needed for the purposes of the present study, and since the ST was only one sample, the Spanish original was analysed manually to compare it to the English translations. Again the results, shown in Tables 6 and 7, are not conclusive given the small number of TTs and the fact that one ST is not enough to draw statistically significant conclusions. Moreover, both the non-translated Spanish text and its English translations would need to be analysed using the same method, since there might differences in the way complexity is calculated manually and by an automated tool such as CTAP.

Table 6. *Analysis by number of syntactic constituents in the corpora*

Constituents	ST	TT1	TT2	TT3	TT4	TT5	TT6
Number of sentences	11	12	11	11	11	11	11
Number of clauses	12	14	12	12	12	14	12
Number of dependent clauses	1	1	1	1	2	1	0
Number of complex T-units	1	1	0	0	0	1	0

As discussed above, given the fact that it did not consider a control group, and since I could only compare translated texts to one source text, this pilot study served solely to streamline the logistics for the actual translation experiment. For the results of the full-scale translation study to be conclusive, the ST sample needed to be larger and more varied for it to be representative of an average conservation biology abstract in English. Apart from comparing the corpus results with the results yielded from the translation experiment, translations could be later contrasted against a gold standard obtained from a corpus of professional (published) translations into Spanish.

Table 7. *Analysis by syntactic complexity features*

Features	ST	TTs
Mean length of T-units	22.36	25.36
Mean sentence length in tokens	22.36	22.77
Mean length of clauses	20.50	20.20
Dependent clauses per T-unit ratio (number of dependent clauses/number of T-units)	0.09	0.10
Average Complex T-unit ratio (number of complex T-units/number of T-units)	0.009	0.03
Average Dependent clause ratio (number of dependent clauses/number of clauses)	0.08	0.08
Average T-unit complexity ratio (number of clauses/number of T-units)	1.09	1.26

The profile of the informants was another aspect stemming from the conclusions of the pilot study that I considered to improve the full-scale experiment. In order to isolate the variable of differing degrees of proficiency in the target language, I needed to ensure, as mentioned above, that all participants were native speakers of Spanish.

3.2.2. Full-scale translation experiment

The translation experiment took place in August 2018 with a total number of 42 participants. The informants were undergraduate English-to-Spanish translation students from three Chilean universities: Universidad Católica de Temuco (UCT) (18), Universidad de Tarapacá (UTA) (11), and Universidad Arturo Prat (UNAP) (13). All the participants were native speakers of Spanish who entered translation programs with little or very basic skills in the English language, immediately after graduating from secondary school. Additionally, most of them are first in their families to attend tertiary education, as is the case for most

undergraduate students enrolled at universities outside Central Chile (Samaniego, 2017).

Given the students' profile, a significant part of the curriculum is oriented to developing

English language proficiency and to enhancing students' skills in Spanish as a native

language, leaving little room for translation-related subjects in the first two years, then

gradually intensifying translation-specific training until the fifth (last) year.

In a 60-90 minute session, students were asked to translate the abstract of a scientific

article of around 200-300 words from English into Spanish using TM software. The TM

software used was SDL Trados Studio, since it is available to the informants at their

institutions and is the most widely used TM software by both the industry and training

institutions. No TMs were provided to the students in order to avoid previous translations

from influencing students' decisions in terms of TT segmentation.

Students were provided with information about the potential readers of their

translations, scientists, and the researcher collected the translations from the participants'

computers once they had finished the task. At the same time, another group of students were

asked to perform the same task using Microsoft Word instead of TM software.

Each group was divided into two sub-groups in order to have one experimental group

and one control group in each institution. To control variables such as foreign and native

language proficiency and experience in translation and software use, only students of the final

(fifth) year of the programs were invited to participate. Initially, the experiment design

considered informants from just a single training institution in order to isolate curricular

differences among programs of study. However, two other universities were included to

ensure a sample that was more representative of the Chilean training context. If different

outcomes stemmed from each institution, a thorough analysis would be necessary in order to

determine if variations in the results could be explained by curricular differences or any other

factors. Nevertheless, if the outcome from the three universities' informants coincided, then the validity of the results of the translation experiment would be further reinforced.

The English to Spanish Translation program at Universidad Católica de Temuco is a 10-semester undergraduate training program which includes five practical units in "science and technology translation" distributed from semesters 5 to 9. In the third semester, students are introduced to CAT tools in a unit called "Computers and Translation". From then on, they start developing technological competence in all their practical units. In the fifth semester, they study more advanced CAT tools in a unit called "Technology and Translation". In the ninth semester, students are required to translate full research articles.

The English to Spanish Translation program at Universidad de Tarapacá devotes the first seven semesters to developing English and Spanish linguistic and cultural skills, and the last three semesters to translator training. The translation component considers one unit in CAT tools and two units in technical and scientific translation, with the use of different TM software being a mandatory cross-curricular requirement for the last two semesters.

The English to Spanish Translation program at Universidad Arturo Prat offers a minor in French translation and devotes semesters 7 to 10 to practical and theoretical aspects of the translation profession. It includes two units in technical and scientific translation in which training in TM software is provided, with the use of TM software being a requirement for all translation projects along the course of the two units.

Although the informants are students, from the description of the academic programs participating in the study, it follows that they can be considered junior translators expected to have developed a certain degree of competence in scientific translation and the use of TM software.

In order to ensure independent observation, the texts that served as STs for the translation experiment were different from those included in the English sub-corpus, but were

extracted from the same journals that fed the samples for the English sub-corpus. So as to prevent idiosyncratic textual features from influencing the results of the experiment, texts from different authors were used, and no text was translated by more than one informant in the experimental groups. The same texts were translated by the informants in the control groups. This allows for comparison of translations with and without the use of a TM system in specific cases to illustrate the potential influence of the software on the translational product, and strengthen the results, interpretations, and their generalisability.

3.3. Findings

3.3.1. Syntactic dependency relations

Comparing the most prominent syntactic dependency features between TM and MS Word Spanish translations, and between English STs and Spanish translations, the results of this method do not seem to support the initial expectation that translations would fall somewhere between the English and Spanish originals with regard to the three linguistic features under examination, DET, CASE, and NMOD (see Table 8). The average occurrences of the three syntactic features are relatively similar for both TM and MS Word translations, with the TTs produced without TM software showing a slight underrepresentation of DET, CASE, and NMOD. Therefore, the results would suggest that the hypothesis that the TM segmentation system encourages underrepresentation of syntactic features (CASE, DET and NMOD) in Spanish translations should be rejected.

Table 8. *Average occurrences of syntactic dependency features*

Syntactic dependency feature	TM translations	MS Word TTs	English STs	Spanish NTs** in comparable corpus
DET	49.95	43.38	15.09	38.08
CASE	56.38	53.76	28.05	42.99
NMOD	39.90	39.047	18.14	30.29
Number of texts	21*	21*	22	100

*20/22 STs were translated both with and without a TM system; of the remaining 2 STs, 1 was translated with a TM system and 1 was translated without a TM system.
** NTs = non-translated texts.

One possible interpretation of the results is that they could reflect that the student translators who participated in the experiment are highly competent in recognising grammatical differences between SL and TT and in dealing with the translation of the syntactic issues at hand. In fact, by exploring the instances of the three syntactic relations, I could verify that, in most cases, their use was obligatory in Spanish. Still, when both TM and MS Word translations are compared to the Spanish non-translated texts in the comparable corpus discussed in Chapter 2, all the translations show a frequency of occurrence of DET, CASE and NMOD higher than non-translated texts. An explanation for this could be that there is a tendency on the part of the student translators to normalise, in Baker's (1993) terms, the language of the translations. In other words, the informants could have striven to adhere to the norms of the TL system to the point of exaggeration or overreaction, as put forward by Bernardini and Ferraresi (2011). In their corpus-based study aimed at unveiling features of translated texts, Bernardini and Ferraresi (2011) analyse the presence of Anglicisms in Italian technical writing and translation. They found that the translators participating in their study tend to be more "conservative" than native Italian writers in the use of English words and morphological features when there is an alternative that is considered "normal" or more "typical" of the Italian language. The text samples making up the corpus deal with a very

restricted topic in the field of computing, and it is thus surprising that, instead of finding traces of interference, what the findings of Bernardini and Ferraresi's study confirm is that translators' choices tend to normalise the language more than native Italian writers. What is even more striking and conclusive is that the translations analysed in the study were produced by "amateur" translators who were more experienced in the computing field than in linguistics or translation. These results led the authors to the conclusion that "the very act of translation may induce one to take a more conservative, normalizing attitude" (Bernardini & Ferraresi, 2011, p. 242), and add to the evidence for normalisation as a "translation universal" (Baker, 1993) or for Toury's (1995) "law of growing standardization". Although and Ferraresi (2011) focus on the frequency of lexical and morphological calques in translation and do not analyse syntactic features such as those under scrutiny in the present study, their findings and conclusions can provide a new line of interpretation for the preliminary results of the translation experiment. Moreover, the study under discussion has a methodological implication for the present research project in that the former proves the value of using comparable corpora, that is to say, translated text material for comparison against non-translated texts produced in the translations' TL, to escape from the circularity of parallel corpora (the contrast of TTs against their STs).

As pointed out above, if different outcomes stemmed from each institution, a thorough analysis would have to be carried out in order to determine if variations in the results can be explained by curricular differences or any other factors. In this regard, as shown in Table 9 below, no significant differences were detected among institutions.

Table 9. *Average occurrences of syntactic dependency features per institution and experimental/control group*

Institution	UCT		UTA		UNAP		
Feature	TM	MSW	TM	MSW	TM	MSW	All translations
DET	54.22	54.55	49.71	50.17	42.6	44.33	49.16
CASE	58.00	58.89	56.29	54.33	53.6	52.67	55.07
NMOD	39.89	43.88	40.71	38.17	38.8	38.5	40.11

MSW = Microsoft Word

Assuming that there are differences between Spanish originals and Spanish translations (due to either transfer or normalisation), I considered it convenient for the purposes of this study to build a corpus of professional Spanish translations that could serve as the benchmark against which students' translations could be compared. In this gold standard corpus, research article abstract authors were not native speakers of Spanish, thus the need for intervention of a professional translator. For sample selection, similar criteria as for the selection of the previous corpora were considered, that all or most of the authors be native speakers of English, as judged by their name and institutional affiliation. This would ensure that the authors themselves were not the ones who carried out the translation, and that professional translation practitioners had been hired for the translation of the abstracts composing the gold standard corpus. The source for this new corpus was one of the journals that fed the English sub-corpus, *Conservation Biology*. Although this journal publishes articles in English only, it requires that authors submit a Spanish translation of the English abstract. Since *Conservation Biology* is highly cited and enjoys prestige in the field, it can be assumed that the translations are carried out by professional translators and are therefore of a high standard. I therefore built a corpus of 22 abstract translations extracted from *Conservation Biology*, the same number of STs used in the translation experiment, and conducted the same syntactic dependency feature analysis carried out on the previous translated and non-translated corpora.

Table 10 below shows the average occurrences of DET, CASE, and NMOD in the gold standard corpus.

Table 10. *Average occurrences of DET, CASE, and NMOD in Gold Standard corpus*

Feature	Gold Standard average	Translation experiment TTs	Spanish subcorpus of non-translated texts
DET	46.18	49.16	38.08
CASE	64.73	55.07	42.99
NMOD	53.95	40.11	30.29

As can be observed, averages in the gold standard corpus for CASE and NMOD are significantly higher than those found in the TTs obtained in the translation experiment; however, the average occurrence of DET is relatively lower in the gold standard than in the translations from the experiment. The results of this analysis would then partially support the hypothesis of the present study, at least for CASE and NMOD. As compared to the average in the Spanish sub-corpus of non-translated texts, both the Gold Standard and the translation experiment TTs show an even higher degree of occurrence of the studied features. This is an interesting finding in that it shows that both professional translations and TM-mediated students' translations differ from Spanish originals, this being perhaps a confirmation of the presence of translationese in scientific translation.

By taking a closer look at the samples of published translations considered for the Gold Standard, from the point of view of a native Spanish speaker and professional translator such as this author, it can be established that the translations are generally of a good standard; however, evident traces of syntactic transfer can still be recognised in the translated texts, for example the transfer of ellipsis when it is not the preferred case in Spanish, and the unnecessary use of the passive voice. This could suggest that (a) English as the "lingua franca" of science has a marked influence on the way abstracts are translated into Spanish in

terms of syntax, or (b) the translation samples were most probably not translated by experienced, professional translators. If (b) were the case, I would need to consider the possibility of building a new corpus to be the gold standard for comparison, one in which I could ensure that the samples correspond to authentic pieces of professional translation work. To do this, I would have to request professional English to Spanish translators to participate in the present study. However, as discussed above, the differences between translations produced by professional and trainee translators have already been studied and are not within the scope of the present project.

3.3.2. Syntactic complexity

Textual features of STs and TTs were compared in terms of syntactic complexity measures. For this analysis, I selected only three measures: mean length of T-units, T-unit complexity ratio, and dependent clause ratio. These three features can provide information as to whether ST segmentation was replicated in the TTs. In other words, these measures can bring to light whether paratactic structures, typically associated with English, are detected in the Spanish translations in a similar frequency, as opposed to the presence of hypotactic structures identified as characteristic of Spanish.

As stated in Chapter 2, no appropriate electronic tools were readily available to carry out the analysis for Spanish. Thus, I measured syntactic complexity manually following the parameters validated for Spanish by Véliz (1988) and used in previous studies (Torres González, 1993; Meneses et al., 2013; Muse & Delicia, 2013). To ensure that the results for English and Spanish are comparable, I also analysed the English source texts manually and based on the same criteria devised for the Spanish translations.

As Table 11 shows, both TM and MS Word translations show significantly higher mean length of T-units, T-unit complexity ratio and dependent clause ratio as compared to

the English STs. However, TM translations show a slightly lower T-unit complexity ratio and dependent clause ratio than MS Word translations, suggesting a slight but not significant effect of the TM system on TT segmentation. The difference between TM and MS Word translations is not significant, whereas the difference between STs and TM translations is big enough to suggest that students strove to adhere to the textual features of the TL. Therefore, the evidence from this study shows that the use of TM software did not influence the students' translations in terms of syntactic complexity.

Table 11. *Complexity analysis in students' translations*

Syntactic complexity feature	English STs	TM translations	MS Word Translations
Mean length of T-units	20.68	25.66	26.27
T-unit complexity ratio	1.26	1.37	1.41
Dependent clause ratio	0.21	0.27	0.32

3.4. Conclusions

The results of the translation experiment show that the use of CASE, DET and NMOD in the translations conforms to the frequency of these features described for the TL, thus, partially rejecting the expectation that they would be under-represented as per the influence of the SL and TM software. This may be interpreted as the translators being either competent in the use of the features characteristic of the TL or as over-application of the syntactic rules of the TL (normalisation). Similarly, at the level of textual features, the analysis of syntactic complexity shows that the frequency in the use of parataxis in the STs is indeed not transferred on to the TTs. Therefore, the initial expectation that the segmentation system of TM software has an influence on the way translations are written, particularly when translators are trainees, could

not be proven true in the conditions of the present study. The translation reception study, in the following chapter, explores the potential implications of the results of the translation experiment in the receiving context and in the final users of scientific translation.

CHAPTER 4:   Investigating the reception of scientific translation: The specialist reader's perspective

4.1. Introduction: The centrality of the reader

In any attempt to analyse the reception of texts, it stands to reason that careful attention should be paid to the readers of these texts. The study of text reception is thus not only product-oriented but also user-centred. Despite this, and as I argue throughout the thesis, little attention has been paid to the reception—and by extension to the readers—of scientific translation. Translation audiences are a central consideration in approaches such as skopos theory; however, the composition of the target text audience in skopos is "guided by the translator's assumptions about their needs, expectations, previous knowledge, and so on" (Nord, 1997, p. 35). It can thus be argued that, without any empirical evidence about the needs and expectations of translation addressees, the translator's judgement of how to produce a tailored translation is rather subjective. In addressing the critiques of skopos theory, Nord (2012, p. 32) draws attention to the need to develop effective methods to study the reader's expectations, and admits that "it is easy to talk about the audience's expectations but much more difficult to obtain empirical proof of what the audiences really expect". Nord goes on to argue that one way of examining the audience's prospective expectations and background knowledge is the analysis of parallel texts in the target culture. However, she warns that this would only shed light on the expectations for non-translated texts. Therefore, the expectations for translations may be "different" or "even more tolerant when [the readers are] confronted with unfamiliar features". Similarly, Suojanen et al. (2015, p. 40) state that "although communicative theories raise important points regarding reception, concrete discussions of how to analyze or categorize the recipients are fairly rare in them".

For Suojanen et al. (2015), it is unfortunate that translation reception inquiry has primarily been conducted from an academic perspective, with very little interest in creating

tools that can actually help translators. In an interesting attempt to investigate and attend to the needs and expectations of the audience, they put forward a *user-centered translation* approach. By drawing on the concepts of product usability and user experience, the authors propose methods for translators to gather information about the recipients in an "iterative" fashion throughout the translation process in order to create a "usable translation". A usable translation would then be defined as one that the readers can use "effectively, efficiently, and to their satisfaction" in a specific context of use, and one that is produced taking into account "the user's emotions, beliefs, preferences, physical and physiological responses, behaviours and accomplishments" (Suojanen et al., 2015, p. 13).

From a sociological perspective, a number of studies have addressed "the interaction between human agents, translated texts and their context of production and reception" (Saldanha & O'Brien, 2014, p. 150), recognising the importance of the views of translation stakeholders in translation research. One major stakeholder in translation is the reader, whose role, I argue, is also critical in translator training, since, as Olohan (2016, p. 137) states, "[t]ranslators, even very experienced ones, will seldom have the level of expertise of the professional scientist who is research-active in that field". Therefore, the aim of this chapter is to present the design, methodology, results and conclusions of an empirical study of specialist readers, as well as their preferences and expectations regarding textual production in their field of expertise and in their native language. To keep the overall aims of this thesis in sight, this work does not directly intend to find methods to fulfil the readers' needs and expectations but to shed light on strategies to make student translators aware of the audience's expectations and needs, particularly in a rapidly changing professional scenario greatly affected by technological tools.

The structure of the chapter is a follows: (a) a brief presentation of the questionnaire as the research tool of choice, the intended respondents, and the aims of this study; (b) an

account of the pilot test conducted to iron out potential issues and to refine the instrument; (c) the final questionnaire used; (d) an analysis of the data gathered in term of the respondents' profile and the way they evaluated translations and non-translated texts; (e) a discussion of the findings in terms of the correlation between categorical data and text evaluation, and (f) a statistical analysis to strengthen the analysis of translation reception. In the final section, I summarise the findings, discuss their relevance in terms of expectancy norms, and place them in the broader context of the thesis and current T&I research.

4.2. Methodology

The value of considering the views of the readership of specialised translation lies not only in its practical effects, but also in that it may contribute to understanding the workings of highly specialised texts such as scientific research articles. In this context, I developed a translation reception survey to distribute to scientists regarding translations produced by students in the previous stage of this project, the translation experiment. The purpose of the survey was to gather information about the reactions of specialised readers to translations produced using TM software. In order to do so, the respondents were asked to evaluate texts that were written in Spanish as well as texts that were translated into Spanish. The reactions to both translated and non-translated texts were then contrasted to pinpoint differences in the way texts were evaluated and received. The informants were environmental scientists whose native language is Spanish. They used a questionnaire, completed in Spanish via the survey tool Qualtrics, to evaluate the texts. Each participant was prompted to evaluate four different texts without being aware of the fact that some texts were translations while others were not. Once the responses had been recorded, I carried out quantitative and qualitative analyses.

Survey research and questionnaires in particular have been commonly used to foreground general issues relating to the translation profession, translators' attitudes towards

technology, trainees' ideas about translation teaching and learning (Saldanha & O'Brien, 2014), and to analyse real translation users (Suojanen et al., 2015). However, we have come to know very little about the way translated texts are received by specialised readerships such as the scientific discourse community. Previous studies have used questionnaires—alone or combined with other methods—to investigate translation reception, but have mainly focused on the reactions of (not necessarily specialised) readers to translated literary works (e.g. Zhong & Lin, 2007), or on the perception of viewers of subtitled or dubbed audiovisual material (e.g. Orrego-Carmona, 2016; Secară, 2017; Hu et al., 2019). In the present study, the questionnaire method was used to collect "fact-finding" information (Saldanha & O'Brien, 2014) on the participants, such as their experience with writing, their experience in their field of knowledge, and their command of the English language, and to elicit evaluative information on scientific translation. The data stemming from the participants' answers served to shed light on their attitudes and opinions towards translations produced under the conditions set up for the present study: translations carried out by junior translators using or not using TM systems. Answers to both fact-finding questions and questions intended to elicit an evaluation of the texts were correlated at the moment of analysing the results of the survey.

The questionnaire contained closed questions to restrict the number of possible answers, but there were open questions as well to allow the participants to provide explanations for their choices and compensate for what Saldanha and O'Brien (2014, p. 157) refer to as "the restricted nature of the questionnaire." A Likert scale was used to rate the degrees of agreement/disagreement of the participants with the statements proposed or questions asked in the questionnaire. Likert scales usually include a small uneven number of possible answers that allow the respondent to provide a response along a continuum of alternatives, including the possibility of choosing the answer placed in the middle, which the

researcher can interpret as "not being sure" or "not having an opinion". This could be problematic in that it can lead to inconclusive results, and is therefore avoided—as it was in the present study—by some researchers who prefer, instead, to use an even number of questions (Saldanha & O'Brien, 2014). Considering the geographical distance between the researcher and the potential respondents, the most convenient way to apply the survey was via an internet-mediated collection method. Due to this physical distance, a drawback of questionnaire-based studies is the possibility of having a low response rate. Nevertheless, physical distance also allows the researcher to obtain more truthful responses and target "hidden populations" that could not be reached personally (Saldanha & O'Brien, 2014, p. 166). One final issue that I considered is that, even though the participants were all scientists, the usual suggestion for questionnaires is to avoid linguistic jargon in the survey (Saldahna & O'brien, 2014). Therefore, I opted to construct questions using more general vocabulary that could be easily understood by those outside the field of linguistics and T&I Studies.

As discussed in the introduction, the focus of the present study was restricted to grammatical and textual features. Issues pertaining to rhetorical analysis, such as linearity, stridency or the author's positionality, were thus not directly reflected in the questions.

The questionnaire was designed to help answer the main research question of this thesis: *Does Translation Memory segmentation system affect the quality and reception of scientific translations?* The sub-questions I initially formulated to help answer the main research question were: *What are the expectations TL specialist readers have of this textual genre? Do TM students' translations fulfil these expectations?* As the research project evolved and the role of the reader became prominent, new questions came up regarding the readers' evaluation of TM-translations: *What are the expectations of the readers in terms of grammaticality? Do readers rate translations better when translations stick closer to native writing in the TL? Does the reader's proficiency in the SL influence their assessment of*

translations? Can the reader tell between a translation and a non-translated text? What
social repercussions do the readers' reactions and responses to translations have? In trying
to answer these new questions, the aims of the survey were defined as follows:

1. Determine if syntactic complexity in translations is identified by the respondents
   as differing from that of non-translations.

2. Determine if monolingual speakers receive (TM) translations differently from
   bilingual speakers.

3. Elicit responses, reactions and repercussions (as proposed by Chesterman, 2007)
   of (TM) translations.

4.2.1. Pilot test

Before sending out the final version of the questionnaire, I conducted a "road test" using two
experienced informants. The questions in the first section of the questionnaire were
formulated to gather information about the respondents' experience in the field of
environmental science to validate them as eligible informants, and about their perception of
their own competence in the English language. The results showed both respondents were
highly experienced Chilean researchers with scholarly track records spanning over 20 years,
one working in Chile and the other in Brazil. As regards their English-language proficiency,
both informants confirmed their ability to write in English at a level commensurate with
publication in scholarly journals.

For text 1 (translation), the overall respondents' evaluation was very positive. They
validated the text as belonging to the abstract genre and to the field of conservation biology.
They agreed that the text was well written and did not identify any writing issues. For text 2
(non-translated), the informants did not consider it as belonging to the abstract genre because,
both of them argued, it lacked the conceptual framework an abstract should have; that is, they

signaled issues of content and/or rhetorical conventions. However, they did not point out any linguistic issues. As regards text 3 (translation), one respondent signaled an issue with sentence length, pointing out that sentences were "too long and complex"; nevertheless, the English source text was as complex as the translation, and thus this may not necessarily be a translation-induced problem. The issue of sentence length permeated the answers to all successive questions: the abstract was considered too lengthy, not linear, and required the restructuring of elements (place the hypothesis at the beginning, i.e. a rhetorical issue). For text 4 (non-translated), one of the respondents provided a negative evaluation of the text, pointing to a lack of content.

In the final section, respondents were prompted to comment and provide suggestions on any aspects of the questionnaire. Based on this information and the results of the pilot test, I carried out the following modifications to the questionnaire:

- On average, the respondents took 19 minutes to complete the test. Therefore, in the explanatory statement for the full-scale study I changed the estimated time from 60 to 20-40 minutes, as the shorter time commitment could help to increase the response rate.

- I used a slider question to establish a range number of papers read and written, as it might be difficult for the respondents to come up with an exact number.

- I arranged for the survey tool to allow for respondents to go back to previous questions.

- Respondents were able to spot a spelling error and a missing accent mark in one of the translations. Given that orthography is not the focus of this study, this changed my initial idea of presenting the translated texts in their "natural state", as these types of errors might influence the informants' evaluation of the texts. Therefore, after selecting the texts to be included in the final questionnaire, I edited the translations for

orthography and any sort of blatant error that might lead the respondents to tag the translations as faulty without looking further.

- I chose texts of similar length, avoiding those that were too lengthy (over 300 words).

- I inserted an explanatory sentence in the instructions to emphasise that respondents should comment on linguistic/textual features, not on missing or unnecessary content, methodological issues, or theoretical approaches.

4.2.2. Final questionnaire

The structure of the final questionnaire included seven question blocks, each one of them aiming to elicit information related to the three objectives above. As Figure 7 below shows, Block 1 contained an explanatory statement and the informed consent participants needed to accept prior to completing the questionnaire. Block 2 included fact-finding questions aimed at validating the respondents as specialist readers, and at retrieving some information on their academic profile that could be later correlated with their assessment of the abstracts. The questions in Block 3 aimed to elicit information on the respondents' self-perceived proficiency in the English language in order to separate monolinguals from bilinguals, and then correlate this information with their assessments of the abstracts. Block 4 contained four texts: two English-to-Spanish translations of abstracts obtained from the translation experiment, interspersed with two non-translated abstracts published in journals from Spanish-speaking countries. Qualtrics, the survey tool used in this study, randomly selected the texts from a pool of six translations and six non-translations. For each text, respondents were requested to read the abstract and then evaluate it through the selection of one out of four Likert scale choices for each of the seven statements. If the ratings given by a participant revealed a negative evaluation of any of the aspects measured, the respondents were

prompted to elaborate on their answers through open-ended questions. Figure 7 below shows

the structure of the questionnaire.

Figure 7. *Structure of the questionnaire for the translation reception study*
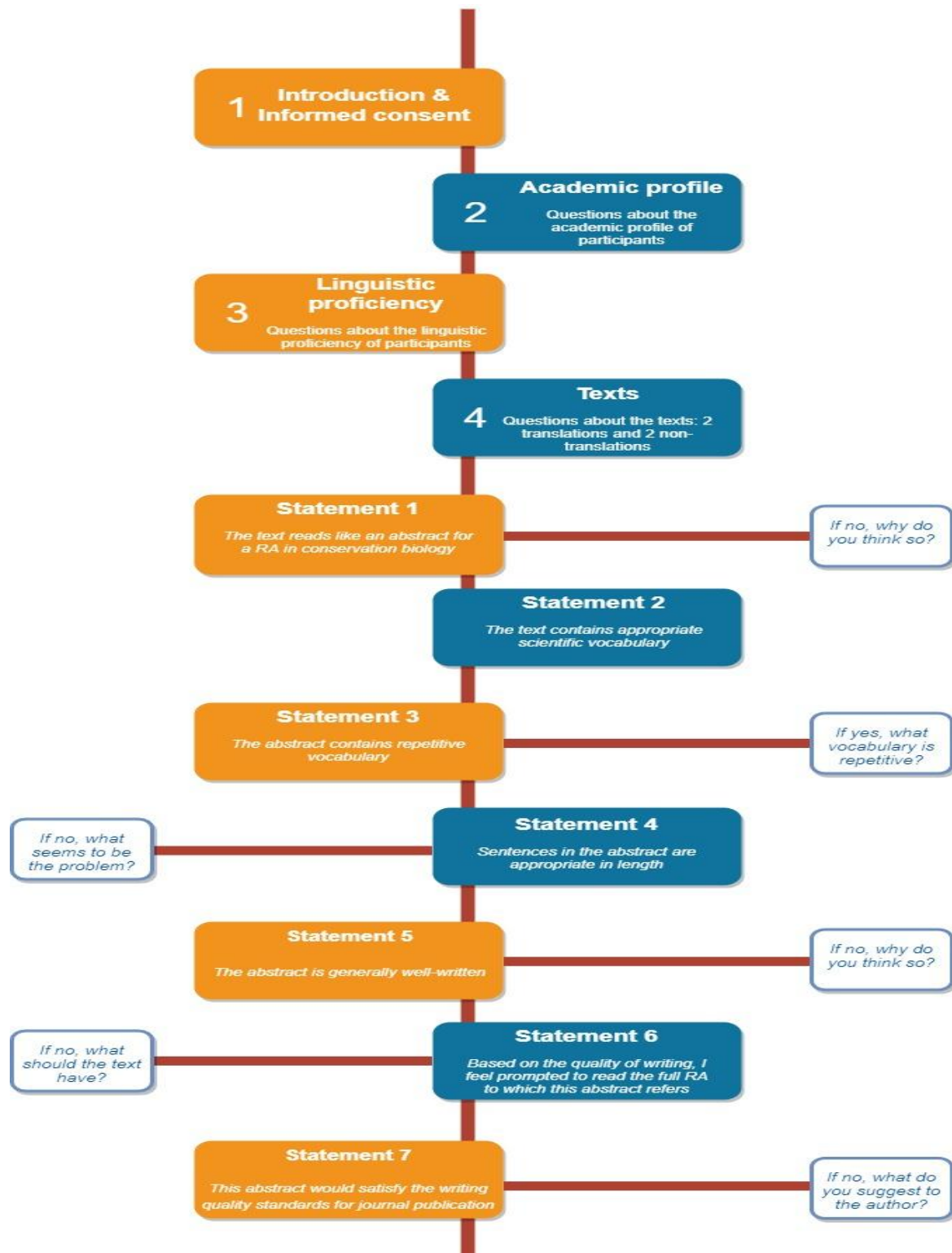
4.2.3. Respondents' profile

The questionnaire was distributed via e-mail to around 100 prospective informants working at universities and scientific societies in Spanish-speaking countries, and international institutions linked to environmental research. In total, 13 scientists answered the questionnaire. Although one of them was based in the USA, all of the respondents were native to Spanish-speaking countries, including Argentina (5), Bolivia (1), Chile (3), Ecuador (1), Peru (1), Uruguay (1), and Spain (1). Ten of them declared they were involved in environmental science in their capacities as researchers, whereas four answered that they were lecturers. Four responded they had been involved in the field as students, but since the choices for this question were not mutually exclusive, this meant that those who selected this choice were also included in the *lecturer* and/or *researcher* categories (see Figure 8).

Figure 8. *Q2 - I have been directly involved in the field of environmental science as a...*
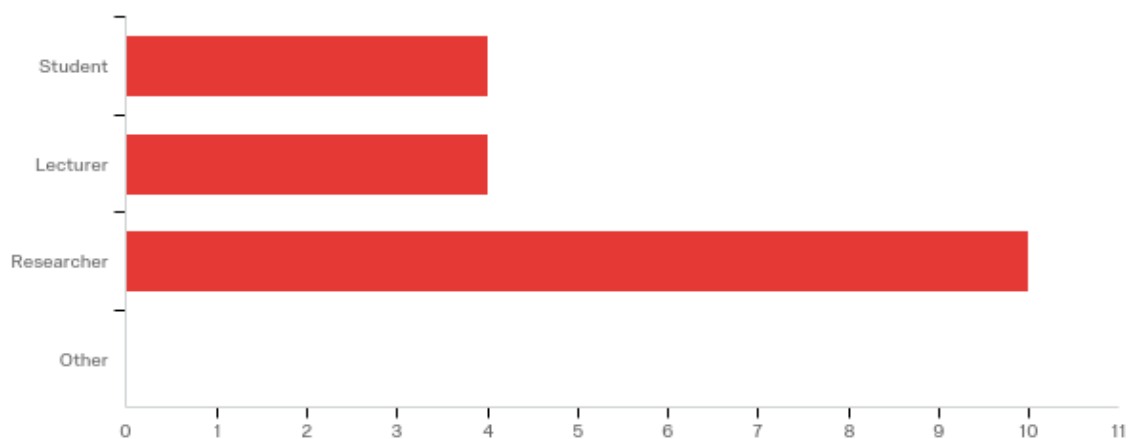
Two of the respondents had been involved in environmental science for 1-5 years, three for 6-10 years, five for 11-19 years, and three for 20 years or more (see Figure 9).

Figure 9. *Q3 - I have been involved in the field of environmental science for...*
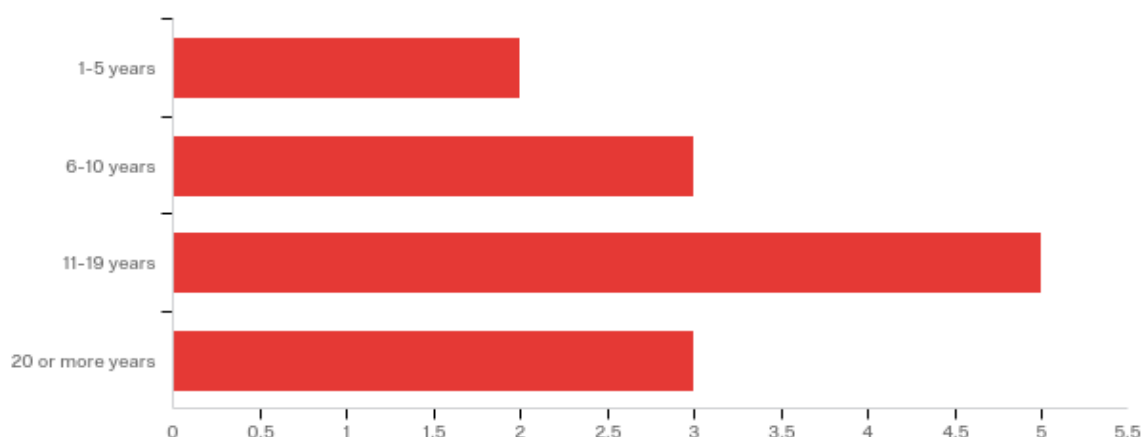
The respondents' specific fields of expertise within environmental science, as stated in the responses to Q4, were varied: ecology, plant ecophysiology, marine biology, evolutionary biology, conservation genetics, bird conservation, ornithology, Antarctic environmental science, fish population dynamics, and mining and environment. This does not seem to have been a problem for the informants in their evaluation of abstracts covering a wide variety of topics within environmental science, as their answers to open-ended questions revealed a very authoritative attitude towards both the content and the linguistic aspects of the texts they examined. Only one comment revealed the respondent's lack of expertise in the field, stating that *[a]l no ser de mi especialidad, me quedan muchos términos que comprender* [since (the topic of the abstract) is beyond my expertise, there are many terms that I do not understand].

The majority of respondents declared that they had read more than 51 research papers in environmental science in the 12 months prior to answering the survey, with three respondents selecting 0-25 papers, three selecting 26-50, five selecting 51-100, and two selecting more than 100 (see Figure 10). As for the number of research papers the informants had written in the same period of time, all of them stated they had written or co-authored 0-25 articles (see Figure 11). However, the 0-25 range that all respondents selected is not

necessarily indicative of their academic writing experience; instead, the respondents'

familiarity with the writing process expressed in their answers to Q7 is a better indicator of

their experience in the writing of scholarly articles.

Figure 10. *Q5 - Over the last 12 months, approximately how many environmental science research articles have you read?*
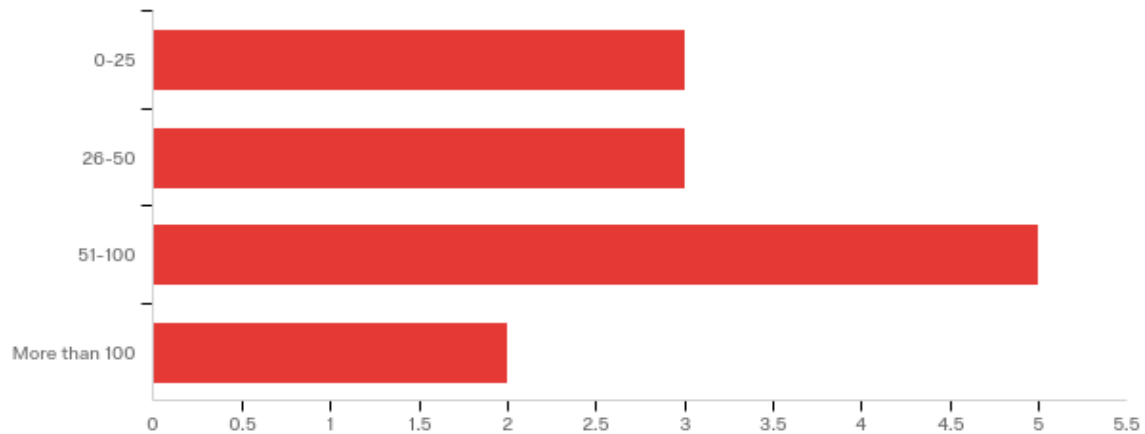
Figure 11. *Q6 - Over the last 12 months, approximately how many environmental science research articles have you written or co-authored?*
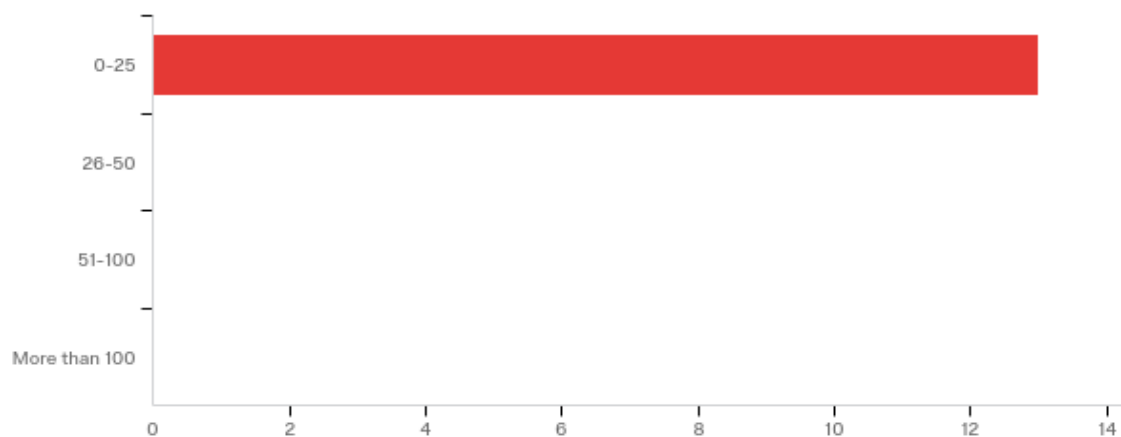
As regards the informants' familiarity with the writing process of research articles, all

of them responded that they were *very familiar* or *somewhat familiar* with the planning stage

(eight and five responses, respectively), and with the actual drafting of a paper (nine and four

responses, respectively). However, three out of the thirteen respondents claimed not to be familiar at all with the editorial work involved in the publication process of a research paper (see Figure 12).

Figure 12. *Q7 - How familiar are you with the following aspects of the writing process of a research article?*
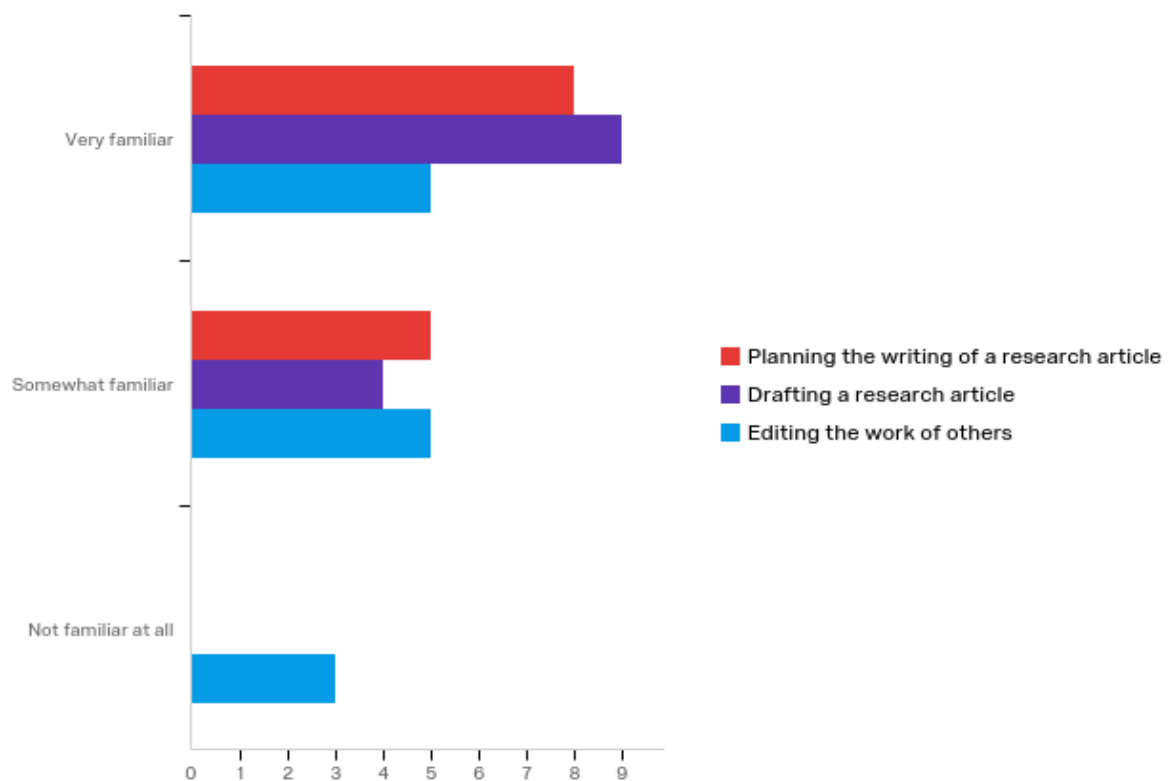
The answers to questions Q2 to Q5 and Q7 indicated that all the respondents were eligible as participants in this study in terms of their affiliation to environmental science, their experience within the field, and their overall familiarity with the writing process of research articles. The results to questions Q3 and Q7 could serve to establish associations between the respondents' experience in environmental science and the way they actually evaluated translated and non-translated research article abstracts in blocks 4 to 7 of the questionnaire.

4.2.4. Respondents' language proficiency

Twelve out of thirteen respondents declared that English was the main language in which they read about environmental science (see Figure 13). In terms of their main language for academic writing in their field, eight respondents declared to write mostly in English, whereas the rest selected Spanish as their main writing language (see Figure 14).

Figure 13. *Q8 – What is the main language in which you read about environmental science?*
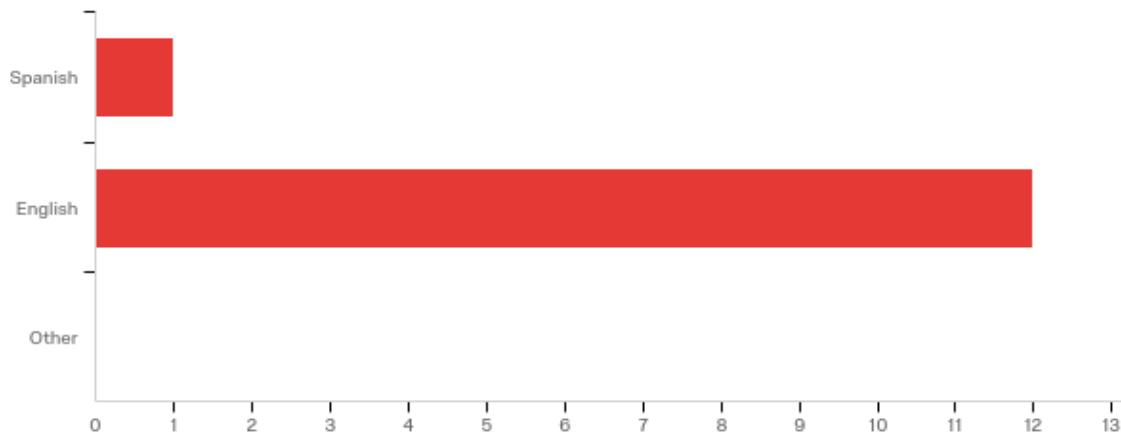
Figure 14. *Q9 - What is the main language in which you write about environmental science?*
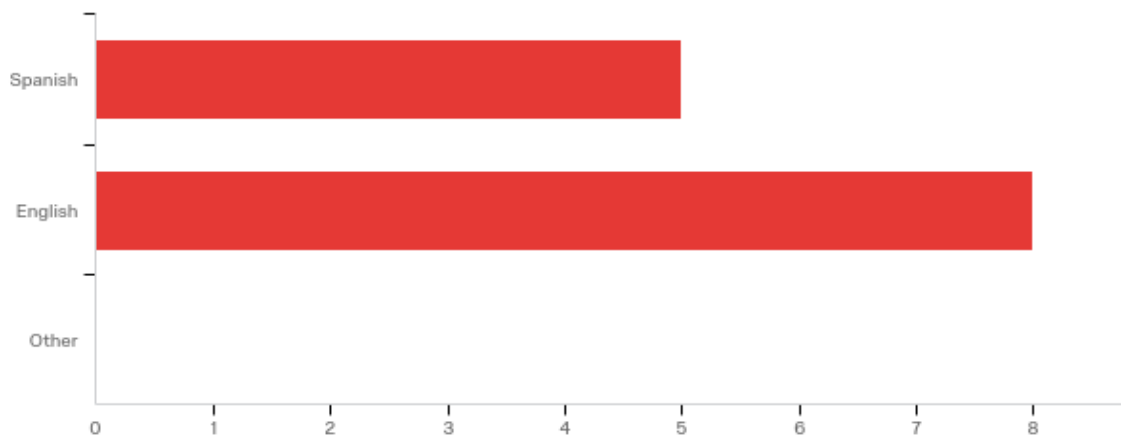
As regards their self-perceived English-language proficiency, six respondents declared to have the confidence to read and write in English for publication, whereas the other seven responded that they "can read in English but do not feel confident to write in English for publication" (see Figure 15).

Figure 15. *Q10 - Which of the following statements best describes your English-language proficiency?*
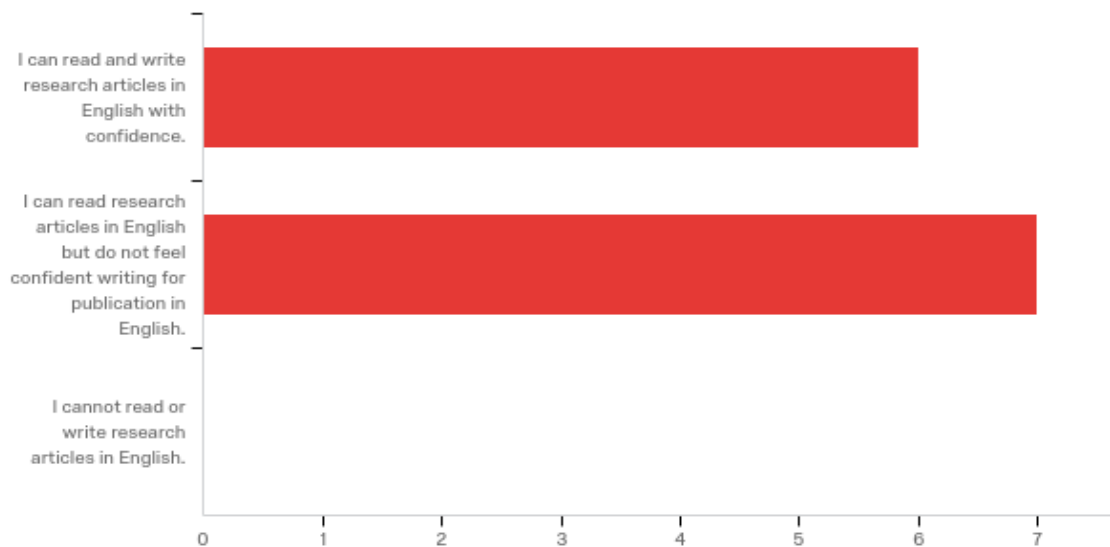
Among those who are not confident writing in English, two of them stated they would seek assistance from "a friend or relative who [they] believe is competent in English", three would look for help from "a colleague who publishes in English", and two would hire "a translator provided by the journal [they] intend to publish [their articles] in" (see Figure 16).

Figure 16. *Q10A - If you do not feel confident writing in English for publication, who do/would you resort to if necessary?*
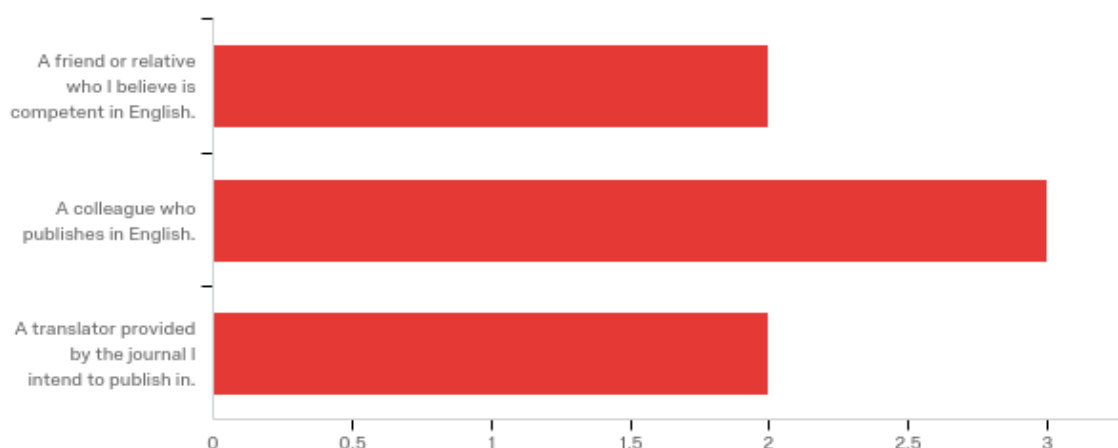
The results for questions Q8 to Q10A indicated that all the participants were bilingual to a certain degree. Therefore, it would be unpractical for the sake of analysis to group them into monolinguals and bilinguals as I had originally planned. Instead, the results of text evaluations should be associated with how confident informants declare themselves to be in their academic writing skills in English.

4.3. Findings

The data obtained from the responses to the questionnaire were analysed in three different ways: (1) a statement-by-statement comparison of translations and non-translations; (2) an association between the respondents' categorical data—namely, their academic profile and proficiency in the English language—and their assessment of the texts; and (3) a statistical analysis to validate the results of analyses (1) and (2).

4.3.1. Evaluation of translations and non-translations

The survey tool randomly selected two translations (Ts) and two non-translated texts (NTs) for each informant to evaluate, from a pool of six Ts and six NTs. Thus, and in order to prevent individual writing styles from invalidating the results, not all respondents were assigned exactly the same texts. In order to take a general look at the results, I consolidated all the responses for Ts and NTs into one comparative table per each evaluative statement:

- *The text reads like an abstract for a research article in conservation biology* (S1);

- *The text contains appropriate scientific vocabulary* (S2);

- *The abstract contains repetitive vocabulary* (S3);

- *Sentences in the abstract are appropriate in length* (S4);

- *The abstract is generally well-written* (S5);

- *Based on the quality of writing, I feel prompted to read the full research article to which this abstract refers* (S6); and

- *This abstract would satisfy the writing quality standards for journal publications* (S7).

For ease of analysis, in Tables 12 to 18, I combined the percentages for those answer choices that I considered revealed a negative assessment of a given statement, and highlighted the percentages in grey. As for the answer choices that implied a positive evaluation of a statement, I combined the percentages and placed them below the negative assessment choices. For statements 1, 2, 4, 5, 6 and 7, the answer choices *Strongly Disagree* and *Disagree* were considered as negative, whereas *Agree* and *Strongly Agree* were deemed to reflect a positive view towards the statement in question. Only in the case of statement 3 does the opposite apply; that is, the answer choices *Strongly Disagree* and *Disagree* are considered positive, whereas *Agree* and *Strongly Agree* are deemed to bear a negative evaluation of the statement.

As stated above, when one of the statements regarding a text received a negative rating, respondents were asked to elaborate by answering an open-ended question. In analysing the answers, I classified the respondents' comments in two general groups: translation-related and non-translation related. *Translation-related* issues are those allegedly caused by the use of TM software and by translation in general, and language issues that are attributable to translator competence. *Non-translation-related* comments, in contrast, are those concerning the text's (lack of) content and rhetorical issues, such as problems in the order or presentation of content. As would seem evident, issues stemming from the comments on non-translated abstracts may only classify as non-translation-related; however, issues regarding translated texts may be either translation- or non-translation-related. Therefore, careful attention was paid to the comments pertaining to translations, given that they are the focus of the study. Moreover, as the number of comments on translations was higher than that of non-translations, it was necessary to determine if the negative evaluation of a translation was, in fact, caused by the use of TM software or if it was an issue of translator competence.

Respondents considered both Ts and NTs as valid texts belonging to the genre of research article abstracts in conservation biology. The difference in the rate of positive evaluation between Ts and NTs for S1 is 11%, with 81% of responses being *Agree* or *Strongly Agree* for Ts, and 92% for NTs (see Table 12 and Figure 17). The answers to the question *Why do you think the text does NOT read like an abstract for a research article in conservation biology?* in the case of translations relate to questions of language clarity, terminology, and content, as is evident in the following comments:

> *Porque no expresa con claridad la idea, porque está escrito raro, repite palabras y no se entiende a dónde va* [Because the idea is not expressed with clarity, because it reads oddly, words are repeated and you do not know where (the work) leads to].

Falta una introducción detallada sobre la problemática [A detailed introduction to the topic is missing].

No observé metodologías, hipótesis, planteo y objetivo de investigación [I cannot identify the methods, the hypothesis, the research problem or aim].

Por la ausencia de términos técnicos en la redacción [Because of the lack of technical terms in the writing (of the text)].

Even though issues of language clarity may be sometimes attributable to translator competence, the comments on non-translations reveal the same language and content issues as translations. For example, the most elaborate comment of the two provided for translated abstracts reads: *En algunos casos no usa la terminología apropiada. La estructura del texto tampoco es adecuada, son oraciones muy largas con explicación redudante. Deberían ser más concisas* [In some cases, the terminology used is not appropriate. The text's structure is not appropriate either; sentences are too long and contain redundant explanations. They should be more concise]. As is evident, the respondent is complaining about the (inadequate) use of terminology and issues that may pertain to the writing skills of the author of the research article. On the other side of the spectrum, the most critical answer for a non-translation touches on similar problems: *Otra vez creo que no se expresa con claridad la idea. Además, las frases son muy extensas y repetitivas* [Again, I think the idea is not clearly expressed. Also, the sentences are very lengthy and repetitive].

Although "lengthy", dense sentences would be typical of Spanish, the fact that this feature was considered as inappropriate even in non-translated Spanish may reveal that there

might be a case of cross-linguistic influence not caused by translation but by the informants' familiarity with English writing and the conventions of abstracts written in English. It might be the case, as well, that the genre under study is closer in Spanish to the rhetorical features of English. Still, a deeper analysis of the answers to the question at hand is unnecessary considering the small difference in the validation of Ts and NTs as members of the genre in question.

Table 12. *S1 - The text reads like an abstract for a research article in conservation biology*

	Translations	Percentage		Non-translations	Percentage	
Strongly Disagree	1	4%		1	4%	
Disagree	4	15%	19%	1	4%	8%
Agree	12	46%		11	42%	
Strongly Agree	9	35%	81%	13	50%	92%
Total	26	100%	100%	26	100%	100%

Figure 17. *Statement 1*
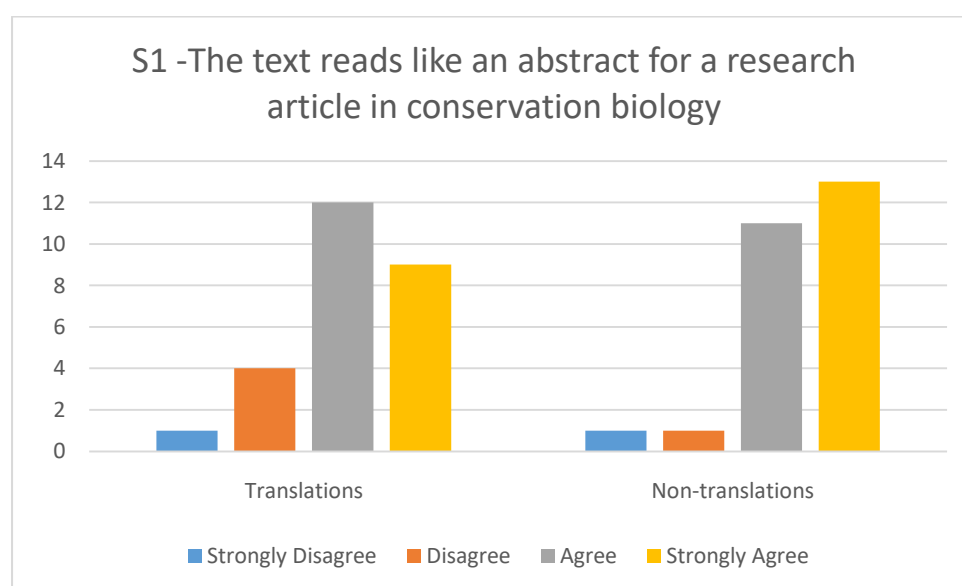
As for the appropriateness of scientific vocabulary (S2), respondents provided a positive evaluation of both Ts and NTs. Although there is a 15% difference between Ts (77%) and NTs (92%), the gap is not significant enough to state that non-translations were deemed to contain more appropriate vocabulary than translations (see Table 13 and Figure 18). The ratings for S1 and S2 indicate that both translations and non-translations are, in the view of the respondents, valid representatives of the genre under study. For this statement, no open-ended questions were asked, as I considered that it does not directly touch on the effects of TM sentence segmentation.

Table 13. *S2 - The text contains appropriate scientific vocabulary*

	Translations	Percentage		Non-translations	Percentage	
Strongly Disagree	2	8%		1	4%	
Disagree	4	15%	23%	1	4%	8%
Agree	14	54%		11	42%	
Strongly Agree	6	23%	77%	13	50%	92%
Total	26	100%	100%	26	100%	100%

Figure 18. *Statement 2*

S2 - The text contains appropriate scientific vocabulary
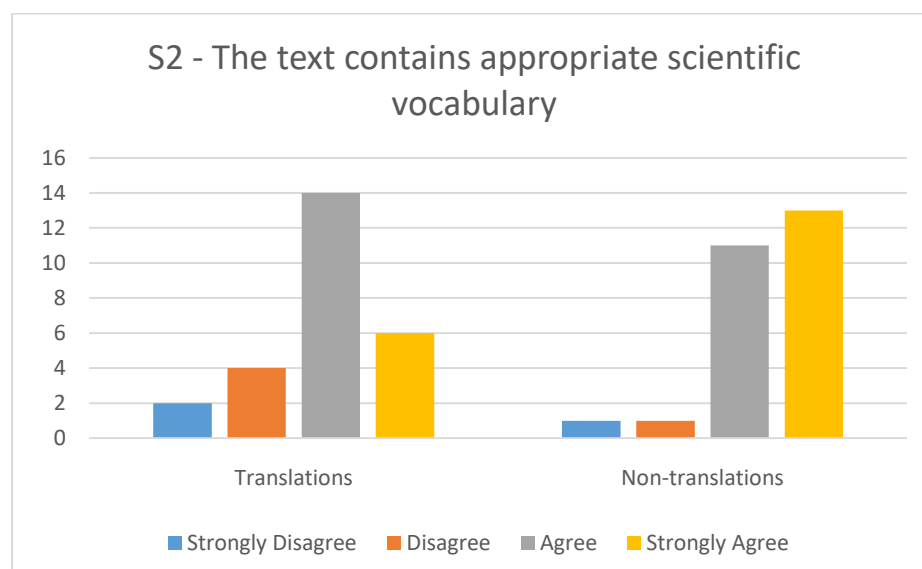
The aim of S3 was to assess the possible influence of the segmentation system of TM software. Where English would prefer paratactic structures and use repetition as a cohesive device, Spanish would form long sentences with grammatical connectors, and avoid word repetition (López Guix & Minnet Wilkinson, 1997/2003). A high degree of word repetition would be indicative of cross-linguistic influence of English on Spanish TM-mediated translation. In this regard, there was a 18% difference in their perception of informants concerning the statement *'The abstract contains repetitive vocabulary* (see Table 14 and Figure 19). At first sight, the ratings for S3 could be interpreted as a slight effect of TM software on the cohesive system of Spanish (see Figure 19); however, in order to determine this, one would need to look into the answers to the open-ended question *What vocabulary do you think is repetitive?* For non-translations, there was only one comment that did not refer to word repetition but to the "repetition of ideas", thus not pertaining to the textual conventions of the text genre in Spanish but to the own author's writing competence. In the case of translations, the answers relate to the repetition of technical terms which are either specific to the text genre or central to the research article (*biologging, corredores, recursos, exposición*), and statistical terms typical of scientific discourse (*resultados, tendencia, diversificación*). The frequency of occurrence of these terms in translation is the same as that of STs in some cases, and slightly less frequent in other cases; however, they are not used to introduce new sentences nor do they provide instances to subordinate sentences. In fact, they are all technical terms not easily replaceable by cohesive or referential devices. Therefore, the high frequency of word repetition may be conceivably attributable to issues of translator competence, since the texts used in the reception study had been translated by translation trainees, but not necessarily to the influence of TM systems.

Table 14. *S3 - The abstract contains repetitive vocabulary*

	Translations	Percentage		Non-translations	Percentage	
Strongly Disagree	3	12%		10	38%	
Disagree	15	58%	70%	13	50%	88%
Agree	8	30%		2	8%	
Strongly Agree	0	0%	30%	1	4%	12%
Total	26	100%	100%	26	100%	100%

Figure 19. *Statement 3*

S3 - The abstract contains repetitive vocabulary
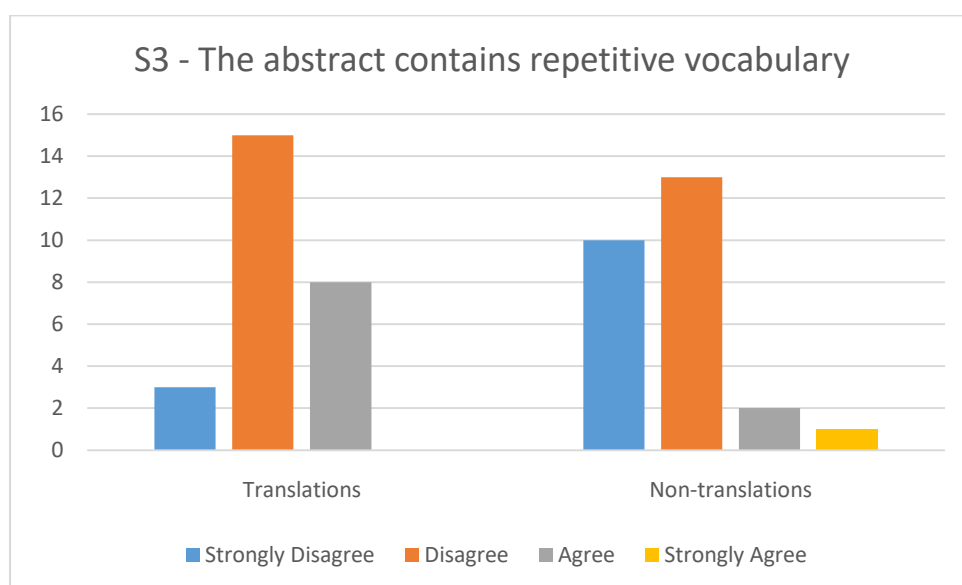
Spanish tends towards the use of complex, subordinate sentences, whereas English favours shorter, independent sentences (Váquez-Ayora, 1977; Beeby, 2000; López Guix & Minnet Wilkinson, 1997/2003). Therefore, the respondents' perception of Spanish sentences as short, particularly in the case of translations, would indicate as well an effect of TM segmentation in the way Spanish constructs discourse at the textual level. In this regard,

there was no difference recorded for the statement *Sentences in the abstract are appropriate in length* (S4), with 35% of the respondents signalling their disagreement with the statement for both translations and non-translated texts, and 65% stating that they agree with the statement (see Table 15 and Figure 20). When probed about what they thought was the problem with sentence length, respondents signalled that they found that the translations contained lengthy sentences, with a high load of irrelevant information, which would not help their understanding of the text, as is evident in the following comments:

Muy largo, lo que dificulta seguir el contenido [Too long, which makes it difficult (for the reader) to follow the content].

Algunas oraciones están muy largas, por lo que debo volverlas a leer para comprender mejor [Some sentences are too long, so I need to read them for a second time in order to understand them better].

Hay más de una idea tanto en la frase introductoria como en la frase "Aunque en nuestro estudio…" [There is more than one idea in both the introductory phrase and the phrase "*Aunque en nuestro estudio…*"].

Son muy extensas y provocan que uno se maree al tratar de comprender [They are too lengthy and trying to understand them is annoying].

By taking a closer look at the translations commented on, I could verify that translators did, in fact, segment TTs in the same way ST strings of written language had been divided; that is, there was a one-to-one correspondence between ST segments and TT

segments. Although one may argue that there might be an effect of TM software on the way TTs were segmented, the fact that the respondents found sentences to be unnecessarily lengthy runs contrary to the expectation that TM-mediated translation would contain sentences shorter than those of non-translated Spanish texts. Instead, I would interpret the informants' observations as indicative of the influence of English, as the lingua franca of science, on the Spanish-speakers' use of scientific discourse. This is confirmed by the respondents' comments about the sentences in non-translated abstracts, which indicate precisely the same issue signalled for translations: sentences are lengthy and, therefore, confusing. Indeed, comments such as *Hay oraciones que se podrían dividir, para ayudar al lector* [Some sentences could be split up in order to help the reader] for a translation read very similarly to comments for non-translations such as:

> *Muy largas, separadas por comas cuando deberían estar separadas por puntos o punto y coma* [They are too long, separated by commas when they should be separated by full stops or semicolons].

> *Son muy largas innecesariamente* [They are unnecessarily long].

> *La primera parte del resumen tiene oraciones muy largas, que no dan una lectura fluida* [The first part of the abstract contains sentences that are too long and do not read with ease].

Table 15. *S4 - Sentences in the abstract are appropriate in length*

	Translations	Percentage		Non-translations	Percentage	
Strongly Disagree	1	4%	35%	2	8%	35%
Disagree	8	31%		7	27%	
Agree	14	54%	65%	9	34%	65%
Strongly Agree	3	11%		8	31%	
Total	26	100%	100%	26	100%	100%

Figure 20. *Statement 4*
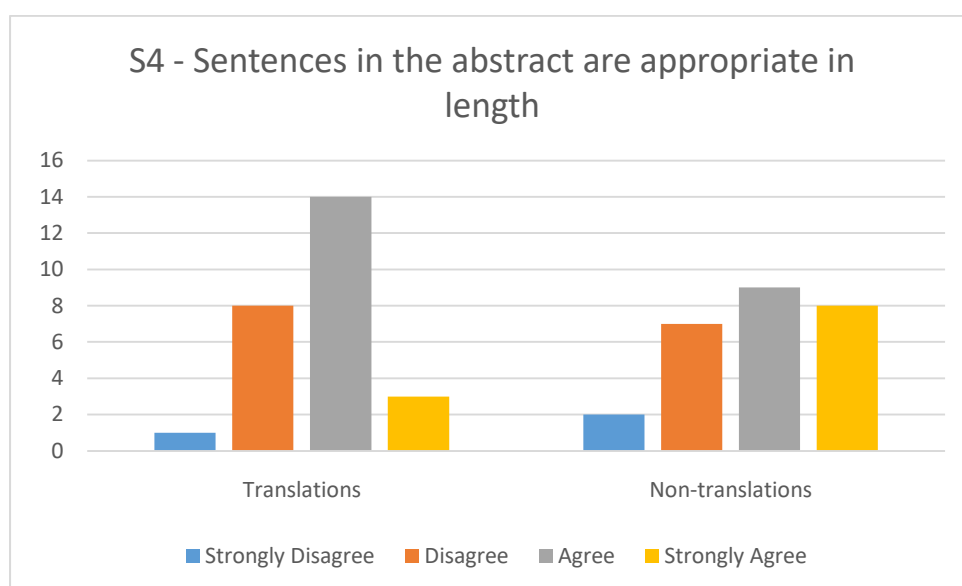
For S5, an important difference can be observed between Ts and NTs, with a positive

evaluation of 58% for Ts and 73% for NTs (see Table 16 and Figure 21). As this statement

touches on the overall quality of the evaluated abstracts, it is worth looking into the answer to

the open-ended question *Why do you think the text is NOT well-written?* For Ts and NTs, the

comments refer equally to both language and content problems. As regards language, respondents signalled the following problems with the use of terminology in Ts:

Otro caso es el uso del término "movimiento en la ecología de aves" en vez de "migración". [Another case (of incorrect terminology) is the use of the term "*movimiento* (movement) *en la ecología de aves*" instead of "*migración*" (migration)].

Uso de palabras muy coloquiales para un resumen de trabajo científico… [The text contains words that are too colloquial for the abstract of a work of research…].

Se encuentra términos que no van de acorde al campo de estudio que se confunden con los resultados obtenidos [There are terms that do not belong to the discipline and are confused with the results obtained].

Table 16. *S5 - The abstract is generally well-written*

	Translations	Percentage		Non-translations	Percentage	
Strongly Disagree	2	8%	42%	2	8%	27%
Disagree	9	34%		5	19%	
Agree	12	46%	58%	10	38%	73%
Strongly Agree	3	12%		9	35%	
Total	26	100%	100%	26	100%	100%

Figure 21. *Statement 5*
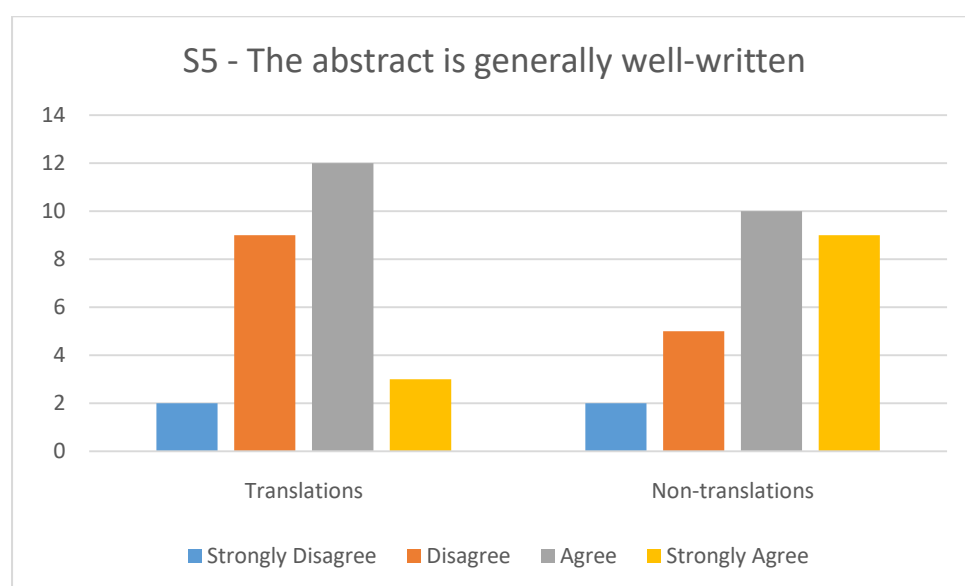
As concerns content, comments on Ts relate to issues such as the lack of information regarding research methods or more or less weight given to certain bits of information:

Asumiendo que es un resumen, el texto no fundamenta claramente las observaciones realizadas con las conclusiones… [Assuming this is an abstract, the text does not clearly substantiate the observations made in the conclusion].

La metodología no está bien escrita, describe más resultados sin saber cómo lo hizo [The methodology is not well written, it describes the results without discussing the way they were obtained].

Porque para un resumen se centra en el contexto y los objetivos, quitando espacio a resultados y conclusiones [Because, for an abstract, it focuses on the context and aims [of the research], leaving little room for the results and conclusions].

Although one of the respondents mentions a "lack of connection between sentences", as the majority of language-related observations relate to the issues of terminology and obscure writing, the low ratings for translations can be attributed, again, to translator competence but not necessarily to the effects of TM software.

The difference in the degree of agreement with statement 6, *Based on the quality of writing, I feel prompted to read the full research article to which this abstract refers*, is significant: 19% in disfavour of translations, with a 54% for Ts and 73% for NTs (Table 17 and Figure 22). The general percentages for agreement are relatively low as compared to the previous statements. This could be due to a number of factors, including the respondents' personal interests or expertise. Therefore, analysing the responses to the open-ended question *What should the text have that would prompt you to read the full research article?* can be useful to understand if the readers' interest in reading the full research articles can be accounted for by the effects of TM software or other factors. There were eight comments for translations, most of them revealing issues of content, as in the cases described for statements 1 to 5; however, the few observations concerning language seemed quite harsh, with one respondent suggesting that the abstract be re-written (*rehacer*). Three of the comments related to terminology, but were rather contradictory:

> *Ser menos complejo. Parece que tiene mucho vocabulario técnico y eso no llama la atención; al contrario, le resta atención* [(The text) should be less complex. It seems to have too much technical vocabulary and that does not catch (the reader's) attention; quite the opposite, it might take attention away from it].

> *Lenguaje 100% científico* [Language that is 100% scientific].

Uso de palabras científicas precisas y mayor claridad en las conclusiones [Use of precise scientific words and clearer conclusions].

Table 17. S6 - *Based on the quality of writing, I feel prompted to read the full research article to which this abstract refers*

	Translations	Percentage		Non-translations	Percentage	
Strongly Disagree	4	15%	46%	3	12%	27%
Disagree	8	31%		4	15%	
Agree	11	42%	54%	7	27%	73%
Strongly Agree	3	12%		12	46%	
Total	26	100%	100%	26	100%	100%

Figure 22. *Statement 6*
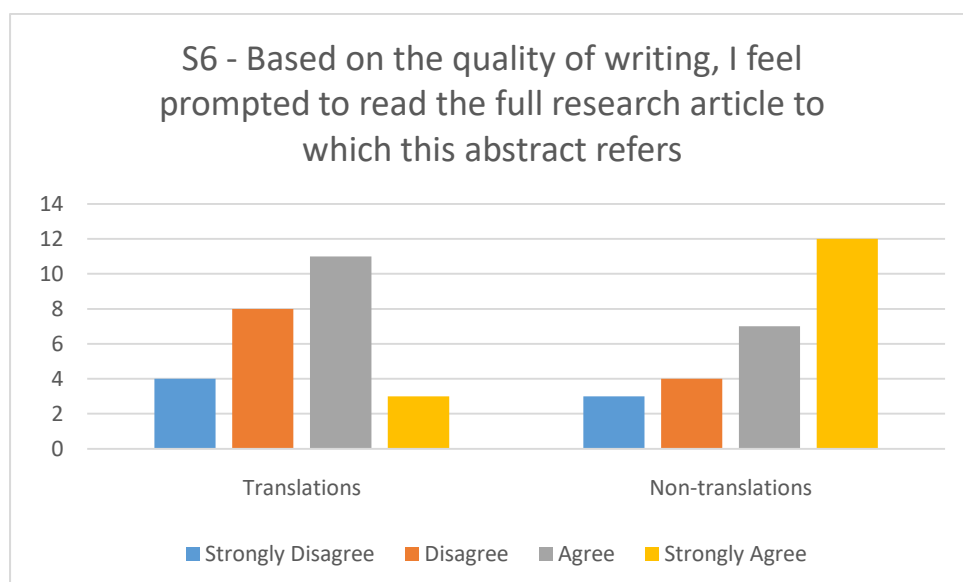
As for the non-translations, the comments were less in number than those for translations, and most of them elaborated on the lack of content in the abstracts. Nevertheless,

two language-related comments precisely support my previous observation that the readers were highly influenced by English, as twelve out of thirteen of them declared they read scientific papers mostly in English:

Escribirlo de otra forma pensando en el lector [Write it (the abstract) in a different way, having the reader in mind].

Debería tener oraciones más cortas en la primera parte del resumen... [there should be shorter sentences in the first part of the abstract].

At the textual level, HCCs, such as those of the Spanish-speaking world, prefer longer, content-loaded sentences, and are author-centred (Katan. 2004). This is in contrast with the general conventions described for English, which tends to use shorter, less content-loaded sentences, and focuses on easing the reader's effort to comprehend the text. Therefore, the evidence presented so far runs contrary to the general expectations for Spanish texts, particularly in the case of scientific writing and the genre of abstracts for research articles in environmental biology.

Regarding the results for S7, *This abstract would satisfy the writing quality standards for journal publications*, the difference between the ratings for Ts and NTs is significantly high: 27% did not favour Ts, with 46% for Ts and 73% for NTs (see Table 18 and Figure 23). Looking into the open-ended question *What would you suggest the author do to improve the abstract's writing?* could help find the cause for the low ratings recorded for Ts. For translations, most of the comments related to a lack of, or an imbalance in, the content, as is evident in the following observations:

Enfatizar los propósitos del estudio y cómo este impacta la conservación de hábitat de especies migratorias… [Emphasise the aims of the study and its impact on the conservation of the habitat of migratory birds].

Ampliar el contexto general, describir mejor los materiales y métodos [Expand on the general context and better describe materials and methods].

Dos oraciones sobre la problemática en la introducción. Lugar donde se llevó a cabo el trabajo y una mejor conclusión [(Include) two sentences about the problem in the introduction. (State) the location where the study took place and improve the conclusion].

Buscar el equilibrio entre las secciones que abarca un resumen [Find a balance between the sections that make up the abstract].

Table 18. *S7 - This abstract would satisfy the writing quality standards for journal publications*

	Translations	Percentage		Non-translations	Percentage	
Strongly Disagree	2	8%	54%	2	8%	27%
Disagree	12	46%		5	19%	
Agree	10	38%	46%	10	38%	73%
Strongly Agree	2	8%		9	35%	
Total	26	100%	100%	26	100%	100%

Figure 23. *Statement 7*

S7 - This abstract would satisfy the the writing quality standards for journal publications
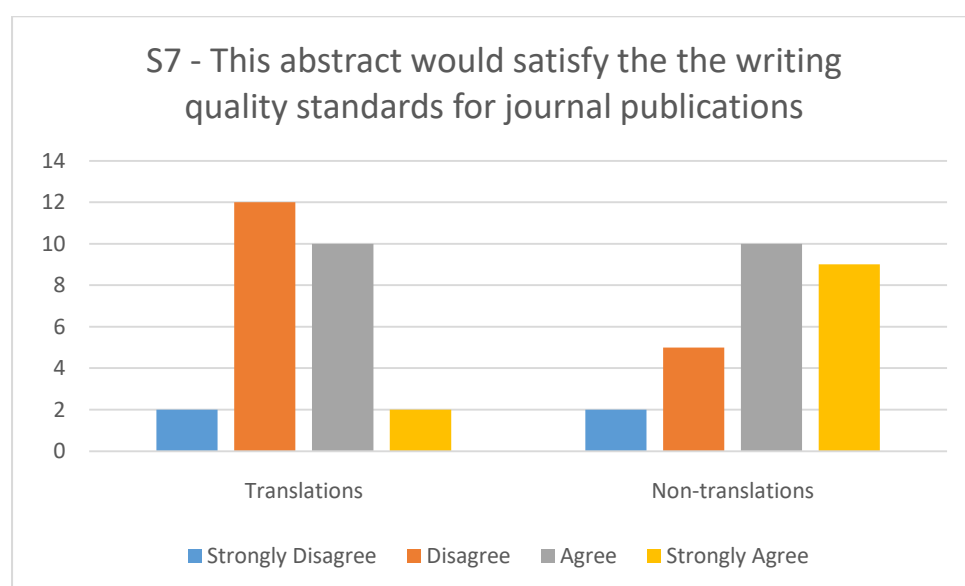
Other comments related to issues of language, such as clarity, and, again, signalled features usually described as typical of English texts: that sentences should be shorter or more concise, and be reader-oriented.

Oraciones cortas y no interconectadas [(Use) sentences that are short and not interconnected].

Brevedad y conceptos claros [Brevity and clear concepts].

Ponerlo en un lenguaje más llamativo para el lector [Use language that is more captivating for the reader].

Worth mentioning is a comment where an informant explicitly addressed problems of translation: *Que se mejore la traducción del inglés al español* [The translation from English into Spanish should be improved]. This is quite particular, as all the other comments about

translations did not reveal the informants were aware of being in front of a translation, regardless of the fact the word "translation" appears in the explanatory statement to the questionnaire.

For non-translations, most comments are language-related, such as *Oraciones más cortas y corregir principalmente los signos de puntuación* [Shorter sentences and correct punctuation], and *Que redacte de nuevo todas las ideas* [Re-write all the ideas]. However, one comment relates to content: *Hablar de la temática donde está sumergido el trabajo y qué implicancias podría tener* [Elaborate on the topic of the article and its potential implications].

4.3.2. Associations between categorical data and text evaluation

Initially, I intended to analyse the association between two variables with the respondents' assessment of texts: their years of experience in the field of environmental science (EXPERIENCE) and their self-perceived English language proficiency (ENGLISH PROFICIENCY). In my attempt to strengthen the analysis of associative patterns, I decided to add a third variable: the language in which the informants usually write for publication (WRITING LANGUAGE). This third variable may be more reliable than self-perceived English-language proficiency, since the capacity for actually writing in English can be a better indicator of language competence.

One question I asked myself before looking for associations between categorical information and the actual evaluation of texts was if it was indeed possible to carry out statistical analysis of data stemming from a small sample. Following advice from a statistical consultant, I put all categorical data into two broad groups, based on the premise that having broader categories would make it easier to find tendencies and associations. For EXPERIENCE, this meant that I merged the categories *1 to 5 years* and *6 to 10 years* into *1-10 years*, and *11 to 19 years* and *20 or more years* into *11+ years*. In the case of ENGLISH

PROFICIENCY, this process was simple. Respondents were prompted to choose one of three categories—*I can read and write in English*, *I can only read in English*, *I cannot read or write in English*—but there were no responses for the third category. Therefore, I just analysed the first two categories. The same applied for WRITING LANGUAGE; the choices were English, Spanish and other language(s), but none of the respondents chose the third option.

For correlation purposes, I gave each and all the responses to the questions in blocks 4 to 7 a numerical score ranging from 1 to 4, where 1 represents the poorest rating possible regarding a statement, and 4 stands for the most positive rating available for the respondents to mark. For most statements, *Strongly Agree* is the most positive rating, and *Strongly Disagree*, the most negative. However, in the case of statement 3, *The abstract contains repetitive vocabulary*, the opposite applies; that is, *Strongly Disagree* means the most positive rating, whereas *Strongly Agree* is taken to represent the most negative rating. Therefore, for statements 1, 2, 4, 5, 6, and 7, the scores assigned were: 1 for *Strongly Disagree*, 2 for *Disagree*, 3 for *Agree*, and 4 for *Strongly Agree*. For statement 3, the scores assigned were 1 for *Strongly Agree*, 2 for *Agree*, 3 for *Disagree*, and 4 for *Strongly Disagree*. Therefore, the lower the score, the less positive the respondents' evaluative views were regarding the text under evaluation. Once each response had been given a score, I summed up the total score for each statement and calculated the average per statement for both translations and non-translations to then insert the results into Table 19, Table 20, and Table 21 below. The highest possible average score for each text category (translation or non-translation) per statement is 8 (4 per each of the two texts evaluated per text category).

In terms of EXPERIENCE, the most experienced respondents rated both Ts and NTs higher than the less experienced group in all seven statements. This may mean that the more experience they have in the field, the more familiar and comfortable readers are with the text

genre, and therefore both Ts and NTs are recognised as research article abstracts in conservation biology. Moreover, since the most experienced scientists are more accustomed to reading in English than in Spanish, it may be the case that any textual features of English present in the Spanish translations could have been unconsciously ignored by the respondents.

Table 19. *Experience*

| Statement | 1-10y (5 respondents) | | | | 11+y (8 respondents) | | | |
| | Ts | | NTs | | Ts | | NTs | |
	Total Score	Average	Total Score	Average	Total Score	Average	Total Score	Average
S1	28	5.60	31	6.20	53	6.62	57	7.13
S2	29	5.80	31	6.20	47	5.87	57	7.13
S3	26	5.20	30	6.00	47	5.87	54	6.75
S4	22	4.40	24	4.80	49	6.13	51	6.37
S5	25	5.00	27	5.40	43	5.38	51	6.37
S6	22	4.40	26	5.20	43	5.38	54	6.75
S7	24	4.80	26	5.20	40	5.00	52	6.50
TOTAL	176	35.20	195	39.00	322	40.25	376	47.00

As regards ENGLISH PROFICIENCY, respondents who claim to be able to read and write for publication in English with confidence rated both Ts and NTs higher than those who declared themselves to be able to only read in English. It may therefore be argued that the more confident readers are in their English language skills, the more inclined they are to recognise English-language features as conventional of scientific writing in Spanish. This reinforces the idea that English, as the lingua franca of science, may exert an influence on the textual conventions of Spanish scientific writing.

Table 20. *English proficiency*

| Statement | CAN ONLY READ with confidence (7 respondents) | | | | CAN READ AND WRITE with confidence (6 respondents) | | | |
| | Ts | | NTs | | Ts | | NTs | |
	Total Score	Average	Total Score	Average	Total Score	Average	Total Score	Average
S1	40	5.71	46	6.57	41	6.83	42	7.00
S2	40	5.71	46	6.57	36	6.00	42	7.00
S3	37	5.29	44	6.29	36	6.00	40	6.67
S4	36	5.14	39	5.57	35	5.83	36	6.00
S5	37	5.29	42	6.00	31	5.17	36	6.00
S6	34	4.86	42	6.00	31	5.17	38	6.33
S7	33	4.71	41	5.86	31	5.17	37	6.17
TOTAL	257	36.71	300	42.86	241	40.17	271	45.17

As for WRITING LANGUAGE, the overall ratings for both Ts and NTs are very similar in both groups of respondents. As I argue above, this variable may be more reliable than self-perceived English-language proficiency, since the capacity to write well in English can be a better indicator of language competence. However, the three variables—EXPERIENCE, ENGLISH PROFICIENCY, and WRITING LANGUAGE—seem to be correlated to a certain extent, since four out of the eight respondents in the 11+y group declared that they can read and write in English with confidence, and that English is the main language in which they write about environmental science.

Table 21. *Writing language*

Statement	MOSTLY WRITE IN SPANISH (5 respondents)				MOSTLY WRITE IN ENGLISH (8 respondents)			
	Ts		NTs		Ts		NTs	
	Total Score	Average	Total Score	Average	Total Score	Average	Total Score	Average
S1	32	6.40	35	7.00	49	6.12	53	6.62
S2	30	6.00	34	6.80	46	5.75	54	6.75
S3	26	5.20	33	6.60	47	5.87	51	6.37
S4	25	5.00	28	5.60	46	5.75	47	5.88
S5	26	5.20	29	5.80	42	5.25	49	6.13
S6	24	4.80	29	5.80	41	5.13	51	6.37
S7	23	4.60	29	5.80	41	5.13	49	6.13
TOTAL	186	37.20	217	43.40	312	39.00	354	44.25

Those informants who declared that they write mostly in English rated both Ts and NTs higher than the group who write mainly in Spanish. Therefore, the analysis of the variable WRITING LANGUAGE supports the argument that the more exposed to the English language Spanish-speaking scientists are, the less inclined they are to notice features of English language in scientific writings in Spanish and the more inclined they would be to accept these features as belonging to the text genre here studied.

Overall, the results show that non-translations were valued higher than translations; however, the comments provided by the informants in the open-ended questions reveal that the problems they found in the translations cannot be clearly attributable to the use of TM software. Moreover, the results also show that the higher the academic experience and English-language competence of respondents, the higher they rated both translations and non-translations. By contrasting the ratings of translations against the respondents' answers to the

open-ended questions, it can be argued that for translations to be accepted as eligible members of the genre under study, they need to strike a balance between certain English textual conventions and features of proper Spanish grammar. This finding is in line with the proposition that scientific discourse is discipline-specific, rather than culture-dependent, and confirms the dominance of English as the lingua franca of science.

4.3.3. Statistical analysis

A set of statistical models were developed to strengthen the validity of the findings presented in the preceding section. The aim of the analysis below was to confirm whether the differences between the ratings the respondents gave to translations and those assigned to non-translated texts were statistically valid.

The data used to estimate the model was the evaluation average for each previously established variable and sub-variable. These are:

- Variable EXPERIENCE, divided into the sub-variables:

  - 1-10 Years

  - 11+ Years

- Variable ENGLISH PROFICIENCY, divided into the sub-variables:

  - Read Only

  - Read and Write

- Variable WRITING LANGUAGE, divided into the sub-variables:

  - Spanish

  - English

This process allows us to define various models to determine (a) the differences within each variable in order to reveal the potential difference between the average for

translated abstracts and the average for the abstracts originally written in Spanish, and (b) if the subdivisions made are valid.

Since the variables defined correspond to categories, it is necessary to transform them into binary values, i.e., they adopt values of 1 for the category under study or 0 otherwise. The models aim to determine differences in the media for each sub-division which are represented as follows:

$$AV = \alpha + \beta * V$$

Where:

- V represents the binary variable within the model: if V adopts the value 1, it enables AV to acquire the value α+β; otherwise, the variable adopts the value 0 and therefore AV acquires the value α.

- α represents the base value when the binary variable adopts the value 0.

- β represents the parameter that helps to estimate the possible average difference that could exist between the base value and the category defined as 1 by V.

- AV represents the evaluation average, which is estimated through the previously defined binary variables.

The aim of these statistical procedures is to predict hypotheses, i.e., a theorisation of the value that the parameters of the model can adopt. The process consists of the comparison of two types of hypotheses, a null hypothesis (or base) and an alternative hypothesis.

For this study, the hypotheses used are:

- $H_0: \beta = 0$. This is the null hypothesis, aimed at determining if the beta parameter adopts the value 0, that is, there is no relevant difference between the category under study and the base category.

- $H_a: \beta \neq 0$. This is the alternative hypothesis, aimed at determining the possibility that the beta parameter be different from 0, in which case there would be a significant difference between the category under study and the base category.

Once the hypotheses had been defined, a value was estimated for the possibility that the null hypothesis was true. The models were validated using a one-way ANOVA (Analysis of Variance) in order to determine if the difference between each sub-variable was statistically significant.

This comparison can be summarised in a *p* value, which symbolises the significance of the test, that is, the probability of the null hypothesis being verified if several samplings were carried out. This value will determine which of the hypotheses is true, the null hypothesis or the alternative hypothesis. The general rule is that the lower the p-value, the lower the probability of accepting the null hypothesis, and therefore, the alternative hypothesis should be assumed to be true. The recommended value to reject an alternative hypothesis and support a new hypothesis is 0.05.

The results for each of the models are shown in Table 22 below:

Table 22. *Average for translations and non-translations for each subcategory*

Division	Ts Average	NTs Average	p-value ANOVA test
1-10 years	35.20	39	0.0911
11+ years	40.25	47	0.0017
ReadOnly	36.71	42.86	0.001
Read&Write	40.17	45.17	0.0288
Spanish	37.20	43.40	0.0196
English	39.00	44.25	0.002

By taking a look at the p-value and the averages for Ts and NTs, it can be observed that the majority of beta parameters have at least a 5% significance; therefore, the differences

between the evaluation of Ts and the evaluation of NTs are statistically significant, except in the case of 1-10 Years of Experience, where it is not possible to reach 5% of significance, and thus, the average between translated texts and translations would be statistically similar. Given the small size of the sample, 13 respondents, the models devised here are not necessarily robust; nevertheless, the alternative hypothesis has been proven to be true for ENGLISH PROFICIENCY and WRITING LANGUAGE. In the case of the "1-10 years" sub-variable of the EXPERIENCE variable, the alternative hypothesis was rejected, meaning that the difference between the ratings for Ts and those for NTs was not statistically significant. In conclusion, the statistical analysis showed that, generally, non-translated texts received from the informants a more positive evaluation than translations.

4.4. Conclusions

All of the respondents have been validated as eligible informants for this study: they are academics in different areas of environmental science who are familiar with the writing process of research articles. For academic purposes, they read mostly in English, and 62% of them write for publication in English. This accords with the well-known fact that English is the lingua franca of science, and suggests that this is also the case in the Spanish-speaking scientific community.

Although the informants found instances of word repetition in the translated texts they evaluated, these words were necessary, highly technical terms, difficult to be replaced in the context of scientific writing, and not used to introduce new sentences or clauses. As for sentence length, the informants' observation that the sentences of both translations and non-translations were "lengthy" counters the expectation that TM-mediated Spanish translation would contain sentences shorter than those of non-translated scientific writing in Spanish.

Therefore, the informants did not identify the syntactic complexity of translated texts as overtly distinct from that of the non-translated abstracts.

Since most informants declared themselves to be bilingual (to varying degrees), the comparison between monolingual and bilingual respondents was unpractical. Instead, it was more sensible to contrast the answers in terms of three variables: the respondents' years of experience in the field, their self-perceived English-language proficiency, and the language in which they usually write for publication (English or Spanish). Although not exact, there appears to be a correlation among these variables: the more experienced in the field and the more proficient in English the informants are, the more positively they rated both translations and non-translations.

Overall, translations received a lower rating than non-translations, thus raising a question that is central to the present study: has the use of TM software had an impact on the informants' assessment of translations? Put differently, is this indeed a case of TM influence on translation quality? In my view, the difference in appreciation between translations and non-translations is accounted for by the fact that the translators who produced the samples used in the study have still not reached a high level of professional competence. Consequently, in the particular context of the present study, TM systems in themselves would not have a significant influence on the way scientific translation is received in comparison to non-translated texts of the same genre. Nevertheless, one prominent issue that surfaced from the analysis is that there seems to be a great influence of English on the way the informants perceive scientific writing in the Spanish language, as expressed in their comments about sentence length and reader-friendliness. This opposes what is traditionally assigned to a high-context language like Spanish—at the textual level—in cross-cultural communication research and contrastive analysis. Moreover, this is in line with the proposition that norms for scientific writing may be culturally universal and discipline-specific.

The fact that translations received lower ratings than non-translated texts suggests that the respondents' expectation of translations is that they conform to the grammatical norms exhibited by non-translations. However, as per their comments in the answers to open-ended questions, the participants in this study also seem to expect that Spanish texts show certain features traditionally considered typical of English, supporting again the proposition that scientific discourse is culturally universal, discipline-specific, and unsurprisingly dominated by English. In terms of expectancy norms, it may be argued that, in order to be accepted as correct and appropriate by the discourse community, scientific translations from English into Spanish need to strike a balance between the textual and syntactic conventions of the target language and the textual and rhetorical conventions of the source language. Thus, a translation that conforms too closely to the conventions of the Spanish language may not be accepted as belonging to the text genre in question; conversely, a translated text that sticks too closely to the norms of English may be deemed linguistically inappropriate and discarded as an appropriate member of the text genre. Therefore, the *reactions* to translations obtained from both the respondents' ratings and comments may bring about, as a *response*, that a translated research article be rejected for publication and, as a *repercussion*, that the scientific and societal impact of scholarly work be undermined in the receiving cultural setting. Bennet (2013) confirms that translations of academic texts from English into other languages "stick very closely to the original", but warns that the hegemonic position of English results in the destruction of "alternative forms of construing knowledge". Therefore, translation students should be trained to negotiate carefully between the epistemological discourses of the source and target languages (Bennett, 2013).

CHAPTER 5: Conclusion

As I stated in the introduction, my motivation for pursuing this project was the betterment of translator education in Chile. In my direct contact with Chilean translation students, I noticed their undiscerning use of TM software, resulting in Spanish target texts showing textual features usually associated with English. My initial idea of assessing the quality of TM-mediated translations against non-translated target-language writing evolved as I realised that the views of translation end users could constitute a practical and realistic measure of quality. I came to the realization that, from the perspective of translation end users, the textual features of target-language writing do not necessarily equal quality. Although not an absolute standard of quality, translation reception can inform training in that it provides teachers and trainees with information about the needs and expectations of real translation users. Considering this information in translator training activities may bring students closer to the work environment in which they will operate when they graduate. Thus, in this thesis I set out to examine whether the use of TM software influences the reception of scientific translation. By combining both quantitative and qualitative methods, I was able to explore three main issues, namely the textual features of non-translated research article abstracts written in English and Spanish in the field of conservation biology, the possibility of translation memory-induced linguistic transfer in trainees' translations, and translation reception and the influence of the English language on the written discourse of Spanish-speaking scientists.

In Chapter 1, I reviewed the literature and concepts that frame the motivation and conduct of this study: translation and technology, translator education, and translation reception. I also reviewed research related to translation evaluation and translation competence. Both topics directly inform my discussion of the results in relation to their implications for translator education. Chapter 2 reported on the corpus-based study I conducted to investigate textual and grammatical features of non-translated research article

abstracts written in English and Spanish in the field of conservation biology. As an introduction to the chapter, I reviewed the comparative perspectives of translation to discuss the methodology, findings, and conclusions of the corpus-based study in relation to the other stages of the project and the research question. I began Chapter 3 with a review of cross-linguistic influence, and then discussed the translation experiment carried out with undergraduate translation students from three different universities in Chile. In Chapter 4, I elaborated on the preparation of the translation reception study and considered how translation expectancy norms could be a useful framework to analyse how scientific translation is received. A discussion of the topic of user-centred translation—to argue for the incorporation of the views of the end user in translation—precedes the discussion of the methodology, findings, and conclusions of the translation reception study.

5.1. Summary of findings

My study has revealed that the main differences between English and Spanish research article abstracts in conservation biology relate to the higher frequency of subordinate sentences and CASE, DET, and NMOD in Spanish. The analysis of the translations produced by students in the translation experiment has shown that the use of TM does not necessarily have an impact on the segmentation of TTs; that is, Spanish translations in this study do not show a high frequency of textual features traditionally considered typical of English. In other words, the syntactic complexity of TM translations is not similar to that of the SL; instead, it conforms to the textual norms of the TL. Moreover, the students were successful, sometimes to the point of exaggeration, in adhering to the syntactic features of the TL here studied (DET, CASE, and NMOD).

As to how translations can meet to the expectations of specialist readers in the studied textual genre in the TL, it can be argued that translations from English into Spanish need to

adhere to the grammatical conventions of the TL in order to be considered as linguistically appropriate. Yet, at the same time, they need to show certain textual features of English (such as short, independent sentences) that, as has been proven in this study, have become the norm within the Spanish-speaking scientific community of practice. Judging by the lower ratings given to translated texts in the reception study in comparison with non-translated texts, the respondents were able to differentiate between a translation and a TL non-translated text. However, by taking a closer look at the respondents' answers to open-ended questions, it can be established that the informants still validated the translations as belonging to the text genre. The lower ratings of the translations can, therefore, be accounted for by the students' incipient development of translator competence and lack of professional experience.

Based on the findings explained above, the answer to the main research question—*Does the segmentation system of translation memory software affect the quality and reception of scientific translations?*—is that, since the translation-induced problems the respondents detected in the translations are attributed to the translators' lack of translation competence and experience, TM did not exert significant influence on the way specialist readers received trainees' English-to-Spanish translations. Nevertheless, from the results of the translation reception study, one can outline some basic "expectancy norms" of English-to-Spanish scientific translation. Users expect translations to show the proper grammatical features of the TL, yet at the same time they expect that the texts will show certain textual features that are usually associated with English-language writing, such as short sentences. As stated previously, this confirms the well-known fact that English is the lingua franca of science and that scientific discourse has some features that are universal.

Finally, evidence from this study and the most recent literature suggest that there is a great need to train translators to reflect on the outcome of translation technologies and to adapt constantly to new scenarios. This implies that trainers should keep updated with new

developments. They must also be open-minded and accept that technology is here to stay, as it is now an integral part of the translation industry, and that it can enhance the translator's work if used effectively. Consequently, in the following sections, I will explore the latest developments in translator training, the industry and the profession, in search of cues as to how to apply the findings of this thesis to the evolving context of translator education and training.

5.2. Current trends in the field

This thesis dealt with the use of TM in the context of undergraduate translator training. In particular, the focus was placed on the effects of the segmentation feature of these systems. The recent technological developments, such as the emerging use of TMs in combination with MT (Kenny, 2020; O'Hagan, 2020), were beyond the scope of the initial focus of my research project. Nevertheless, they have directed me to start looking beyond TM to cater for the students' need to adapt to all manner of new electronic tools and potential changes in the role of the translator in the translation process in the near future. Thus, in this conclusion my aim is not only to summarise the findings of my research project. I also seek to explore the dynamic professional scenario of translation in search of some pedagogical guidance in the use of technology in order to tackle what Nitzke et al. (2019, p. 293) assertively refer to as the students' "fear of being replaced by the computer", a sentiment that I can attest currently overwhelms translation trainees. Therefore, in the following sections, I provide a review of the current trends in the industry, the profession, and translation pedagogy, and discuss scholarly recommendations for the teaching of technology.

5.2.1. The industry and the profession

As discussed in the literature review in Chapter 1, the translator's "toolbox" has evolved at a fast pace and is now far more technological than what the traditional portrayal of translators looking up words in a hard copy dictionary would suggest. Besides generic office equipment and software, professional translators could not do without TM, which is a minimum requirement for a career in translation and now offers a significant number of functionalities (Zaretskaya et al., 2018). Moreover, translators nowadays require a continually growing and diverse number of online resources (Corpas Pastor & Durán-Muñoz, 2018), including term banks, corpora, professional discussion forums, search engines, MT (Gough, 2018), quality estimation tools, and translation management tools, among others. In addition, technological advances have allowed the diversification of translation and interpreting services to address the needs of audiences that had been neglected in the past (Angelone et al., 2020), a phenomenon that is now termed "media accessibility". Thus, technological advancement has significantly changed the language industry (Angelone et al., 2020), and the physical environment, tools and tasks of the translation profession (Schäffner, 2020). Most importantly, translators are now being assigned new roles in the translation process and facing an "identity crisis" (Way, C., 2020) caused by the radical improvement of MT output.

The game changer in the language services industry is NMT, with its effects extending "beyond written translation", and altering "the workflow process and settings…quality and productivity as performance metrics, and the very agents involved in the content creation" (Angelone et al., 2020, p. 3). Consequently, new technology has raised questions as to "who should translate, how and to what level of quality" (O'Hagan, 2020, p. 1). Nowadays, translators combine the use of a range of electronic tools and are incorporating MT in different stages of the translation process (Gough, 2018). However, even though MT is a breakthrough for the industry, the quality of its output does not yet rival the quality of

human translation. That is to say that raw MT output is just "good enough" to serve a variety of purposes but requires human intervention, at a post-editing stage, to reach a professional level of quality (Way, A., 2020; Guerberof Arenas, 2020; Poirier, 2018). It is because of this quality "gap" that A. Way (2020, p. 325) argues that NMT "is not already the state-of-the-art in the field" and will not be so in the near future. Instead, language service providers are still using SMT (Way, A, 2020). In addition to the limitations related to quality assurance, Zaretskaya et al. (2018, p. 47) report that sometimes translators are not allowed to use MT because of the "client's information security requirements".

The initial distinction between CAT tools and MT made by Bowker (2002) and discussed in the literature review in Chapter 1 of this thesis is now being questioned, since MT is being used in combination with TM software, and requires to be fed with human translations. The integration of MT into TM allows the translator to use proposals that are both retrieved from the translation memory in use and machine-translated (O'Hagan, 2020). SMT has indeed been proven to significantly increase translators' productivity (Way, A., 2020), although Way claims that this is not necessarily the case with NMT, and Pym (2020) notes excessive optimism in the promotional discourse of developers and providers. Similarly, the transition of translation and language resources from paper to digital formats has allowed their integration into TM systems and translation platforms, obscuring the distinction between tools and resources (Gough, 2018). In the case of the TM system SDL Trados Studio, for instance, the translator is offered the possibility of using MT when there are no "perfect or sufficiently high fuzzy matches" ("full segment mode") in the TM, and predictive text that is "based on what the translator is typing" ("autosuggest" function) (Macken et al., 2020, p. 2). This is why scholars are now talking about the "blurring" of technologies (Doherty, 2016; O'Hagan, 2020; Kenny, 2020).

Because quality professional translation cannot be achieved at present without human intervention, scholars nowadays refer to the human-machine interaction as "augmented translation" (O'Hagan, 2020). This term highlights the centrality of the human translator in the translation process and technology as a complementary aid or productivity booster. "Adaptive machine translation" is another term that has been added to the repertoire of Translation Studies terminology. This feature is integrated into CAT tools (Angelone et al., 2020) and "learns" from the human-made corrections made in the editing phase of the translation workflow, reducing the chances of repeating the corrected errors (Rowda, 2016).

A. Way (2020) argues that NMT has not yet been fully adopted in the industry, since its output "can be deceptively fluent" (p. 320), with perfectly fluent TL sentences sometimes wholly unrelated to the ST, and because quality metrics are still insufficient to secure more fuzzy matches than SMT. Therefore, he recommends that translators who have still not incorporated MT in their workflow should do so as of now to take advantage of SMT-based post-editing rates. However, this does not mean that translators should rest on their laurels but, instead, be aware of the benefits of technology for the productivity of the human translator and the changes it may still cause to the profession in the future. In the end, the interaction between humans and computers is here to stay, and the "co-existence of human and machine could be qualitatively different in the near future" (O'Hagan, 2020, p. 2). Indeed, in a very recent study, Macken et al. (2020) examine the impact of MT on the translation workflow at the European Union's Directorate-General for Translation. They compared the quality of SMT and NMT in the English-French and English-Finish language pairs and found that "neural machine translation systems seems to provide more consistently useful output [for post-editing] than statistical ones" (p. 16).

The most noticeable changes in the translation workflow brought about by the increase in the quality of MT are pre- and post-editing. Based on stylistic rules or guidelines

(controlled language), pre-editing is the treatment of texts before being machine-translated in order to increase the quality of MT output (Guerberof Arenas, 2020). These rules usually address such issues as the simplification of sentences, the reduction of the passive voice, consistency of terminology, and the tagging of proper names that will not need translation, among others (Guerberof Arenas, 2020). Post-editing in turn, is the comparison of a machine-translated text against its ST in search of errors according to criteria previously specified for the translation task at hand, aimed at "increas[ing] productivity and […] accelerat[ing] the translation process" (Guerberof Arenas, 2020, p. 333), and constitutes an increasingly common practice in the industry (Koponen, 2015). This task is usually carried out by a human translator or post-editor, but MT output can also be post-edited automatically, based on common MT errors, before it is sent to the human post-editor to reduce human effort (Guerberof Arenas, 2020).

One of the problems Guerberof Arenas (2020) reports regarding post-editing is that it is difficult for the human translator to adhere to the level of correction specified for a specific translation task. Post-editing can be "light" or "full", depending on the needs of the client, but the tendency of post-editors is to correct all the errors they detect. Among the problems post-editing poses for translators, Guerberof Arenas (2020) lists a degree of quality of MT output that sometimes does not optimise the translation workflow, tight, unrealistic deadlines, and rates that are usually lower than translation rates.

As for the ways translation and language-related services are provided nowadays, Esselink (2020, p. 109) makes a distinction between "translation agencies" and "language service providers". He points out that the main difference between these two categories of companies is that language service providers are multinational enterprises that do not usually hire in-house translators, but act as "translation production and quality management agencies". Language service providers, therefore, rely heavily on technological tools and

166

especially the web, with cloud translation platforms at the core of their services. King (2020) argues that "effective integration of TMs and term bases into the NMT" is not a reality, which reinforces A. Way's (2020) assertion that NMT is still not cutting-edge in the industry but may soon be. Finally, post-editing of NMT output has still not proven efficient (Guerberof Arenas, 2020), precisely because of the same reasons pointed out by A. Way (2020): NMT produces errors that are not as predictable as those found in SMT.

For Corpas Pastor and Durán-Muñoz (2018), translation-specific technological competence is what distinguishes a professional translator or interpreter from a non-professional translation practitioner. It is this particular technological specialisation that is changing the roles and responsibilities of the translation professional, with job titles being today as diverse as "specialized translator, conference interpreter, localizer, post-editor and reviser… transcreator, quality assurance engineer, multilanguage UX designer and strategy consultant" (Angelone et al., 2020, p. 2). This means that translators' work now goes far beyond linguistic transfer. It includes advanced use of CAT tools, collaborative teamwork over the internet, and dealing with clients, with radical changes in the workflow and the ergonomics of translation (Schäffner, 2020). Translation should then "really reinvent itself or be faced with obsolescence", and translators must act as "intercultural, interlingual information brokers and consultants" to do justice to their work and competencies (Way, C., 2020, p. 186). Put in the words of a translation practitioner

> [r]ather than being mere language experts, translators will have to become anthropologists of a sort—anthro-linguists, if you'd like—students of human nature and culture. Specifically, our role in the translation process will be twofold...First, we will act as masters of humanity: make sure the soul of the content is properly conveyed...Secondly, we will act as cultural experts for the target market, ensuring that

the result is well-understood, that it doesn't step on any toes (unless the point is that it does) and that it maintains the same cultural spirit as the source. (Shitrit, 2019)

In a similar vein, Massey and Ehrensberger-Dow (2017, p. 303) point to creativity as a feature distinguishing human translation from MT. The authors argue that human translators will still be needed in areas where "intuition, creativity and ethical judgment" can be added values that clients cannot find in MT. Since the increasing exposure to technology brings about "potential constraints on human creativity and autonomy" (Massey & Ehrensberger-Dow (2017, p. 306), training and continuous development should prepare and entitle translators to make the most of their human capacities.

For Koskinen (2020), the sustainability of the profession in the advent of MT lies in tailoring translation services to meet the individual needs and expectations of clients and especially of users, particularly in areas where MT and post-editing cannot cater for the "emotional and cognitive effects" desired for and expected by translation audiences (e.g. genres relating to marketing, instructions, ideology, and the arts). Indeed, Koskinen (2020, p. 143) posits that MT and other industry practices are "counterintuitive" for translators, since "[m]ost translators would agree with the idea that they have their readers' best interest in mind when they translate, but more often than not, what is 'best' for the reader is decided on by the translator, not defined in and through active interaction with the readers."

The new professional profiles should have an immediate effect on translation curricula, and translator education should address these changes in the profession and then be evaluated in terms of how well it prepares students to fulfill emerging professional profiles and have a successful career in the languages services sector (Angelone et al., 2020; Schäffner, 2020). This, of course, implies that there is a great need to provide continuous professional development (Way, C., 2020), since, despite the full range of existing CAT

tools, translators "keep using only the 'traditional' translation memory tools on a regular basis" in their practice (Zaretskaya et al., 2018, pp. 44-45). In this regard, in their study of the views of the users of translation tools, Zaretskaya et al. (2018) found that translators are generally reluctant to trust and adopt translation technologies. Moreover, those that were more confident in the use of translation tools were those who have undergone formal training in the form of specialised courses and university degrees. They also point out that, even though training in electronic tools is now being provided at universities, training institutions do not "fully keep up with the pace of the technology development in the industry" (Zaretskaya et al., 2018, p. 53), reinforcing C. Way's (2020) assertion that there is a great need to provide continuous professional development.

5.2.2. Pedagogical trends

In her survey of the current state and evolution of translation didactics research, Hurtado Albir (2019) addresses the three main challenges of translator training today: the major and rapid changes in the profession, constant academic and professional mobility, and the educational shifts and technological developments of the last decades. These, she argues, demand new curriculum designs that respond to local societal needs but, at the same time, adapt to a globalised translation market. The three challenges signalled by Hurtado Albir are clearly intertwined, with technology being at the core; technological developments have brought about changes in the role and work of the translator, and technology has greatly accelerated globalisation and mobility (even if not physical but virtual). Thus, technology not only impacts the way translators translate but their new roles in the translation process, the training needs of students, and the methods and media of teaching. The current pedagogical trends, therefore, point towards what Drechsel (2019) terms "technology literacy".

The teaching of translation should not take a purely instrumental approach to technology (Kenny, 2020), since, even though "[m]achines do not currently possess agency" (Melby & Hague, 2019, p. 223), when mediated by electronic tools such as TM texts do become active and influence the translator's unconscious decisions (Littau, 2016b). Therefore, one aspect of paramount importance when facing the challenges of translator education is the need to train students in the critical use of technological tools. Moreover, it is imperative that teachers help students to free themselves from the constraints of formal education and self-learn and adapt to the constant introduction of new tools and the subsequent changes to the profession and the industry they bring about (Hurtado Albir, 2019; Nitzke et al., 2019). This need for versatility in adapting to ever-changing environments caused by globalisation and new technologies is not only imposed on trainees and practitioners but also on educators and researchers (Orlando, 2016; 2019).

With the advent of NMT, translation tasks can now be performed without human intervention (Moorkens, 2018). Consequently, translators are being contracted as post-editors of MT output without being trained for such a task (Mellinger, 2017). The implication of this for translator training is therefore evident: in order to keep up with the changes in job requirements for translators (Nitzke et al., 2019), trainees should develop "machine translation literacy" (Bowker, 2019), that is, be trained in the tools and technicalities of post-editing MT output. However, as Nitzke et al. (2019, p. 295) perceptively note, "translators [and, by extension, student translators] need to learn the extent to which they can trust the output of machine translation or translation memories or how to choose between various relevant or similar matches in a term base". Thus, the ability to assess—and reflect critically on—the quality of machine-translated texts, combined with life-long learning skills to adapt to ever-changing translation environments, may help students to overcome "the fear of being replaced by the computer" (Nitzke et al., 2019, p. 293).

Melby and Hague (2019) refer to the students' fear of being replaced by computers as the "Singularity preoccupation", a term coined by Kurzweil (2005) to describe the concern that one day soon machines will be able to carry out complex mental tasks more efficiently than humans and therefore replace labour. The authors are optimistic as to the sustainability of the profession and argue that the possibility of computers fully replacing human translators (Singularity) will not arrive shortly, since certain types of translation can only be performed to a professional standard by human translators. The latter is due to the machines' inability to translate non-textual content, grasp cultural nuances, take agency, and make decisions based on "translation specifications" (a more developed concept of the translation brief). Nevertheless, Melby and Hague urge trainers to help students brace for a "pre-Singularity" era largely marked by MT. In order to succeed, they argue, translators should become "language-services advisors". A *language-services advisor* is a translation-trained professional who, based on structured specifications for a translation commission, can assist translation stakeholders in deciding the best alternative from a spectrum ranging from raw MT to human-post-edited MT to fully human-performed translation. They propose that, in order to train language-services advisors, curricula should aim to train students in (a) translation specifications and the MT-human translation spectrum, (b) an understanding that human translation will not disappear before Singularity, and (c) at least one translation domain in which they should become highly competent. By becoming competent language-services advisors, students will feel "confident about the future of the profession" (Melby & Hague, 2019, p. 211). From these suggestions, it follows that the translation curriculum should ensure that students understand that technological tools are not an intrinsic threat to the profession but can indeed enhance the translator's productivity.

As regards pedagogical aspects, Melby and Hague (2019) suggest that role-playing is a helpful strategy for the teaching of language advisory services. Similarly, though addressing

translator education in a broader sense, González-Davis and Enríquez Raído (2018) posit that translator training should help students to transition from a "classroom community of practice" to a "professional community of practice" by exposure to real-life or simulated work environments where texts, materials and activities are authentic and stimulate students to "act like professionals". This approach, termed *situated learning*, encourages the trainees' engagement in activities that "bring the professional world into the classroom", "tak[e] the classroom outside its physical realm into various professional learning spaces", or combine both, thus avoiding the teaching of decontextualised, abstract knowledge (González-Davis & Enríquez Raído, 2018). Although this approach was first proposed a few decades ago (Vienne, 1994; Kiraly, 1995; Gouadec, 2002), it is still influential today. However, it is true that, in the age of technology, situated learning and other pedagogical approaches need to evolve and cater not only for the changing professional realities but also for the new teaching environments that have likewise been changed by technology. *Blended learning*, the combination of face-to-face and online teaching spaces and activities, has been gaining ground lately and may be a response to these changes. Furthermore, the move to fully internet-mediated learning impelled by the worldwide health crisis unfolding precisely at the time of writing is proof that we should not discard the possibility of online teaching gaining unstoppable momentum soon. However, as González-Davis and Enríquez Raído (2018, p. 4) warn, the implications of digital work and learning spaces is a "relatively unexplored area [that] has yet to be underpinned by systematic research", or as Kenny puts it (2020, p. 450), "their integration into translator training is still young".

Nitzke et al. (2019) agree with Melby and Hague (2019) in that translators need to be technology savvy and highly competent in advising clients efficiently in order to stand up to the challenges of the new digital paradigm. However, in line with González-Davis and Enríquez Raído's (2018) appraisal, Nitzke et al. (2019, p. 293) lament that adequate training

in "digital competencies" is missing in translation curricula. Therefore, what they propose is a framework for *digital competencies* that is broken down into two main categories: generic competencies (those needed to skillfully use tools for work and communication across all domains of life) and domain-specific competencies (those needed for the efficient use of tools designed for professional translation). By distinguishing between generic and translation-specific digital competences, the authors posit, they can be integrated into the translation curriculum as learning objectives. If we aim to train professionals with life-long professional skills, we could not but agree that placing the focus on training within a framework of digital competencies is beyond doubt more sensible and useful than taking a utilitarian approach to technology. Nitzke et al.'s translation-specific digital competencies are further classified into *instrumental*, *research*, *post-editing*, and *MT*. This framework comprises skills graduates need to acquire in order to combine the use of generic tools (such as text processors) with "state-of-the-art CAT tools" (such as TMs), critically appraise MT output and the suggestions of TMs and databases, use MT and edit its output, understand how MT works, and be aware of the most common errors found in MT output. Finally, Nitzke et al. (2019) recommend blended learning as the best way for translation teachers, trainees and practitioners to keep abreast of technological developments. Given the dynamic nature of today's working environments and technological advancements, theoretical knowledge of TM or MT post-editing, for instance, could be more efficient if delivered online prior to a hands-on, face-to-face session. Similarly, practitioners—and teachers themselves—could use online training material as a cost- and time-effective way to keep continuously updated at their convenience.

In summary, the latest trends in translation pedagogy include:

(a) the full inclusion of technology as both professional tools and learning spaces;

(b) the integration and recognition of MT as part and parcel of professional translation, bridging the long-held divide between CAT tools and MT that

positioned the latter at the periphery of translator education (Kenny, 2020), yet

without losing sight of the differentiation between machine and human

translation (Kenny, 2020);

(c) a view of technology training as the development of digital competencies for

long-life learning, including the ability to self-learn and reflect critically on the

potential drawbacks and ethical issues of technology-mediated text

production;

(d) a broader definition of the translator's role in the translation process; that is,

the recognition of the translation professional as a language-services

consultant; and

(e) learning strategies that bring trainees as close as possible to real-life

professional scenarios.

Since this thesis aims to provide directions for translator education and training in

Chile, I posit that Chilean translation programs should follow the above trends. I would argue

that the inclusion of technology in Chilean training programs is underway. To the best of my

knowledge, all undergraduate translator training programs include training in generic

technological tools and TM systems. However, the use of digital learning environments that

could encourage continuing and self-learning is still at its infancy, as most of the teaching is

conducted face-to-face. As for each of the remaining trends mentioned above, I argue that

there is still a long road ahead. In a quick, informal survey, I asked five Chilean translation

teachers for their opinion about the use of MT in the training of translators at the

undergraduate level. They all said they had used MT in class at least once, but only one of

them (a practitioner who teaches translation as a side job) was aware that post-editing is a

new trend in the industry, and elaborated on the need to include in-class discussions on the

ethical implications of the use MT. The other teachers declared that MT "can be an aid to

teach translation" that "increases students' linguistic awareness" and "is useful for students to learn how to edit texts". Although these statements are true, they suggest that there is a certain degree of disconnection of teachers from the industry and the professional reality of translation, as they do not view technological training as "digital competencies" and MT as an already existing part of the working world. In a scenario where training is somehow disconnected from the industry and the profession, it can be argued that situated learning is highly unlikely. Since teachers are not in tune with the new reality of the profession, they are still not completely ready to prepare trainees to fulfil the new, enhanced roles of the translator in the age of technology. Therefore, the challenge remains for Chilean translation teachers to dissipate our own "fear of being replaced by the computer" before we can help trainees to do so. For this to happen, educators should come closer to the industry and broaden our knowledge of actual translation practice, but, most importantly this gap between education and the industry reveals that training the trainers in T&I pedagogy is essential in any T&I curriculum.

5.2.3. Pedagogical recommendations

Massey and Ehrensberger-Dow (2017, p. 306) posit that the threat to translators' "self-concept and identity" posed by technology can be aggravated if "the role and position of human translation is not redefined", and suggest that the onus of addressing this is on translator education. As discussed above, they argue that, for the sake of the sustainability of the profession, translator education should stress those aspects needed in high-quality translation that are exclusive to human decision-making, that is, creativity, intuition, and ethical behaviour. For example, translation graduates should be sufficiently versatile to adapt texts to genres that defy a repetitive, mechanical approach to translation, such as those associated with social media. For this to happen, they recommend that translation trainees be

exposed to translation technology from the earliest stages of training, in a regular and sustained manner, and across the curriculum ("not just in translation technology courses"). Extensive exposure to new technological tools will thus allow trainees to critically assess the advantages and limitations of electronic tools and the ways technology can best serve their professional needs ("and not the other way around"). These recommendations permeate the most recent literature on technological training in translator education, as I will discuss below.

If electronic translation tools have brought about changes in the industry and the profession, it is logical to assume that these changes should be reflected in the way translation is taught. Moreover, if the assimilation of technology into translation workflows has been nothing but effortful (Bowker, 2015), it can be argued that technological developments have as well posed challenges to translator curricula and their implementation. In the words of Buysschaert et al. (2018, p. 126), the advent of technological developments in the industry "has had a disruptive effect on translation training", bringing about emerging "new skills that can only be partially taught in the context of traditional lectures and classes".

With the number of tools and resources already available being substantial and clearly overwhelming for translation trainers, Bowker (2015) addresses the challenges posed by technology in terms of *which* tools and *what* aspects of technology should be taught, and *when*, *how*, and *why* they should be incorporated into training. Although dating back to 2015, Bowker's comprehensive survey of the role of computer-aided tools in translator training is most relevant today and serves as an umbrella framework to discuss the challenges that translator education should endure in the digital age.

As for *which* tools should be taught, based on current training experiences and the trends in the profession, Bowker (2015) points out that training can be provided in the use of a wide range of tools and resources, such as general computer applications (e.g. word

processors, spreadsheets, conversion and compression software), documentation tools and resources (e.g. dictionaries, thesauri, corpora, concordancers), terminology tools (e.g. term extractors, terminology management systems), translation technology (e.g. TM software), localisation tools, MT, voice recognition tools, translation workflow tools, audiovisual translation tools, and collaboration tools. Clearly, the large number of tools makes it impossible to cover them all in a translator training program. In fact, in her report on an experimental master's introductory course in translation technology, Rodríguez-Castro (2018, p. 369) found that "[a]lthough the adoption of dynamic teaching methodologies allowed students to learn a significant amount of material, it must be acknowledged that the amount of content (and software tools) and the level of complexity was overwhelming". Therefore, several aspects should be considered in selecting which tools to teach. In particular, this decision will be highly influenced by the local context in which a training institution operates and other aspects raised in Bowker (2015), as discussed below.

As for *what* aspects of technology should be taught, Bowker (2015) asserts that even though the use of general computer applications is already part of the skill set of today's translation students, it should be reinforced and oriented towards translation practice, most conveniently as outside-the-classroom learning activities. Concerning translation-specific tools, even though the extensive exposure to tools is recommended (Massey & Ehrensberger-Dow, 2017), an important factor to take into consideration is the fact that tools will surely become obsolete (Bowker, 2015) and give way to improved or new technology. Therefore, trainers should aim to select those tools that integrate "fewer extra features" and include the functions graduates are more likely to use in their professional practice, so that students are not intimidated and overwhelmed by technology (Bowker, 2015, p. 94). The consensus among scholars is that training should adapt to the evolving needs of the market and, at the same time, provide students with the knowledge necessary to "evaluate and learn to use such

tools themselves" (Bowker, 2015, p. 93). This implies that graduates should be able to learn, evaluate and compare a variety of tools, in order to decide which ones best suit their professional needs. In this way, graduates will be equipped with a "transferable skill" that will accompany them throughout their professional career. Moreover, as regards the way this can be achieved in the classroom, scholars point to the importance of starting with learning to use simple tools and scaffolding the learning process from there (Bowker, 2015; Moorkens, 2018). This is also a pointer as to *how* and how far into a training program (*when*) translation technology should be addressed: the earliest possible, gradually incorporating the use of tools from the less complex ones to those systems that integrate the most common features required by the translation market.

An issue usually encountered in translator training, which relates to *how* translation technology is taught, is the fact that electronic tools are frequently addressed in isolation from other tools that, in a real-life professional scenario, are used in a combined or integrated manner (Bowker, 2015). This means that translation technologies are customarily taught in specialised or "core" courses, but not necessarily integrated with other tools in the same course or put into practice in other translation-related courses. Although in-depth knowledge of technological tools and the understanding of their underlying processes are part and parcel of the translator's skill set, using these tools in isolation does not correspond to the way graduates will translate when they join the working world, and thus, will not help trainees to grasp "the bigger picture of translation practice" (Bowker, 2015, p. 97). The way to tackle this problem, Bowker (2015, p. 97) asserts, is to secure a learning environment that is as close as possible to "an authentic workplace setting". This brings us back to the above-discussed concept of "situated learning". Within the framework of situated learning, Buysschaert et al. (2018) propose *simulated translation bureaus* as "the most elaborate form of authentic experiential learning" (p. 131), where electronic tools can be practised and integrated into the

translation workflow in the closest possible way to an authentic professional scenario. Such a scenario offers teachers the opportunity to minimise or adjust the degree of control over learning. In a similar vein, but with a focus on MT, Mellinger (2017) suggests that MT should be included "curriculum-wide", since this would allow students not only to develop skills that are nowadays required in the industry but also to become aware of the limitations of MT output and the relevance of (human) linguistic competence.

Bowker (2015) asserts that, apart from the cross-curricular integration of technologies, the main issues that need to be addressed in the teaching of translation technologies are (a) access to tools, (b) students' expectations regarding what technologies can actually do, (c) access to authentic resources, (d) trainer training, and (c) students' wide range of needs. Access to tools can be solved with the use of freely available open-source software, although the decreasing tendency in the cost of computer software may suggest that this is not the most important problem in translator education. There is well-supported evidence to suggest that students have high expectations as to what electronic tools can indeed achieve, leading to uncritical use of, for example, the propositions of TM software (Bowker, 2015). Bowker (2015) suggests that students' high expectations of technology can be tackled by providing students with information beyond the actual instructions of how to use a specific tool, such as the purpose of that tool within the translation workflow and how it compares to its alternatives. Additionally, Bowker recommends that practical exercises include reflection questions that encourage the students to evaluate their own experience using one specific tool in comparison with others. As for access to authentic material, such as already created TMs, term databases and corpora, Bowker (2015) suggests that these should be compiled and centralised by institutions in order to prevent students from using them "empty", as this is not an authentic work environment. Moreover, storing and centralising material, and learning resources for both students and trainers, would prevent teachers from the time-consuming

task of populating TM and terminology management systems, help them to keep up with the latest translation tools, and help them to feel ready to teach these tools. Finally, differing learning needs as concerns translation technology might be dealt with by incorporating technology at the early stages of training, since "[i]nitial comfort and confidence levels may also influence the effectiveness of different learning strategies" (Bowker, 2015, p. 101).

As is evident in this conclusion, MT is the most "disruptive" of technologies in the translation profession, industry and academic discipline (in the sense argued by Buysschaert et al., 2018). As such, MT is perhaps the translation technology we should pay the most attention to, not only because it will soon be mainstream in the industry but also because, as pointed out by Bowker (2015), it is difficult for teachers to keep up with it. With the integration of MT into translation workflows, particularly in the form of post-editing or correction of raw MT output (Koponen, 2015; Moorkens, 2018), translator training programs should now consider how to best prepare trainees for the new professional context (Mellinger, 2017), particularly if we take into account that MT-related tasks, such as post-editing, differ from human translation and revision in terms of practical and cognitive aspects (Koponen, 2015). Kenny and Doherty (2014) and Doherty and Kenny (2014) advocate for the inclusion of translators in all stages of SMT workflows where they can be of value, suggesting that this should be tackled in translator training in order to empower trainees to assume a role in the new translation context that is less reductive and more decisive. This entails that trainers have "an ethical commitment to ensuring the sustainability of the profession" (Kenny & Doherty, 2014, p. 290). Along the same line and concerning NMT, Moorkens (2018, p. 376) stresses that "helping students to learn about new technologies, including NMT, is a positive empowering intervention", as they will become aware that, "despite the hype", MT still has its limitations, and it is because of these limitations that translators have an important role to play in (machine) translation workflows. Similarly,

Mellinger (2017, p. 281), as mentioned above, argues that MT should be taught "curriculum-wide" and in the form of different skills, namely, "controlled authoring, terminology management, engine tuning, and post-editing", which not only can be taught in technology-specific courses but also incorporated in other translation- and language-related courses. In this way, teachers can "model expert behaviour" and better prepare students for the environment in which they will be involved when they join the translation industry. Mellinger (2017) also argues that post-editing should be explicitly included in translation curricula in order to widen the professional prospects of translators, considering the post-editing market "sector as a viable area of work for graduates" in addition to translation as it has been traditionally viewed.

All things considered, scholars agree that training in new translation technologies is highly favourable for students. For instance, Koponen (2015) provides evidence that students can benefit from the practice of, and reflection on, MT and post-editing, based on both scholarly sources and their own practical experience, in that negative attitudes towards MT that students show at the start of a course on post-editing changed significantly at the end of the same course. There is also consensus among scholars that training in translation technologies should not only be practical but theoretical and reflective. As regards the challenges for translation education in the digital age mentioned by Bowker (2015), and particularly in the Chilean translator training context, it is my opinion that the access to tools can be easily resolved and that teachers are capable of creating authentic learning instances that allow meeting the varying needs of students. However, there is a great need to train the trainers in both the use and the teaching of technologies, particularly MT. Only once the training needs of teachers have been satisfied will we be able to secure authentic material and adjust students' expectations about technology to a degree where trainees become aware of their paramount role in the translation profession.

As shown in this review of the current translation trends, translation professionals and trainees are experiencing what scholars have termed "automation anxiety", an "identity crisis", or "the fear of being replaced by the computer". Clearly, this is an issue that translator trainers must embrace, as it is our moral responsibility to train human beings who are confident in their skills and to ensure "the sustainability of the profession" (Kenny & Doherty, 2014, p. 290). As Massey and Ehrensberger-Dow (2017) aptly assert, translator education—and Translation Studies by extension—should not focus on how translators can adapt to emerging technology, but on how technology can be best used in the service of translators. Put in the wider context of T&I Studies, it would be important to examine how translators and other users of computer-aided tools are helping to shape translation technologies (Olohan, 2017). As Olohan (2017) argues, contrary to popular belief, technology is not necessarily "de-skilling" the human translators. Instead, translators are acquiring new higher-level skills such as post-editing. However, technology is also being used by the industry to "de-value" the skills and work of translators, creating an "illusion of technical necessity" of technology (Thorpe, 2008, p. 72, cited in Olohan, 2017), where alternative solutions to translation issues are purposefully discarded.

5.3. Final remarks

Even though the main motive behind this thesis was to find insights into how best to train translators, particularly as regards their use of technology and in the context of my own teaching, the way this research project developed allowed me to explore related topics such as the reception of scientific translation and the dominance of the English language in the Spanish-speaking scientific community. At a personal level, I believe that the realisation of this thesis has allowed me to explore my own teaching practice and beliefs, and will have a significant and positive impact at the professional level on the way I contribute to the training

of translators in Chile. The results of my study made me abandon my interest on the micro-linguistic effects of TM to concentrate on the wider issue of improving training in, and widen my vision of, translation technology, and how profound its effects are on the translation profession in particular and in our lives in general.

To summarise the recommendations yielded from the above survey of current trends, translation programs and teachers should ensure, first, that some of the latest translation technologies are explicitly integrated into the curriculum. Second, translation technologies should be taught from the very beginning of the training process, both in technology-specific courses and across the curriculum. And third, theoretical and practical knowledge should be scaffolded from the less complex tools to those that integrate the most common features of translation workflows. In this way, trainers will be able to help trainees to develop digital competencies, dissipate their fear of Singularity, and establish a firm professional identity. Since digital competencies should be developed across the curriculum and interwoven with other elements of translator competence, teachers should ensure that learning takes place in a way that integrates all competencies and resembles the conditions of real professional translation environments, with authentic material and active learning activities. Moreover, in order to ensure the employability of graduates, learning environments should match the current market needs and demands. Avoiding the development and practice of translation skills in isolation, including those that relate to technologies, can also aid the trainers in assessing students' learning in a formative and process-oriented fashion. However, training the trainers in, and persuading them of the importance of, the teaching and learning of technology remains a significant challenge in the Chilean undergraduate translator education context.

Even though evidence from the translation experiment shows that students were aware of the effects of TM on the syntactic complexity of TL texts, there is a need to

explicitly discuss and reflect on the effects of technology during in-class activities. Although the scientists who informed the translation reception study did not view the issue of syntactic complexity as a problem, the issues that informants did detect and relate to the development of translator competence should be tackled by trainers from a more holistic approach to translation teaching and learning in an environment that takes into account the latest trends in the industry and the profession and that is as close as possible to a real-life professional translation scenario. Tackling issues of translator competence in a way that integrate all skills in real-life-like scenarios could certainly improve the quality of technology-mediated translations carried out by students. As for the implications of the translation reception study in teaching, considering the results of this in the translation classroom could help students to recognise areas where there is a need for a "human flavour", and be best prepared for achieving a tailor-made translation product. Yet, this implies a need for further examination of scientific genres, from both a scholarly point of view and from a teaching perspective, in the corresponding language pair, and for understanding how English does or does not influence the discursive and linguistic practices of the target language community. This, in turn, will allow trainers to develop teaching strategies and learning activities for trainees to best tailor their translation services to the end users' needs and expectations.

A particular contribution of my thesis to the body of knowledge in T&I Studies is the understanding of the needs and expectations of the end users of scientific translation, and how these may affect and inform English-to-Spanish translation. I helped to further the knowledge of the "expectancy norms" of scientific translation, confirming and providing evidence for the dominance of English in the scientific discourse of the Spanish-speaking scientific community and for how the Spanish language is being shaped by the hegemony of the "lingua franca". Nevertheless, this study had some limitations. Due to the nature of the main research question, no TM was loaded on to the TM system. This implies that the

experimental conditions did not mimic the way that TM is actually used in today's translation practice, with access to proposals from previous translations and in combination with MT and terminology management features. Future studies of this kind may benefit from studying students' use of TM—or any other technology—in more natural learning conditions. As for the translation reception study, obtaining a large number of informants proved unfeasible in the time frame of the study. However, the analysis of qualitative data allowed me to draw and validate valuable conclusions.

I believe that expanding the translation reception study and designing a practical proposal for the teaching of technologies in Chilean undergraduate translation programs are two interesting possibilities for further research. On the one hand, a translation reception study could benefit from obtaining a larger number of participants and using a more refined text genre category and fine-tuned questions, based on the initial design of the survey. On the other hand, a realistic, context-appropriate pedagogical proposal that clearly establishes the needs of trainers in terms of technological knowledge, and the needs of the students in terms of the current state of the profession and industry, may create the conditions for better, up-to-date, student-centred teaching and learning. This will help to train not only better translators, but also citizens who are critically engaged in the globalised world.

REFERENCES

Alcina, A. (2008). Translation technologies: Scope, tools and resources. *Target: International Journal of Translation Studies, 20*(1), 79-102. https://doi.org/https://doi.org/10.1075/target.20.1.05alc

Angelone, E., Ehrensberger-Dow, M., & Massey, G. (2016). Cognitive processes. In C. Angelelli & B. Baer (Eds.), *Researching translation and interpreting* (pp. 43-57). Routledge.

Angelone, E., Ehrensberger-Dow, M., & Massey, G. (2020). *The Bloomsbury companion to language industry studies*. Bloomsbury Publishing. https://doi.org/http://dx.doi.org/10.5040/9781350024960

Austermühl, F. (2001). *Electronic tools for translators*. St. Jerome Publishing.

Baker, M. (1993). Corpus linguistics and translation studies: Implications and applications. In M. Baker, G. Francis, & E. Tognin-Bonelli (Eds.), *Text and technology: In honor of John Sinclair* (pp. 233-250). John Benjamins Publishing Company.

Baker, M. (2006). *Translation and conflict: A narrative account*. Routledge.

Bartsch, R. (1987). *Norms of language: Theoretical and practical aspects*. Longman.

Beeby, A. (2000). Evaluating the development of translation competence. In C. Schäffner & B. Adab (Eds.), *Developing translation competence* (pp. 185-198). John Benjamins Publishing Company.

Bennett, G. (2010). *Using corpora in the language learning classroom: Corpus linguistics for teachers*. University of Michigan Press.

Bennett, K. (2013). English as a lingua franca in academia: Combating epistemicide through translator training. *The Interpreter and Translator Trainer, 7*(2), 169-193. https://doi.org/http://dx.doi.org/ 10.1080/13556509.2013.10798850

Bernardini, S. (2004). The theory behind the practice: Translator training or translator

    education? In K. Malmkjaer (Ed.), *Translation in undergraduate degree programmes*

    (pp. 17-29). John Benjamins Publishing Company.

Bernardini, S., & Ferraresi, A. (2011). Practice, description and theory come together:

    Normalization or interference in Italian technical translation? *Meta: Translators'*

    Journal, 56(2), 226-246. https://doi.org/10.7202/1006174ar

Bowker, L. (2002). *Computer-aided translation technology: A practical introduction*.

    University of Ottawa Press.

Bowker, L. (2005). Productivity vs quality? A pilot study on the impact of translation

    memory systems. *Localisation Focus: The International Journal of Localisation,*

    4(1), 13-10.

Bowker, L. (2015). Computer-aided translation: Translator training. In C. Sin-wei (Ed.), *The*

    Routledge encyclopedia of translation technology (pp. 88-104). Routledge.

Bowker, L. (2019). *Machine translation and global research: Towards improved machine*

    translation literacy in the scholarly community. Emerald Publishing Limited.

Breiman, L. (2001). Random forests. *Machine Learning, 45*(1), 5-32.

    https://doi.org/http://dx.doi.org/ 10.1023/A:1010933404324

Brems, E., & Ramos Pinto, S. (2013). Reception and translation. In Y. Gambier & L. v.

    Doorslaer (Eds.), *Handbook of translation studies* (Vol. 4, pp. 142-147). John

    Benjamins Publishing Company.

Bundgaard, K., Chistensen, T. P., & Schjoldager, A. (2016). Translator-computer interaction

    in action: An observation process study of computer-aided translation. *The Journal of*

    Specialised Translation(25), 106-130.

Burgess, S., & Cargill, M. (2013). Using genre analysis and corpus linguistics to teach

    research article writing. In V. Matarese (Ed.), *Supporting research writing: Roles and*

challenges in multilingual settings (pp. 55-71). Chandos Publishing.

Buysschaert, J., Fernández-Parra, M., Kerremans, K., Koponen, M., & van Egdom, G.-W. (2018). Embracing digital disruption in translator training: Technology immersion in simulated translation bureaus. *Revista Tradumàtica*(16), 125-133. https://doi.org/https://doi.org/10.5565/rev/tradumatica.209

Byrne, J. (2012). *Scientific and technical translation explained*. St. Jerome Publishing.

Campbell, S. (1998). *Translation into the second language*. Longman.

Carl, M., & Planas, E. (2020). Advances in interactive translation technology. In E. Angelone, M. Ehrensberger-Dow, & G. Massey (Eds.), *The Bloomsbury companion to language industry studies* (pp. 361-386). Bloomsbury Publishing. https://doi.org/http://dx.doi.org/10.5040/9781350024960.0020

Chen, X., & Meurers, D. (2016). CTAP: A web-based tool supporting automatic complexity analysis. Workshop on Computational Linguistics for Linguistic Complexity, Osaka, Japan.

Chen, Y. (2011). The translator's subjectivity and its constraints in news transediting: A perspective of reception aesthetics. *Meta: Translator's Journal, 56*(1), 119-144. https://doi.org/https://doi.org/10.7202/1003513ar

Chesterman, A. (1993/2017). From 'is' to 'ought': Laws, norms and strategies in translation studies. In A. Chesterman (Ed.), *Reflections on translation theory: Selected papers 1993-2014*. John Benjamins Publishing Company.

Chesterman, A. (2000). Teaching strategies for emancipatory translation. In C. Schäffner & B. Adab (Eds.), *Developing translation competence* (pp. 77-89). John Benjamins Publishing Company.

Chesterman, A. (2007). Bridge concepts in translation sociology. In M. Wolf & A. Fukari (Eds.), *Constructing a sociology of translation*. John Benjamins Publishing Company.

Christensen, T. P., & Schjoldager, A. (2016). Computer-aided translation tools: The uptake and use by Danish translation service providers. *The Journal of Specialised Translation*(25), 89-105.

CNA-Chile. *Comisión Nacional de Acreditación - Chile*. Retrieved 15 May 2019 from http://www.cnachile.cl

Colina, S., & Angelelli, C. (2016). Translation and interpreting pedagogy. In C. Angelelli & B. J. Baer (Eds.), *Researching translation and interpreting* (pp. 108-117). Routledge.

Colina, S., & Venuti, L. (2017). A survey of translation pedagogies. In L. Venuti (Ed.), *Teaching translation: Programs, courses, pedagogies* (pp. 203-215). Routledge.

Connor, U. (1996). *Contrastive rhetoric: Cross-cultural aspects of second-language writing*. Cambridge University Press.

Corpas Pastor, G., & Durán-Muñoz, I. (2018). *Trends in e-tools and resources for translators and interpreters*. Brill/Rodopi.

Cronin, M. (2013). *Translation in the digital age*. Routledge.

De Sutter, G., Cappelle, B., De Clercq, O., Loock, R., & Plevoets, K. (2017). Towards a corpus-based, statistical approach to translation quality: Measuring and visualizing linguistic deviance in student translation. *Linguistica Antverpiensia, New Series: Themes in Translation Studies, 16*, 25–39.

Dependencies, U. (2018). *Universal Dependencies*. Retrieved 18 November 2018, from http://universaldependencies.org/

Diéguez Morales, M. I. (2008). La traducción en Chile: Aspectos académicos, gremiales, profesionales, jurídicos y normativos. IV Congreso: El español, lengua de traducción para la cooperación y el diálogo, Toledo, Spain.

Doherty, S. (2016). The impact of translation technologies on the process and product of translation. *International Journal of Communication, 10*, 947-969.

Doherty, S., & Kenny, D. (2014). The design and evaluation of a statistical machine translation syllabus for translation students. *The Interpreter and Translator Trainer, 8*(2), 295-315. https://doi.org/http://dx.doi.org/ 10.1080/1750399X.2014.937571

Doherty, S., Moorkens, J., Gaspari, F., & Castilho, S. (2018). On education and training in translation quality assessment. In J. Moorkens, S. Castilho, F. Gaspari, & S. Doherty (Eds.), *Translation quality assessment: From principles to practice* (pp. 95-106). Springer. https://doi.org/https://doi.org/10.1007/978-3-319-91241-7

Dragsted, B. (2006). Computer-aided translation as a distributed cognitive task. *Pragmatics and Cognition, 14*(2), 443-464. https://doi.org/https://doi.org/10.1075/pc.14.2.17dra

Drechsel, A. (2019). Technology literacy for the interpreter. In D. B. Sawyer, F. Austermühl, & V. Enríquez Raído (Eds.), *The evolving curriculum in interpreter and translator training: Stakeholder perspectives and voices* (pp. 259-268). John Benjamins Publishing Company. https://doi.org/http://dx.doi.org/ doi 10.1075/ata.xix

Dreyfus, H. L., & Dreyfus, S. E. (1986). *Mind over machine*. Blackwell.

Drugan, J. (2013). *Quality in professional translation: Assessment and improvement*. Bloomsbury.

Esselink, B. (2020). Multinational language service provider as user. In M. O'Hagan (Ed.), *The Routledge handbook of translation and technology* (pp. 109-126). https://doi.org/https://doi.org/10.4324/9781315311258

Even-Zohar, I. (1978/1990). The position of translated literature within the literary polysystem. In L. Venuti (Ed.), *The Translation Studies Reader* (3rd ed.). Routledge.

Faes, F. (2019). *New DeepL CEO on customer service and human-in-the-loop translation*. Slator. Retrieved 30 April 020 from https://slator.com/people-moves/new-deepl-ceo-on-customer-service-and-human-in-the-loop-translation/

Fish, S. (1980). *Is there a text in this class? The authority of interpretive communities*.

Harvard University Press.

Fløttum, K., Dahl, T., & Kinn, T. (2006). *Academic voices: Across languages and disciplines*. John Benjamins Publishing Company.

Franco Aixelá, J. (2009). An overview of interference in scientific and technical translation. *The Journal of Specialised Translation, 11*, 75-88.

Galán-Mañas, A., & Hurtado Albir, A. (2015). Competence assessment procedures in translator training. *The Interpreter and Translator Trainer, 9*(1), 63-82. https://doi.org/https://doi.org/10.1080/1750399X.2015.1010358

Giannossa, L. (2016). Corpus-based studies. In C. Angelelli & B. Baer (Eds.), *Researching translation and interpreting*. Routledge.

Gile, D. (1995). Interpretation research: A new impetus? *Hermes, Journal of Linguistics, 14*, 15-29.

González-Davies, M., & Enríquez Raído, V. (Eds.). (2018). *Situated learning in translator and interpreter training: Bridging research and good practice*. Routledge.

Gouadec, D. (2002). *Profession: Traducteur*. La Maison du Dictionnaire.

Gough, J. (2018). Investigating the use of resources in the translation process. In G. Corpas Pastor & I. Durán-Muñoz (Eds.), *Trends in e-tools and resources for translators and interpreters* (pp. 9-36). Brill/Rodopi.

Graesser, A., McNamara, D., Louwerse, M., & Cai, Z. (2004). Coh-Metrix: Analysis of text on cohesion and language. *Behavior Research Methods, Instruments and Computers, 36*(2), 193-202.

Guerberof Arenas, A. (2020). Pre-editing and post-editing. In E. Angelone, M. Ehrensberger-Dow, & G. Massey (Eds.), *The Bloomsbury companion to language industry studies* (pp. 333-360). Bloomsbury Publishing. https://doi.org/http://dx.doi.org/10.5040/9781350024960.0019

Hall, E. T. (1989). *Beyond culture*. Doubleday.

Heine, B., & Kuteva, T. (2013). Contact and grammaticalization. In R. Hickey (Ed.), *The handbook of language contact* (pp. 86-105). Wiley-Blackwell.

Hickey, R. (2013). Language contact: Reconsideration and reassessment. In R. Hickey (Ed.), *The handbook of language contact* (pp. 1-28). Wiley-Blackwell.

Hoey, M., & Houghton, D. (2001). Contrastive analysis and translation. In M. Baker (Ed.), *Routlege encyclopedia of translation studies* (pp. 45-49). Routledge.

Holmes, J. S. (1988). The name and nature of translation studies. In J. S. Holmes (Ed.), *Translated! Papers on literary translation and translation studies* (pp. 67-80). Rodopi.

Holmes, R. (1997). Genre analysis, and the social sciences: An investigation of the structure of research article discussion sections in three disciplines. *English for Specific Purposes, 16*(4), 321-337. https://doi.org/10.1016/S0889-4906(96)00038-5

Hopkins, A., & Dudley-Evans, T. (1988). A genre-based investigation of the discussion sections in articles and dissertations. *English for Specific Purposes, 7*(2), 113-121. https://doi.org/10.1016/0889-4906(88)90029-4

House, J. (1977). *A model for translation quality assessment*. Narr.

House, J. (1997). *Translation quality assessment: A model revisited*. Narr.

House, J. (2013). Quality in translation studies. In C. Millán & F. Bartrina (Eds.), *The Routledge handbook of translation studies* (pp. 534-547). Routledge.

Hu, K., O'Brien, S., & Kenny, D. (2019). A reception study of machine translated subtitles for MOOCs. *Perspectives: Studies in Translation Theory and Practice*. https://doi.org/http://dx.doi.org/10.1080/0907676X.2019.1595069

Hurtado Albir, A. (1999). La competencia traductora y su adquisición: Un modelo holístico y dinámico. *Perspectives: Studies in Translatology, 7*(2), 177-188.

https://doi.org/http://dx.doi.org/10.1080/0907676X.1999.9961356

Hurtado Albir, A. (2019). La investigación en didáctica de la traducción: Evolución, enfoques

y perspectivas. *MonTI: Monografías de Traducción e Interpretación, 11*, 47-76.

https://doi.org/http://dx.doi.org/10.6035/MonTI.2019.11.2

Hurtado Albir, A., & Pavani, S. (2018). An empirical study on multidimensional summative

assessment in translation teaching. *The Interpreter and Translator Trainer, 12*(1), 25-

47. https://doi.org/http://dx.doi.org/10.1080/1750399X.2017.1420131

Hymes, D. H. (1971). *On communicative competence*. University of Pennsylvania Press.

Ibáñez Orellana, R., Moncada Nahuelquín, F., & Santana Covarrubias, A. (2015).

Organización retórica y relaciones de coherencia en el abstract de biología. *Estudios

Filológicos, 56*, 51-84. https://doi.org/http://dx.doi.org/10.4067/S0071-

17132015000200004

Iser, W. (1978). *The act of reading: A theory of aesthetic response*. Routledge.

Ivaska, I., & Siitonen, K. (2017). Learner language morphology as a window to

crosslinguistic influences: A key structure analysis. *Nordic Journal of Linguistics,

40*(2), 225-253. https://doi.org/http://dx.doi.org/10.1017/S0332586517000129

Jauss, H. R. (1982). *Toward an aesthetic of reception*. University of Minnesota Press.

Kabatek, J. (1997). Dime cómo hablas y te diré quién eres: Mezcla de lenguas y

posicionamineto social. *Revista de Antropología Social, 6*, 215-236.

Kaplan, R. B. (1966). Cultural thought patterns in inter-cultural education. *Language

Learning, 16*(3-4), 1-20.

Katan, D. (2004). *Translating Cultures: An introduction for translators, interpreters and

mediators* (2nd ed.). St. Jerome Publishing.

Kellerman, E. (1995). Crosslinguistic influence: Transfer to nowhere? *Annual Review of

Applied Linguistics, 15*, 125-150.

Kelly, D. (2002). La competencia traductora: Bases para el diseño curricular. *Puentes*(1), 9-20.

Kelly, D. (2005). *A handbook for translator trainers: A guide to reflective practice*. St. Jerome.

Kelly, D., & Martin, A. (2020). Training and education, curriculum. In M. Baker & G. Saldanha (Eds.), *Routledge encyclopedia of translation studies* (3rd ed., pp. 591-596). Routledge.

Kenny, D. (2020). Technology and translator training. In M. O'Hagan (Ed.), *The Routledge handbook of translation and technology* (pp. 498-515). Routledge.

Kenny, D., & Doherty, S. (2014). Statistical machine translation in the translation curriculum: Overcoming obstacles and empowering translators. *The Interpreter and Translator Trainer, 8*(2), 276-294. https://doi.org/http://dx.doi.org/10.1080/1750399X.2014.936112

King, P. (2020). Small and medium- sized enterprise (SME) translation service provider as technology user: Translation in New Zealand. In M. O'Hagan (Ed.), *The Routledge handbook of translation and technology* (pp. 148-165). Routledge.

Kiraly, D. (1995). *Pathways to translation: Pedagogy and process*. Kent State University Press.

Kiraly, D. (2000). *A social constructivist approach to translator education: Empowerment from theory to practice*. St. Jerome.

Kiraly, D. (2016). *Towards authentic experiential learning in translator education*. V&R unipress GmbH/Mainz University Press.

Koby, G. S., & Lacruz, I. (2017). The thorny problem of translation and interpreting quality. *Linguistica Antverpiensia, New Series - Themes in Translation Studies*(16), 1-12.

Koponen, M. (2015). How to teach machine translation post-editing? Experiences from a

post-editing course. Proceedings of the 4th Workshop on Post-Editing Technology and Practice (WPTP4), Miami.

Koskinen, K. (2020). Tailoring translation services for clients and users. In E. Angelone, M. Ehrensberger-Dow, & G. Massey (Eds.), *The Bloomsbury companion to language industry studies* (pp. 139-152). Bloomsbury Publishing. https://doi.org/http://dx.doi.org/10.5040/9781350024960.0011

Kranich, S. (2014). Translations as a locus of contact. In J. House (Ed.), *Translation: A multidisciplinary approach* (pp. 96-115). Palgrave Macmillan.

Kurzweil, R. (2005). *The Singularity is near: When humans transcend biology*. Penguin.

LeBlanc, M. (2013). Translators on translation memory (TM): Results of an ethnographic study in three translation services and agencies. *Translation & Interpreting, 5* (2), 1-13. https://doi.org/http://dx.doi.org/10.12807/ti.105202.2013.a01

Li, D. (2012). *Curriculum design, needs assessment and translation pedagogy: With special reference to translation training in Hong Kong*. LAP LAMBERT Academic Publishing.

Littau, K. (2016a). Translation and the materialities of communication. *Translation Studies, 9*(1), 82-96. https://doi.org/https://doi.org/10.1080/14781700.2015.1063449

Littau, K. (2016b). Translation's histories and digital futures. *International Journal of Communication, 10*, 907-928.

López Guix, J. G., & Minett Wilkinson, J. (1997/2003). *Manual de traducción inglés-castellano: Teoría y práctica*. Gedisa.

Macken, L., Prou, D., & Tezcan, A. (2020). Quantifying the effect of machine translation in a high-quality human translation production process. *informatics, 7*(12). https://doi.org/https://doi.org/10.3390/informatics7020012

Malmkjaer, K. (1998). Unit of translation. In M. Baker (Ed.), *Routledge encyclopedia of*

translation studies (1st ed., pp. 286–288). Routledge.

Martín-Martín, P. (2003). A genre analysis of English and Spanish research paper abstracts in experimental social sciences. *English for Specific Purposes, 22*(1), 25-43. https://doi.org/10.1016/S0889-4906(01)00033-3

Martín-Martín, P. (2005). *The rhetoric of the abstract in English and Spanish scientific discourse: A cross-cultural genre-analytic approach*. Peter Lang.

Martín-Mor, A. (2011). *La interferència lingüística en entorns de traducció asistida per ordinador: Reserca empíricoexperimental* [Doctoral thesis, Universitat Autònoma de Barcelona]. Barcelona.

Martín-Mor, A. (2019). Do translation memories affect translations? Final results of the TRACE project. *Perspectives, 27*(3), 455-476. https://doi.org/https://doi.org/10.1080/0907676X.2018.1459753

Massey, G., & Ehrensberger-Dow, M. (2017). Machine learning: Implications for translator education. *Lebende Sprachen, 62* (2), 300–312. https://doi.org/https://doi.org/10.1515/les-2017-0021

Matras, Y. (2013). Contact, convergence, and typology. In *The handook of language contact* (pp. 66-85). Wiley-Blackwell.

Mayoral Asensio, R. (2007). For a new approach to translator training: Questioning some of the concepts which inform current programme structure and content in Spain. *The Interpreter and Translator Trainer, 1*(1), 79-95. https://doi.org/https://doi.org/10.1080/1750399X.2007.10798751

Melby, A. K., & Hague, D. R. (2019). A singular(ity) preoccupation: Helping translation students become language-services advisors in the age of machine translation. In D. B. Sawyer, F. Austermühl, & V. Enríquez Raído (Eds.), *The evolving curriculum in interpreter and translator education: Stakeholder perspectives and voices* (pp. 205-

228). John Benjamins Publishing Company.

https://doi.org/https://doi.org/10.1075/ata.xix.10mel

Melby, A. K., & Wright, S. E. (2015). Translation memory. In C. Sin-wai (Ed.), *The Routledge encyclopedia of translation technology* (pp. 662-677). Routledge.

Mellinger, C. D. (2014). *Computer-assisted translation: An empirical investigation of cognitive effort* [PhD thesis, Kent State University]. Kent.

Mellinger, C. D. (2017). Translators and machine translation: knowledge and skills gaps in translator pedagogy. *The Interpreter and Translator Trainer, 11*(4), 280-293. https://doi.org/10.1080/1750399X.2017.1359760

Mellinger, C. D. (2018). Re-thinking translation quality: Revision in the digital age. *Target, 30*(2), 310-331. https://doi.org/http://dx.doi.org/10.1075/target.16104.mel

Meneses, A., Ow, M., & Benítez, R. (2013). Complejidad sintáctica: ¿Modalidad comunicativa o tipo textual? Estudio de casos de producciones textuales de estudiantes de 5° básico. *Onomázein, 25*(1), 65-93.

Micheli, P. (2013). *La subcompetencia instrumental profesional dentro del currículum de traducción en Chile: El estado del arte y propuesta curricular* [Master's dissertation, Universidad Autónoma de Barcelona]. Barcelona.

Moorkens, J. (2018). What to expect from neural machine translation: A practical in-class translation evaluation exercise. *The Interpreter and Translator Trainer, 12*(4), 375-387. https://doi.org/http://dx.doi.org/10.1080/1750399X.2018.1501639

Muse, C., & Delicia, D. (2013). Complejidad sintáctica y discurso académico: Parámetros gramaticales en la producción escrita de estudiantes universitarios. *Revista Nebrija de Lingüística Aplicada, 14*.

Nida, E. A. (1964). *Toward a science of translation*. Brill.

Nida, E. A., & Taber, C. R. (1969). *The theory and practice of translation*. Brill.

Nitzke, J., Tardel, A., & Hansen-Schirra, S. (2019). Training the modern translator: The acquisition of digital competencies through blended learning. *The Interpreter and Translator Trainer, 13*(3), 292-306. https://doi.org/http://dx.doi.org/10.1080/1750399X.2019.1656410

Nord, C. (1997). *Translating as a purposeful activity: Functionalist approaches explained*. St. Jerome Publishing.

Nord, C. (2012). Quo vadis, functional translatology? *Target, 24*(1), 26-42. https://doi.org/http://dx.doi.org/10.1075/target.24.1.03nor

O'Hagan, M. (2020). *The Routledge handbook of translation and technology*. Routledge.

Olohan, M. (2011). Translators and translation technology: The dance of agency. *Translation Studies, 4*(3), 342-357. https://doi.org/http://dx.doi.org/10.1080/14781700.2011.589656

Olohan, M. (2016). *Scientific and technical translation*. Routledge.

Olohan, M. (2017). Technology, translation and society: A constructivist, critical theory approach. *Target, 29*(2), 264-283. https://doi.org/http://dx.doi.org/10.1075/target.29.2.04olo

Orlando, M. (2011). Evaluation of translations in the training of professional translators: At the crossroads between theoretical, professional and pedagogical practices. *The Interpreter and Translator Trainer, 5*(2), 293-308. https://doi.org/http://dx.doi.org/10.1080/13556509.2011.10798822

Orlando, M. (2016). *Training 21st-century translators and interpreters: At the crossroads of practice, research and pedagogy*. Frank & Timme GmbH.

Orlando, M. (2019). Training and educating interpreter and translator trainers as practitioners-researchers-teachers. *The Interpreter and Translator Trainer, 13*(3), 216--232. https://doi.org/https://doi-

org.ezproxy.lib.monash.edu.au/10.1080/1750399X.2019.1656407

Orrego-Carmona, D. (2016). A reception study on non-professional subtitling: Do audiences

notice any difference? *Across Languages and Cultures, 17*(2), 163.

https://doi.org/http://dx.doi.org/10.1556/084.2016.17.2.2

PACTE. (2003). Building a translation competence model. In F. Alves (Ed.), *Triangulating*

translation: Perspectives in process oriented research (pp. 43-66). John Benjamins

Publishing Company.

PACTE. (2015). Results of PACTE's experimental research on the acquisition of Translation

Competence: The acquisition of declarative and procedural knowledge in translation:

The dynamic translation index. *Translation Spaces, 4*(1).

https://doi.org/https://doi.org/10.1075/ts.4.1.02bee

PACTE. (2019). Evolution of the efficacy of the translation process in translation competence

acquisition. *Meta: Translator's Journal, 64*(1), 242.

https://doi.org/http://dx.doi.org/10.7202/1065336ar

Poirier, É. (2018). Human translation technologies and natural language processing

applications in meaning-based translation learning activities. In G. Corpas Pastor & I.

Durán-Muñoz (Eds.), *Trends in e-tools and resources for translators and interpreters*

 (pp. 85-106). Brill/Rodopi.

https://doi.org/https://doi.org/10.1163/9789004351790_006

Pym, A. (2011). What technology does to translating. *The International Journal of*

Translation and Interpreting Research, 3(1), 1-9.

Pym, A. (2014). *Exploring translation theories* (2nd ed.). Routledge.

Pym, A. (2020). Quality. In M. O'Hagan (Ed.), *The Routledge handbook of translation and*

technology (pp. 437-452). Routledge.

Quispesaravia, A., Perez, W., Sobrevilla, M., & Alva-Manchego, F. (2016). Coh-Metrix-Esp:

A complexity analysis tool for documents written in Spanish. Tenth International

Conference on Language Resources and Evaluation, Portorož, Slovenia.

Rodríguez-Castro, M. (2018). An integrated curricular design for computer-assisted

translation tools: Developing technical expertise. *The Interpreter and Translator Trainer, 12*(4), 355-374.

https://doi.org/http://dx.doi.org/10.1080/1750399X.2018.1502007

Rowda, J. (2016). Adaptive machine translation in a nutshell. Retrieved 15 April 2020, from

https://www.linkedin.com/pulse/adaptive-machine-translation-nutshell-juan-martín-

fernández-rowda

Saldanha, G., & O'Brien, S. (2014). *Research methodologies in translation studies*.

Routledge.

Samaniego, M. (2017). *Undergraduate translator education in Chile: An inquiry into teacher and student thinking, learning experiences and teaching practices* [Doctoral thesis, The University of Arizona]. Tucson.

Schäffner, C. (2009). Functionalist approaches. In M. Baker & G. Saldanha (Eds.), *Routledge encyclopedia of translation studies* (2nd ed., pp. 115-121). Routledge.

Schäffner, C. (2020). Translator's roles and responsibilities. In E. Angelone, M. Ehrensberger-Dow, & G. Massey (Eds.), *The Bloomsbury companion to language industry studies* (pp. 63-89). Bloomsbury Publishing.

https://doi.org/10.5040/9781350024960.0008

Schäffner, C., & Adab, B. (2000). Developing translation competence: Introduction. In C. Schäffner & B. Adab (Eds.), *Developing translation competence* (pp. vii-xvi). John Benjamins Publishing Company.

Secară, A. (2017). Cn U Read Ths. The reception of *text* language in subtitling. In D. Kenny (Ed.), *Human issues in translation technology*. Routledge.

Shitrit, M. K. (2019). *Will translators have a job in 5 years?* Retrieved 30 April 2020, from

    https://trans.me/2019/05/29/translation-anthropology/

Soulé, M. (1985). What is conservation biology? *Bioscience, 35*(11), 727-734.

Straka, M., & Straková, J. (2017). Tokenizing, POS Tagging, Lemmatizing and Parsing UD

    2.0 with UDPipe. CoNLL 2017 Shared Task: Multilingual Parsing from Raw Text to

    Universal Dependencies, Vancouver, Canada.

Suojanen, T., Koskinen, K., & Tuominen, T. (2015). *User-centered translation*. Routledge.

Swales, J., & Najjar, H. (1987). The writing of research article introductions. *Written*

    Communication, 4(2), 175-191. https://doi.org/10.1177/0741088387004002004

Swales, J. M. (1981). *Aspects of article introductions*. University of Aston.

Swales, J. M. (1990). *Genre analysis: English in academic and research settings*. Cambridge

    University Press.

Tagliamonte, S., & Baayen, R. (2012). Models, forests, and trees of York English: Was/were

    variation as a case study for statistical practice. *Language Variation and Change,*

    24(2), 135-178. https://doi.org/http://dx.doi.org/10.1017/S0954394512000129

Taviano, S. (2013). English as a lingua franca and translation: Implications for translator and

    interpreter education. *The Interpreter and Translator Trainer, 7*(2), 155-167.

    https://doi.org/http://dx.doi.org/10.1080/13556509.2013.10798849

Teich, E. (2003). *Cross-linguistic variation in system and text: A methodology for the*

    investigation of translations and comparable texts. De Gruyter Mouton.

Thorpe, C. (2008). Political theory in science and technology studies. In E. J. Hacket, O.

    Amsterdamska, M. Lynch, & J. Wajcman (Eds.), *The handbook of science and*

    technology studies (pp. 63-82). The MIT Press.

Torres González, A. (1993). *Madurez sintáctica en estudiantes no universitarios de la zona*

    metropolitana de Tenerife [Doctoral thesis, Universidad de La Laguna]. San Cristóbal

de La Laguna. http://riull.ull.es/xmlui/handle/915/10138

Toury, G. (1995). *Descriptive translation studies and beyond*. John Benjamins Publishing

Company.

Toury, G. (2012). *Descriptive translation studies and beyond. Revised edition*. John

Benjamins Publishing Company.

Venuti, L. (1995). *The translator's invisibility*. Routledge.

Venuti, L. (1998). *The scandals of translation: Towards an ethics of difference*. Routledge.

Vienne, J. (1994). Pour une pédagogie de la traduction en situation. In M. Snell-Hornby, F.

Pöchhacker, & K. Kaindl (Eds.), *Translation Studies – An Interdiscipline* (pp. 421–

431). John Benjamins Publishing Company.

Vinay, J.-P., & Darbelnet, J. (1958). *Stylistique comparée du français et de l'anglais*.

Beauchemin.

Vázquez-Ayora, G. (1977). *Introducción a la traductología: Curso básico de traducción*.

Georgetown University Press.

Véliz, M. (1988). Evaluación de la madurez sintáctica en el discurso escrito. *Revista de

Lingüística Teórica y Aplicada*(26), 105-141.

Washbourne, K. (2020). Training and education, theory and practice. In M. Baker & G.

Saldanha (Eds.), *Routledge encyclopedia of translation studies* (3rd ed., pp. 597-602).

Routledge.

Way, A. (2020). Machine translation: Where are we today? In E. Angelone, M.

Ehrensberger-Dow, & G. Massey (Eds.), *The Bloomsbury companion to language

industry studies* (pp. 311-382). Bloomsbury Publishing.

https://doi.org/http://dx.doi.org/10.5040/9781350024960.0018

Way, C. (2020). Training and pedagogical implications. In E. Angelone, M. Ehrensberger-

Dow, & G. Massey (Eds.), *The Bloomsbury companion to language industry studies*

(pp. 179-208). Bloomsbury Publishing.

https://doi.org/http://dx.doi.org/10.5040/9781350024960.0013

Weinreich, U. (1953). *Languages in contact: Findings and problems*. Linguistic Circle of

New York.

Zanettin, F. (1998). Bilingual comparable corpora and the training of translators. *Meta:*

Translator's Journal, 434, 616-630. https://doi.org/https://doi.org/10.7202/004638ar

Zaretskaya, A., Corpas Pastor, G., & Seghiri, M. (2018). User perspective on translation

tools: Findings of a user survey. In G. Corpas Pastor & I. Durán-Muñoz (Eds.),

Trends in e-tools and resources for translators and interpreters (pp. 37-56).

Brill/Rodopi.

Zhong, Y., & Lin, J. (2007). Are readers lost in the foreign land? Investigating the impact of

foreignised translation in Guangzhou. *Perspectives, 15*(1), 1-14.

https://doi.org/http://dx.doi.org/10.2167/pst001.0